Governmental surveillance system of healthcare-associated infection in Brazil*

SISTEMAS GOVERNAMENTAIS DE VIGILÂNCIA DE INFECÇÕES RELACIONADAS À ASSISTÊNCIA À SAÚDE NO BRASIL

SISTEMAS GUBERNAMENTALES DE VIGILANCIA DE LAS INFECCIONES RELACIONADAS CON LA ATENCIÓN A LA SALUD EN BRASIL

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ABSTRACT

Objective: This study aimed to describe the structure of governmental surveillance systems for Healthcare Associated Infection (HAI) in the Brazilian Southeastern and Southern States. **Method**: A cross-sectional, descriptive and exploratory study, with data collection by means of two-phases: characterization of the healthcare structure and of the HAI surveillance system. **Results**: The governmental teams for prevention and control of HAI in each State ranged from one to six members, having at least one nurse. All States implemented their own surveillance system. The information systems were classified into chain (n=2), circle (n=4) or wheel (n=1). **Conclusion**: Were identified differences in the structure and information flow from governmental surveillance systems, possibly limiting a nationwide standardization. The present study points to the need for establishing minimum requirements in public policies, in order to guide the development of HAI surveillance systems.

RESUMO

Objetivo: Este estudo objetivou descrever a estrutura dos sistemas governamentais de vigilância de Infecções relacionadas à Assistência à Saúde (IRAS) nos Estados do Sudeste e Sul do Brasil. **Método:** Estudo transversal, descritivo e exploratório, com coleta de dados por meio de duas fases: caracterização das estruturas de assistência à saúde e do sistema de vigilância de IRAS. **Resultados:** As equipes governamentais para a prevenção e controle de IRAS em cada Estado variou de um a seis membros, tendo pelo menos um enfermeiro. Todos os Estados implantaram um sistema de vigilância próprio. Os sistemas de informação foram classificados em cadeia (n=2), círculo (n=4) e roda (n=1). **Conclusão:** Foram identificadas variações na estrutura e fluxo de informação dos sistemas governamentais de vigilância, podendo limitar sua uniformização em âmbito nacional. O presente estudo aponta a necessidade de estabelecer requisitos mínimos em políticas públicas para orientar o desenvolvimento dos sistemas de vigilância de IRAS.

RESUMEN

Objetivo: El presente estudio ha tenido como objetivo describir la estructura de los sistemas gubernamentales de vigilancia de las Infecciones Relacionadas con la Atención a la Salud (IRAS) en Sureste y Sur de Brasil. **Método:** Estudio transversal, descriptivo y exploratorio, con recolección de datos en dos fases: caracterización de las estructuras de asistencia a la salud y del sistema de vigilancia de las IRAS. **Resultados**: Los equipos gubernamentales para la prevención y el control de las IRAS en cada Estado variaron de uno a seis miembros, con al menos un enfermero. Todos los Estados implantaron su propio sistema de vigilancia. Los sistemas de información fueron clasificados en cadena (n = 2), círculo (n = 4) y rueda (n = 1). **Conclusión**: Se han identificado variaciones en la estructura y el flujo de información de los sistemas gubernamentales de vigilancia que pueden limitar su uniformización en ámbito nacional. Este estudio apunta la necesidad de establecer requisitos mínimos en políticas públicas para guiar el desarrollo de los sistemas de vigilancia de las IRAS.

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INTRODUCTION

An essential measure to prevent healthcare associated infections (HAI) is to create a consistent system of surveillance, thus promoting a reliable situation diagnosis in order to perform efficient control for the problem[1-2].

Since the 1970s, these HAI surveillance systems have been evolving in various countries and regions of the world. The North-American and European systems stand out as pioneers of this movement and have been achieving favorable results[3-8].

Brazil, a continent-sized country, has States with relative political autonomy, and the assumptions of organization of National Health System warrants a decentralized process. Therefore, several initiatives to pursue the conception of HAI surveillance systems are being generated in these States. Nevertheless, this is a reality still partially unknown, which can lead to the formation of disintegrated and individualized networks[9].

Despite the process of HAI governmental surveillance systems developing worldwide there are no published studies relating their characteristics. Accordingly, to contribute to this area of knowledge, this study has as its objective the characterization of the HAI surveillance system in States in the Southeastern and Southern regions of Brazil, seeking to understand how these systems are structured and what are the characteristics of their information flow.

