Esc Anna Nery 2023;27:e20220229

RESEARCH | PESQUISA

www.scielo.br/EAN

The quality of professional practices in infection control programs in Brazil: a cross-sectional study

Qualidade das práticas de profissionais dos programas de controle de infecção no Brasil: estudo transversal

Calidad de las prácticas de profesionales en programas de control de infecciones en Brasil: un estudio transversal

André Luiz Silva Alvim[1]
Bráulio Roberto Marinho Gonçalves Couto[2]
Andrea Gazzinelli[3]

1. Universidade Federal de Juiz de Fora. Juiz de Fora, MG, Brasil.

2. Centro Universitário de Belo Horizonte. Belo Horizonte, MG, Brasil.

3. Universidade Federal de Minas Gerais. Belo Horizonte, MG, Brasil.

ABSTRACT

Objective: To analyze the quality of professional practices in infection control programs regarding structure, process, and outcome. **Method:** This is a quantitative, descriptive, and cross-sectional study carried out in 114 hospital infection control services in the five official regions of Brazil. The data were collected using a structured instrument whose psychometric properties were previously validated. Data treatment was performed by principal component analysis and non-parametric Kruskal-Wallis test. **Results:** The best quality index of infection control programs was attributed to the South region, to hospitals that had 300 beds or more, to those that used the National Healthcare Safety Network criterion for infection surveillance and to places that carried out an active prospective search as their surveillance method. **Conclusion and implications for practice:** The quality of infection control programs is related to hospital location, size, and infection surveillance method. The creation of a quality index, hitherto unheard of in Brazilian studies, draws attention to the precarious performance of health services.

Keywords: Hospital Infection Control Program; Infection Control; Hospital Services; Patient Safety.

RESUMO

Objetivo: Analisar a qualidade das práticas de profissionais dos programas de controle de infecção em relação aos componentes de estrutura, processo e resultado. **Método:** Trata-se de um estudo de abordagem quantitativa, do tipo descritivo e transversal realizado em 114 serviços de controle de infecção hospitalar das cinco regiões oficiais do Brasil. Coletaram-se os dados por meio de um instrumento estruturado, cujas propriedades psicométricas foram validadas previamente. O tratamento dos dados foi realizado pela análise de componentes principais e o teste não paramétrico Kruskal-Wallis. **Resultados:** O melhor índice de qualidade dos programas de controle de infecção foi atribuído à região Sul, aos hospitais que continham 300 leitos ou mais, aos que utilizavam o critério *National Healthcare Safety Network* para vigilância das infecções e aos locais que realizavam busca ativa prospectiva como método de vigilância. **Conclusão e implicações para a prática:** O índice de qualidade dos programas de controle de infecção está relacionado à localização, ao tamanho do hospital e ao método adotado para vigilância de infecções. A criação de um índice de qualidade, até então inédito em estudos nacionais, chama atenção para o desempenho precário dos serviços de saúde.

Palavras-chave: Controle de Infecções; Programa de Controle de Infecção Hospitalar; Segurança do Paciente; Serviços de Controle de Infecção Hospitalar.

RESUMEN

Objetivo: Analizar la calidad de las prácticas de los profesionales de los programas de control de infecciones en relación con los componentes de estructura, proceso y resultado. **Método:** Se trata de un estudio cuantitativo, descriptivo y transversal realizado en 114 servicios de control de infecciones hospitalarias de las cinco regiones oficiales de Brasil. Los datos fueron recolectados mediante un instrumento estructurado, cuyas propiedades psicométricas fueron previamente validadas. El tratamiento de los datos se realizó mediante el análisis de componentes principales y la prueba no paramétrica de Kruskal-Wallis. **Resultados:** El mejor índice de calidad de los programas de control de infecciones se atribuyó a la región Sur, a los hospitales que tenían 300 camas o más, a los que utilizaron el criterio de *National Healthcare Safety Network* para la vigilancia de infecciones y a los locales que realizaban las búsquedas prospectivas activas como el método de vigilancia. **Conclusión e implicaciones para la práctica:** La calidad de los programas de control de infecciones está relacionada con la ubicación, el tamaño del hospital y el método adoptado para la vigilancia de infecciones. La creación de un índice de calidad, hasta ahora inédito en los estudios brasileños, llama la atención sobre el precario desempeño de los servicios de salud.

