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Major article

Structure for prevention of health care–associated infections in Brazilian hospitals: A countrywide study

Maria Clara Padoveze PhD, RN, MSc [a,*], Carlos Magno Castelo Branco Fortaleza MD, PhD, MSc [b], Carlos Kiffer MD, PhD, MSc [c], Afonso Luís Barth PhD [d], Irna Carla do Rosário Souza Carneiro MD, PhD, MSc [e], Heloisa Ilhe Garcia Giamberardino MD, MSc [f], Jorge Luiz Nobre Rodrigues MD, PhD, MSc [g], Lauro Santos Filho MD, PhD, MSc [h], Maria Júlia Gonçalves de Mello MD, PhD, MSc [i], Milca Severino Pereira PhD, RN, MSc [j], Paulo Gontijo Filho MD, PhD, MSc [k], Mirza Rocha MD, PhD, MSc [l], Eduardo Alexandrino Servolo de Medeiros MD, PhD, MSc [m], Antonio Carlos Campos Pignatari MD, PhD [m]

[a] *Department of Collective Health Nursing, School of Nursing of University of São Paulo, São Paulo, Brazil*
[b] *Department of Infectious Diseases, Botucatu School of Medicine, State University of São Paulo, Botucatu, Brazil*
[c] *Special Clinical Microbiology Laboratory, Infectious Diseases Discipline, Federal University of São Paulo, São Paulo, Brazil*
[d] *Laboratory of Research in Bacterial Resistance, Center for Experimental Research, Clinical Hospital of Porto Alegre, Federal University of Rio Grande do Sul, Porto Alegre, Brazil*
[e] *Department of Infectious Diseases, Federal University of Pará, Belém do Pará, Brazil*
[f] *Epidemiology and Infection Control Department, Pequeno Principe Hospital, Curitiba, Brazil*
[g] *Department of Community Health, Faculty of Medicina, Federal University of Ceará, Ceará, Brazil*
[h] *Clinical Microbiology Discipline, Federal University of Paraíba, João Pessoa, Brazil*
[i] *Hospital Infection Control Committee, Instituto de Medicina Integral Prof. Fernando Figueira, Recife, Brazil*
[j] *Department of Nursing, Pontifical Catholic University, Goias, Brazil*
[k] *Microbiology, Biomedical Sciences Institute, Uberlândia Federal University, Uberlândia, Brazil*
[l] *Núcleo de Vigilância Hospitalar, Instituto Nacional de Saúde da Mulher, da Criança e do Adolescente Fernandes Figueira, Fundação Oswaldo Cruz, Rio de Janeiro, Brazil*
[m] *Division of Infectious Diseases, Federal University of São Paulo, São Paulo, Brazil*

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Background: Minimal structure is required for effective prevention of health care–associated infection (HAI). The objective of this study was to evaluate the structure for prevention of HAI in a sample of Brazilian hospitals.
Methods: This was a cross-sectional study from hospitals in 5 Brazilian regions (n = 153; total beds: 13,983) classified according to the number of beds; 11 university hospitals were used as reference for comparison. Trained nurses carried out the evaluation by using structured forms previously validated. The evaluation of conformity index (CI) included elements of structure of the Health Care–Associated Prevention and Control Committee (HAIPCC), hand hygiene, sterilization, and laboratory of microbiology.
Results: The median CI for the HAIPCC varied from 0.55-0.94 among hospital categories. Hospitals with >200 beds had the worst ratio of beds to sinks (3.9; $P < .001$). Regarding alcoholic product for handrubbing, the worst ratio of beds to dispensers was found in hospitals with <50 beds (6.4) compared with reference hospitals (3.3; $P < .001$). The CI for sterilization services showed huge variation ranging from 0.0-1.00. Reference hospitals were more likely to have their own laboratory of microbiology than other hospitals.

* Address correspondence to Maria Clara Padoveze, PhD, RN, MSc, School of Nursing of University of São Paulo. Av. Dr. Enéas de Carvalho Aguiar, 419, São Paulo - São Paulo, Brazil, CEP 05.403-000.
E-mail address: padoveze@usp.br (M.C. Padoveze).

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Conclusion: This study highlights the need for public health strategies aiming to improve the structure for HAI prevention in Brazilian hospitals.

