Integrative Review

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Quality of the hospital infection control programs: an integrative review

Qualidade dos programas de controle de infecção hospitalar: revisão integrativa

Calidad de los programas de control de infecciones hospitalarias: revisión integradora

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ABSTRACT

Objective: To analyze the quality of health in relation to the components of structure, process, and outcome in actions for the prevention and control of infections.

Method: An integrative literature review in the LILACS, Web of Science, Scopus, and SciELO databases. The time delimitation covered articles published between January 2009 and May 2019.

Results: The final sample consisted of 10 articles published, mainly in Scopus (60%), and in Web of Science (30%). The structural elements varied among the study countries, suggesting opportunities for improvement of organizational characteristics and human resources. Regarding the process of the implemented routines, inconsistencies were found to comply with the guidelines. The result component was not emphasized among the studies included in the review.

Conclusion: The quality of hospital infection control programs has yet to be improved among the health services, highlighting the need for investment in the structure, process, and outcome components.

Keywords: Hospital infection. Hospital infection control program. Quality of health care.

RESUMO

Objetivo: Analisar a qualidade em saúde em relação aos componentes de estrutura, processo e resultado nas ações de prevenção e controle de infecções.

Método: Revisão integrativa da literatura nas bases de dados da LILACS, Web of Science, Scopus e SciELO. A delimitação temporal abrangeu artigos publicados entre janeiro de 2009 e maio de 2019.

Resultados: A amostra final foi de 10 artigos publicados, principalmente no Scopus (60%) e na Web of Science (30%). Os elementos estruturais variaram entre os países de estudo, sugerindo oportunidades de melhoria das características organizacionais e dos recursos humanos. Em relação ao processo das rotinas implantadas, foram encontradas inconsistências ao cumprimento das diretrizes. O componente resultado não obteve ênfase entre os estudos incluídos na revisão.

Conclusão: A qualidade dos programas de controle de infecção hospitalar ainda precisa ser aprimorada entre os serviços de saúde, destacando a necessidade de investimentos nos componentes de estrutura, processo e resultado.

Palavras-chave: Infecção hospitalar. Programa de controle de infecção hospitalar. Qualidade da assistência à saúde.

RESUMEN

Objetivo: Analizar la calidad de la salud en relación con los componentes de estructura, proceso y resultado en las acciones para la prevención y control de infecciones.

Método: Revisión bibliográfica integradora en bases de datos LILACS, *Web of Science*, *Scopus* y SciELO. La delimitación temporal abarcó artículos publicados entre enero de 2009 y mayo de 2019.

Resultados: La muestra final consistió en 10 artículos publicados, principalmente en *Scopus* (60%) y *Web of Science* (30%). Los elementos estructurales variaron entre los países del estudio, lo que sugiere oportunidades para mejorar las características de la organización y los recursos humanos. Con respecto al proceso de las rutinas implementadas, se advirtieron inconsistencias para cumplir con las pautas. El componente de resultados no se enfatizó entre los estudios incluidos en la revisión.

Conclusión: La calidad de los programas de control de infecciones hospitalarias aún no se ha mejorado entre los servicios de salud, razón por la cual, se destaca la necesidad de invertir en los componentes de estructura, proceso y resultados.

Palabras clave: Infección hospitalaria. Programa de control de infecciones hospitalarias. Calidad de la atención de salud.

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INTRODUCTION

Quality in health aims to effectively meet the needs of the patient, providing safe care, and maximum well-being, in its most complete and extended forms[1]. In the health services, the search for quality assessment becomes a constant, reflecting a culture of excellence that provides improved care to achieve patient safety[2–3].

It is highlighted that the theme is widely discussed among the health professionals and its definition still varies in the literature. In this study, the construct of quality in health is adopted through the evaluation of the components of structure, process, and outcome. This interdependent triad supports systematic research and concerns the organizational infrastructure, the activities developed in the health services and the quality indicators that reflect the care for the patient[3].