Palabras clave: Control de Infecciones; Prevención & control; Programa de Control de Infecciones Hospitalarias; Seguridad del Paciente; Servicios Hospitalarios.

Corresponding author:
André Luiz Silva Alvim.
E-mail: andrealvim1@hotmail.com

Submitted on 07/06/2022.
Accepted on 01/06/2023.

DOI:https://doi.org/10.1590/2177-9465-EAN-2022-0229en

INTRODUCTION

Health quality is a set of properties attributed to the fulfillment of patients' needs for a continuous improvement of care safety. One of the quality assessment models is the Donabedian's triad, comprising the structure, process, and outcome components, aimed at monitoring, detecting, and adjusting deviations to meet the expected goals.[1]

In this model of health care quality assessment, structure refers to the organizational characteristics attributed to the several available resources. Regarding process, the norms and procedures related to the activities carried out in the institutions are emphasized. Finally, the outcome component can be attributed to indexes of health care assessment which reflect the system.[1]

Among the several conditions that affect quality, Healthcare-Associated Infections (HAI) are noteworthy.[2-4] In the United States, 1.7 million HAI are estimated to occur every year, totaling 99 thousand deaths. The incidence of infections in Europe affects around 2,609,911 hospitalized patients per year and approximately 37 thousand deaths are reported.[2,3] In Brazil, the rates are similar to those of other developing countries, over 10,8%, varying according to complexity of healthcare.[4]

Health services can avoid HAI by performing epidemiological surveillance and adopting efficient infection control measures. One of the strategies includes the implementation of the Hospital Infection Control Program (HICP), defined by the Brazilian Ministry of Health as a set of deliberate and systematic actions aimed at reducing as much as possible the incidence and severity of these infections.[3,5]

The actions carried out in HICP are still diversified and reinforce problems demanding an enhancement of quality components.[6-8] These problems are associated to a lack of government incentives, reduced financial support, an insufficient amount of human resources, and inadequate infrastructure, which negatively influence the promotion of safe, harm-free care.[9]

Studies reinforce the importance of developing strategies for monitoring the Program by periodically analyzing the activities of the Hospital Infection Control Commission (HICC) and by the Hospital Infection Control Service (HICS).[8-9] Moreover, the World Health Organization (WHO) released a new guideline with evidence-based recommendations on the essential components for the implementation and monitoring of HICP both regionally and centrally.[3] However, publications prioritize a local approach of the panorama of quality of health care in HAI prevention and control.[7,-8]

Thus, the literature does not yet establish a Brazilian quality index related to structure, process, and outcome to enable an understanding of the reality of services in face of the activities proposed by the HICP. In addition, the studies do not provide a comparison of health services through a systematic assessment of the practices of professionals in the HICS.[8-10] This gap reinforces the contribution of this study in recognizing the magnitude of infections and their impacts on quality of health care.

This study is expected to alert health managers and health regulatory bodies to the real situation of the quality of Brazilian infection control programs. These data may be a foundation for public policies aimed at preventing HAI and other epidemiologically relevant diseases which directly affect public health.

Thus, the objective of this study is to analyze the quality of the practices of professionals in infection control programs regarding the components structure, process, and outcome.

METHOD

This is a quantitative, descriptive, cross-sectional study. The construction of the methodological steps of this article were guided by the criteria of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) tool.[11]

Non-probabilistic, convenience sampling was employed through the snowball technique. The target public of this study encompassed nurses and physicians specializing in infection control and/or similar areas. The inclusion criteria were being a health professional in a small, medium sized, or large public, private, philanthropic, or charitable service and having more than one year of experience. Those who were not employees of the HICS and/or who had not concluded an undergraduate course (academics/interns) were excluded.

The sample comprised 114 health professionals: 103 nurses specializing in infection control and 11 physicians, stratified into 9 infectious disease specialists and 2 epidemiologists. They represent the infection control services of the five official Brazilian regions: Center-West, Northeast, North, Southeast, and South. The first forty-five sites were recruited by the Brazilian National Registry of Health Establishments (*Cadastro Nacional de Estabelecimentos de Saúde* – CNES), located in the capitals of each Brazilian state. The participants were contacted by the first researcher through telephone and/or email. Subsequently, the health professionals responded to a structured instrument sent by email while indicating other services, until a nationwide sample was achieved. In this step, there were no refusals or loss of participants.

