

# Determinants of nurses' adherence to basic infection control precautions: a scoping review

## Determinantes da adesão às precauções básicas no controle de infecção entre enfermeiros: uma revisão de escopo

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### ABSTRACT

**Objective:** To analyze factors influencing nurses' adherence to standard precautions. **Method:** The Joanna Briggs Institute (JBI) methodology was used. **Results:** Twelve studies were analyzed, and the following factors were identified as influencing nurses' adherence to basic infection control precautions: inadequate training/education, unavailability of materials, lack of support/incentives from management, professional experience, and lack of awareness/education/training. **Conclusion:** There is a clear need to develop written procedures and recommendations and to disseminate this information to health care professionals. This will help to raise awareness and promote the adoption of best practice, thereby reducing the risk of infection and improving patient safety. **Descriptors:** Knowledge; Infection Control; Nursing.

### RESUMO

**Objetivo:** Analisar os fatores que influenciam a adesão dos enfermeiros às precauções padrão. **Método:** Utilizou-se a metodologia do Instituto Joanna Briggs (JBI). **Resultados:** Foram analisados 12 estudos que identificaram os seguintes fatores que afetam a adesão dos enfermeiros às precauções básicas de controle de infecção: formação/treino insuficiente; indisponibilidade de materiais; falta de apoio/incentivo por parte da gestão; experiência profissional; falta de formação/educação/conscientização. **Conclusão:** Há uma necessidade evidente de criar procedimentos e recomendações por escrito e compartilhar essas informações com os profissionais de saúde. Isso ajudará na conscientização e na adoção de boas práticas, contribuindo para a redução do risco de infecção e aumentando a segurança do paciente. **Descritores:** Conhecimento; Controle de Infecções; Enfermagem.

### INTRODUCTION

Health care-associated infections (HAIs) and the rise of microbial resistance to antimicrobial agents pose a high risk to both patients and health care workers. This risk has become increasingly apparent since the mid-20th century<sup>(1)</sup>. HAIs are considered a serious health problem, being one of the most common adverse events in health care, with a significant impact on morbidity, mortality and associated economic costs. Therefore, the quantification and characterization of this risk is of paramount importance to health care systems<sup>(2)</sup>.

The European Centre for Disease Prevention and Control (ECDC) estimates that 3.1 million people contract a HAI. In developed countries, approximately seven out of every 100 hospitalized patients will acquire at least one HAI; in developing countries, this number rises to approximately 10 out of every 100 hospitalized patients. In Europe, there are an estimated 4,131,000 cases of HAI annually, resulting in an additional 16 million hospital days and approximately 37,000 deaths. In Portugal, the prevalence of HAIs was 9.1% between 2016 and 2017, the second highest in Europe<sup>(3)</sup>, leading to significant financial, economic, social, and individual costs.

Nurses must perform their duties in a safe, ethical, responsible manner<sup>(4)</sup> as they play a critical role in the implementation of prevention strategies. Because of the potential for nurses to transmit microorganisms, they should take appropriate measures to prevent cross-infection. Health care facilities must recognize the importance of HCAs and implement infection prevention and control strategies. Standard infection control precautions (SICPs) should be applied to all patients, regardless of an infectious diagnosis<sup>(5)</sup>. In addition, health care workers must be protected from occupational hazards<sup>(4)</sup>.

These guidelines include recommendations for safe infection control practices in health care facilities<sup>(1,6)</sup>.

The SICP is a set of preventive strategies based on best practices in infection control and includes ten essential elements: patient assignment, hand hygiene, respiratory etiquette, proper use of personal protective equipment (PPE), decontamination of clinical equipment, environmental monitoring, safe laundry handling, appropriate waste collection, safe practices in the preparation and administration of injectables, and responsible use of antimicrobial agents in the workplace<sup>(6)</sup>. The Programa Nacional para a Prevenção e Controlo de Infecções e de Resistência aos Antimicrobianos includes the implementation of various intervention bundles to support invasive procedures and devices<sup>(6)</sup>. The SICP assumes that there are no specific at-risk patients. Adherence to these precautions is intended to ensure the safety of patients, health care workers, and all those who interact with health care facilities.

