

## Evaluation of Multimodal Strategies Implementation; Education and Training on Compliance in The Implementation of The Infection Prevention and Control Program: An Integrative Review

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### Abstract

**Backgrounds;** Infection Prevention and Control (IPC) is crucial for protecting patients, healthcare workers, visitors, and the surrounding community from healthcare-associated infections (HAIs). The prevalence of HAIs remains high globally, particularly in Southeast Asia. Effective IPC programs are essential to reduce HAIs and improve healthcare quality and patient safety; **Objectives;** This integrative review aims to identify and evaluate the literature on the implementation of multimodal strategies, specifically education and training, to improve compliance with IPC programs. **Methods;** This integrative review aims to identify and evaluate the literature on the implementation of multimodal strategies, specifically education and training, to improve compliance with IPC programs. **Results;** Out of 910 articles initially identified, 17 met the eligibility criteria, and 7 were included in the final review. The studies highlighted the importance of educational interventions, regular training, monitoring, and feedback to enhance compliance with IPC protocols. Key strategies included hands-on training, simulation-based education, and continuous professional development programs. **Conclusions;** Implementing multimodal strategies, particularly focusing on education and training, significantly improves compliance with IPC programs. Ongoing education, practical training, and regular evaluations are critical components for sustaining high standards of infection control in healthcare settings.

**Keywords:** *Infection Prevention and Control (IPC), Healthcare-Associated Infections (HAIs), Multimodal Strategies, Education, Training.*

## **BACKGROUND**

Infection Prevention and Control (IPC) is an effort to protect patients, staff, visitors, and the community around healthcare facilities (Ministry of Health RI, 2017). Infection Prevention and Control (IPC) is implemented by breaking the cycle of infectious disease transmission (Ministry of Health RI, 2022). As a result of healthcare services, care at healthcare facilities, a person can acquire an infection known as Health Care Associated Infections (HAIs). IPC aims to prevent HAIs and is an important component of healthcare quality and patient safety (World Health Organization, 2022a). The implementation of IPC requires program support, finances, and knowledge. The prevalence of HAIs worldwide remains very high (Wah Goh et al., 2023). The prevalence of HAIs in Southeast Asian countries ranks the highest in the world. The incidence of HAIs in Southeast Asia is 21.6% (95% CI: 0.15-0.29) (Wah Goh et al., 2023). Of every 100 patients treated in acute care hospitals, seven patients in high-income countries and 15 patients in low- and middle-income countries will acquire at least one HAI (World Health Organization, 2022b). The CDC (Centers for Disease Control and Prevention) reported that of 31 patients, at least 1 patient experiences HAIs. Data on patient care in hospitals in the United States in 2015 showed approximately 687,000 HAI incidents, with 72,000 patients dying from HAIs. However, there was a significant decrease of about 8-12% in 2017 and 2018 (CDC, 2023). Therefore, the implementation of IPC programs must be carried out to reduce/prevent the incidence of HAIs.

HAIs are infections that occur in patients during the treatment process in hospitals or other healthcare facilities, where there was no infection or it was not in the incubation period at the time of admission and may appear after the patient is discharged, and infections that can occur in healthcare workers due to their work (World Health Organization, 2018). To reduce the incidence of HAIs, healthcare facilities need to consistently implement the Infection Prevention and Control (IPC) program (Ministry of Health RI, 2017). The IPC program in healthcare services must be implemented, and the IPC team must ensure its application (Thandar et al., 2022). The IPC program consists of isolation precautions, infection prevention/bundles, HAIs surveillance, education and training, and rational use of antimicrobials. Additionally, monitoring is carried out through ICRA (Infection Control Risk Assessment), audits, and other periodic monitoring (Ministry of Health RI, 2020). The World Health Organization (WHO) released the IPCAF (Infection Prevention find strategies that can be implemented to increase compliance with the application of the IPC program).

## **METHODS**

Many studies have been conducted on the implementation of IPC programs and the achievement of IPC programs. We focus on evaluating the implementation of IPC programs in relation to the results of the IPC program achievements. Specifically, we are interested in knowing:

- a. How the implementation of multimodal strategies; education and training in the application of Infection Prevention and Control programs.
- b. What strategies can be implemented to increase compliance with the application of the Infection Prevention and Control program.
- c. The role of nurses in applying the results of multimodal strategies; education and training in the application of the Infection Prevention and Control program.

### **Search Strategy**

The modified integrative review method by (Whittemore Robin, 2005) describes five stages of the framework: identifying the problem, which explains the problem stated in the background, literature search with accessible data search, data evaluation by filtering data, analysis by assessing the scientific quality of the study. Integrative review allows the inclusion of scientific studies with different designs, both experimental and non-experimental, and types of data, both quantitative and qualitative, and can be aligned with the research interest and questions.