A minimal structure is required for effective prevention of health care–associated infection (HAI), mainly the presence of an active Health Care–Associated Infection Prevention and Control Committee (HAIPCC).[1] Appropriate resources for hand hygiene, medical devices sterilization, and microbiologic analysis of clinical specimens are also among the core components of a good structure for HAI prevention and control.[2] Developing countries have higher HAI rates compared with developed nations, mainly because of their lack of resources and scarcity of expertise in epidemiology and infection control.[3] This raises an important concern regarding patient safety worldwide; therefore, high priority should be given for infection prevention strategies in low and middle-income countries.[3,4]

In the last decade, Brazil has experienced a significant improvement in its socioeconomic condition. However, until now, there has been a lack of information regarding the structure for prevention of HAI in hospitals within country. The knowledge of the actual structure for HAI prevention in Brazilian hospitals will support public policies aiming at overcoming deficiencies and defining priorities. To fulfill this need, a national study was proposed to identify the main features of HAI prevention resources in the country with a multidisciplinary team of researchers, called Project IRAS-Brazil. This study aimed to evaluate the structure for prevention of HAI in a sample of Brazilian hospitals.

MATERIALS AND METHODS

Design and settings

A cross-sectional study was carried out from August 2011-August 2013. Hospitals located in the 5 Brazilian regions were evaluated.

Sampling

A list of all acute care hospitals in the country was obtained from the free-access national database of health care facilities (CNES: http://cnes.datasus.gov.br/). The sample size included 10 out of 26 Brazilian states (Ceará, Goiás, Minas Gerais, Pará, Paraná, Paraíba, Pernambuco, Rio Grande do Sul, Rio de Janeiro, and São Paulo). These states were selected by convenience; nevertheless, they host about two-thirds of all health care facilities within the country. A cluster sampling technique was used, and clusters were defined by state and number of hospital beds. The hospitals were chosen at random in the study base (from the 10 states) within 3 categories according to the number of beds: 10-49 beds, 50-199 beds, and $\geq$200 beds. Eleven university hospitals which harbored the teams that conducted the study were included by convenience and were used as reference for comparison purposes.

Data collection

Teams of nurses experienced in infection control were trained to carry out the evaluation by using structured forms previously validated.[5] They visited each one of the randomized facilities and reference hospitals and performed the evaluation through direct observation, inspection of documents, and interviews. Written guidelines were developed to avoid dissimilarities in data collection procedures. For each state under investigation, a coordinator hosted in the reference hospitals was in charge to manage operational issues of data collection and to ensure homogeneity along the investigation procedures. Evaluation was focused on 4 essential areas: HAIPCC, sterilization service (SS), hand hygiene resources, and laboratory of microbiology. These areas were selected considering their impact in HAI prevention. Each area was evaluated according to their main components: for HAIPCC, components included operational structure, guidelines, HAI surveillance, and activities for preventions. For SS, components included cleaning, preparing-wrapping, and sterilization-storage. Hand hygiene resources included structural conditions for handwashing and antiseptic handrubbing with alcohol. The ratio of beds to sinks, beds to alcohol dispensers, patients to sinks, and patients to alcohol dispensers was calculated counting the resources available at the point of care. Elements of functionality and cleanliness of hand hygiene resources were also evaluated. Laboratories of microbiology were only visited if they were located within hospital premises; the 10 following components were evaluated: human resources, technical guidelines, management programs, environmental structure, decontamination and waste, automation, culture media and water quality, quality control, susceptibility tests, and typing procedures. Each component was further detailed in several elements to be evaluated. Elements were evaluated in regard to their presence, with no attempt to further evaluate their quality details. A conformity index (CI) was composed by the overall sum of elements in a given area to be evaluated, and the final CI was considered as the proportion of the number of elements which were in conformity in a given component evaluated. A CI of $\geq$0.75 (or 75%) was considered a good level of quality in structure for infection prevention and control.

A summary of data collection tool is available on request from the author.

Statistics

The databank was fed in each state and sent by electronic means to a central coordination located in São Paulo, where data consolidation and analysis were performed.

The 11 university hospitals were used as reference when performing comparison among categories. The rationale of choosing these hospitals as reference was not related to the excellence in infection prevention, but rather to the presence of well-established infection control teams with tradition in research in this field. Spearman coefficient (ρ) was used to identify correlation in the CI among the components evaluated. Linear regression models were used to identify correlations between the CI (dependent variables) and hospital categories and country regions (independent variables). Mid-*P* correction of the Fisher exact test was used for comparison of ratio of sinks or alcohol dispensers per patients or beds. In all tests, significance was assumed if $P < .05$. Statistics tests were performed using OpenEpi (Emory University, Atlanta, GA), Epi Info 3.5 (Centers for Disease Control and Prevention, Atlanta, GA), and SPSS 19.0 (IBM, Armonk, NY).

Ethics

The research project was approved by the Committee of Ethical Research of the Federal University of São Paulo (protocol no. 0119/