According to the Relatório Anual do Programa Prioritário de Infecções e Resistências aos Antimicrobianos (2021)<sup>(5)</sup>, the percentage of compliance with hand hygiene best practices was 97.4% and compliance with glove use/replacement was 84.1% in 2020. One study<sup>(7)</sup> found only two-fifths of health care workers followed standard precautions, putting them at significant risk of developing infections. Other studies have found health care workers' knowledge of the basic concept and practice of SICPs was unsatisfactory, with an adherence rate of only 82.1%. Several barriers to SICP adherence have been identified, including unavailability and inaccessibility of materials and procedures, lack of training, reluctance to use PPE, lack of supervision and management support for safe practices, lack of performance feedback, inadequate knowledge of SICP, and low perception of

effectiveness and risk of infection<sup>(8-9)</sup>. Positive factors for SICP compliance<sup>(8)</sup> included awareness of SICP and placement of PPE and hand hygiene stations in prominent locations.

Some authors<sup>(10)</sup> report low compliance with SICP by health care workers, with a rate of only 66.8%. In addition, one study<sup>(11)</sup> suggests inadequate adherence to SICP during direct patient care (54%) and invasive procedures (46%).

Understanding the factors that influence nurses' adherence to the SICP is critical to clinical practice and improving health outcomes. By identifying and understanding these factors, effective strategies can be developed to improve adherence, reduce the risk of HCAs, and improve patient safety. Poor adherence to the SICP can lead to an increase in HCAs, compromising patient and health care worker safety<sup>(11)</sup>. This knowledge can support the formulation of health policies, guidelines, and education and training programs for nurses. To achieve these goals, institutions and management bodies must commit themselves to raising awareness, providing education and training, conducting internal audits, and establishing procedures that allow for more effective, conscious, participatory, and responsible performance<sup>(12)</sup>.

However, nurses' adherence to the SICP may be influenced by several factors that are not yet fully understood. Therefore, a comprehensive review is needed to identify and analyze these factors.

A search of the CINAHL database via EBSCO and the MEDLINE database via PubMed revealed a lack of published literature reviews in this specific area. Therefore, we decided to conduct this scoping review to analyze the factors that influence nurses' adherence to standard precautions and to provide evidence to improve this adherence. This review aims to answer the following review question: What are the factors that influence nurses' adherence to standard precautions in clinical practice?

## METHOD

A scoping review was conducted based on the methodology proposed by the Joanna Briggs Institute (JBI)<sup>(13)</sup>. A scoping review allows for the mapping of key concepts, clarification of research areas, and identification of gaps in existing knowledge with the aim of analyzing the factors that influence nurses' adherence to standard precautions<sup>(14)</sup>. The PCC (population, concept, context) strategy was used to search for scientific evidence (Figure 1)<sup>(15)</sup>.

**Figure 1 - Acronym PCC. Porto, PT, Portugal, 2023**

Population (P)	Nurses in care
Concept (C)	Factors influencing nurses' adherence to SCIPs
Context (C)	Clinical practice

A three-stage search approach was used as the methodological strategy<sup>(13)</sup>. Investigation began with a comprehensive search of the CINAHL and MEDLINE databases to identify the most frequently used words in titles and abstracts as well as indexing terms. Next, a database search was performed by using a combination of keywords and descriptors to form Boolean phrases tailored to each database. Finally, in the third step, with a time frame of 2017 to 2022, the reference lists of relevant literature were reviewed to identify additional studies.

The study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Extension for Scoping Reviews (PRISMA-ScR). The study has been registered on the Open Science Framework (OSF)

platform (DOI 10.17605/OSF.IO/68VZ7) and can be accessed via the link: <https://osf.io/68vz7/>. Inclusion criteria were that the studies should be available in full text, free of charge, and written in Portuguese, English, or Spanish. Quantitative, qualitative, and mixed methods studies were considered. Reference lists of relevant literature were reviewed to identify additional studies. Exclusion criteria excluded studies involving other professional groups. The search and identification strategy for studies was conducted in June 2022 on the electronic databases CINAHL and MEDLINE by using the descriptors presented in Figure 2. Keywords included in the titles and abstracts of relevant articles were used to refine the overall search strategy.