The data collection was performed from December 2018 to July 2019 through an instrument for assessing Infection Control Programs. The tool was built and validated by the researchers through a published methodological study.[12] This tool includes 36 multiple choice questions stratified into 15 items related to structure assessment, 16 related to the process, and five related to the outcome. All questions were followed by definitions, detailed explanations, and concepts, which included the norms attributed to each question. The answers to each question were generated through a Likert scale containing the following options: yes, partially, and no. The content validity index (0.902) and Cronbach's alpha test (0.82) showed that the items have good internal consistency. The data collection was chosen to be interrupted in August 2019 after no replies were obtained for over three weeks.

The variable outcome of interest was Infection Control Program Quality Index (ICPQI). The investigated variables were: type of administration (private, public, philanthropic, charitable/other); Brazilian region (Southeast, North, Center-West, Northeast,

or South); medical staff (open or closed), number of beds, and healthcare specialties (clinical and/or surgical, others). In addition to these, questions on the assessment of infection control programs were included.

For result treatment and analysis, the database was verified, with a double check of the information for inconsistencies requiring adjustments. In the first step, an exploratory analysis was performed through descriptive statistics using absolute and relative values to characterize the services involved in this study using the *Epi Info* software (version 6.0).

To create the ICPQI, Principal Component Analysis (PCA) was applied to the sample correlation matrix of the variables. This statistical technique enabled the creation of linear combinations of the variables, which were corelated and employed to create an adequacy index to enable the comparison of HICP not only for each quality index in isolation, but globally, through a single global quality indicator.

Thus, the implementation of this technique involved the verification of the degree of association between the variables of interest. The differences between the measure units of the variables may lead to marked discrepancies between variances. To reduce this problem and possible biases, the eigenvalues of variance were balanced, placing them in the same measure unit and thus obtaining the correlation matrix of the responses for each of the 36 variables.

Initially, the correlation matrix was decomposed, the eigenvalues of this matrix were found, and the number of implicit components in the base structure of the questions was assessed. The first eigenvector was thus obtained, with 36 values referring to the study's variables. Subsequently, the mean and the standard deviation of each variable were calculated to be used in the calculation of the standardized score, which was considered for the construction of the index number. The last step defined the standardized score of the replies through a statistical cut point in the quartiles.

Finally, the ranges of the ICPQI values were defined for a comparison among health services and their respective quality categories, which were: very precarious (ICPQI ≤ -3), precarious (ICPQI > 3 and ≤ 0), moderate (ICPQI > 0 and < +2), good (ICPQI ≥ +2and < +3), and very good (ICPQI ≥ +3). After the inspection of variable normality, the non-parametrical Kruskal-Wallis test was adopted to compare the scores (mean, median, and standard deviation); the significance level was 0.05. All statistical analysis were performed using the IBM® SPSS software.

This study was approved by the Research Ethics Committee (REC) of the Lifecenter Hospital in opinion number 2.340.091 and CAAE: 78299817.0.0000.5126, in 10/20/2017. The participants were included after reading and signing the Informed Consent Form.

RESULTS

Out of the 114 health services involved in this study, 72 (63%) were in Southeast Brazil and 45 (39%) were private institutions containing 200 beds (47%). Out of the total, 90 (79%) provided clinical and surgical specialists and 63 (55%) had an open medical staff. In addition, 100 (87.7%) adopted the criterion of the Brazilian National Sanitary Surveillance Agency (*Agência Nacional de Vigilância Sanitária* – ANVISA) for epidemiological surveillance of infections and 45 (39.5%) used the prospective method for investigating HAI.

Table 1 presents an analysis of the quality of HICP regarding structure, process, and outcome. Only 36 (31.6%) of the services had an antimicrobial management program and 53 (46.5%) reported that patient safety protocols were implemented effectively. Not more than 29 (25.4%) had the participation of stakeholders (strategic public) in the elaboration of HAI prevention and control protocols and directives. Regarding health education, only 25 (22%) responded that physicians participated regularly in the training proposed by the HICS. Multimodal strategies were employed by 48 (42.1%) health services. Remarkably, 80 (70.2%) participants reported that the multidisciplinary team was overburdened. Only 60 (52.6%) institutions periodically monitored air quality.

