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Quality improvement project to reduce infection indicators in intensive care

Projeto de melhoria de qualidade para redução dos indicadores de infecção em terapia intensiva

Proyecto de mejora de la calidad para reducir los indicadores de infección en cuidados intensivos

Danielle de Mendonça Henrique[a]
Sarah Cristina Fonseca de Souza Mousinho Barreto[b]
Flavia Giron Camerini [a]
Cintia Silva Fassarella[a]
Vivian Shutz[c]
Juliana Rodrigues Alves[a]

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ABSTRACT

Objective: To analyze incidence density indicators of healthcare-associated infections before and after implementation of a quality improvement project in an intensive care unit.

Method: A quasi-experimental study, conducted between January 2017 and December 2020, included the period before and after the implementation of a quality improvement project to reduce infection incidence density indicators in an intensive care unit of a hospital in Rio de Janeiro. Data were collected in 2022 from the database of the Hospital Infection Control Commission and analyzed through time series.

Results: After the project, the incidence density of ventilator-associated pneumonia decreased from 28.3 cases/1000 ventilator days to 16.5; bloodstream infections decreased from 20.8 cases/1000 catheter days to 7.5; and urinary tract infections decreased from 2.8 cases/1000 indwelling bladder catheter days to zero.

Conclusion: The quality improvement project had an impact on the reduction of infection incidence density indicators, reinforcing the importance of epidemiological surveillance in directing actions aimed at improving quality and patient safety.

Descriptors: Infection control; Quality indicators health care; Patient safety; Nursing; Intensive care units.

RESUMO

Objetivo: Analisar os indicadores de densidade de incidência de infecções relacionadas à assistência à saúde antes e após a implementação de um projeto de melhoria da qualidade em uma unidade de terapia intensiva.

Método: Estudo quase-experimental, realizado entre janeiro de 2017 e dezembro de 2020, que compreendeu o período antes e após a implementação de um projeto de melhoria da qualidade para redução dos indicadores de densidade de incidência de infecção em uma terapia intensiva de um hospital do Rio de Janeiro. Os dados foram coletados em 2022 a partir do banco de dados da Comissão de Controle de Infecção Hospitalar e analisados por séries temporais.

Resultados: Após o projeto, a densidade de incidência de pneumonia associada à ventilação mecânica diminuiu de 28,3 casos/1000 dias de ventilação mecânica para 16,5; infecção de corrente sanguínea caiu de 20,8 casos/1000 dias de cateter para 7,5 e infecção de trato urinário, de 2,8 casos/1000 dias de cateter vesical de demora para zero.

Conclusão: O projeto de melhoria da qualidade impactou na redução dos indicadores de densidade de incidência de infecções, reforçando a importância da vigilância epidemiológica no direcionamento de ações voltadas para melhoria da qualidade e segurança do paciente.

Descritores: Controle de infecções; Indicadores de qualidade em assistência à saúde; Segurança do paciente; Enfermagem; Unidades de terapia intensiva.

[a] Universidade do Estado do Rio de Janeiro, Faculdade de Enfermagem, Programa de Pós-Graduação em Enfermagem, Rio de Janeiro, Rio de Janeiro, Brazil.

[b] Universidade do Estado do Rio de Janeiro, Hospital Universitário Pedro Ernesto, Rio de Janeiro, Rio de Janeiro, Brazil.

[c] University of Central Florida, Academic Health Sciences Center. Orlando, Florida, USA.

RESUMEN

Objetivo: Analizar los indicadores de densidad de incidencia de infecciones relacionadas con la atención sanitaria antes y después de la implementación de un proyecto de mejora de la calidad en una unidad de cuidados intensivos.

Método: Estudio cuasi-experimental, realizado entre enero de 2017 y diciembre de 2020, abarcando el período anterior y posterior a la implementación de un proyecto de mejora de la calidad para reducir los indicadores de densidad de incidencia de infecciones en una unidad de cuidados intensivos de un hospital de Río de Janeiro. Los datos fueron recogidos en 2022 a partir de la base de datos de la Comisión de Control de Infecciones Hospitalarias y analizados por series temporales.

Resultados: Después del proyecto, la densidad de incidencia de neumonía asociada al ventilador se redujo de 28,3 casos/1000 días de ventilador a 16,5; la infección del torrente sanguíneo se redujo de 20,8 casos/1000 días de catéter a 7,5 y la infección del tracto urinario, de 2,8 casos/1000 días de catéter vesical permanente a cero.

Conclusión: El proyecto de mejora de la calidad repercutió en la reducción de los indicadores de densidad de infecciones, lo que refuerza la importancia de la vigilancia epidemiológica para orientar las acciones encaminadas a mejorar la calidad y la seguridad de los pacientes.

Descriptores: Control de infecciones; Indicadores de calidad de la atención de salud; Seguridad del paciente; Enfermería; Unidades de cuidados intensivos.

INTRODUCTION

Healthcare-Related Infections (HAIs) are considered adverse events (AEs) because they are preventable and closely related to the conduct of healthcare professionals[1]. They are indicators of health care quality and patient safety, directly impacting on the increase in hospitalization time, mortality rates and antimicrobial resistance[2]. Every year, hundreds of millions of patients are affected worldwide, with records of a progressive increase of 0.06% per year in the global prevalence rate of HAIs, measured at 0.14%[3].

