

# Interventions to improve compliance with hand hygiene in patient care

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## Abstract

Healthcare-associated infections are a significant cause of morbidity and mortality. Hand hygiene is considered an effective method of prevention. This article summarizes the results of a Cochrane systematic review evaluating methods for improving hand hygiene compliance in patient care.

**Keywords:** Compliance. Hand hygiene. Patient care. Infection. Systematic review.

## Intervenciones para mejorar el cumplimiento de la higiene de manos en la atención al paciente

### Resumen

Las infecciones asociadas con la atención médica son una causa importante de morbilidad y mortalidad. La higiene de las manos se considera un método eficaz de prevención. Este documento resume los resultados de una revisión sistemática Cochrane que evalúa los métodos para mejorar el cumplimiento de la higiene de manos en la atención al paciente.

**Palabras clave:** Cumplimiento. Higiene de manos. Atención al paciente. Infección. Revisión sistemática.

## Introduction

The following is a summary of a Cochrane systematic review that evaluated the success of methods to improve compliance with hand hygiene recommendations and determined if hand hygiene decreased healthcare-associated infection rates<sup>1</sup>.

Hospital-acquired infections are a severe public health problem worldwide. Over the past two decades, hospitalized patient care (PC)-related infections have increased. Also, infections caused by antimicrobial-resistant

gram-negative bacteria have further increased. According to reports from the U.S. Centers for Disease Control and Prevention (CDC), about 1.7 million hospitalized patients each year acquire healthcare-associated infections while being treated for other health problems. In addition, one in 17 patients dies from these infections (more than 98,000). Several studies report a prevalence of healthcare-associated infections between 4 and 11.9%. The most frequent are urinary tract and lower respiratory tract infections<sup>2</sup>. These infections can be considered a serious threat to patient health and an additional

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healthcare cost. The cost estimate per case of a hospital-acquired infection varies between \$2,027 and \$12,197, resulting in a financial burden of \$96-\$147 billion per year.

Most hospital-acquired infections are transmitted by direct, person-to-person contact, mainly by healthcare personnel. Hand hygiene is a primary method of infection prevention, as it blocks the transmission of pathological microorganisms. Transmission of pathogens by healthcare personnel in contact with patients or within a sterile area is prevented mechanically by washing hands with soap and water or with an antiseptic liquid. Similarly, rubbing hands with an alcohol-based disinfectant eliminates some of the pathogens that cause hospital infections.

Different groups worldwide have established standards and recommendations for hand washing.

Multiple interventions have been implemented at the healthcare level to improve hand hygiene in an individual or multimodal group. However, the most effective method has not yet been determined. Therefore, the main objectives of this Cochrane systematic review were to evaluate strategies, both in the short- and long-term, to improve hand hygiene compliance in patient care and to determine if increasing hand hygiene compliance can reduce rates associated with healthcare-associated infection.

## Methods

The Cochrane review from which this summary was extracted included randomized controlled clinical trials and non-randomized trials, controlled before/after studies, and interrupted time series in which any intervention for the improvement of hand hygiene with soap and water or alcohol-based products, or both, was evaluated in nurses, physicians, and other healthcare workers in any healthcare setting<sup>1</sup>.

Time-series studies had to show a clearly defined time for the intervention and at least three points at which data were collected before and after the intervention. Studies that promoted hand hygiene or adherence to infection prevention and control methods were potentially eligible. Studies in which an artificially controlled environment was evaluated or took place outside the clinical setting were excluded.

The following outcomes were assessed in the review:

- Hand hygiene compliance, measured through observation or an indicator of compliance (effective use of soap or sanitizer for hand hygiene). Healthcare workers' self-report of hand hygiene methods was not considered a valid measure of compliance.
- Decrease in healthcare-associated infections.

- Decrease in colonization by clinically significant nosocomial pathogens.

The review was conducted following the Cochrane methodology and the Cochrane Effective Practice and Organisation of Care (EPOC) group<sup>3</sup>.

Bibliographic searches were performed in the central electronic databases to identify the studies: Cochrane Central Register of Controlled Trials, PubMed, Embase, CINAHL, Clinical Trials, and the World Health Organization (WHO) international clinical trials registry platform, as well as other relevant resources from 2009 to October 2016.

Study selection, data extraction, and methodology assessment were performed by three independent reviewers using the criteria and methods standardized in the Cochrane EPOC Group. The evaluation of the included studies was performed with the bias detection mechanism<sup>4</sup>. Data analysis was performed with Review Manager 5 statistical software (RevMan 5 Version 5.3)<sup>5</sup>. Results were reported using the measures of effectiveness described in the studies. These measures varied among them: adjusted odds ratios (OR), adjusted relative risks (RR), and mean differences (MD). Two independent reviewers evaluated the quality of evidence using the GRADE methodology<sup>6</sup>.