METHOD

Design

A cross-sectional, descriptive and exploratory study of the characterization of HAI governmental surveillance systems implemented in Brazilian States in the Southeastern and Southern regions. These regions were selected once they represent more than half of available healthcare settings in the country.

Settings and population

The Brazilian Southeastern and Southern regions have seven States – four in the Southeast and three in the South. The study was performed in the HAI control and prevention division of each State Health Department (SHD). Were invited to participate in the study each State Coordinator in charge of the HAI surveillance systems in these regions. None refused participation, which totaled seven managers that agreed through a consent form.

Data collection

The study was carried out in two phases: I) characterization of healthcare structures in each State; II) characterization of HAI surveillance system in the States.

A semi-structured instrument was used for data collection, which was previously submitted to a pilot-test for adjustments in its structure and contents. This test took place in one of the studied SHD, selected by convenience. *Phase I:* information was obtained through consultation of secondary data of public access in web pages of the Brazilian Institute of Geography and Statistics (IBGE,www.ibge.gov.br) and Brazilian Registry of Health Institutes (CNES, cnes.datasus.gov.br) on June 4, 2012. *Phase II:* data were obtained through interviews with managers of HAI prevention and control programs in the States from June to August 2012.

Data analysis

Data were analysed based on three main variables: 1) healthcare structure, which included the characterization of the absolute number and ratios of population and healthcare services (including primary, secondary and tertiary level); 2) operational structure for surveillance services of HAI, which included the identification of their components, such as human, physical and organizational resources; 3) characterization of HAI surveillance systems, focused on their components, data flows, and strategies adopted for continuous improvement. The information systems were classified into three categories, according to their data flow: 1) *chain* (in which information flows through government levels without feedback to notifying hospitals); 2) *circle* (in which information flows through government levels with feedback to notifying hospitals); 3) *wheel* (in which information is primarily transmitted to a hub - by using software - which simultaneously flows to different government levels)[10].

A continuous improvement in the evaluated systems was considered as being present whenever we identified of the existence of maintenance and reviewing processes aiming at detecting and correcting errors in the data gathered; a structure for cycles of data auditing; and educational practices to maintain the full-functionality of the system.

Ethical issues

The research project was submitted to the Ethical Research Committee of the School of Nursing of the University of São Paulo, by approval protocol number 7887. One of the State SHD also required a previous project examination by its Ethical Committee, with favourable manifestation on June 19, 2012.

RESULTS

Health structure

The Southeastern and Southern Regions in Brazil are composed of seven states, concentrating more than 55% of the whole Brazilian population, in spite of comprising only 17% of the national territory[9,11]. Data obtained

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from above mentioned websites demonstrated that, aside from high population, these States also have a high number of healthcare services (more than 65% of Brazilian healthcare services), mainly under private administration, representing a complex healthcare structure, with high concentration of services. A wide range of healthcare services/population ratio was verified, showing that these services are unevenly available in the region (Table 1).

Table 1 – Characteristics and aspects of healthcare structure in the Brazilian States of the Southeast and Southern Regions - São Paulo, 2013

State	Population (N)	Healthcare Services* (N)	Hospitals (N)	Ratio Private Service / Public Service	Ratio Healthcare Service / Population X 10,000 inhab.
Espírito Santo	3,514,952	5,241	113	3.2	14.91
Minas Gerais	19,597,330	30,716	650	2.5	15.67
Rio de Janeiro	15,989,929	15,34	560	3.8	9.59
São Paulo	41,262,199	58,033	890	6.0	14.06
Paraná	10,444,526	19,423	499	4.1	18.60
Rio Grande do Sul	10,693,929	19,004	337	3.8	17.77
Santa Catarina	6,248,436	12,488	228	3.5	19.99

* All of the healthcare services were registered in the Brazilian Registry of Health institutes (CNES).
Source: Ministry of Health of Brazil (www.cnes.datasus.gov.br) and Brazilian Institute of Geography and Statistics (IBGE, www.ibge.gov.br), 2012.