In Intensive Care Units (ICUs), the risk of acquiring HAIs is increased due to the characteristics of critically ill patients, which include immunosuppression, metabolic alterations and the use of invasive devices. A multicenter study with longitudinal follow-up of patients in ICUs in 88 countries showed an in-hospital mortality rate of 30% in patients with suspected or proven infection. A multilevel analysis found that ICU-acquired infection was associated with a higher risk of mortality compared to community-acquired infection (odds ratio [OR], 1.32 [95% CI, 1.10-1.60]; P = 0.003)[4].

HAIs represent a significant economic impact for health systems[5]. Long hospital stays are an important indicator when it comes to the costs of infections[6]. In the event of infection, the length of stay can be increased by around 8 days, while a 10% reduction in the incidence of HAIs can result in the availability of 5,800 bed-days[7].

Considering the magnitude of the problem of HAIs and their negative impact on health services around the world, strategies that contribute to a culture of patient safety have been recommended; above all, the implementation of quality improvement projects, as it is a short-term collaborative approach that favors learning through contact with experienced teams and professionals, using structured, systematic and auditable methodologies in search of improvements in patient care, filling the gaps between the best available scientific evidence and bedside care[8].

A qualitative systematic review showed that quality improvement projects help to strengthen the safety culture and the practice of qualified and effective care[9]. A study that analyzed the implementation of improvement projects in 116 Brazilian ICUs identified a significant impact on the incidence of HAIs, with a 43.5% reduction in Primary Bloodstream Infection (PBI), a 52.1% reduction in Ventilator-Associated Pneumonia (VAP) and a 65.8% reduction in Catheter-associated urinary tract infection (CAUTI), preventing a total of 5140 infections[8].

A quasi-experimental study carried out in five clinical-surgical ICUs in the northeast region of Brazil showed that the implementation of the quality improvement project reduced 33.8% of VAP cases and 45% of PBIs[10]. Another publication highlights that quality improvement projects can lead to a reduction in sepsis mortality and improved adherence to infection prevention packages[11].

HAIs are preventable in 55 to 70% of cases. There is evidence that health professionals have available knowledge about prevention measures; however, this knowledge does not predict adherence and compliance with good practices, as it can be influenced by length of experience, training and updating of knowledge anchored in the best evidence[12].

In view of the above, it is important that intervention actions to reduce the incidence of HAIs in ICUs are anchored in the systematic approach of a quality improvement model, as proposed by the Institute for Healthcare Improvement (IHI)[13]. It is considered that this approach contributes to sustaining satisfactory health outcomes and a better patient experience, resulting

in changes in the behavior of health professionals and institutions[14].

This study therefore posed the following research question: what is the effect of implementing a quality improvement project on the incidence of HAIs in the ICU? In order to answer this question, the aim of the study was to analyze the incidence density indicators of healthcare-related infections before and after the implementation of a quality improvement project in an intensive care unit.

METHOD

This is a quality improvement study with a quasi-experimental design, in line with the recommendations of the Revised Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) guideline[15].

We analyzed HAI incidence density indicators from January 2017 to December 2020, before (Phase 1) and after (Phase 3) the implementation of a quality improvement project to reduce HAIs in an adult ICU of a General Hospital in Rio de Janeiro, RJ, Brazil. This period was limited to the implementation of the project entitled "Health in Our Hands - Improving Patient Safety on a Large Scale in Brazil". It was an initiative of the Ministry of Health, which aimed to implement new strategies, based on staff training, changes in practices and, above all, working with hospital units to reinforce the safety culture anchored in the IHI methodology, which took place between 2017 and 2020 in the study setting.

Data was collected in July and August 2022. The indicators were obtained from the database of the Hospital Infection Control Commission (HICC), following the recommendation of the National Health Surveillance Agency (ANVISA), which includes HAI indicators as compulsory notification. The indicator analyzed in the study was the Incidence Density (ID), which is calculated by the ratio of the number of infections with patients or devices-day, multiplied by 1,000. Thus, it was calculated for PBI, VAP and CAUTI[16].

The study was carried out in three phases: The first phase was considered the baseline, aimed at situational diagnosis of the problem. The second phase was the intervention (2018 and 2019) and the third phase was the analysis of the impact of the intervention on quality indicators (2020).

In phase 1, the project's management team took part in training offered by the "health in your hands" project to get to grips with the IHI methodology. This team was made up of the coordinator of the quality and patient safety center and the heads of nursing, medicine and physiotherapy at the ICU. For a year (2017), these managers led systematic meetings with other managers from different sectors of the hospital who were directly or indirectly involved in the prevention and control of HAIs (warehouse, pharmacy, management, ICHR, nursing management). This year's HAI incidence density indicators were analyzed and the weaknesses in care processes were identified. At this stage, a situational diagnosis was carried out and the quality improvement project was drawn up, based on a quality tool called the steering diagram, which structured the main guidelines for change actions. The goal was to reduce the incidence density of HAIs by 50% by December 2020 and, in order to achieve this goal, the diagram's primary drivers were drawn up based on the quality assessment triad proposed by Donabedian (Structure, Process and Results), shown in Figure 1[17].