Table 2 presents a categorization of the quality level regarding the practices of professionals in infection control programs. The main categories represent 79.8% of the low performance of ICPQI, which were: moderate (40.4%), precarious (27.2%), and very precarious (12.2%).

The best performance of quality of the HICP in the services included in this study is presented in Table 3. A statistically significant difference was identified for the South region (p=0.02), private administration (p=0.04), health services containing 300 beds or more (p<0.01), those using the criterion of the National Healthcare Safety Network (NHSN) for HAI surveillance (p<0.01), and those using active prospective search as a surveillance method (p<0.01).

DISCUSSION

With the assessment of professional practices in the infection control programs, the health services were observed to report work overload while indicating a need for periodical monitoring of air quality and for following the use of antibiotics through a specific management program. Another remarkable aspect is the low adherence of physicians to the training proposed by the HICS.

In this perspective, the services included in this study presented diversified actions in the context of prevention and control of infections influencing quality of health. This fact is related to a low adherence by the multidisciplinary team in face of the operational activities proposed by the HICS.[10] Although adherence to the HICP provides opportunities for improvement in countries such as Austria, Brazil, and China, the impact of the implementation of this program promotes significant reductions of HAI, which includes several topographies, antimicrobial resistance, and an increased patient survival rate.[10,13-15]

This study has shown that work overload, the implementation of specific protocols for the reduction of HAI, health education, and the use of multimodal strategies must be recognized as priorities in decision-making. A study conducted in 65 Austrian hospitals has shown similar flaws that must be improved by managers and health professionals, since this is crucial for patient safety and to guarantee the minimum acceptable quality standards.[13]

Table 1. Descriptive analysis of the instrument for assessment of infection prevention and control programs (n=114), Brazil, 2019.

Items of the instrument	Yes	Partially	No
	n (percentage)		
Structure			
Your region has a Central Public Health Laboratory (CPHL).	100 (87.7)	0 (0.0)	14 (12.3)
Your institution has its own microbiology laboratory or a third party.	103 (90.3)	2 (1.8)	9 (7.9)
There is basic sanitation in your health service region.	103 (90.3)	9 (7.9)	2 (1.8)
You consider that there is adequate ventilation in your institution.	60 (52.6)	7 (6.1)	47 (41.3)
Your work institution periodically monitors water quality.	100 (87.7)	5 (4.4)	9 (7.9)
Your work institution periodically monitors air quality.	60 (52.6)	28 (24.6)	26 (22.8)
Your institution has a HICC and a HICS structured in accordance with current legislation.	98 (86.0)	16 (14.0)	0 (0.0)
The structure of your institution contributes to hand hygiene effectively.	102 (89.5)	9 (7.9)	3 (2.6)
There are sinks and/or dispensers for alcohol and/or liquid soap at all service points.	91 (79.8)	15 (13.2)	8 (7.0)
Your institution has a Health Solid Waste Management Program (HSWMP) described and validated.	102 (89.5)	7 (6.1)	5 (4.4)
Your work institution has an overcrowding of patients.	35 (30.7)	8 (7.0)	71 (62.3)
You consider that the health professionals that comprise the multidisciplinary team are overloaded.	80 (70.2)	7 (6.1)	27 (23.7)
Your institution has at least 1 (one) meter of bed spacing between patients.	82 (71.9)	8 (7.0)	24 (21.1)
You consider that your institution has an adequate structure serve patients during an epidemic or pandemic.	57 (50.0)	19 (17.7)	38 (33.3)
Your institution adopts cohort isolation for patients under specific precautions.	73 (64.0)	4 (3.5)	37 (32.5)
Process			
Patient safety protocols are implemented at the institution.	53 (46.5)	47 (41.2)	14 (12.3)
The HICS knows and validates the cleaning and disinfection protocols for surfaces.	96 (84.2)	10 (8.8)	8 (7.0)
Your institution performs cleaning, preparation, sterilization, disinfection, and storage of health products.	106 (93.0)	6 (5.3)	2 (1.7)
The HICS professionals develop protocols based on scientific evidence.	101 (88.6)	7 (6.1)	6 (5.3)
Stakeholders (strategic public) participate in the elaboration of HICS protocols and guidelines.	29 (25.4)	22 (19.3)	63 (55.3)
Your institution monitors the use of antibiotics through an Antimicrobial Management Program.	36 (31.6)	20 (17.5)	58 (50.9)
Your institution has implemented protocols on standard, contact, droplets, and aerosol precautions.	108 (94.7)	1 (0.9)	5 (4.4)
Your institution implements the multimodal strategy for improving hand hygiene.	67 (58.7)	10 (8.8)	37 (32.5)
Your institution has other multimodal strategies related to prevention and control of HAI.	48 (42.1)	11 (9.6)	55 (48.3)
The medical professionals actively participate in the training defined by the HICS.	25 (22.0)	33 (28.9)	56 (49.1)
The nursing team actively participates in the training defined by the HICS.	102 (89.5)	11 (9.6)	1 (0.9)
The physiotherapy team actively participates in the training defined by the HICS.	70 (61.4)	15 (13.2)	29 (25.4)
The administrative professionals and the management team receive training from HICS.	106 (93.0)	1 (0.9)	7 (6.1)
The HICS conducts sectoral audits periodically in the health care sectors.	85 (74.6)	13 (11.4)	16 (14.0)
Outcome			
The HICS identifies outbreaks in a timely manner through infection indicators and establishes control measures.	113 (99.1)	0 (0.0)	1 (0.9)
The results of the bundles are disclosed to the institution for the prevention and control of HAI.	65 (57.0)	13 (11.4)	36 (31.6)
The HICS carries out a survey of indicators of Healthcare-Associated Infections and disclose it widely to the entire institution.	88 (77.2)	15 (13.2)	11 (9.6)
The HICS prioritizes problems based on indicators of Healthcare-Associated Infections.	73 (64.0)	22 (19.3)	19 (16.7)
The HICS professionals periodically provide feedback on infection indicators to the multidisciplinary team.	77 (67.5)	17 (15.0)	20 (17.5)