Among the various problems that affect the quality of care and negatively impact patient safety, Health Care Related Infections (HCRIs) stand out. These infections increase the length of hospital stay, as well the health care costs and even morbidity and mortality[4–5].

One of the strategies for reducing HCRIs and promoting the quality of disease prevention and control actions refers to the creation of Hospital Infection Control Programs (HICPs)[6–9]. According to Ordinance No. 2616, of May 12th, 1998, the HICPs are a set of actions deliberately and systematically developed, with a view to reducing incidence and severity of infections to the maximum possible[6].

However, the implementation of strategies related to the HICPs still faces serious challenges, especially in developing countries[7]. The problems include lack of government incentive, inadequate financial support, discrepancies in relation to the team's roles, behavioral factors and weaknesses in the implementation of patient safety policies[7,10–12].

This study may show health care professionals an overview of the quality of the infection control programs, targeting structural components, processes, and outcomes that impact on the prevention and control of the HCRIs. It is expected that this integrative review will provide subsidies that assist in the construction of new national guidelines and recommendations related to the theme.

The objective, therefore, was to analyze the quality of health in relation to the components of structure, process, and outcome in actions for the prevention and control of infections.

METHOD

This is an integrative literature review study that covered the following methodological stages: (1) establishing the hypothesis or research question; (2) sampling or searching in the literature; (3) categorizing the studies; (4) evaluating the studies included in the review; (5) interpreting the results, and (6) knowledge synthesis[13].

The construction of this article was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) aiming to increase the quality and reliability of the information obtained. Although PRISMA is a document developed for systematic reviews and meta-analyses, the topics contributed to the construction of all the methodological stages of the study[14].

The PICO strategy was used to elaborate the research question: P = Population; (I) Intervention (or exposure); (C) Comparison; and (O) Outcome. This procedure sought to strengthen the Evidence-Based Practice (EBP) through a well-structured problem for maximum recovery of articles in the literature[15]. The following guiding question was formulated: "What is the outlook for the Hospital Infection Control Programs in relation to the quality components?"

The search for articles included the Latin American and Caribbean Literature in Health Sciences (*Literatura Latino-Americana e do Caribe em Ciências da Saúde*, LILACS), Web of Science, and Scopus databases, as well as the Scientific Electronic Library Online (SciELO) electronic library. As a strategy for retrieving scientific information, the following MeSH descriptors were crossed: Hospital Infection Control Program, Cross Infection, Quality of Health Care and Infection Control. These descriptors were used in the search with the help of the Boolean operators (*AND* and *OR*). For the survey of articles in SciELO, the same words translated into Portuguese were used. It was chosen to disregard the use of quotation marks to expand articles, avoiding possible losses in the initial survey.

The inclusion criteria were complete, open access articles published between January 2009 and May 2019, in Portuguese, English, and Spanish. The exclusion criteria corresponded to reflection articles, editorials, non-systematic literature reviews, books, manuals, and other texts that did not have a peer review process, and/or that did not specifically address the object of study. The studies were exported to the Mendeley® software and, later on, those duplicated in two or more databases were excluded (Figure 1).