Key processes to improve the results of infection indicators were reviewed, including the bundles for inserting and maintaining central venous and indwelling bladder catheters. In addition, the safety huddle was implemented with aspects centered on infection prevention, which consisted of an objective, daily meeting held at the bedside by the multidisciplinary team, which allowed for the discussion of problems and the definition of strategies to resolve them effectively.

Phase 2 is the intervention, *i.e.* the implementation of the quality improvement project using the multivariate strategies presented below. Initially, multi-professional working groups were set up with the care team, forming the VAP, PBI and CAUTI teams. In each group, the Ishikawa or Fishbone Diagram quality tool was applied, which guided the identification and organization of the most critical factors contributing to the incidence of each of the HAIs in the ICU. Once the problems had been identified, the group debated ideas for intervention and outlined actions based on changes to care processes anchored in scientific evidence, such as optimizing the placement of the date on equipment and cannulas, monitoring dressing changes and elevating the headboard 30º to prevent VAP, using a form to pass the safety huddle, delimiting the height of the diuresis

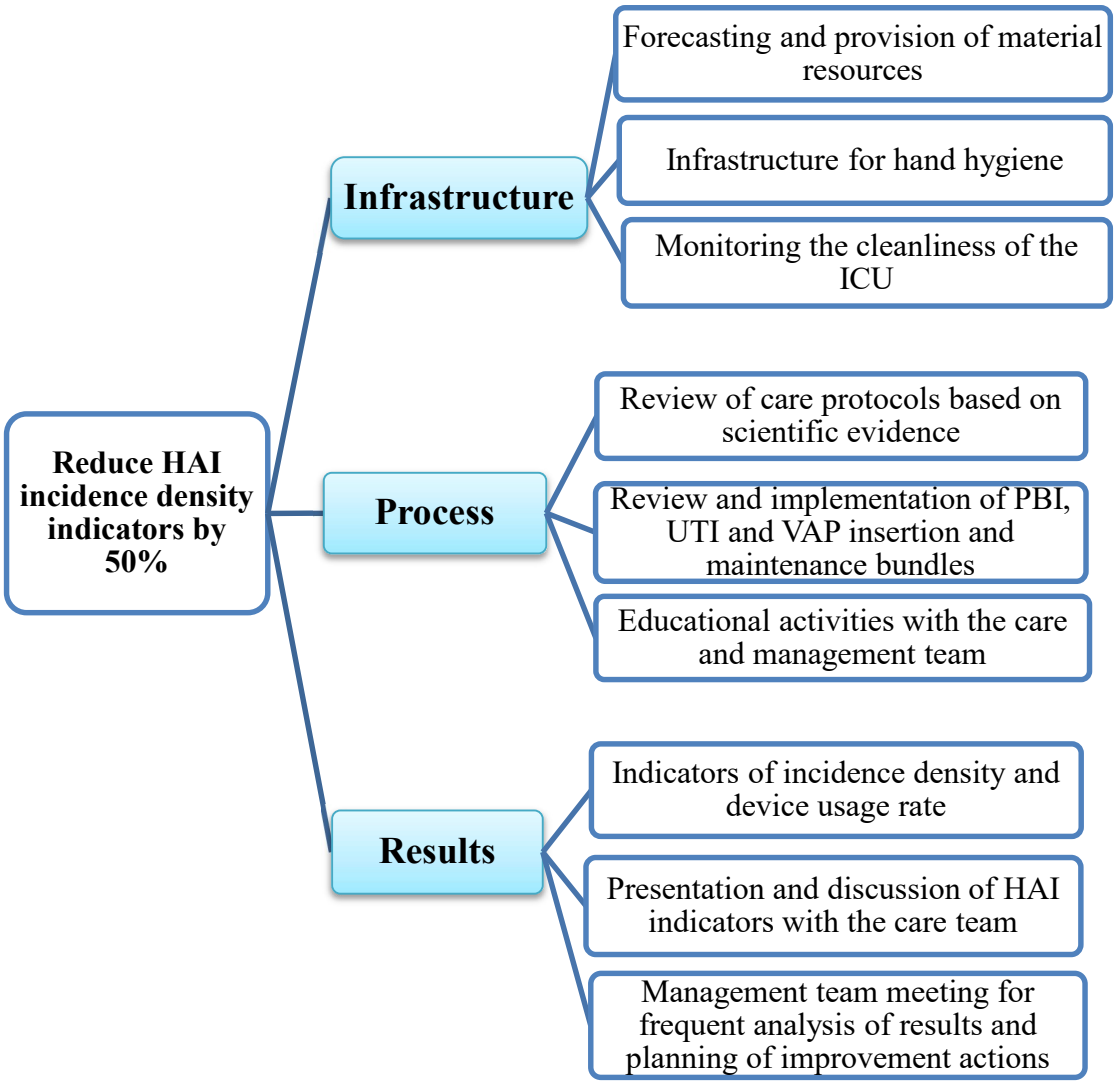


Figure 1. Guiding Diagram - Strategies implemented to reduce HAI incidence density indicators. Rio de Janeiro, RJ, Brazil, 2023.
Source: Prepared by the authors. Adapted from the Patient Safety Essentials Toolkit by the Institute for Healthcare Improvement (IHI)[17].

collector from the floor, among other actions. To test the applicability of the strategies that emerged, another quality tool was used - plan-do-study-act (PDSA).