Operational structure of surveillance services

Three out of seven States had an independent organizational unity for HAI surveillance; the others dealt with the HAI subject simultaneously with other activities, accumulating tasks from other sectors.

The human resources placed on the HAI service ranged from one to six professionals, and the professionals carrying out these functions were pharmacists, physicians, dentists, veterinarians, nurses and administrative technicians. In every State there was at least one nurse on the team.

In regard to material resources, three SHD have a exclusive physical area for dealing with the HAI surveillance subject and four of them share the same physical area with other sectors; multimedia projection equipment and televisions for educational purposes are available to all. Personnel for administrative support were found in only three SHD. The number of computers varied from one to six, in accordance with the team. Only three SHD have free internet access; four states have restricted access. The existence of an official regiment to rule the service was mentioned in four of the SHD.

HAI Surveillance Systems

Surveillance methods

HAI incidence surveys were found in all States, however only two use prevalence surveys. Healthcare services that report data to SHD are mainly acute care hospitals, being either general or specialized. Aside from these services, four SHD mentioned data reported from other types of healthcare settings: mixed care units (primary and specialized care), day-hospitals, emergency centres, obstetric centres and public health laboratories (information on microbiological data).

All SHD use Central Venous Catheter-associated Bloodstream Infections (CVC-BSI) as a HAI indicator, notification of which is recommended by the Brazilian National Agency for Sanitary Surveillance (ANVISA).

Five SHD also monitor Catheter-associated Urinary Tract Infection (UTI), Ventilator-associated Pneumonia (VAP), and Surgical Site Infection (SSI). Other additional indicators have being used in a few SHD, such as: microorganism isolated in CVC-BSI (in two states); Multidrug-resistant Bacteria Infection and Colonization (one state); Antimicrobial Consumption (one state); Infection associated to Natural Birth and Cesarean Section (one state), and specific indicators for Long-Term Healthcare Settings such as Pneumonia, Scabies, and Gastroenteritis (one state).

Information systems

Periodicity for sending data varied from weekly to monthly or semi-annual. Three SHD have specific legislation for mandatory periodic report.

In regard to data transmission, one of the SHD referred to the use of only printed forms; three used electronic media (two of them by means of spreadsheets sent by email and one by direct transmission in real time - online). In the other remaining SHD, transmission occurred by either printed forms or electronic media (spreadsheets).

Feedback of results was usually found to be given to participating hospitals, except in two of the SHD. In three of them this feedback happens during meetings or annual scientific events, and other results are given by means of printed reports or electronic media.

Analysis of detailed operational characteristics of the information systems allowed us to understand the flow of information in each SHD and to classify them according to the categories previously defined. These flows were classified as *circle* in four SHD, as *chain* in two SHD, and as *wheel* in one of them.

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Periodical maintenance or review of the system was reported as being performed in five SHD. The frequency of this procedure may vary among SHD, being monthly (one), annual (one) or irregular (three). In most of situations (six) the personnel in SHD are in charge of it; one SHD has outsourced this activity.

Only two SHD perform quarterly data audits; however, managers reported that these are more likely to be an eventual evaluation and discussion with participating hospitals with data outliers, than to be a systematic process.

Planning and execution of educational activities focused on the surveillance system are established in all of the SHD. These activities may occur by attendance in presence courses or web conferences, with variable periodicity depending on the SHD (semi-annual, annual or undetermined).

DISCUSSION

This study intends to offer a more judicious point of view in regard to government construction of HAI surveillance systems for standardization of practices, bringing lights to the relevance of this theme with regards to public health. The knowledge of the characteristics of HAI government surveillance systems may allow guidance in public policies and favors initiatives aiming at homogenization or even unification of some systems.

The State usually plays a strategic role in the quality of HAI surveillance. It is mainly responsible for structuring the minimum resources needed to guide the surveillance planning, leading to key actions for prevention and control of HAI[2,12-13]. The surveillance system should be planned in such a way that allows connection with other governmental structures to promote joint actions with efficacy and opportunity.

