Authors: Dave K. Marchand, Suzanne McCormack


Acknowledgments:

Disclaimer: The information in this document is intended to help Canadian health care decision-makers, health care professionals, health systems leaders, and policy-makers make well-informed decisions and thereby improve the quality of health care services. While patients and others may access this document, the document is made available for informational purposes only and no representations or warranties are made with respect to its fitness for any particular purpose. The information in this document should not be used as a substitute for professional medical advice or as a substitute for the application of clinical judgment in respect of the care of a particular patient or other professional judgment in any decision-making process. The Canadian Agency for Drugs and Technologies in Health (CADTH) does not endorse any information, drugs, therapies, treatments, products, processes, or services.

While care has been taken to ensure that the information prepared by CADTH in this document is accurate, complete, and up-to-date as at the applicable date the material was first published by CADTH, CADTH does not make any guarantees to that effect. CADTH does not guarantee and is not responsible for the quality, currency, propriety, accuracy, or reasonableness of any statements, information, or conclusions contained in any third-party materials used in preparing this document. The views and opinions of third parties published in this document do not necessarily state or reflect those of CADTH.

CADTH is not responsible for any errors, omissions, injury, loss, or damage arising from or relating to the use (or misuse) of any information, statements, or conclusions contained in or implied by the contents of this document or any of the source materials.

This document may contain links to third-party websites. CADTH does not have control over the content of such sites. Use of third-party sites is governed by the third-party website owners’ own terms and conditions set out for such sites. CADTH does not make any guarantee with respect to any information contained on such third-party sites and CADTH is not responsible for any injury, loss, or damage suffered as a result of using such third-party sites. CADTH has no responsibility for the collection, use, and disclosure of personal information by third-party sites.

Subject to the aforementioned limitations, the views expressed herein are those of CADTH and do not necessarily represent the views of Canada’s federal, provincial, or territorial governments or any third party supplier of information.

This document is prepared and intended for use in the context of the Canadian health care system. The use of this document outside of Canada is done so at the user’s own risk.

This disclaimer and any questions or matters of any nature arising from or relating to the content or use (or misuse) of this document will be governed by and interpreted in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein, and all proceedings shall be subject to the exclusive jurisdiction of the courts of the Province of Ontario, Canada.

The copyright and other intellectual property rights in this document are owned by CADTH and its licensors. These rights are protected by the Canadian Copyright Act and other national and international laws and agreements. Users are permitted to make copies of this document for non-commercial purposes only, provided it is not modified when reproduced and appropriate credit is given to CADTH and its licensors.

About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada’s health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.
**Research Questions**

1. What is the clinical effectiveness of non-manual room disinfection methods for infection prevention in healthcare facilities?

2. What is the cost-effectiveness of non-manual room disinfection methods for infection prevention in healthcare facilities?

3. What are the evidence-based guidelines regarding non-manual room disinfection methods for infection prevention in healthcare facilities?

**Key Findings**

Two health technology assessments, three systematic reviews (one with a meta-analysis), and six non-randomized studies were identified regarding the clinical effectiveness of non-manual room disinfection methods for infection prevention in healthcare facilities. No economic evaluations were identified. One evidence-based guideline was identified regarding non-manual room disinfection methods for infection prevention in healthcare facilities.

**Methods**

This report makes use of a literature search strategy developed for a previous CADTH report. For the current report, a limited literature search was conducted on key resources including OVID Medline, PubMed, the Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic studies and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2014 and October 11, 2018 to capture any articles published since the previous report. Internet links were provided, where available.