The actions implemented during the intervention included educational activities using active methodologies. Gamification was carried out with a question-and-answer game to prevent UTIs and a simulated scenario was developed to implement the catheter insertion bundle. Another highlight of the project was the presentation of HAI incidence indicators. Monthly meetings were held with the care team to analyze the project, encouraging positive results and discussing negative ones with the team, with a view to developing new improvement strategies to be tested. These meetings encouraged participation in the change process.

The analysis of the indicators in the pre- and post-intervention phases was based on time series, organizing the quantitative sequences of indicators according to their distribution over time in order to identify trends in their occurrence[18].

The incidence density indicators were distributed in a trend graph, since it is a simple analytical tool, widely used for quality improvement, which helped to identify the behavior of HAIs in the period studied, allowing a temporal (analytical) view versus a static (numerical) view of the data, and can be the first step in planning a care improvement project.

To construct the trend graphs, the median was taken as the central line, as this measure is not influenced by extreme values in the data, and is a guideline for analyzing the increase or decrease in HAIs in the unit studied[19].

To analyze the graphs for evidence of non-random patterns in the data based on an error of $p < 0.05$, this study used the recommendations of the Quality Health Care indicator development and use guide, which considers four main rules: (a) a positive or negative change is only considered if the graph shows six consecutive points above or below the median; (b) five consecutive points above or below the median indicate a trend; (c) the number of times the line crossed the median identifies heterogeneity in the data, and may reflect a need for specific interventions; (d) astronomical, unusually high or low points may signal some random event outside the pattern that should be investigated by the healthcare team[20].

In compliance with Resolution No. 466/2012 on research involving human beings, the study was submitted to and approved by the Research Ethics Committee, under substantiated opinion No. 5.997.457/2023.

RESULTS

High rates of HAI incidence density were identified in the period before the intervention. There were 34.0 cases of VAP per 1000 days of mechanical ventilation and 18.8 cases of PBI per 1000 days of central venous catheter. With regard to CAUTI, the incidence density before the intervention was 2.8 cases/1000 days of indwelling bladder catheter (IBC). Table 1

The objective of the quality improvement project was to reduce the median incidence density of HAIs in the ICU by 50% after the intervention. The target was achieved most robustly in the incidence of SSTI, which reduced the median by 77.6% during and after the intervention. As for CAUTI, the improvement project brought cases of this infection to zero in the study ICU. VAP proved to be the infection with the greatest difficulty in maintaining the improvement; although it showed a reduction, the variability of the indicator is expressed by the value of the standard deviation.

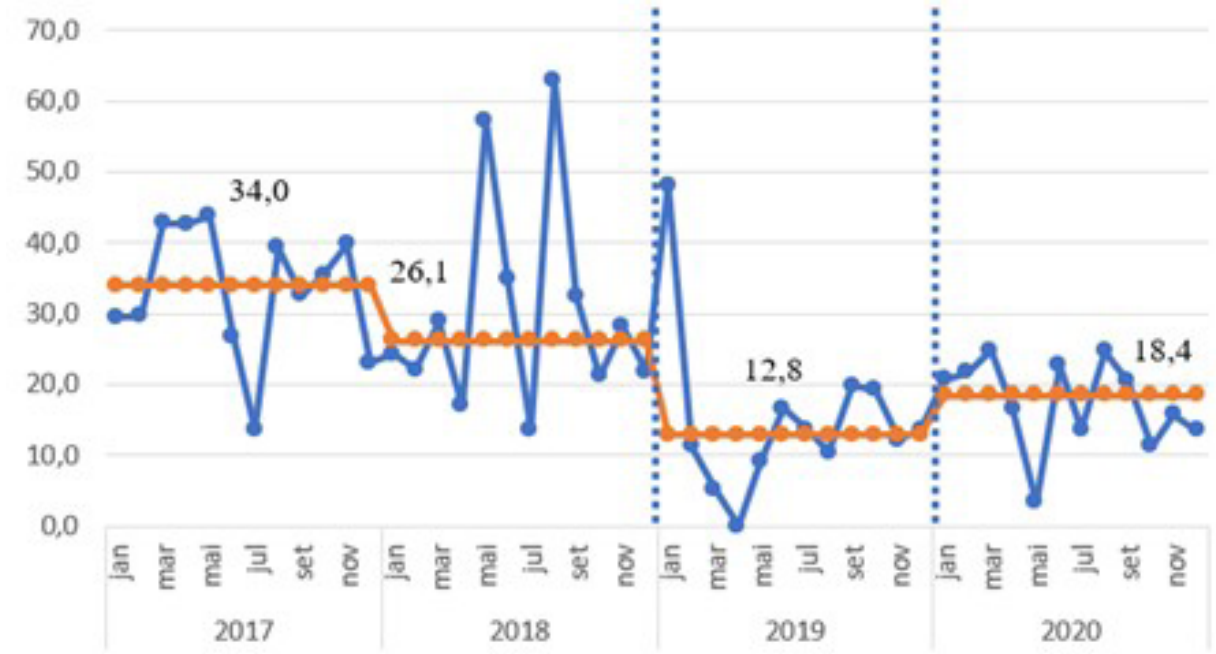
Graph 1 shows the trend in VAP incidence density, highlighting the heterogeneity of this indicator over the study period. In the period before the intervention, 2017 had a median of 34 cases/1000 days of MV (Mechanical Ventilation) and in 2018 the median was 26.1 cases/1000 days of MV and did not show a continuous pattern. In 2019, the year in which the improvement project was implemented, between February and June, there was a tendency for the indicator to improve, since for five consecutive months the indicator remained below the median and in July this improvement was installed, represented by six consecutive points below the median, which was maintained in consecutive months, reducing the baseline to 12.8 cases/1000 MV days.