**Figure 2 - Descriptors for search. Porto, PT, Portugal, 2023**

DeCS Descriptors		
English	Spanish	Portuguese
Knowledge	Conocimiento	Conhecimento
Nursing	Enfermería	Enfermagem
Infection Control	Control de Infecciones	Controle de Infecções

The Boolean operators AND and OR were used, with AND indicating studies that related the topics and OR including synonyms, according

to the combinations between the descriptors shown in Figure 3.

**Figure 3 - Descriptors and synonyms used on the databases. Porto, PT, Portugal, 2023**

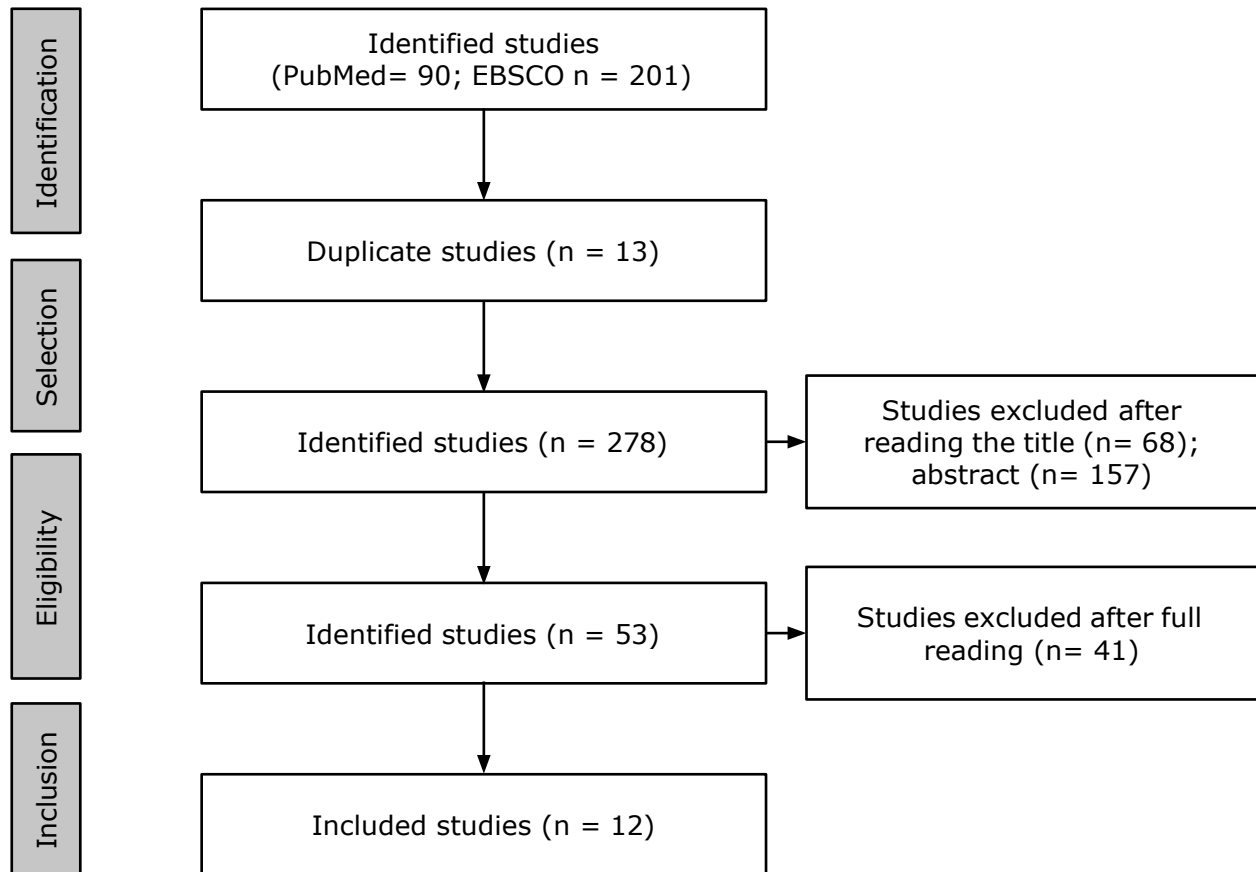
Database	Controlled terms
PubMed	("Knowledge"[MeSH Terms] OR "Knowledge"[Title/Abstract]) AND ("infection control"[Title/Abstract] OR "infection control"[MeSH Terms]) AND ("Nursing"[MeSH Terms] OR "Nursing"[Title/Abstract])
MEDLINE	TX Knowledge AND TX Infection control AND TX Nursing
CINAHL	TX Knowledge AND TX Infection control AND TX Nursing
Nursing & Allied Health Collection	TX Knowledge AND TX Infection control AND TX Nursing

