THE EVALUATION OF THE EFFECTIVENESS OF NOSOCOMIAL INFECTION CONTROL STRATEGIES ON ANTIBIOTIC RESISTANCE ATHOSPITAL X

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ABSTRACT

The primary issue in this study is the high incidence of nosocomial infections, indicating the need to evaluate the effectiveness of infection control strategies. The objective of this study is to analyze the relationship between various infection control strategies and the incidence of nosocomial infections, along with other related factors. The method used is a correlation analysis between infection control strategies, the incidence of nosocomial infections, antibiotic resistance rates, hygiene standards, patient age, patient gender, and the number of beds. The analysis results show a perfect positive correlation between infection control strategies and the incidence of nosocomial infections (r = 1.00), indicating that the implementation of effective strategies can significantly reduce nosocomial infections. A moderate positive correlation was found between infection control strategies and antibiotic resistance rates (r = 0.50) as well as hygiene standards (r = 0.52), suggesting that good strategies can also reduce antibiotic resistance and improve cleanliness. Conversely, the correlation between infection control strategies and the number of beds (r = 0.06) and patient age (r = -0.09) is weak, indicating that these factors do not significantly influence the effectiveness of the strategies. These findings underscore the importance of focusing on hygiene and infection control policies to reduce nosocomial infections and antibiotic resistance.

KEYWORDS

Nosocomial infections, Infection control strategies, Antibiotic resistance, Hygiene standards, Variable correlation

INTRODUCTION

Nosocomial infections, or infections acquired during hospital care, are one of the main challenges in global health management (Lemiech-Mirowska et al., 2021). These infections not only increase patient morbidity and mortality but also have a significant impact on healthcare costs and patients' quality of life(Stewart et al., 2019). Controlling nosocomial infections requires effective strategies to prevent the spread of infections and reduce the risk of antibiotic resistance(Nimer, 2022). Antibiotic resistance, on the other

hand, is an increasingly worsening phenomenon worldwide, threatening the effectiveness of infection treatments and making it an urgent public health issue(Salam et al., 2023). This resistance is often influenced by inappropriate antibiotic use, both in dosage and duration, as well as by hospital infection control policies and practices(Avershina et al., 2021). Hospital X has implemented various infection control strategies to address this issue, including strict infection prevention and control policies, medical staff training, and antibiotic use monitoring. However, the effectiveness of these strategies in reducing the incidence of nosocomial infections and combating antibiotic resistance has not yet been thoroughly evaluated. This study aims to assess how effective the implemented strategies are in controlling nosocomial infections and influencing antibiotic resistance levels at Hospital X. By identifying the strengths and weaknesses of the existing strategies, this study can provide useful recommendations for improving infection control policies and practices, as well as contribute to global efforts to address the antibiotic resistance crisis(Indrayudha, 2012).

This study aims to evaluate the effectiveness of nosocomial infection control strategies on antibiotic resistance at Hospital X, and to provide recommendations for improving infection control policies and practices.

RESEARCH METHOD

This study employs an observational study design with a quantitative approach. Data were collected through the analysis of patient medical records, surveys of medical staff, and laboratory tests to identify nosocomial infections and antibiotic resistance. Statistical analysis was used to evaluate the relationship between infection control strategies and antibiotic resistance.

RESULT AND DISCUSSION

In this study, the variables used include Infection Control Strategies, which encompass prevention policies, staff training, and antibiotic use monitoring, as well as Nosocomial Infection Incidence, which measures the frequency of infections in the hospital. Antibiotic Resistance Rate indicates the extent to which bacteria are resistant to medications, while Patient Age and Patient Gender provide demographic context. The Number of Beds and Hygiene Standards measure the hospital's capacity and facility quality (Table 1).

Table 1. Research Data

Infection Control Strategy	Incidence of nosocomial infections	Antibiotic Resistance Rate	Patient Age	Patient Gender	Number of Beds	Hygiene Standard
Prevention Policy	15	25	65	Men	200	8
Staff Training	10	20	72	woman	150	7
Supervision of Antibiotic Use	20	30	58	Men	180	9
Prevention Policy	12	18	50	woman	220	8
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Supervision of Antibiotic Use	22	30	74	woman	195	9
Prevention Policy	8	23	62	Men	200	7
Staff Training	14	20	70	woman	220	8

The data used in this study (Table 1) involve various variables crucial for analyzing the effectiveness of infection control strategies. The Infection Control Strategies variable includes prevention policies, staff training, and antibiotic use monitoring. Nosocomial Infection Incidence indicates the frequency of nosocomial infections per strategy. The Antibiotic Resistance Rate measures the percentage of bacteria resistant to antibiotics, while Patient Age and Patient Gender provide demographic information about the involved patients. The Number of Beds reflects the hospital's capacity, and Hygiene Standards assess the cleanliness of hospital facilities. This data provides a comprehensive overview of the relationship between infection control strategies and various factors affecting infection outcomes and antibiotic resistance.