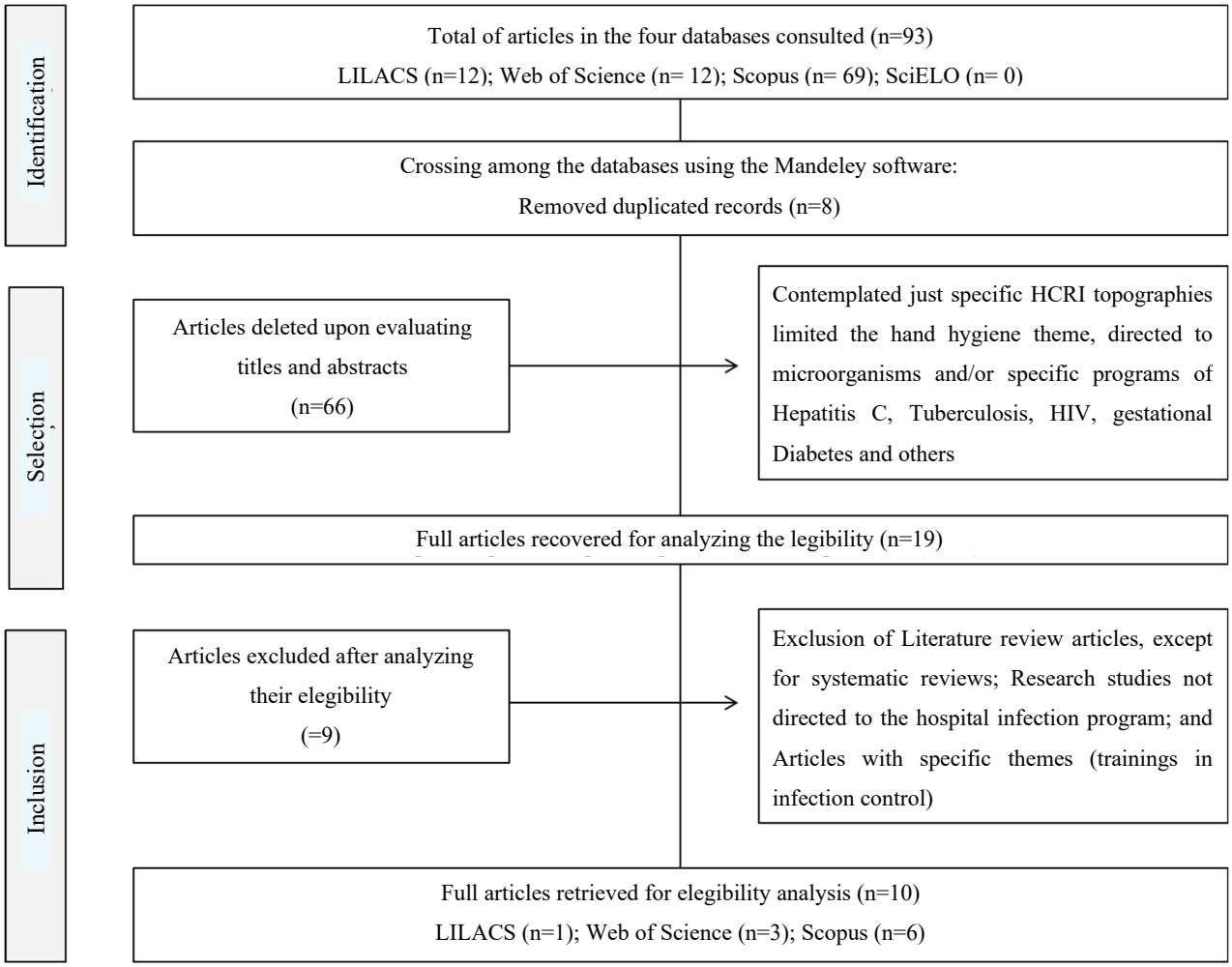

Figure 1 – Draft of the articles included in the integrative literature review
Source: Research data, 2019.

The selection of the articles was carried out in June 2019. An eligibility assessment form was adopted, prepared by the Ministry of Health and adapted by the researchers themselves[16]. In this case, the criteria to be used were the following: (1) identification of the article (author's last name, name of the journal, year of publication, volume, and number of pages); (2) eligibility criteria, adapted (Was the article peer-reviewed?; Does the article evaluate the quality requirements applied to the Hospital Infection Control Program?; Do the results and conclusions answer the PICO question?) and (3) confirmation for eligibility (Considering the study design, the intervention, and the population involved, can the study be included?).