In 2020, after the implementation of the improvement project, there was an increase in the indicator's baseline (median) to 18.4 cases/1000 MV days. It is suspected that this increase may be related to hospitalizations for COVID-19 and its ventilatory repercussions and consequent impact on mechanical ventilation time. In short, during the intervention the improvement project's target was achieved, with a reduction in VAP

Table 1. Comparison of indicators of incidence density of Healthcare-Related Infections. Rio de Janeiro, RJ, Brazil, 2023.

Indicators	Before the Intervention (2017)				After Intervention (2020)			
	Mean (SD†)	Median	P 25	P 75	Mean (SD†)	Median	P 25	P 75
ID* PAV	34.1 (9.1)	34.0	21.3	42.6	17.9 (6.3)	18.4	14.1	22.4
ID *PBI	19.5 (5.0)	18.8	16	22.2	5.3 (3.5)	4.2	3.7	5.6
ID* CAUTI	2.9 (2.4)	2.8	-	4.8	-	-	-	-

*ID – Incidence Density
†SD – Standard Deviation
- Numeric data equal to zero, not resulting from rounding
Source: prepared by the authors, 2023.



Graph 1. Trends in the Incidence Density of Pneumonia Associated with Mechanical Ventilation in the period 2017-2020. Rio de Janeiro, RJ, Brazil, 2023.
Source: Prepared by the authors.

of 62.3%, but this percentage was not sustained and the reduction at the end of December 2020 was 45.9%.

Analysis of the trend in UTI incidence density showed that this infection is infrequent in the unit studied. After the intervention, the median was reduced from 2.8 cases per 1000 days of DBC (delayed bladder catheter) to zero, *i.e.* the tendency is not to have this type of infection. It should be noted that, before the changes proposed by the improvement project, several astronomical points were identified, such as the maximum value of 7.50 cases/1000 days of DBC in July 2018, which can be attributed to isolated cases of CAUTI, which did not impact on the central trend of the behavior of this infection, but which demonstrate a certain heterogeneity of the data, as can be seen in Graph 2.

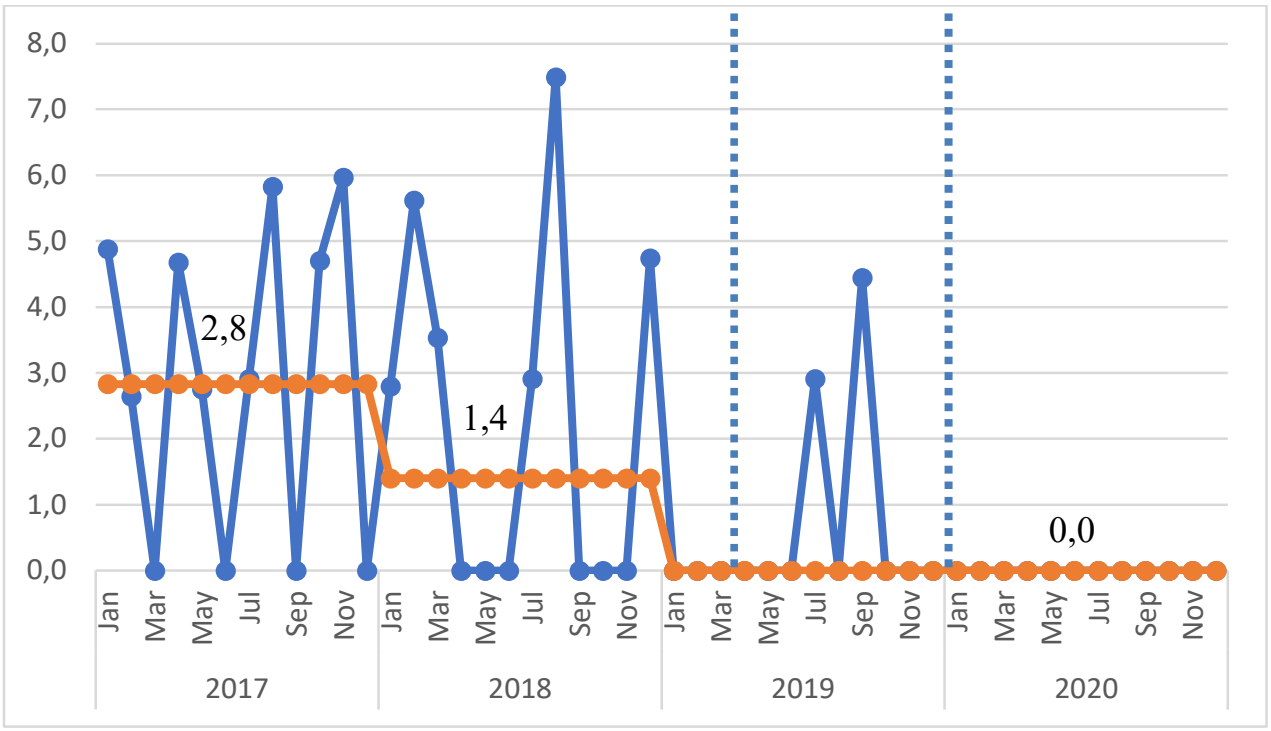
Graph 3 shows the trend in the incidence density of PBI in the ICU studied. This indicator was significantly impacted by the improvement project, with a significant 77.6% reduction in the PBI incidence rate. The median before the intervention was calculated at 18.8 cases/1000 CVC days in 2017 and 20.8 cases/1000 CVC days in 2018, and in the year the project was implemented, 2019, this indicator fell to 7.5 cases/1000 CVC days. It is noteworthy that the indicator established an improvement in May 2019, when it obtained six consecutive points below the central line, which reduced further in 2020.