Source: study data, 2019.

The offer, access, and use of health services in Brazil presents fewer discrepancies in the South and Southeast regions.[16] This study shows that these two regions present the best ICPQI. A different study assessing the structure of HAI prevention in Brazilian hospitals reinforces the need to elaborate a national plan prioritizing this quality component, particularly in the Center-West, North, and Northeast regions, which present lower economic growth and minimal resources for the prevention of infectious diseases when compared to South and Southeast.[6]

However, when it comes to the administration of health services, the best performance was observed to be that of the private sector. There are a few passages in the literature that attribute this variable to ICPQI performance, which makes it possible to relate the findings to higher investment in structure, equipment, and technological resources in this sector. The search for health quality must be universal, including public and philanthropic services. One of the suggestions for improvement is related to processes of audit, qualification, or accreditation in the health sector, which may contribute to organizational advances in the systematic actions developed by infection control professionals.[17,18]

The operational capacity of health services with 300 beds or more was also assessed; this is an associated factor of the best quality index. Small sized hospitals (up to 50 beds) frequently have precarious resources due to a lack of economic investment.[17,19] In fact, studies show that hospitals with 200 beds or more could have better technological resources to facilitate HAI prevention and control, such as adequate hand hygiene supplies, health product sterilization, and laboratory support for microbiological analysis of specimens.[6]

The health services that used the NHSN criterion presented a better performance when compared to those using ANVISA's criterion. Although some conceptual differences are observed between the two methodologies, there are no epidemiological restrictions to case detection and notification.[20,21] A possible explanation for the poor performance of HICP quality is the

Table 2. Categorization of the quality level: analysis by range of values in the Infection Control Program Quality Index, Brazil, 2019 (n=114).

Range of ICPQI values	Quality category	n	Percentage
ICPQI ≤ -3	Very precarious	14	12.2
-3 > ICPQI ≤ 0	Precarious	31	27.2
0 > ICPQI < +2	Moderate	46	40.4
+2 ≤ ICPQI < +3	Good	17	14.9
ICPQI ≥ +3	Very good	06	5.3

Source: study data, 2019.

Table 3. Principal Component Analysis related to associated factors of the Infection Control Program Quality Index (ICPQI), Brazil, 2019.