To assess the methodological quality, the tool for the evaluation of accuracy in observational studies was used[17]. Each of the 10 questions receives 1 point when the answer is positive. The final classification can vary from 8 to 10 (high), 5 to 7 (medium), and 0 to 4 (low). In the case of the systematic review articles included in this study, the Assessment of Multiple Systematic Reviews (AMSTAR) was used, which submits 14 items of methodological quality assessment, without establishing cut-off points[18].

The level of evidence from the studies was categorized according to the recommendations of the Agency of Healthcare Research and Quality (AHRQ), with level 1 being a systematic review or meta-analysis of controlled clinical trials; level 2, a well-designed randomized controlled clinical trial; level 3, a controlled clinical trial without randomization; level 4, a well-designed cohort or case-control studies; level 5, a systematic review of qualitative and descriptive studies; level 6, descriptive or qualitative studies, and level 7, expert opinion[19].

Data was transferred to a synoptic table for knowledge synthesis. For analyzing the information, the *Microsoft Excel*

2013 program was used, having performed simple descriptive statistics, submitting absolute numbers and percentages. The results of the studies included in the review were coded for similarity and subsequently analyzed by content categorization, making it possible to develop a narrative synthesis.

This study did not involve research with human beings, exempting it from approval by the Research Ethics Committee (REC).

RESULTS

The final sample consisted of 10 articles published in the four databases evaluated, mainly in Scopus (60%) and in Web of Science (30%). Only 1 (10%) study captured in LILACS met the inclusion criteria.

The majority (70%) of the articles was published in the English language. The origin countries of the publications were the following: Brazil (20%), Africa (10%), Germany (10%), Australia (10%), Colombia (10%), United States (10%), Netherlands (10%), and Iran (10%). Only one study (10%) was conducted simultaneously between the countries of Europe and Asia. Regarding the field of knowledge, all (100%) of the journals were in the health area, namely: PLoS ONE (20%), American Journal of Infection Control (10%), BMJ Open (10%), Colombia Medical (10%), Infection, Disease and Health (10%), International Journal for Quality in Health Care (10%), Iranian Red Crescent Medical Journal (10%), *Revista da Escola de Enfermagem da USP* (10%), and *Revista de Saúde Pública* (10%) (Table 1).

With a balance between the years of publication, the years with the greatest number of publications were 2016 (20%), 2015 (20%), and 2014 (20%). In 2013, no articles were captured in the selected databases. Despite searches in the literature, no explanation was found for the reasons. Regarding the design, it is highlighted that, mostly, the studies were cross-sectional and descriptive (60%), and had health services as the study scenario (80%). All (100%) of the studies showed high methodological quality, but with low levels of evidence (Chart 1).

As for the topics covered, most of the articles included at least one quality component related to the HICP, with three categories of analysis emerging: (1) structural elements of hospital infection control programs (2) considerations on process evaluation in infection control and (3) the influence of the outcome component as a strategy for improving the HICP.

Structural elements of hospital infection control programs

Most of the studies (70%) addressed the structural aspects of hospital infection control programs[20–21,23–25,28–29]. The physical facilities, the organizational characteristics, and the human and material resources were highlighted among the publications.

Two articles showed several weaknesses attributed to the HICP of the African countries, highlighting the inadequate infrastructure for the prevention and control of HCRIs[24,28]. The authors described that only 13% of the services had an active HICC, 11% still recycled procedure gloves and that just over half (52%) had running water and appropriate supplies for hand hygiene[28].

A number of studies carried out in Brazil showed good performance in the evaluation of the parameters of the technical-operational structure, finding compliance rates that varied from 80 to 100%[20,29]. However, there was certain lack of data on the quality of the HICP from institutions in the Unified Health System (*Sistema* Único *de Saúde*, SUS) network. These successful results diverged from a survey conducted in the countries of Europe and Asia, which indicated opportunities for improvement in relation to the use of Personal Protective Equipment (PPE) and of the isolation areas [21].