The literature search was conducted on three databases accessed in December 2023, namely Science Direct, Ebsco, and PubMed. Keywords used in the Science Direct database: (educational[MeSH Terms] OR (education[MeSH Terms])) AND ((training[MeSH Terms] OR (Trainings[MeSH Terms] AND ((control infection) OR (infection control[MeSH Terms])))). Keywords used in the Ebsco database: "educational" AND "training" AND "infection control". Keywords used in the PubMed database: (education[MeSH Terms] AND ((training[MeSH Terms] AND (infection control[MeSH Terms])))).

Inclusion criteria established are:

- a. Written in English between 2013 and 2023.
- b. Articles published nationally and internationally, accessible with Free FullText and Open Access.
- c. Studies discussing multimodal strategy interventions.
- d. Studies with a population of nurses working in hospitals.

Exclusion criteria established are:

- a. Research not published due to lack of formal peer review.
- b. Studies related to the development of research tools.

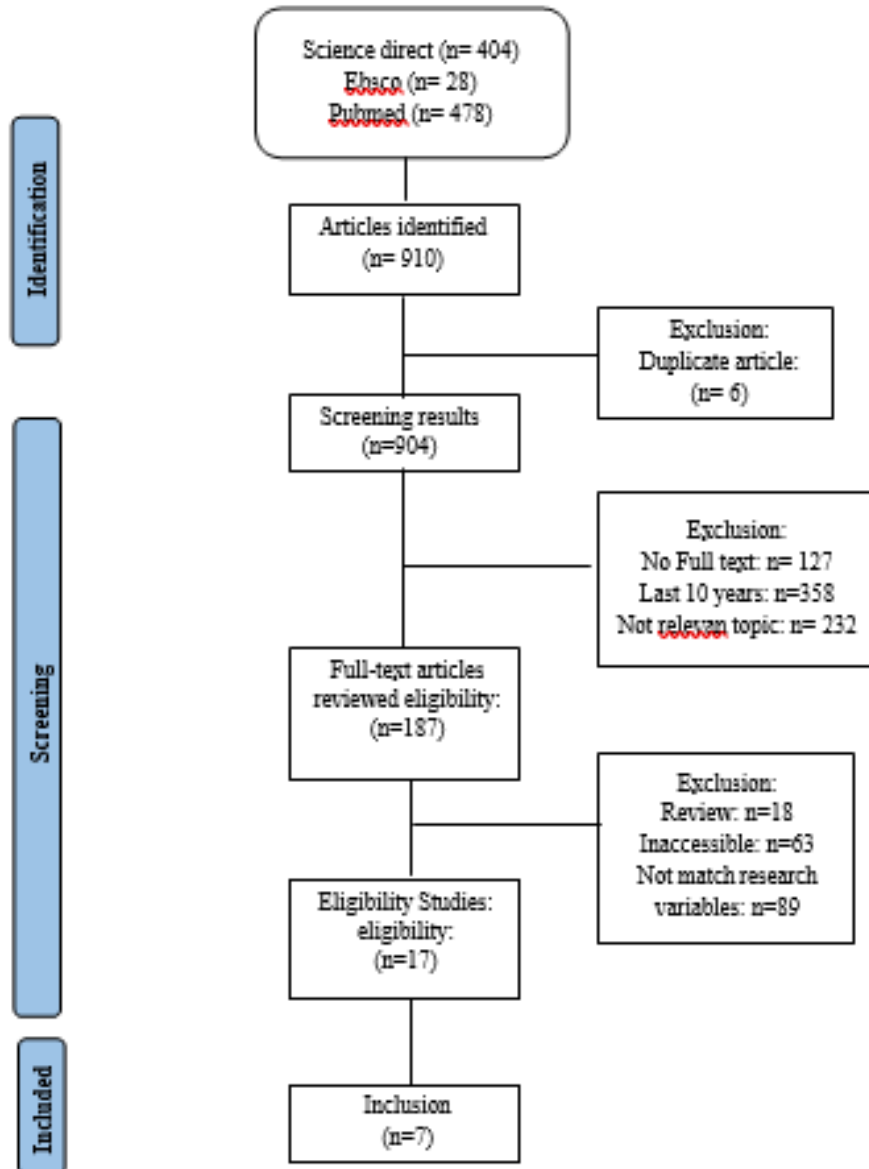


Fig. 1. Prisma Flow Diagram

### Data Extraction and Quality Appraisal

The initial search was conducted based on predetermined keywords, resulting in articles from three databases. After identifying the articles, duplicate articles were removed. The process continued with the selection of relevant full-text articles, publications from the last 10 years, and topic suitability to obtain complete articles that meet the inclusion criteria. Subsequently, an in-depth review was conducted on the full-text articles that met the inclusion criteria, which were then selected for the integrative review process. The selection process used the Rayyan application (Fig 1).