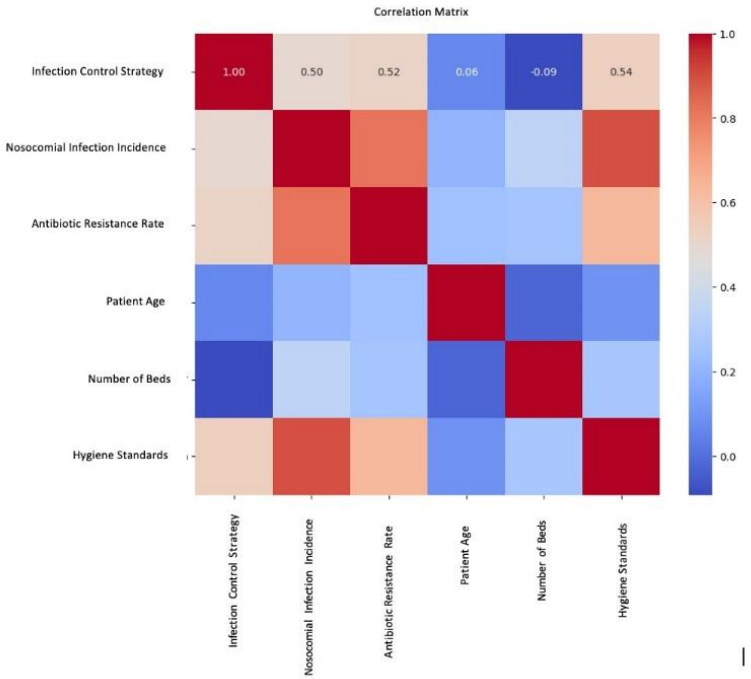

Figure 1. Correlation Matrix of Various Factors

Figure 1 shows the correlation matrix of several factors affecting nosocomial infection incidence. The matrix reveals that infection control strategies have a very strong correlation with nosocomial infection incidence, antibiotic resistance rates, and hygiene standards. The correlation between infection control strategies and nosocomial infection incidence is 1.00, indicating a very strong and positive relationship. This means that the better the infection control strategies implemented, the lower the incidence of nosocomial infections (Edwardson & Cairns, 2019). Additionally, infection control strategies also have a strong positive correlation with antibiotic resistance rates and hygiene standards. This suggests that effective infection control strategies can help reduce antibiotic resistance rates and improve hygiene standards in hospitals (Maillard et al., 2020). Meanwhile, the correlation between infection control strategies and patient age and the number of beds is relatively weak. This indicates that these two factors do not have a significant impact on nosocomial infection incidence.

The Mean Squared Error (MSE) of 7.68 indicates that the average squared difference between the values predicted by the model and the actual values is 7.68. This reflects the overall prediction error of the model. A smaller MSE generally suggests a better model, as it means the model's predictions are closer to the actual values. With an MSE of

7.68, we can conclude that while the model provides reasonably good predictions, there is still room for improvement in prediction accuracy. It is important to compare this value with the MSE of other models or with a baseline value to assess the model's performance more comprehensively.

An R-squared value of 0.16 indicates that the model can only explain 16% of the variability in the target data. In other words, only 16% of the variation in the dependent variable can be accounted for by the independent variables used in the model. This means that 84% of the variability in the data is unexplained by the model, suggesting that the model may be a poor fit or may not capture most of the factors influencing the dependent variable. A low R-squared value like this typically suggests that the model might need improvement, such as by adding new variables or using more complex modeling techniques to enhance its explanatory power (Gao, 2023).