DISCUSSION

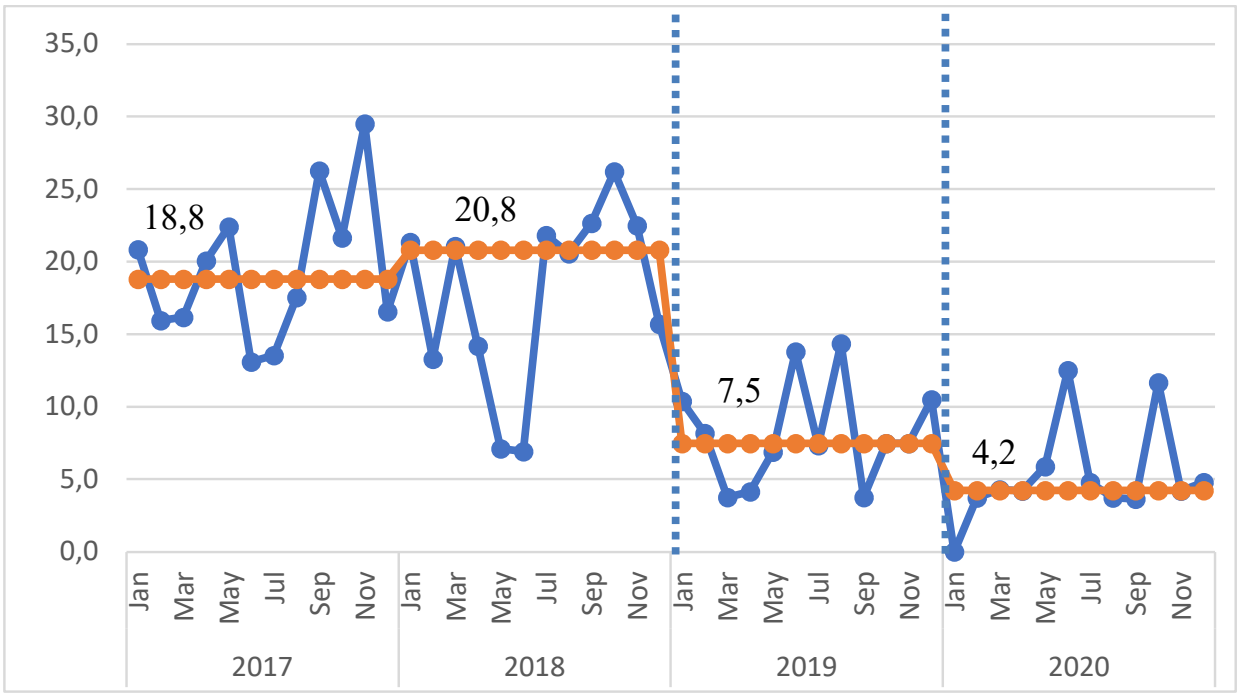
From the analysis of the HAI Incidence Density results, there has been an improvement in the incidence of VAP and SSTI, with VAP being the most prevalent infection, and that CAUTI does not have a high incidence in the unit studied.

Monitoring HAI indicators can be used not only to track internal performance, but also to compare local data with national and international references. In this way, benchmarking these indicators can contribute to comparing current results with local data or comparing different ICUs in the same hospital or with other units that carry out similar activities, usually with higher standards[21].