Variables	n	ICPQI			p-value*
		Mean Index	Median Index	Standard deviation	
Administration					
Public	31	-0.36	0.26	2.37	0.04
Philanthropic	38	-0.45	0.62	2.50	
Private	45	0.45	0.88	2.42	
Region of Brazil					
Center-West	12	-1.23	-0.57	2.73	0.02
Northeast	7	-1.53	-1.42	1.89	
North	16	-0.53	0.56	2.52	
Southeast	72	0.41	0.73	2.28	
South	7	1.50	1.79	0.99	
Number of beds					
1–50	12	-1.42	0.76	2.73	<0.01
51–100	28	-0.30	-1.04	2.67	
101–200	42	0.24	0.85	2.21	
201–300	19	0.80	0.88	1.77	
>300	13	1.38	1.41	1.46	
Criterion for HAI surveillence					
ANVISA	100	-0.21	0.25	2.33	<0.01
NHSN	14	2.12	2.09	0.84	
Surveillence method					
Prospective	45	0.51	0.68	1.83	<0.01
Retrospective	28	-0.78	-0.31	2.73	
Cross-sectional	41	-0.06	0.55	2.65	

Source: study data, 2019.
*Kruskal-Wallis test

difference of laboratory parameters among the diagnosis criteria. Reinforcing this analysis, Brazilian researchers have called attention to the fact that disagreements among methodologies may impact infection indicators, under- or overestimating incidence rates.[10]

In addition to the criteria used by HICS professionals, the prospective HAI surveillance method was related to the best ICPQI. However, the literature presents no explanation of this result. Following infection cases actively is inferred to favor a rapid detection of unexpected cases and thus support the elaboration of assertive preventive actions as early as possible.[22,23]

The quality index of the assessed study sites, which ranged from moderate to very precarious, is noteworthy. This was an expected result, considering that Brazil has a large territory and is diversified regarding the economic situation throughout its states, resources for the prevention of infectious diseases, government incentive, and qualified professionals.[6,16,19] One hypothesis to justify this inefficient performance is a low adherence of services to the national programs proposed by health bodies, which generally do not account for regional specificities during the construction of HAI control guidelines.

Considering Donabedian's framework and the results, the assessment of quality components must be observed simultaneously and cross-sectionally by HICS professionals, representing a judicious approach for HICP assessment. The literature reinforces that the search for quality must be global, involving from high managers to operational team, in which the actions proposed by the HICP may contribute for improvements in patient care.[1,23] Therefore, this study presented promising outcomes regarding this theme, aiming at a reduction of the incidence of HAI and the best evidence-based practices.

CONCLUSION AND IMPLICATIONS FOR THE PRACTICE

Based on the diversified actions in the context of HAI prevention and control, Brazil's heterogeneity contributed to a poor performance of the quality index among the analyzed health services, classified as moderate, precarious, or very precarious. However, health services located in the South region, privately administered, with 300 beds or more, using the National Healthcare Safety Network criterion for HAI surveillance and those performing active prospective search as a surveillance method presented promising outcomes for HICP.

This study presented some limitations which must be considered. The first consists of the difficulty in generalizing results due to a non-probabilistic sampling having been employed. The sample size is also restricted in certain Brazilian regions, which does not preclude achieving the proposed objectives. To account for this, the researchers adopted precautions in statistical analysis to reduce possible biases. Finally, the conclusions on which variables are associated to the best outcomes of ICPQI face methodological limitations, since these can lead to possible interpretations on the association of the best performance with hospitals employing criteria which are not indicated by the national agency.

The contribution of this study for the practice lies on the data which show the need to improve the quality components of HICP. The creation of a quality index calls attention to the precarious performance of health services. This study may alert health managers of Brazil's heterogeneity regarding deficient structures, processes, and outcomes. Therefore, the results support the construction of HAI prevention and control policies based on patient safety.

ACKNOWLEDGMENTS

We thank *Programa de Pós-Graduação em Enfermagem da Universidade Federal de Minas Gerais* (UFMG) for the support provided with resources of *Programa de Apoio à Pós-Graduação* (PROAP), of *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES).

AUTHOR'S CONTRIBUTIONS

Design of study. André Luiz Silva Alvim. Andrea Gazzinelli.

Data obtention. André Luiz Silva Alvim.