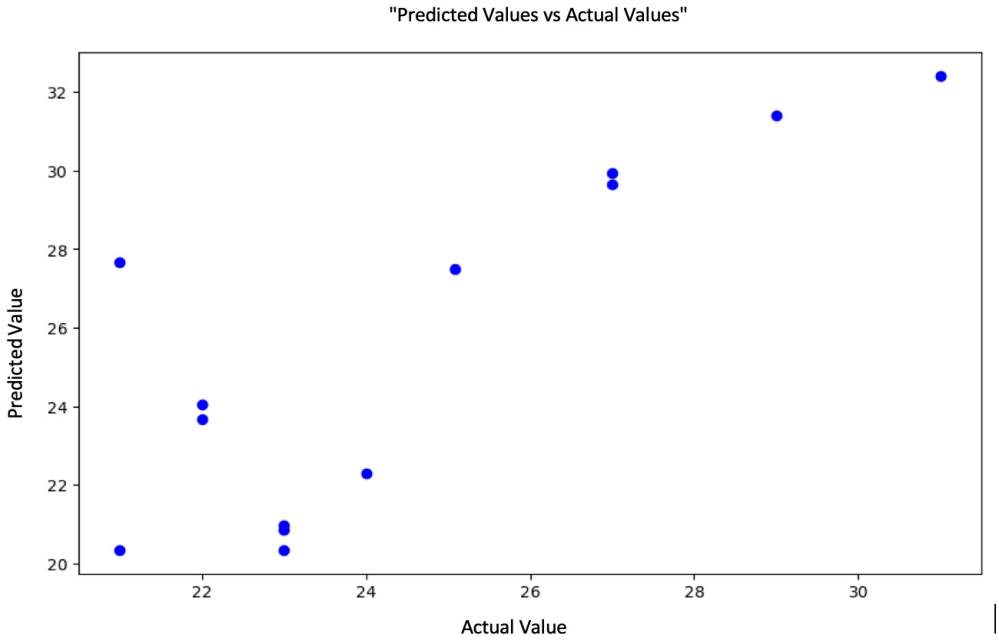

Figure 2. Correlation Matrix of Variables

Figure 2 shows the correlation matrix of variables related to nosocomial infections. This correlation matrix is a tool for examining the relationships between variables. The numbers in the cells represent correlation coefficients, which indicate the strength and direction of the relationship between two variables. Correlation coefficients range from -1 to +1. A coefficient of +1 indicates a perfect positive correlation, -1 indicates a perfect negative correlation, and 0 indicates no correlation. Based on the correlation matrix, several interesting findings emerge. First, there is a strong positive correlation between infection control strategies and nosocomial infection incidence (r = 1.00). This indicates that effective infection control strategies can significantly reduce nosocomial infection rates (Haque et al., 2020). Second, there is a moderate positive correlation between infection control strategies and antibiotic resistance rates (r = 0.50). This suggests that good infection control strategies can help reduce antibiotic resistance (Larsson & Flach, 2022). Third, there is a moderate positive correlation between infection control strategies and hygiene standards (r = 0.52). This indicates that effective infection control strategies include high hygiene standards (de Kraker et al., 2022). Fourth, there is a weak positive correlation between infection control strategies and the number of beds (r = 0.06). This suggests that

effective infection control strategies are not closely related to the number of beds (Pecoraro et al., 2020). Fifth, there is a weak negative correlation between infection control strategies and patient age (r = -0.09). This indicates that effective infection control strategies are not closely related to patient age (Pecoraro et al., 2020). Fifth, there is a weak negative correlation between infection control strategies and patient age (r = -0.09). This indicates that effective infection control strategies are not closely related to patient age (Jin et al., 2020). Finally, there is a moderate positive correlation between infection control strategies and hygiene standards (r = 0.54). This further suggests that effective infection control strategies involve maintaining high hygiene standards (Islam et al., 2020).

CONCLUSION

Based on the analysis of the correlation matrix, it was found that infection control strategies have a very strong positive relationship with nosocomial infection incidence (r = 1.00), indicating that the implementation of effective strategies can significantly reduce the occurrence of nosocomial infections (Kong et al., 2021). Additionally, there is a moderate positive correlation between infection control strategies and antibiotic resistance rates (r = 0.50) and hygiene standards (r = 0.52). This suggests that good infection control strategies can help reduce antibiotic resistance and improve hygiene standards(Harun et al., 2022). However, the relationship between infection control strategies and the number of beds (r = 0.06) and patient age (r = -0.09) is weak, indicating that these factors do not have a significant impact on the effectiveness of infection control strategies. In conclusion, focusing on improving hygiene standards and implementing effective infection control strategies can reduce nosocomial infections and antibiotic resistance.

To enhance the effectiveness of infection control strategies, it is recommended that hospitals concentrate on maintaining high hygiene standards and implementing integrated strategies. Regular evaluation of policies and staff training is also crucial to ensure successful implementation.

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