When comparing the median incidence density of VAP, CAUTI and PBI, from 2017 to 2020, with data from the Patient Safety and Quality in Health Services Bulletin No. 20 published in 2020, it was observed that only the incidence density of CAUTI was lower than the national data. Even after the intervention and reduction in the incidence of VAP, the rate of 18.4 cases/1,000 MV days achieved by the project is higher than the national rate of 11.50 cases/1,000 MV days[22]. This may be due to the profile of ICU patients, since patients with many comorbidities, especially neurological, cardiorespiratory and COVID-19 diseases, are associated with a higher rate



Graph 2. Trends in Urinary Tract Infection Incidence Density in the period 2017-2020. Rio de Janeiro, RJ, Brazil, 2023.
Source: Prepared by the authors.



Graph 3. Trends in the Incidence Density of Primary Bloodstream Infection in the period 2017-2020. Rio de Janeiro, RJ, Brazil, 2023.
Source: Prepared by the authors.

of VAP. Another aspect to be considered is the microbiological profile, since multidrug-resistant microorganisms are responsible for unfavorable outcomes, which contribute to longer mechanical ventilation times[23].

A systematic review that aimed to identify the combined interventions used by ICUs around the world since the implementation of the "Institute for Healthcare Improvement Ventilator Bundle" showed that 22 studies reduced VAP by more than 36%, ten studies showed a drop of more than 65% and four of these studies indicated zero or almost zero after the interventions[24].

A study carried out in 786 ICUs in 37 countries, which aimed to identify the impact of HAIs on ICU mortality, showed that VAP is an independent risk factor for mortality because, despite the implementation of the VAP prevention bundle, this infection has a high prevalence, ranging from 21% to 41%. This can be explained by low adherence to the bundle, which ranges from 15% to 66% in low- and middle-income countries[25]. Barriers evidenced in intensive care services include job insecurity, poor knowledge, negative attitude, insufficient equipment and patient severity, while facilitators were educational training, equipment functioning, adequate staffing, strong leadership and organizational support[26].

International studies show that the implementation of educational strategies to implement the VAP prevention bundle, guided by nurses, has an impact on reducing the incidence density of this infection. One study showed a reduction in the incidence density of pneumonia from 29.3/1,000 to 15.3/1,000 ventilator days and a significant reduction in the risk of developing pneumonia after intervention (RR 0.34, 95% confidence interval 0.19-0.61, p = 0.001)[21]. Another study used a multidimensional approach in 374 ICUs in 35 low- and middle-income countries in Latin America, Asia, Eastern Europe and the Middle East and found a reduction in the incidence density of VAP from 28.46/1,000 ventilator days at the start of the study to 9.68/1,000 ventilator days after 28 months[25].

In Brazil, although adherence to the reporting of HAIs is evolving, there is still a gap in registration in national databases and efforts have been made to improve the reliability of HAI data[22]. A national study evaluating nursing adherence, before and after training health professionals to implement the VAP prevention bundle, identified improvements in positioning the ventilator filter, keeping the headboard elevated, oral hygiene with chlorhexidine and cuff pressure. The incidence density fell from 7.99 to 4.28 infections/1000 days of mechanical ventilation[27].

A study evaluating the quality of the data compiled by the Brazilian HAI Surveillance System between 2012 and 2021 highlights that incidence density indicators can provide valuable guidance for hospital infection prevention and control policies[28]. Another national study that adopted regular monitoring of the actions proposed by the bundle associated with quality improvement models with robust and continuous educational strategies with the multi-professional team showed positive results in reducing VAP[29].

As for the CAUTI incidence density indicator, the values obtained in this study are lower than the national average recorded by ANVISA, which shows rates of 3.1 to 7.4/1,000 CVD days[22]. It should be noted that the results of this indicator may be underestimated. This is due to the fact that ANVISA's criteria for defining CAUTI includes clinical signs associated with complementary tests (qualitative and quantitative urine tests and uroculture) which are not always requested in the study unit. Another issue that may have contributed to the low incidence of the indicator is that many patients screened with uroculture were taking antibiotics before the test was taken, which may have hindered the growth of microorganisms and led to false-negative results[30].

A cohort study carried out in an intensive care unit, the aim of which was to identify factors related to the occurrence of urinary tract infections associated with the use of catheters, showed an incidence density of CAUTIs of 4.8 cases per 1000 days of CVD, highlighting that the majority (80.6%) had no indication for the use of the catheter or prescription for insertion and/or maintenance (86.7%)[30].

Recommendations for preventing CAUTI emphasize that the most effective measures are related to indicating the use of the catheter and removing it as soon as it is no longer necessary. In this sense, the daily assessment of the need for the catheter by the multi-professional team is an efficient strategy for reducing CAUTIs, associated with the measures in the catheter insertion and maintenance bundle[31].

The PBI incidence indicator represented the greatest reduction in HAIs as a result of the quality project implemented. It exceeded the target proposed by the

project - 50% and achieved a reduction in incidence density of 77.6% and still maintained this improvement.