**RESULTS**

A total of 291 potentially relevant studies were identified. Of these, 13 were excluded as duplicates using Rayyan software. Of the remaining 278 studies, 68 were excluded after title review and 157 after abstract review. Of the remaining 53 studies, 41 were excluded after reading the full text. Finally, 12 studies were included in this review. The studies selected for analysis in this review were obtained through a strategy of identifica-

tion, selection, eligibility assessment and inclusion according to predetermined inclusion criteria and search parameters. Data from the included studies were extracted by two independent review author, and a third review author was consulted in case of disagreement to decide on the inclusion or exclusion of an article. The process of study identification and inclusion is documented in a PRISMA flowchart (Figure 4)<sup>(15)</sup>.

**Figure 4 - Flowchart of the study selection process. Porto, PT, Portugal, 2023**



Source: PRISMA Flow Diagram adapted from Page et al., 2020.

Data from the studies are presented in an evidence table that identifies various characteristics such as author(s) and year, type of study, objective(s), and main outcomes (Figure 5).

**Figure 5 - Studies included in this scoping review. Porto, PT, Portugal, 2023**

Authors/ year	Title	Type of study	Objective(s)	Main results
Alvim, A.L.S., et al., 2017 <sup>(16)</sup>	Knowledge of nursing professionals in relation to measures of prevention of infections.	Quantitative	Assess nursing professionals' knowledge regarding infection prevention measures related to healthcare-associated infections.	Unsatisfactory knowledge in the age group (30 years or older) may be related to excessive self-confidence and professional outdatedness regarding current content.
Musu M, et al., 2017 <sup>(17)</sup>	Assessing hand hygiene compliance among healthcare workers in six Intensive Care Units.	Prospective observational	Assess the presence of infection control procedures and protocols to evaluate healthcare workers' adherence to hand hygiene (HH) and handwashing techniques in six ICUs.	The ICUs showed low levels of adherence to best hygiene practices. There is a need to implement infection control strategies. Multidisciplinary interventions can effectively prevent and control the risk of healthcare-associated infections (HAIs).
Farotimi AA, et al., 2018 <sup>(18)</sup>	Effect of Training on Knowledge, Perception and Risk Reduction Regarding Infection Control among Nurses in Selected Teaching Hospitals in Nigeria.	Quasi-experimental	Examine the effects of a training program on knowledge, perception, and risk reduction related to infection control among nurses.	The training program is highly effective, and nurses should be exposed to infection control training to benefit from the necessary knowledge and skills to combat the spread of infection in the healthcare environment.
Russell D, et al., 2018 <sup>(19)</sup>	Factors for compliance with infection control practices in home healthcare: findings from a survey of nurses' knowledge and attitudes toward infection control.	Quantitative, exploratory-descriptive study	Explore the levels of compliance with infection control practices and identify the associated demographic, knowledge, and attitude correlations.	Improving adherence to infection control practices in home healthcare should focus on strategies to change perceptions of infection risk and other attitudinal factors.
Arinze-Onyia SU, et al., 2018 <sup>(20)</sup>	Knowledge and Practice of Standard Precautions by Health-Care Workers in a Tertiary Health Institution in Enugu, Nigeria	Quantitative, exploratory-descriptive study	Assess the knowledge and practices of Standard Precautions (SP) among healthcare professionals in tertiary healthcare units.	Standard precaution training and the regular provision of PPE are vital for adherence to standard precautions.
Nasiri A, et al., 2019 <sup>(21)</sup>	Knowledge, attitude, practice, and clinical recommendation toward infection control and prevention standards among nurses: A systematic review.	Systematic Review	Describe nurses' knowledge, practice, and attitude regarding infection control and prevention standards.	They have adequate knowledge and a positive attitude towards healthcare-associated infections; however, due to average and poor practices, they need systematic and integrated implementation of the recommendations.
Kakkar SK et al., 2021 <sup>(22)</sup>	Educating nursing staff regarding infection control practices and assessing its impact on the incidence of hospital-acquired infections.	Prospective study.	Educate and train nurses on infection control practices, assess the impact of the training, and evaluate whether this training has made any difference in the incidence of catheter-associated urinary tract infections (CAUTI) and intravenous (IV) infections.	Although a single educational module improved nurses' knowledge and attitude towards infection control, it did not significantly improve practices or incidence rates.
Almohammed AO et al., 2021 <sup>(23)</sup>	Corrigendum: Knowledge, Attitude, and Practices Associated With COVID-19 Among Healthcare Workers in Hospitals: A Cross-Sectional Study in Saudi Arabia	Cross-sectional study	Assess healthcare professionals' knowledge, attitude, and practices (KAP) regarding coronavirus disease 2019 (COVID-19) in various public and private hospitals in Riyadh, Saudi Arabia.	Nurses demonstrated a less favourable attitude compared to medical staff from other professions, but this did not prevent them from being the best in applying appropriate practices.