**Selection Criteria**

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.
Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Patients and healthcare workers in healthcare facilities (including acute care, rehab, and residential care)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Non-manual room disinfection techniques, including but not limited to:</td>
</tr>
<tr>
<td></td>
<td>• Steam cleaning</td>
</tr>
<tr>
<td></td>
<td>• Ozone disinfection</td>
</tr>
<tr>
<td></td>
<td>• Ultraviolet light</td>
</tr>
<tr>
<td></td>
<td>• High-intensity narrow-spectrum light</td>
</tr>
<tr>
<td></td>
<td>• Hydrogen peroxide</td>
</tr>
<tr>
<td></td>
<td>• Anti-microbial coatings (e.g., triclosan, silver, copper)</td>
</tr>
<tr>
<td></td>
<td>• Bacteriophage-modified surfaces</td>
</tr>
<tr>
<td></td>
<td>• Polycationic and light activated antimicrobial surfaces</td>
</tr>
<tr>
<td></td>
<td>• Sharkskin like surfaces (e.g., Sharklet)</td>
</tr>
<tr>
<td>Comparator</td>
<td>Any other disinfection method (manual or non-manual)</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Q1: Clinical effectiveness (e.g., rates of hospital acquired infection, infection control outcomes, infection prevention outcomes, patient colonization rate)</td>
</tr>
<tr>
<td></td>
<td>Q2: Cost-effectiveness</td>
</tr>
<tr>
<td></td>
<td>Q3: Guidelines and best practice</td>
</tr>
<tr>
<td>Study Designs</td>
<td>Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations, evidence-based guidelines</td>
</tr>
</tbody>
</table>

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, economic evaluations, and evidence-based guidelines.

Two health technology assessments, three systematic reviews (one with a meta-analysis), and six non-randomized studies were identified regarding the clinical effectiveness of non-manual room disinfection methods for infection prevention in healthcare facilities. No relevant randomized controlled trials or economic evaluations were identified. One evidence-based guideline was identified regarding non-manual room disinfection methods for infection prevention in healthcare facilities.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

Two health technology assessments, three systematic reviews (one with a meta-analysis), and six non-randomized studies were identified regarding the clinical effectiveness of non-manual room disinfection methods for infection prevention in healthcare facilities. No relevant randomized controlled trials or economic evaluations were identified; although, one non-randomized study included a financial impact analysis.

The first health technology assessment noted that portable ultraviolet light surface-disinfecting devices were effective in reducing the rate of hospital-acquired infections (HAIs) (composite outcome). They also performed a 5-year budget impact analysis from a hospital's perspective; however, their estimates were sensitive to several variables. This
contrasts with a second health technology assessment\(^2\) that focused on evaluating a specific hydrogen peroxide vapour disinfection system. They concluded that the device could be used as a complement, but not a substitute, to existing surface cleaning and surface disinfection methods.\(^2\)

The authors of one systematic review\(^3\) and two non-randomized studies\(^6,11\) observed a reduction in *Clostridium difficile* infections,\(^3,9\) vancomycin-resistant enterococci,\(^3\) or multiple-drug-resistant organisms\(^11\) following the use of no-touch ultraviolet light disinfection methods. Similarly, one non-randomized study\(^6\) evaluated the impact of an ultraviolet-C disinfection robot along with other horizontal infection prevention interventions in intensive care units and hospital wards and observed a decreased rate of HAIs throughout the study period.\(^6\)

Two other non-randomized studies\(^7,8\) compared the rates of HAIs before and after the introduction of an ultraviolet-C disinfection strategy and noted a decrease in incidence,\(^7\) as well as a decreased need for hospitalizations, especially for pneumonia, from a long-term care setting\(^8\). One study\(^7\) also included a financial impact analysis, noting substantial direct cost savings.\(^7\)

A second systematic review\(^4\) and a non-randomized study\(^10\) concluded, that copper surfaces\(^4,10\) and copper-impregnated linens\(^10\) lead to reduced rates of HAIs.

One evidence-based guideline\(^12\) was identified regarding non-manual room disinfection methods for infection prevention in health care facilities. The Ontario Agency for Health Protection and Promotion discusses the advantages and disadvantages of various no-touch disinfection strategies.\(^12\)

### References Summarized

#### Health Technology Assessments


#### Systematic Reviews and Meta-analyses


Randomized Controlled Trials

No literature identified.

Non-Randomized Studies


Economic Evaluations

No literature identified.
Guidelines and Recommendations

See: Table 5 (page 83) and Table 6 (page 84)
Appendix — Further Information

Previous CADTH Reports


Health Technology Assessments

Methods Unspecified

Randomized Controlled Trials

**Combined Interventions**


Non-Randomized Studies

**Qualitative Studies**


Clinical Practice Guidelines – Unspecified Methodology