Data analysis and interpretation of the results. André Luiz Silva Alvim. Bráulio Roberto Marinho Gonçalves Couto. Andrea Gazzinelli.

Writing and critical review of the manuscript. André Luiz Silva Alvim. Bráulio Roberto Marinho Gonçalves Couto. Andrea Gazzinelli.

Approval of the final version of the article. André Luiz Silva Alvim. Bráulio Roberto Marinho Gonçalves Couto. Andrea Gazzinelli.

Responsibility for all aspects of content and integrity of the published article. André Luiz Silva Alvim. Bráulio Roberto Marinho Gonçalves Couto. Andrea Gazzinelli.

ASSOCIATED EDITOR

Rafael Silva

SCIENTIFIC EDITOR

Marcelle Miranda da Silva

REFERENCES

1. Ayanian JZ, Markel H. Donabedian's Lasting Framework for Health Care Quality. N Engl J Med. 2016 jul 21;375(3):205-7. http://dx.doi.org/10.1056/NEJMp1605101. PMid:27468057.
2. Manoukian S, Stewart S, Dancer S, Graves N, Mason H, McFarland A et al. Estimating excess length of stay due to healthcare-associated infections: a systematic review and meta-analysis of statistical methodology. J Hosp Infect. 2018;100(2):222-35. http://dx.doi.org/10.1016/j.jhin.2018.06.003. PMid:29902486.
3. Lee MH, Lee GA, Lee SH, Park YH. Effectiveness and core components of infection prevention and control programmes in long-term care facilities: a systematic review. J Hosp Infect. 2019 ago;102(4):377-93. http://dx.doi.org/10.1016/j.jhin.2019.02.008. PMid:30794854.
4. Fortaleza CMCB, Padoveze MC, Kiffer CRV, Barth AL, Carneiro ICRS, Giamberardino HIG et al. Multi-state survey of healthcare-associated infections in acute care hospitals in Brazil. J Hosp Infect. 2017;96(2):139-44. http://dx.doi.org/10.1016/j.jhin.2017.03.024. PMid:28433398.