The herein studied Brazilian regions represent large areas of territory, with intense cultural, structural and economical diversity, concentrating a high contingent of population and healthcare settings[9]. Taking into account these features, those Brazilian States are, to some extent, comparable to many other countries in the world in terms of complexity. Furthermore, the Brazilian healthcare system grants autonomy to the States through decentralization of actions to determine their processes of disease control. Accordingly, this level of government plays a role of formulator of action and policies, which include HAI prevention and control. Aside from its intrinsic prevention role, the State works as a central articulation component in a network, composed of public and private healthcare settings, municipalities, and also at federal level.

It is relevant to start discussions on what could be the minimal structure which should be considered for HAI government surveillance, taking into account the dimension of each State apparatus. This structure must be sufficient to guarantee the integration with other areas of knowledge aiming to deal with the multiple aetiology characteristics of HAI.

Hence the complex nature of technical and political issues determining responsibility for structuring services and teams to deal with HAI prevention and control. Nevertheless, and in face of the great diversity found, the question raised is which would be the minimal required physical and human resources for a surveillance team to be structured at government level? Aside from that, which would be the required and recommended professional categories and competencies for composing these teams? We observed that all States included nurses in their team of HAI prevention and control. Historically, the nursing practice was highly interspersed by infection prevention and control activities since the works of Florence Nightingale[14]. Surveillance of diseases have been since then inherently linked to nursing activities; notwithstanding to this, the role of nurses in the States could not be distinguished in our study which suggest needs for further studies.

Consensus standards have been published recommending the core components for an effective HAI program at national level; despite this, specific studies on the minimal structure for this were not found and these questions remain unanswered[15-16].

Our study revealed differences in characteristics in developing HAI surveillance systems, bringing up the diversity in the status of the infection prevention at the States. As for similarities these systems had in common the tendency to mirror great world models, primarily in the North-American model *National Nosocomial Infections Surveillance* (NNIS), currently incorporated in the *National Healthcare Safety Network* (NHSN), precursor of this process and the main reference model for world[3-4].

HAI surveillance throughout the world, with few exceptions, is still strongly focused on incidence data, where result indicators are especially monitored in certain infectious sites[12,17-18]. This reality was also found in the Brazilian context. Pioneer systems such as European systems - German model *Krankenhaus Infektions Surveillance System* (KISS) – advanced in the monitoring of HAI, by means of including indicators other than infection outcomes, such as process and structure indicators[6-7,19-21]. Other systems such as the Dutch *Preventie van Ziekenhuisinfecties door Surveillance* (PREZIES) also have incorporated annual prevalence studies without detriment to periodic incidence studies[6-7,20-22]. As an advantage, prevalence studies may add a complementary point of view, provided they look at all infection sites in all wards and not exclusively in intensive care.

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Overall the HAI government surveillance systems have both common as well divergent characteristics. The identification of these aspects may be the first step to build an action plan to unify them, respecting economic and cultural diversity and seeking to integrate information[2,12-13].

To allow this potential unification among different surveillance systems the actions developed must be articulated, including data gathering, ways and means to transfer data, analysis and even feedback to participants, bringing efficiency and effectiveness to the process[12-13,23]. Agile systems supported by transmission mechanisms, such as software or even spreadsheets, tend to be more efficient than paper, due to speed and reliability throughout the surveillance process[13,23]. Nevertheless, this aspect alone does not guarantee quality of the final product; minimal standardization of characteristics needs to be adopted in accordance with monitoring intentions.

Moreover, a continuous education of the system feeders is essential to meet the basic standards of data acquisition. This action associated with the implementation of other tools for supporting data quality, such as auditing, are required for good reliability in the process[13,18]. This auditing must not be seen as isolated actions, aiming only to verify data consistency. Its implementation must be wide and educationally planned in cycles of continuous improvement[24]. However, in the Brazilian regions evaluated, data auditing actions are incipient. This may possibly be due to the difficulties of incorporating auditing activities into a system that is still going through the structuring process.

Governmental agencies should work together with the various healthcare facilities, integrating effective networks of specialized investigation and ongoing monitoring. Both the reliability of the data and the effectiveness of the prevention process are dependent upon the quality of this network[2,21].

CONCLUSION

Brazil is undergoing a relatively recent process of construction of HAI surveillance systems at a governmental level. The present study can be a reference for other countries also developing their surveillance systems or even regions that aspire to establish unified systems. It also presents itself as a reflection model for a government process to construct HAI surveillance systems.

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