It was impossible to perform a metaanalysis of the data due to the heterogeneity among the studies.

## Results

A total of 4,219 bibliographic entries were identified for the review<sup>1</sup>, of which 3,685 were excluded because they did not meet the inclusion criteria. Subsequently, 534 articles were reviewed, and finally, 26 studies were included (23 studies were eligible after the search, and three had already been included in a previous version of the review)<sup>7</sup>.

According to the type of study, 14 of the 26 included studies were randomized controlled studies (two randomized clinical trials, nine cluster-randomized trials, two stepped-wedge cluster-randomized trials, and one randomized trial with cross-over), two non-randomized clinical trials, and ten interrupted time series. The studies were conducted in long-term care facilities, primary care, anesthesia ward, and hospital critical care units (23 studies).

The studies reported the results of multimodal hand hygiene campaigns with complex interventions similar to or based on WHO recommendations on either some or all of the five recommended actions for hand washing<sup>8</sup>. Only three studies reported using the five moments<sup>8</sup> as part of promotional material to inform staff about

hand hygiene. Eighteen studies used more than one intervention. Some studies considered additional methods such as social promotion or personnel participation in the development of the campaign. Six studies reported a single intervention (educational sessions, electronic teaching games, posters, purposeful feedback with additional components). Studies measured hand hygiene compliance by direct observation (20 studies), video observation (one study), or electronic monitoring (one study). In addition, the studies evaluated the proportion of nurses complying with hourly hand hygiene and the development of healthcare-associated infections.

According to the results in the review, hand hygiene compliance increased in all studies, regardless of the intervention or outcome measure employed, study design, or setting. However, the increase and compliance level varied at the intervention's beginning and end. The evidence from the review showed that when feedback and compliance training are implemented as a single strategy, better hand hygiene outcomes are achieved. It was also observed that close placement of an alcohol-based hand sanitizer as the only method used slightly increases slightly hand hygiene compliance. In 11 studies, hand hygiene compliance measures were long-term (12 months or longer). Four studies reported a decrease in infections, with the most commonly reported microorganism, methicillin-resistant *Staphylococcus aureus* (MRSA). Only one study reported a reduction in mortality.

Overall, the risk of bias in the studies was high, with at least two items with high or unclear risk. In addition, the evidence obtained from these studies showed low or moderate reliability.

The WHO recommendations for hand hygiene promotion interventions are the most comprehensive and applicable in all healthcare settings. However, they should be adapted according to the needs and resources available in each location.

Multimodal interventions that include some (but not all) of the WHO-recommended strategies and those that have all of the recommended procedures (plus additional ones) may slightly improve hand hygiene compliance and be more effective in some groups and settings than in others.

It is unclear whether multimodal interventions containing all WHO-recommended strategies (alcohol-based hand gel, training, reminders, compliance feedback, and support) increase hand hygiene compliance or even offer an advantage over individual interventions, as the evidence shows a lesser degree of reliability.

## **Implications for practice**

As healthcare personnel probably transmit most hospital-acquired infections, hand washing should reduce these infections. Several international bodies have promoted the WHO recommendations. Because these recommendations are practical, they tend to be adapted to different locations depending on the resources available and the strategies used.

There is sufficient evidence to justify implementing measures to improve hand hygiene. However, it is not clear whether interventions should be multimodal. Therefore, it will be necessary for organizations to evaluate their performance and revise such interventions accordingly.

New study designs evaluating the efficacy of interventions to improve hand hygiene compliance and reduce healthcare-associated infections need to optimize their methodology and report potential biases. These studies must include sufficient pre-and post-intervention data collection sites and information on the period during which each phase of the study took place. Studies also need to use consistent measures of effect. More detailed designs and analyses are required to determine the value of the individual components.

In addition, there is a need for more efficient communication of the results of studies on interventions to improve hand hygiene compliance, which would facilitate their implementation and adaptation to different healthcare settings.

Healthcare institutions and organizations should be expected to consider relevant measures to improve hand washing compliance by healthcare personnel, contributing to decreasing nosocomial infections and improving healthcare quality.

## **Ethical disclosures**

**Protection of human and animal subjects.** The authors declare that no experiments were performed on humans or animals for this study.

**Confidentiality of data.** The authors declare that they have followed the protocols of their work center on the publication of patient data.

**Right to privacy and informed consent.** In accordance with the statutes of the Cochrane Collaboration, the Cochrane Associated Centre Hospital Infantil de México Federico Gómez is authorized to publish this Cochrane review summary in Mexico.

## Conflicts of interest

The authors declare no conflicts of interest.

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