5. Portaria n. 2.616, de 12 de maio de 1998 (BR). Dispõe sobre diretrizes e normas para a prevenção e o controle das infecções hospitalares. Diário Oficial da União [periódico na internet], Brasília (DF), 1998 [cited 2022 July 6]. Available from: http://bvsms.saude.gov.br/bvs/saudelegis/gm/1998/prt2616_12_05_1998.html
6. Padoveze MC, Fortaleza CM, Kiffer C, Barth AL, Carneiro IC, Giamberardino HI et al. Structure for prevention of health care–associated infections in Brazilian hospitals: a countrywide study. Am J Infect Control. 2016;44(1):74-9. http://dx.doi.org/10.1016/j.ajic.2015.08.004. PMid:26412480.
7. Menegueti MG, Canini SRMS, Bellissimo-Rodrigues F, Laus AM. Avaliação dos Programas de Controle de Infecção Hospitalar em serviços de saúde. Rev Lat Am Enfermagem. 2015;23(1):98-105. http://dx.doi.org/10.1590/0104-1169.0113.2530. PMid:25806637.
8. Alves DCI, Lacerda RA. Avaliação de Programas de Controle de Infecção relacionada a Assistência à Saúde de Hospitais. Rev Esc Enferm USP. 2015;49(spe):65-73. http://dx.doi.org/10.1590/S0080-623420150000700010.
9. Salmanov A, Vozianov S, Kryzhevsky V, Litus O, Drozdova A, Vlasenko I. Prevalence of healthcare-associated infections and antimicrobial resistance in acute care hospitals in Kyiv, Ukraine. J Hosp Infect. 2019;102(4):431-7. http://dx.doi.org/10.1016/j.jhin.2019.03.008. PMid:30910424.
10. Giroti ALB, Ferreira AM, Rigotti MA, Sousa ÁFL, Frota OP, Andrade D. Programas de Controle de Infecção Hospitalar: avaliação de indicadores de estrutura e processo. Rev Esc Enferm USP. 2018;52:e03364. http://dx.doi.org/10.1590/s1980-220x2017039903364. PMid:30088544.
11. Cheng A, Kessler D, Mackinnon R, Chang TP, Nadkarni VM, Hunt EA et al. Reporting guidelines for health care simulation research. Simul Healthc. 2016 ago;11(4):238-48. http://dx.doi.org/10.1097/SIH.0000000000000150. PMid:27465839.
12. Alvim ALS, Gazzinelli A, Couto BRGM. Construção e validação de instrumento para avaliação da qualidade dos programas de controle de infecção. Rev Gaúcha Enferm. 2021;42:e20200135. http://dx.doi.org/10.1590/1983-1447.2021.20200135. PMid:33886924.
13. Aghdassi SJS, Hansen S, Bischoff P, Behnke M, Gastmeier P. A national survey on the implementation of key infection prevention and control structures in German hospitals: results from 736 hospitals conducting the WHO Infection Prevention and Control Assessment Framework (IPCAF). Antimicrob Resist Infect Control. 2019;8:73. http://dx.doi.org/10.1186/s13756-019-0532-4. PMid:31080588.
14. Wang J, Liu F, Tan JBX, Harbarth S, Pittet D, Zingg W. Implementation vof infection prevention and control in acute care hospitals in Mainland China – a systematic review. Antimicrob Resist Infect Control. 2019;8(1):32. http://dx.doi.org/10.1186/s13756-019-0481-y. PMid:30792854.
15. Ershova K, Savin I, Kurdyumova N, Wong D, Danilov G, Shifrin M et al. Implementing an infection control and prevention program decreses the incidence of healthcare-associated infections and antibiotic resistance in a Russian neuro-ICU. Antimicrob Resist Infect Control. 2018 jul 31;7:94. http://dx.doi.org/10.1186/s13756-018-0383-4. PMid:30083313.
16. Oliveira RAD, Duarte CMR, Pavão ALB, Viacava F. Barreiras de acesso aos serviços em cinco Regiões de Saúde do Brasil: percepção de gestores e profissionais do Sistema Único de Saúde. Cad Saude Publica. 2019;35(11):e00120718. http://dx.doi.org/10.1590/0102-311x00120718. PMid:31691779.
17. Santos PLC, Padoveze MC, Lacerda RA. Desempenho dos programas de prevenção e controle de infecções em pequenos hospitais. Rev Esc Enferm USP. 2020 set 14;54:e03617. http://dx.doi.org/10.1590/s1980-220x2019002103617. PMid:32935766.
18. Siegfried A, Heffernan M, Kennedy M, Meit M. Quality improvement and performance management benefits of public health accreditation: national evaluation findings. J Public Health Manag Pract. 2018;24(3, Suppl 3):S3-9. http://dx.doi.org/10.1097/PHH.0000000000000692. PMid:29595591.
19. Oliveira HM, Silva CPR, Lacerda RA. Políticas de controle e prevenção de infecções relacionadas à assistência à saúde no Brasil: análise conceitual. Rev Esc Enferm USP. 2016;50(3):505-11. http://dx.doi.org/10.1590/S0080-623420160000400018. PMid:27556723.
20. Djuric O, Markovic-Denic L, Jovanovic B, Bumbasirevic V. Agreement between CDC/NHSN surveillance definitions and ECDC criteria in diagnosis of healthcare-associated infections in Serbian trauma patients. PLoS One. 2018 out 4;13(10):e0204893. http://dx.doi.org/10.1371/journal.pone.0204893. PMid:30286119.
21. Agência Nacional de Vigilância Sanitária. Critérios diagnósticos de Infecções Relacionadas à Assistência à Saúde [Internet]. Brasília: ANVISA; 2017 [cited 2022 July 6]. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/criterios_diagnosticos_infeccoes_assistencia_saude.pdf
22. van Mourik MSM, Perencevich EN, Gastmeier P, Bonten MJM. Designing Surveillance of Healthcare-Associated Infections in the Era of Automation and Reporting Mandates. Clin Infect Dis. 2018 mar 5;66(6):970-6. http://dx.doi.org/10.1093/cid/cix835. PMid:29514241.
23. Alvim ALS, Couto BRGM, Gazzinelli A. Qualidade dos programas de controle de infecção hospitalar: revisão integrativa. Rev Gaucha Enferm. 2020;41:e20190360. http://dx.doi.org/10.1590/1983-1447.2020.20190360. PMid:32813809.