Regarding human resources, 30% of the articles explained the need to expand the number of infection controllers to meet the organizational demands[21,23,25]. Two studies recommended the adequacy of the number of these professionals according to the proportion of the number of beds[23,25].

Considerations on the evaluation of the infection control process

Most of the studies (60%) highlighted some operational actions for the prevention and control of infection[20,25–29]. Brazilian researchers observed that the process of the implanted routines was not uniform among the evaluated hospitals[20]. Other data emphasized the small number of professionals with specific qualifications, generating inconsistencies in compliance with published guidelines[27].

In Colombia, 65% of the HCRI surveillance activities are carried out in a combined manner, using the active and passive surveillance format. In addition, it was perceived

Table 1 – Characterization of the studies included in the integrative literature review. Brazil, 2009-2019 (n=10).

Variables	n	%
Language		
English	7	70.0
Portuguese	2	20.0
Spanish	1	10.0
Country of study		
Africa	1	10.0
Germany	1	10.0
Australia	1	10.0
Brazil	2	20.0
Colombia	1	10.0
United States	1	10.0
Eurasia*	1	10.0
Netherlands	1	10.0
Iran	1	10.0
Journals		
American Journal of Infection Control	1	10.0
BMJ Open	1	10.0
Colombia Médica	1	10.0
Infection, Disease and Health	1	10.0
International Journal for Quality in Health Care	1	10.0
Iranian Red Crescent Medical Journal	1	10.0
PLoS ONE	2	20.0
Revista da Escola de Enfermagem da USP	1	10.0
Public Health Magazine	1	10.0
Knowledge Area		
Health	10	100.0

Source: Research data, 2009-2019.
*Eurasia = European and Asian countries (Turkey, Pakistan, Russia, Georgia, Kosovo, Bulgaria, Oman, Iran, India, and Kazakhstan).

Author and year	Design and scenario	Methodological quality and level of evidence	Main highlights
Giroti et al., 2018[20]	Cross-sectional and descriptive n=14 (Health Care Services)	Score 9/10 (high); Level 6	The indicators referring to the technical-operational structure and the epidemiological surveillance system for infection had better compliance: 80.58% and 81.59%, respectively. However, the indicators on the operational guidelines and the prevention and control of infection were not satisfactory, showing that there is no uniformity in the routines implemented in hospitals.
Fletcher et al., 2017[21]	Cross-sectional, descriptive n = 23 (Health Services)	Score 9/10 (high); Level 6	The authors highlighted opportunities for improvement in relation to the structure, emphasizing the use of PPE, isolation for confirmed cases, and an adequate number of professionals. In addition, they recommended additional audits to guarantee the quality of the national programs.
Arefian et al., 2016[22]	Systematic review n=27 (Studies)	Score 14/14; Level 5	Since 2009, the number of publications on HCRI prevention programs has increased; however, there has been no improvement in the quality of these studies. The authors reinforce the importance of making investments in the HICPs to reduce unnecessary expenses resulting from infectious events.
Mitchell et al., 2016[23]	Cross-sectional, descriptive n = 40 (HICCs)	Score 9/10 (high); Level 6	In Australia, approximately 1,675 hours are spent on the HCRI surveillance process, which increases as the number of beds goes up. For the authors, the success of the surveillance program depends on the ability to provide information to those who can implement changes and act as an incentive for continuous team participation.
Van Mourik et al., 2015[24]	Systematic review n = 35 (Studies)	Score 10/14; Level 5	In Africa, little has been invested in the HICP. Improper infrastructure, inadequate infection prevention practices, as well as lack of laboratory input negatively influence the indicators, generating underreporting.
Hernández-Gómez et al., 2015[25]	Descriptive n = 23 (Health Services)	Score 9/10 (high); Level 6	Regarding the structure, it is necessary to increase the proportion of professionals per number of beds. In the process evaluation, it is highlighted that 65% perform the surveillance of HCRIs in a combined way (active and passive), using the NHSN criterion of the CDC, from the United States. The HCRI results are compiled into a specific software; however, it could achieve greater adherence to an active, standardized and prospective surveillance model.