Park SK, et al., 2021 <sup>(24)</sup>	Factors influencing knowledge, awareness, and compliance with standard precautions among psychiatric nurses	Cross-sectional study	Assess the level of knowledge, awareness, and adherence to standard precautions and examine individual factors related to compliance with standard precautions among psychiatric nurses	Compliance with standard precautions was significantly correlated with knowledge and awareness, and awareness was a significant factor in compliance. The coronavirus pandemic significantly influenced the mental health infection system. Psychiatric nurses must continue to improve adherence to infection prevention.
Singh S, et al., 2021 <sup>(25)</sup>	To Study the Awareness about Universal Health Precautions among Nursing Professionals in a Medical College Hospital of India	Cross-sectional study	Assess the knowledge and awareness of nursing professionals regarding Standard Precautions (SPs).	Nursing professionals learn about Standard Precautions (SPs) through practical exposure rather than formal education. It is necessary to address this through formal training workshops and lecture discussions.
Gambeta K, et al., 2021 <sup>(26)</sup>	Knowledge to action: Needs assessment for infection control professionals across healthcare settings	Quantitative, exploratory-descriptive study	Describe the needs of infection prevention and control (IPAC) professionals in healthcare settings in a region of Ontario, Canada, to inform priorities for the development of resources and capacity-building activities.	There is a need for more support to improve environmental cleaning practices, surveillance, and routine practices; however, findings varied according to the setting. An important theme focused on the need for strategies to inspire and motivate stakeholders to invest in infection prevention and control. 67% expressed interest in developing skills in this area.
Lailawidar et al., 2022 <sup>(27)</sup>	Health Workers Compliance Towards Infection Prevention and Control in Indonesia	Cross-sectional correlational quantitative study	Identify factors related to healthcare professionals' adherence to the implementation of infection prevention and control in the district general hospital.	There is no significant relationship between education, employee status, training, years of experience, knowledge, attitude, and reward with healthcare professionals' adherence to the implementation of infection prevention and control in the ward, emergency room, ICU, NICU, and delivery room.

### Ethical considerations

This review provided an in-depth analysis of the factors influencing nurses' adherence to standard precautions and promoted knowledge and awareness among professionals for excellent practice. It does not raise any ethical concerns and therefore does not require submission to an ethics committee.

### DISCUSSION

Knowledge of SICP procedures among health care workers is critical to effective infection control, with important implications for the safety of patients, health care workers, and the environment. Infections can be prevented by adhering to evidence-based infection control strategies such as SICP. Nurses' adherence to SICP is fundamental to preventing the spread of infection in health care facilities and can be influenced by a variety of factors, including knowledge and attitude deficits, lack of time, availability of equipment, discomfort from using equipment, or the perception that equipment interferes with performance, among others.