Authors	Goals are clearly explained	Study design explained	Appropriate research method	Adequate description, sample, and exclusion criteria	Ethics presented	Results are clearly reported	The results are in accordance with the study questions and literature	Limitations presented	Implications discussed
Hang Thi Phan et al, (2018)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ermira Tartari et al, (2019)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
S Brusafarro et al, (2010)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constantinos Tsioutis et al, (2020)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Benedetta Allegranzi et al, (2013)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
L. Ara et al, (2019)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sahar Hammoud et al, (2021)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.

First Author	Year/ Country	Research Objectives	Method	Sample/setting	Strategies to improve compliance with the implementation of IPC program
Hang Thi Phan (Phan et al. 2018)	2018/ Vietnam	Evaluating the effectiveness of educational interventions on hand hygiene (HH) compliance regarding the knowledge and hand hygiene compliance of nurses in hospitals.	A randomized controlled study conducted in three hospital departments, NICU, operating room, and delivery room.	206 nurses	An educational intervention approach to improve hand hygiene compliance and knowledge. Additionally, other strategies that can be used include implementing simple yet effective training and education programs, as well as regular compliance monitoring to ensure long-term improvement in compliance.
Ermira Tartari (Tartari et al. 2019)	2019/ Iran, Malaysia, Meksiko, Afrika Selatan, Spanyol, Thailand.	Evaluating the impact of Train-the-Trainer (TTT) training on knowledge about microbial transmission during healthcare services, best practices in hand hygiene, and WHO's direct observation methods.	Questionnaires completed by course participants before and after the TTT training in six countries.	305 IPC professionals who completed the Train-the-Trainer (TTT) program in six countries, namely Iran, Malaysia, Mexico, South Africa, Spain, and Thailand.	Intensive training, scenario-based simulation education, and the use of various hand hygiene promotion initiatives, such as poster contests and video usage.
S Brusafarro (Brusafarro et al. 2014)	2014/ Eropa	Reporting on the development of activity status and IC/HH practitioners in Europe between 2006 and 2010, as well as the finalization of the agreed-upon core IC/HH competencies in Europe.	Questionnaire-based surveys and interviews	33 respondents	Involves evaluating the use of the European core curriculum developed by the IPSE project in European countries, reassessing the training needs for IC/HH in those countries, establishing an IC/HH training network, and proposing strategies to further support IC/HH training in EU/EEA member countries.

The 2<sup>nd</sup> Nani Hasanuddin International Health Conference (NHIHC)

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Constantinos Tsioutis (Tsioutis et al. 2020)	2020/ Eropa	Mapping current training opportunities for IPC professionals, defining local needs, and highlighting differences across 11 European countries (Cyprus, France, the UK, Germany, Greece, Italy, the Netherlands, Poland, Romania, Spain, Switzerland).	Qualitative	The sample size in this study is not specifically mentioned. However, the study involves IPC experts directly engaged in IPC training and education in their countries and/or internationally.	Developing cross-disciplinary training programs across regions with the same learning objectives, shared knowledge, and support from national and international professional bodies.
Benedetta Allegranzi (Allegranzi et al. 2013)	2013/ Italia, Arab Saudi, Pakistan, Mali, and Kosta Rika	Evaluating the impact of the World Health Organization (WHO) hand hygiene promotion strategies on compliance and knowledge among healthcare workers in various healthcare settings across different countries.	Quasi eksperiment	2630 nurses	Intensive education based on WHO methods, installation of hand hygiene posters in all patient care areas, and presentation of survey results to staff during education and feedback sessions to motivate workers and administrators in understanding the local situation, recognizing shortcomings, and supporting sustainability.
L. Ara (Ara et al. 2019)	2019/ Bangladesh	Improving nurses' compliance with standard infection control practices through multi-modal interventions (MMI) in various hospital settings in Bangladesh.	Pretest-post-test quasi-experimental approach	642 nurses	A multi-modal, multi-faceted approach consisting of system changes and educational interventions
Sahar Hammoud (Hammoud et al. 2021)	2021/ Hungaria	Assessing nurses' awareness of infection control measures.	Cross sectional	21 nurses	Regular training and education for healthcare workers, implementation of incentives and rewards for compliance, ongoing supervision and feedback, and the use of technology to monitor and enhance compliance. Additionally, improving infrastructure and medical equipment, as well as increasing patient awareness and participation in infection

## RESULTS AND DISCUSSION

A total of seven articles were analyzed and synthesized, resulting in answers to the question: What strategies can be implemented to improve compliance with Infection Prevention and Control (IPC) program implementation.

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