Chart 1 – Synoptic chart with the description of the variables of the articles included in the integrative review. Brazil, 2009-2019 (n=10)

Author and year	Design and scenario	Methodological quality and level of evidence	Main highlights
Shojaee et al., 2014[26]	Cross-sectional, descriptive n = 23 (Health Services)	Score 9/10 (high); Level 6	Six sessions related to the HICP were evaluated: leadership and programming; program focus; isolation methods; health and hand protection techniques; improvement in safety and quality of patients and staff training, where most items presented adequate conditions, with compliance records above 77%, except for isolation methods (67.4%).
Stone et al., 2014[27]	Cross-sectional, descriptive n = 3,374 (Health Services)	Score 10/10 (high); Level 6	The authors showed that there are few professionals working at the HICC with specific degrees and these are not consistent with the published guidelines. It is added that little time is invested in health education to prevent infection.
Friday et al., 2012[28]	Cross-sectional Descriptive n = 63 (Health Services)	Score 8/10 (high); Level 6	About the structure, only 13% of the services had HICC, 52% of the locations had running water in 24 hours, few supplies were available for hand hygiene, and 11% still recycled gloves. Regarding the process component, 63% reported having infection control procedures and 33% said they had a training program.
Silva et al., 2011[29]	Methodological and descriptive study n = 50 (Health Services)	Score 8/10 (high); Level 6	The "structure" and "epidemiology" indicators showed 100% compliance for almost all the assessments. The greatest conformities, with statistical significance, were in the group of institutions with qualification or accreditation processes in health.

Chart 1 – Cont.
Source: Research data, 2019.
Note: HICC = Hospital Infection Control Commission; CDC = Centers for Disease Control and Prevention; NHSN = National Healthcare Safety Network.

that most of the 23 health services evaluated follow the NHSN methodology of the CDC, from the United States[25].

Three articles included in this integrative review suggested improvements in relation to the health education process carried out by the HICC[26–28]. In the United States, the researchers concluded that little time is invested in qualifications and training[27]. Corroborating this, it is highlighted that only 33% of the health services in Nigeria have an active training program and not more than 11% investigate maternal deaths related to infection[28].

The influence of the outcome component as a strategy to improve the HICP

In their systematic review, the authors reinforced the importance of investments in the HICP to improve the quality of infectious indicators[22]. A multicenter study showed that the success of the program depends on the ability to provide information to the managers that can promote changes and act as an incentive for continued participation in infection control actions[23]. However, the outcome component was not emphasized among the other articles in this review.

Two studies showed compliance rates above 77% related to the HICP results, attributing the best outcomes to institutions with qualification or accreditation processes in health[26,29]. A suggested improvement recommended for the success of the HICP refers to conducting additional audits to ensure the quality of the infection indicators[21].

DISCUSSION

The scope of the HICP must establish a minimum structure necessary for the prevention and control of the HCRIs. The studies that evaluated the infrastructure characteristics

showed that there is no minimum quality standard recommended among the health services[20–21,23–25,28]. This occurred mainly in developing countries that presented the greatest precariousness of this evaluation component[24].

In the African countries, the researchers raised several weaknesses attributed to the HICP, highlighting the low investment in systemic actions that reduce the incidence and magnitude of infectious diseases[24,28]. It is known that the best care practices are ensured through compliance with the current guidelines, emphasizing hand hygiene, the use of PPE, and the adequate training of human resources[30].

The structural elements impact on the success of prevention and infection control actions, where it was possible to survey in the literature that national hospitals need to adapt the physical space due to the fact that they share the same location with other administrative sectors[20]. This data contradicts the recommendations described in the current legislation on the obligation to provide all the necessary resources for the performance of the HICC[6].