According to a study<sup>(16)</sup>, health care workers have limited knowledge related to overconfidence, extensive professional experience, and a lack of interest in updating their knowledge on SICPs. The same study suggests that newly graduated professionals tend to adhere more strictly to institutional protocols than more experienced professionals. Another study<sup>(19)</sup> found that older, non-Hispanic black nurses with specific training in infection control demonstrated greater adherence to infection control practices than younger, non-Hispanic white nurses without specific training. According to a study<sup>(21)</sup>, nurses have adequate knowledge and positive attitudes towards HAIs. However, low adherence to the SICP was observed, indicating the need to improve the systematic and integrated implementation of infection prevention and control recommendations. Inadequate training can lead to a lack of understanding of infection control practices, resulting in nurses failing to implement the correct measures. This can lead to a higher likelihood of the spread of infection in healthcare settings, increasing the risk of infection for patients.

HCAIs are a significant cause of high morbidity, mortality, disability and reduced quality of life, as well as increasing healthcare costs. There is a need to systematically plan and implement effective infection prevention and control strategies. Reward variables are factors that influence health care workers' adherence to infection prevention and control practices<sup>(27)</sup>. Lack of management support and incentives can also play a significant role in SICP compliance. When nurses do not receive the necessary support from management to implement infection control measures, motivation and commitment to follow established guidelines may decrease. This can lead to inconsistent practices and an increased risk of infection for patients<sup>(8-9)</sup>.

A study<sup>(17)</sup> shows that health care workers in intensive care units have low levels of hand hygiene compliance, highlighting the need for multidisciplinary interventions to prevent and control HCAI risks. Nurses strive to provide safe and excellent care that promotes health and well-being. They play a critical role in implementing health programs that raise awareness of safe practices among health care workers. Another study<sup>(22)</sup> found that continuing education improves professional behavior and knowledge related to care, resulting in competent and accountable performance that meets current patient and professional safety requirements. Yet another study<sup>(28)</sup> indicated that the significant variability in education and training content can lead to confusion, unsafe practices, and lack of confidence among healthcare professionals, resulting in lower adherence to SICPs. The study highlights the importance of implementing a national training and surveillance program for infection control practices to improve and standardize practices in this area. Standardization and training in SICP could contribute to more consistent practices supported by educational resources. According to a previous study<sup>(18)</sup>, nurses should benefit from education programs that focus on knowledge, awareness, and risk reduction. These programs enhance the acquisition and improvement of knowledge and skills, particularly in the use of SICP, to reduce or minimize the spread of infection in health care facilities. Nurses increase their knowledge of SICP through clinical practice<sup>(25)</sup>. However, these topics need to be addressed in formal training sessions and case discussion workshops in order to articulate and develop new knowledge. Health care worker training and the regular and adequate provision of PPE are predictors of knowledge of and adherence to SICPs<sup>(20)</sup>. In addition, the unavailability of necessary supplies, such as PPE, can limit the ability of caregivers

to follow standard precautions. Lack of access to adequate PPE can create a sense of discomfort or insecurity in performing infection control practices, which can negatively influence adherence. A study<sup>(26)</sup> highlighted the need for greater support to improve environmental hygiene practices, monitor daily practices, and outline strategies to motivate professionals and institutions to invest in SICP. Addressing these issues that influence adherence to SICP is critical to promoting a safe environment for patients and reducing the risk of HCAIs.

## CONCLUSION

According to the outlined objective, it was found that the adherence to SICP among nurses in infection control is insufficient. The main factors identified for this gap were inadequate training, unavailability of materials, lack of support/incentives from management, professional experience, and lack of education/awareness in this area. Ongoing education and communication play an essential role in raising awareness among professionals about the importance of SICP and promoting a culture of safety. Establishing policies and educational programs that include these topics in formal sessions, case discussions, audits, peer evaluations, and feedback is critical to providing the knowledge and skills necessary to implement safe practices, resulting in greater adherence to SICP. This may include the implementation of reward and recognition systems for professionals who consistently adhere to the SICP as well as the integration of these practices into institutional quality and safety indicators.

## CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

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