TITLE: Double Gloves for Prevention of Transmission of Blood Borne Pathogens to Patients: A Review of the Clinical Evidence

DATE: 27 March 2012

CONTEXT AND POLICY ISSUES

As concern surrounding the risk of blood borne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) surfaced in the 1980s, the use of surgical gloves by surgeons, surgical nurses, and surgical assistants increased. The Centers for Disease Control and Prevention (CDC) has issued standard precautions, originally called universal precautions, which recommend wearing gloves "when it can be reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes, nonintact skin, or potentially contaminated intact skin (e.g., of a patient incontinent of stool or urine) could occur."¹

The history of double gloving (wearing two pairs of surgical gloves) dates back to the early 1990s. A 2002 Cochrane review on double gloving analyzed 18 studies on the practice of double-gloving and concluded that the number of breaks to the innermost glove is lessened when a second glove is worn over top.² The authors also noted that the wearing of orthopaedic gloves, which are thicker than standard latex, is as effective as wearing two pairs of standard latex gloves in reducing the number of perforations.²

Certain organizations, such as the Association of PeriOperative Nurses (AORN), have interpreted these results to mean that double gloving minimizes the risk of transmission of blood borne pathogens.³ In fact, the number of perforations in the gloves is a surrogate outcome for the clinically meaningful outcome, which is the transmission of blood borne pathogens from patient to surgical staff or from surgical staff to patient.

This report will review the available evidence on the comparative clinical effectiveness of double gloving versus single gloves, specifically in terms of preventing transmission of blood borne pathogens from infected healthcare workers to patients. This information will be used to inform clinical guidelines for carriers of blood borne infections, such as HBV, HCV, and HIV, working in the surgical setting.

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RESEARCH QUESTION

What is the comparative clinical effectiveness of double gloving versus single gloves for preventing transmission of blood borne pathogens from infected healthcare workers to patients?

KEY MESSAGE

One systematic review was identified which aimed to evaluate the comparative clinical effectiveness of double gloving versus single gloves for preventing transmission of blood borne pathogens from infected healthcare workers to patients. The authors found no trials which provided data on transferred blood borne infections in surgical patients or the surgical team in relation to gloving method. Our literature search found no trials addressing this research question.

METHODS

Literature Search Strategy

A limited literature search was conducted on key resources including MEDLINE, PubMed, The Cochrane Library (2012, Issue 2 of 12), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI (Health Devices Gold), Canadian and abbreviated list of major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. The search was limited to English language documents, but was not limited by publication date. The search was run on February 22, 2012.

Selection Criteria and Methods

One reviewer screened the titles and abstracts of the retrieved publications and examined the full-text publications for the final article selection. Selection criteria are outlined in Table 1.

Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Healthcare workers (including dentists and medical trainees) infected with bloodborne pathogens (HIV, Hep B, Hep C)</th>
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<tbody>
<tr>
<td>Intervention</td>
<td>Double (or triple) gloves</td>
</tr>
<tr>
<td>Comparator</td>
<td>Single gloves</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Transmission of pathogen to the patient</td>
</tr>
<tr>
<td>Study Designs</td>
<td>HTA/Systematic review/Meta-analysis Randomized controlled trials (RCTs) Non-randomized studies</td>
</tr>
</tbody>
</table>

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria in Table 1. Studies investigating the number of perforations in double versus single gloves or the amount of blood transferred through a perforated glove were excluded.
Critical Appraisal of Individual Studies

A MeaSurement Tool to Assess Reviews (AMSTAR)\(^5\) was used to critically appraise the selected systematic reviews in the report.

**SUMMARY OF EVIDENCE:**

**Quantity of Research Available**

The literature search yielded 259 citations. Upon screening titles and abstracts, 247 citations were excluded, and 12 potentially relevant articles were retrieved for full-text review. One additional article was identified from the grey literature search. Of the 13 potentially relevant reports, one systematic review met the inclusion criteria. The process of study selection is outlined in the PRISMA flowchart (Appendix 1). The primary studies (RCTs and non-randomized studies) retrieved from the literature search were not relevant to our research question. Some studies examined the incidence of perforations in double versus single gloves, but no evidence was found regarding the incidence of blood borne infections in surgical patients.

**Summary of Study Characteristics**

A systematic review conducted by Tanner et al.\(^4\) in 2009 investigated the comparative effectiveness double gloving versus alternative gloving strategies. The primary outcome of interest was the rate of surgical site infections. Rates of perforations in the innermost surgical glove and rates of blood borne infections in surgical patients or the surgical team were secondary outcomes. Two trials were included which addressed the primary outcome of the review, however no trials reporting the rates of blood borne infections in surgical patients or the surgical team were included. The bulk of the trials included in this review provide data on glove perforation rates.

<table>
<thead>
<tr>
<th>First Author, Title, Publication Year</th>
<th>Objective (of interest)</th>
<th>Search Strategy</th>
<th>Study Criteria</th>
<th>Studies Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanner, Double gloving to reduce surgical cross infection, 2009(^4)</td>
<td>To determine if double gloving compared with single gloving reduces the risk of infections, including surgical site infections, blood borne infections in surgical patients and blood borne infections in the surgical team.</td>
<td>Searched Cochrane Wounds Group Specialised Register, Cochrane Central Register of Controlled Trials, Ovid MEDLINE, Ovid EMBASE and Ovid CINAHL.</td>
<td>RCTs only; No date or language restrictions were applied.</td>
<td>31 trials were included in this review; no evidence to determine the effect of wearing additional gloves on transferred infections.</td>
</tr>
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</table>
Summary of Critical Appraisal

The systematic review included in this report is of good methodological quality. The search methods were comprehensive (although study inclusion was restricted to RCTs) and based on pre-defined criteria. Publication status was used as an inclusion criterion (i.e., grey literature was not searched). Appropriate methods were used for quality assessment, data collection, and analysis: Both authors independently assessed the relevance and quality of each trial and data were extracted by one author and checked by a second author. A full list of studies (included and excluded) was provided. Publication bias was addressed, but no formal assessment was conducted. Conflicts of interest were not reported in the review or the assessment of included studies.

Summary of Findings

The systematic review described in this report did not identify any RCTs on the transfer of blood borne infections in surgical patients or the surgical team, relative to gloving method. Our broader search strategy included non-randomized studies, but was still unable to identify any evidence on the topic.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING:

No conclusions can be drawn regarding the comparative effectiveness of double gloving versus single gloves for preventing transmission of blood borne pathogens from infected healthcare workers to patients as no clinical evidence was found.
REFERENCES


APPENDIX 1: Selection of Included Studies

259 citations identified from electronic literature search and screened

→ 247 citations excluded

12 potentially relevant articles retrieved for scrutiny (full text, if available)

→

1 potentially relevant report retrieved from other sources (grey literature, hand search)

→ 13 potentially relevant reports

→

12 reports excluded:
- irrelevant intervention (1)
- irrelevant outcomes (4)
- other (review articles, editorials) (7)

→

1 report included in review