An intervention study in a cardio-intensive care unit reduced the rate of PBI from 3.1/1,000 CVC days to 0.4/1,000 CVC days, increased adherence to the bundle from 64% to 100% and sustained the process. The institution's target was zero catheter infections, with 757 days free of PBI. It is noteworthy that the multidisciplinary approach contributed to promoting a culture of patient safety and the strategies adopted corroborated the actions for change, which included adherence to the bundles, regular meetings with the team and educational activities with simulations[32].

Compared to the international panorama, it can be seen that, in European countries, the PBI incidence density indicator shows an average of 1.9/1000 CVC days, alternating between some countries, such as Scotland (1.7) and Spain (2.6)[33]. Another study carried out in 366 American ICUs with high catheter infection rates did not produce a statistically significant reduction in the indicator, showing that PBI is a problem in both developed and developing countries, which makes it even more necessary to carry out studies on interventions to reduce this event[34].

In addition to the main interventions to reduce the incidence of PBI, which are aseptic insertion bundles and good catheter maintenance practices, an important strategy is to prevent the unnecessary use of CVCs; therefore, a daily assessment of the need to keep the catheter should be carried out. Idle catheters represent a significant risk of infection: 26.2% of catheters are not used after discharge from the intensive care unit (ICU), 63% of patients with CVCs had at least one day of idleness[8].

HAIs are preventable adverse events with a global prevalence of around 7% in developed countries and 15% in underdeveloped countries, and in Brazil the average is around 10.8%[1]. The analysis of HAI indicators can be extremely useful not only to indicate the quality of care provided, but also to guide intervention measures in a more assertive manner in the ICU and consequent planning and implementation of improvements[28].

Planning improvement actions based on the analysis of indicators to contribute to better practices and results in care can be considered a relevant strategy for reducing HAIs in the ICU. Timely and regular feedback on care and quality indicators, such as HAI rates, influences the implementation of and adherence to infection prevention and control measures, and these indicators are considered tools for continuous improvement[28].

Nurses who frequently monitor the overview of HAI indicators in the ICU can be considered a great ally in dealing with these infections, because in addition to being the professional who spends the most time providing direct patient care, they manage several variables that are directly related to indicators of structure, processes and results, such as the management of human and material resources, as well as the implementation of protocols and bundles. It should be noted that the sharing of responsibilities between professionals and the actions to prevent and control HAIs resulting from this behavior have a positive influence on promoting safer and better quality care[35].

The improvement project adopted in the study was successful in reducing HAIs in the ICU, which corroborates the results found in intervention studies that highlight that quality improvement projects are associated with successful experiences in reducing the incidence of HAIs in intensive care units, allowing the implementation of evidence-based practices, engagement of the management and care team, and creating sustainable improvements, with an impact on the culture of patient safety.

The main limitation of this study was the inability to differentiate which elements of the bundles had the strongest effect on the prevention of cases and on the incidence of HAIs, and the analysis based on secondary data may suffer from information bias due to unmeasured variables, such as underreporting, disagreement between pre-determined diagnostic criteria for HAIs, weaknesses in the surveillance system, inadequate access to tests and laboratory results.

CONCLUSION

The monitoring and analysis of HAI incidence density indicators before and after the implementation of a quality improvement project reinforces the importance of epidemiological surveillance in directing actions aimed at the quality of health care. The quality improvement project showed positive results by achieving the goal of reducing the incidence density indicators for VAP, CAUTI and PBI in the ICU by 50%.

The quality tools used in the intervention, such as the steering diagram and PDSA, when implemented with the involvement and effective participation of the care team, proved to be effective. Future research could generate robust evidence to ratify the association between quality and patient safety strategies and the analysis and monitoring of infection indicators in the ICU.

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Availability of data and material

Access to the dataset is available on request from the corresponding author.

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Author contribution

Conceptualization: Danielle de Mendonça Henrique.
Data curation: Sarah Cristina Fonseca de Souza Mousinho Barreto, Juliana Rodrigues Alves.
Formal analysis: Flavia Giron Camerini, Cintia Silva Fassarella, Vivian Shutz.
Acquisition of funding: Danielle de Mendonça Henrique.
Investigation: Sarah Cristina Fonseca de Souza Mousinho Barreto, Juliana Rodrigues Alves.
Methodology: Danielle de Mendonça Henrique.
Project management: Danielle de Mendonça Henrique.
Supervision: Danielle de Mendonça Henrique.
Validation: Danielle de Mendonça Henrique, Sarah Cristina Fonseca de Souza Mousinho Barreto, Flavia Giron Camerini, Cintia Silva Fassarella, Vivian Shutz, Juliana Rodrigues Alves.
Visualization: Danielle de Mendonça Henrique, Sarah Cristina Fonseca de Souza Mousinho Barreto, Flavia Giron Camerini, Cintia Silva Fassarella, Vivian Shutz, Juliana Rodrigues Alves.
Writing - original draft: Danielle de Mendonça Henrique, Sarah Cristina Fonseca de Souza Mousinho Barreto, Juliana Rodrigues Alves.
Writing - review & editing: Flavia Giron Camerini, Cintia Silva Fassarella, Vivian Shutz.

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Corresponding author

Danielle de Mendonça Henrique
danimendh@gmail.com

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João Lucas Campos de Oliveira

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