With regard to human resources, the researchers from Australia measured the time spent on the surveillance of HCRIs and pointed out that 1,675 hours are spent on this activity in the total of 4,653 hours[23]. Corroborating this, the authors indicated that the appropriate proportion of infection controllers should be established according to the size of the hospital[25]. Epidemiological surveillance activities, outbreak investigations, training, and qualifications only happen properly when there are enough professionals to carry out the planned actions[31].

In Brazil, the HICC's operational guidelines and specific activities still need to be improved among the services[20]. It is noteworthy that the success of infection prevention and control actions includes the involvement of all the professionals, patients, and family members[11]. Quality assurance in health requires commitment, dedication, implementation of good practices, and constant updates by the multidisciplinary team. One of the challenges is to ensure that process measurement is widely encouraged, even in health services with low financial investment.

In this sense, the focus of Brazilian studies on structural and process evaluations is highlighted, mainly in the survey of indicators of permanent education as a quality requirement for preventing HCRIs[7–9]. Moreover, the organizational context does not contribute to the success of the program, and there are still difficulties in implementing the recommendations and weaknesses in the implementation of patient safety policies[10–12].

In the United States, although the network of hospitals performs satisfactorily in relation to the HICP, the time invested in training that prevents, for example, urinary tract infection, is still limited[27]. A study carried out in Nigeria showed a deficit in a training program for infection control in maternity hospitals[28]. In this context, infection controllers are committed to reducing HCRIs by using health education actions with the professionals. There are several strategies that can be used in the practice to stimulate the team, highlighting parodies, posters, phrases permeated with a touch of humor and even information technology software, which makes the working hours of the professionals involved more flexible[32].

The result of the actions developed by the HICC with a view to reducing the incidence of the HCRIs impacts on the quality indicators, considered an important component that reflects the care provided by the team[33]. The indicators envisage the excellence of care and provide better organizational outcomes; however, from the point of view of the studies included in this review, this component did not stand out much.

Through infectious indicators, it is possible to measure the quality of the interdisciplinary care provided to the patient and to detect possible failures related to work processes[33]. A systematic review stated that investments made in the HICP provide improvements in institutional results[22]. Furthermore, the incentive of the health managers to carry out the actions planned by the HICC was considered a factor that contributes to the promotion of the set of actions developed by the program[23].

A number of studies have recommended additional audits and health accreditation processes aimed at improving indicators through systematic actions developed by the HICC[21,29]. Among the various benefits of hospital accreditation, the changes in the behavior of the professionals and in patient satisfaction stand out. In this sense, the organizational advances resulting from this process contribute to better decision making, thus guaranteeing patient safety[34–35].

This study represented an advance for teaching and research because the elaboration stages were developed with methodological rigor, using instruments validated in the literature that allowed for a more critical assessment of the studies included in this review. In addition, understanding the quality components of the hospital infection control programs will contribute to the planning of systematic actions that seek innovation in the practice of health professionals, providing safe and harm-free care.

As limitations of the study, it is highlighted that the time delimitation may have contributed to the non-inclusion of articles that answer the research question, which may be published before the defined period. Moreover, there were no interpretations by the researchers during the categorization

of articles, explaining only the results of the studies captured in the strategy for retrieving scientific information.

CONCLUSION

In this study, it was possible to analyze the hospital infection control programs in relation to the quality components, highlighting the need to improve the structure, process, and outcome. It was observed that the organizational characteristics are diversified among the countries, that the activities developed do not comply with the evidence-based guidelines, and that there is still a need to emphasize infection indicators that reflect the excellence of patient care.

In general, it is highlighted that the actions developed by the HICP have great variation in the literature, presenting suggestions for improvements to be worked on by the health managers to reduce the magnitude of the HCRIs. It is hoped that this study has provided subsidies that contribute to the construction of new guidelines and recommendations linked to the theme.

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