Title of Systematic Review Protocol:
Glove utilization in the prevention of cross transmission: A systematic review

Centre conducting review: The Thailand Centre for Evidence Based Nursing and Midwifery

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Review Objective/Questions

The objective of this review is to evaluate the evidence regarding clinical use of gloves in the prevention of cross transmission. The following questions will be addressed in this review:

1. Does glove usage prevent the contamination of HCWs’ hands and reduce cross transmission?
2. What are the rates of adherence to glove utilization among HCWs?
3. What is the inappropriate use of gloves among HCWs?
4. How the wearing gloves impact on adherence to hand hygiene among HCWs?

Background:

Health care workers (HCWs)’ hands become contaminated by pathogens and this increases linearly with time on hands during patient care. Therefore, cross transmission of microorganisms by the hands of HCWs is considered the most likely means of transmission of hospital-acquired infection. This risk can be minimized by thorough hand washing and the use of gloves. Gloves are worn to protect the hands from contamination with organic matter and microorganisms, and to reduce the risks of transmission of microorganisms from HCWs to patients and vice versa. Gloves should be worn for invasive procedures, any contact with sterile sites, non-intact skin, mucous membranes and exposure to blood, all other body fluids and sharp or contaminated instruments. Two prospective controlled trials provide evidence that wearing gloves can help reduce transmission of pathogens in healthcare settings. In addition, the efficacy of gloves in preventing contamination of HCWs’ hands has been confirmed in several observational studies. However, gloves do not provide complete protection against hand contamination. Bacterial flora from patients was found on the hands of up to 30% of HCWs who had worn gloves during patient contact. Bacterial can gain access to the caregivers’ hands via small defects in gloves or by contamination of hands during glove removal. Gloves often leak during use and, in fact, may leak before use.
Gloves must be worn as single-use items, and changed between different patients and between different care/treatment activities on the same patient to prevent cross-contamination of body sites. Nevertheless, inappropriate use of gloves is observed regularly worldwide. Three observational studies found that healthcare workers did not always remove gloves after previous care and gloves were not always changed between each patient contact. Furthermore, one observational study demonstrated that gloves were overused in healthcare environments. The unnecessary and inappropriate use of gloves results in a waste of resources and may increase the risk of cross transmission. In addition, inappropriate use of gloves increases the wearer’s exposure to the chemicals and accelerants in the glove material, which can result in skin sensitization or inability to work.

Preventing cross contamination of hands by using gloves is considered important because hand washing or hand antisepsis may not remove all potential pathogens when hands are heavily contaminated. Although gloves offer protection, they do not provide complete protection against hand contamination, therefore, hands should always be decontaminated after glove removal. Hand hygiene following glove removal further ensures that the hands will not carry potentially infectious material that might have penetrated through unrecognized tears or that could contaminate the hands during glove removal. The impact of wearing gloves on adherence to hand hygiene policies has not been definitely established, since observational studies have yielded contradictory results. Furthermore, failure to remove gloves and to wash hands when moving between patients without change, can result in the subsequent cross-transmission of nosocomial pathogens. Therefore, the influence of glove use on hand hygiene practice is unclear. Given the impact of glove usage on cross-transmission, we will conduct a systematic review to contribute to the understanding of the efficacy of glove use in the prevention of cross transmission and identify specific areas for further research.

A search of JBI Library of Systematic Reviews, Cochrane Library of Systematic Reviews, DARE database, MEDLINE was performed and no existing systematic reviews on this topic.

**Definitions of terms:**

Clinical use of glove or glove usage refers to the wearing of gloves to either prevent the hands becoming contaminated with organic matter or microorganisms, or to prevent the transfer of microorganisms to both patients and healthcare workers. The choice of glove to be use should be based on an assessment of the task of transmission of microorganisms to the patient, and the risk of contamination to the healthcare worker by patients’ blood, body fluids, secretions and excretions.

Cross transmission is defined as the method by which any potentially infecting agent is spread from the healthcare worker to the patient and vice versa, as well as from one patient to another.

Prevention of cross transmission refers to the management of those factors that could lead to spread microorganisms so as to prevent the occurrence of the disease.

Reduction of cross transmission refers to the act of decreasing the risk of germ dissemination to the environment and of transmission from the healthcare worker to the patient and vice versa, as well as from one patient to another.
Contamination of HCWs’ hands refers to the presence of microorganisms on a surface of HCW’s hands—therefore, a potential source for transmission.

Inappropriate use of gloves among HCWs is defined as the use of gloves when not indicated which represents a waste of resources and may increase the risk of cross-transmission. It is also refers to HCWs failing to remove gloves between patients or failing to change gloves during the care of a single patient, thus facilitating the spread of microorganisms.

Adherence to hand hygiene among HCWs refers to readily acting in accordance with the guideline for hand hygiene in the care of all patients. Adherence to the guideline is defined as either washing the hands with soap or antiseptic and water or rubbing the hands with alcohol-based solutions.

Inclusion Criteria

Types of studies
This review will consider any randomized clinical trials (RCTs) that evaluate the use of gloves in the prevention of cross transmission. In the absence of RCTs, other research designs such as before and after studies, descriptive or observational studies will be considered for inclusion in order to identify the best available evidence related to the rates of adherence to glove usage in caring for patient and the inappropriate use of gloves.

Types of participants
This review will consider studies that include health care workers.

Types of intervention
The review will consider studies that evaluated glove utilization.

Types of outcome measures
The outcomes of interest include:

Contamination of HCWs’ hands measured for example as the number of bacterial colonies grown from the fingertips of the HCW’s dominant hand at the end of the observation period.

Transmission of infections measured for example as hospital-acquired infection transferred from one patient to another via contaminated gloved hands. The potential for microbial transmission is defined as an instance where gloves contacted mucous membranes, patient skin, moist body substances or environment and gloves are not changed before performing a care necessitating strict aseptic precautions on the same patient or another patient.

Adherence to glove usage measured for example as the number of observations of correct performance per number of observations of glove usage opportunity.

Inappropriate uses of gloves measured for example as the number of observations of gloving when not indicated or failure to remove gloves between patients and to change gloves during the care of a single patient.
Adherence to hand hygiene measured for example as the number of observations of correct performance per number of observations of hand hygiene opportunity.

**Search strategy**
The comprehensive search strategy aims to find both published and unpublished studies. The time period of the search cover articles published from 2000 to the present day in English and Thai language. A three-step search strategy will be utilized in each component of this review. An initial phase limited search of MEDLINE and CINAHL will be undertaken. A second search using all identified keywords and index terms will then undertake across all included databases. Thirdly, the reference lists or bibliographies of all identified reports and articles will be hand searched for additional studies.

The following databases to be searched will include:
MEDLINE
CINAHL
EMBASE
The Cochrane Library
PubMed,
EBSCO Host Research Databases,
Blackwell synergy.

Individual search strategies will be developed for each database, adopting the different terminology of index thesauri if available.

Hand searching of the most recent issues of the following journals will be conducted for additional references:
-American Journal of Infection Control
-Infection Control and Hospital Epidemiology
-Hospital Infection, Journal of the Medical Association of Thailand
-Nursing Newsletter,
-Bulletin of Nosocomial Infection Control Group of Thailand,
-Nursing Journal,
-Journal of Health Science.

The search will be conducted to locate relevant unpublished materials, such as conference papers, research reports, Digital-dissertations, WHO (World Health Organization, CDC (Centre for Disease Prevention and Control). Content experts will be contacted in order to provide other alternatives for securing relevant literature.

All studies identified during the databases search will be assessed for relevance to the review using a study eligibility tool developed by reviewers (see Appendix I). Full reports will be retrieved for all studies that meet the inclusion criteria as assessed independently by two reviewers. Any discrepancies in reviewer selections will be resolved at a meeting between reviewers prior to selected articles being retrieved. Those studies meeting the inclusion criteria will be submitted to critical appraisal.

**Initial keywords or term:**
include: gloves, transmission, infection, adherence, hand hygiene.
Search for Grey Literature
The grey literature search will consist of conducting an online search of databases and websites including:
- MEDNAR
- Dissertation International
- Conference Proceedings
- Google

Assessment of methodological quality
Papers selected for retrieval will be assessed by two independently reviewers for methodology quality prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs institution (JBI) Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (see Appendix I). Any discrepancies arise between the reviewers will be resolved through discussion between the reviewers.

Data extraction
Data will be extracted from papers included in the review using the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MASTARI) (see Appendix III).

The data extraction will include specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objective.

Data synthesis
Where possible, study results will be pooled in statistical meta-analysis using the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MASTARI). All results will be subject to double data entry. Heterogeneity between combined studies will be tested using chi-square test. Odds ratio (for categorical outcome data) or weighted mean differences (for continuous) and their 95% confidence intervals will be calculated for analysis. Where statistical pooling is not possible the findings will be summarized in a narrative form.

Conflict of interest
No conflicts of interest.

References:


Appendix I: Study eligibility checklist

Glove utilization in the prevention of cross infection

Author…………………………Year…………….Record No……

Types of participants

Health care workers

Types of interventions

Glove use

Types of outcome measures

Cross transmission
Contamination
Adherence to glove usage
Adherence to hand hygiene
Inappropriate uses of gloves

Types of studies

Randomized Controlled Trials
Quasi-experimental design
Observational study
### Appendix II: Critical appraisal instruments

**JBI Critical Appraisal Checklist for Experimental Studies**

<table>
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<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Unclear</th>
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<tbody>
<tr>
<td>1. Was the assignment to treatment groups truly random?</td>
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<td>2. Were participants blinded to treatment allocation?</td>
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<td>3. Were allocation to treatment groups concealed from the allocator?</td>
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<td>4. Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>5. Were those assessing outcomes blind to the treatment allocation?</td>
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<td>6. Were the control and treatment groups comparable at entry?</td>
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<td>7. Were groups treated identically other than for the named interventions?</td>
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<td>8. Were outcomes measured in the same way for all groups?</td>
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<td>9. Were outcomes measured in a reliable way?</td>
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<td>10. Was appropriate statistical analysis used?</td>
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**Overall appraisal:**  
Inclue [ ]  Exclude [ ]  Seek further info [ ]

**Comments (Including reasons for exclusion):**

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JBI Critical Appraisal Checklist for Descriptive/Case Series

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<th>Date</th>
<th>Record Number</th>
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<tr>
<th>Question</th>
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<th>No</th>
<th>Unclear</th>
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</thead>
<tbody>
<tr>
<td>1. Was study based on a random or pseudo-random sample?</td>
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<td>2. Were the criteria for inclusion in the sample clearly defined?</td>
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<td>3. Were confounding factors identified and strategies to deal with them stated?</td>
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<td>4. Were outcomes assessed using objective criteria?</td>
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<td>5. If comparisons are being made, was there sufficient descriptions of the groups?</td>
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<td>6. Was follow up carried out over a sufficient time period?</td>
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<td>7. Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>8. Were outcomes measured in a reliable way?</td>
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<td>9. Was appropriate statistical analysis used?</td>
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Overall appraisal: Include [ ] Exclude [ ] Seek further info [ ]

Comments (Including reason for exclusion):

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Appendix III: Data extraction instrument

JBI Data Extraction Form for Experimental/Observational Studies

Reviewer __________________________ Date ____________
Author ___________________________ Year ____________
Journal ___________________________ Record Number ______

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<thead>
<tr>
<th>Study Method</th>
<th>RCT</th>
<th>Quasi-RCT</th>
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<th>Participants</th>
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<th>Setting</th>
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<table>
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<tr>
<th>Population</th>
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<table>
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<th>Sample size</th>
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<th>Intervention 3</th>
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<th>Intervention 3</th>
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<table>
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<tr>
<th>Clinical outcome measures</th>
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<th>Outcome Description</th>
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### Study results

#### Dichotomous data

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<th>Outcome</th>
<th>Intervention ( ) number / total number</th>
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#### Continuous data

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<tr>
<th>Outcome</th>
<th>Intervention ( ) mean &amp; SD (number)</th>
<th>Intervention ( ) mean &amp; SD (number)</th>
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### Authors Conclusions

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### Comments

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