To enable PROSPERO to focus on COVID-19 submissions, this registration record has undergone basic automated checks for eligibility and is published exactly as submitted. PROSPERO has never provided peer review, and usual checking by the PROSPERO team does not endorse content. Therefore, automatically published records should be treated as any other PROSPERO registration. Further detail is provided here.

Citation

Palpouguini LOMPO, Bea Van den Poel. Bacterial contamination of disinfectants, antiseptics and products used for hand hygiene in hospitals in low- and middle-income countries: a review of frequency, spectrum of microorganisms, risk factors and best practices for risk mitigation.. PROSPERO 2021 CRD42021266271 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021266271

Review question

1. What is the frequency and microbiological spectrum of bacterial contamination of products used for hand hygiene, antiseptics and disinfectants used in human healthcare in low- and middle-income countries?

2. Which are the risk factors for this bacterial contamination?

3. What are the best practices to mitigate the risk of this bacterial contamination?

Searches

1. Bibliographic databases:
• MEDLINE (PubMed)

• Google Scholar

• Worldwide Database for Nosocomial Outbreaks

• African Journal Online (AJOL)

• WHO/HINARI

• Scopus

Concepts approach will be used to screen MEDLINE database: (1) concept antiseptics, disinfectants, hand hygiene products group, (2) concept bacteria, (3) concept contamination/growth, and (4) concept healthcare-associated infection. The same terms will be adapted and used to screen the other databases.

2. Grey literature (https://guides.library.utoronto.ca/c.php?g=577919&p=4123572)

3. Guidelines

• WHO 2009 hand hygiene formulation

• CDC (online) Safe water system and hand washing guide for health care workers

• WHO 2019 Guidelines on Hand Hygiene in Health Care

• CDC2 019 Best Practices for Environmental Cleaning in Healthcare Facilities

• EngenderHealth 2011, 2014

4. Snowball

The literature search will concern the electronic bibliographic database of MEDLINE, Google Scholar, Worldwide Database for Nosocomial Outbreaks, African Journal Online, World Health Organization (WHO)/HINARI, Scopus, and the standard guidelines such as WHO, United States Center for Disease Control (US CDC)/ Healthcare Infection Control Practices Advisory Committee (HICPAC) and EngenderHealth. Search terms covering both research questions will be built up, and a summary of the search strategy in MEDLINE and the other databases as well, is attached in section 17. The main key words will be adapted and used in all databases. Moreover, the reference lists of relevant articles will be screened to complete the literature search. Articles and documentation in English, French, German, Spanish and Portuguese published from 1953 to 2020 will be taken in account.

Search strategy

https://www.crd.york.ac.uk/PROSPEROFILES/266271_STRATEGY_20210706.pdf

Types of study to be included

The type of study to be included comprises: cross-sectional, outbreak investigation, review, original research, guideline, and experimental study if relevant for causes or best practices

Condition or domain being studied

The domain being studied concerns the bacterial contamination of disinfectants, antiseptics and products used for hand hygiene in healthcare settings in low- and middle-income countries.

Participants/population

• Inclusion criteria:

Studies addressing the bacterial contamination of:

- disinfectants used for environmental cleaning;

- antiseptics;

- products used for hand hygiene including soaps and alcohol-based hand rubs;

Studies conducted in hospitals in low- and middle-income countries.

The community dental practices will be included only when relevant for causes or best practices. Furthermore, standard guidelines (also from high-income countries) will be included for the best practices synthesis.

• Exclusion criteria:

Studies addressing:

- exclusively the contamination of water, sinks or other sanitary equipment;

- the contamination of mouthwash products and moistening cream;

- the contamination of disinfectants not used for environmental cleaning (e.g. for the high-level disinfection of (semi)critical instruments);

- the contamination of antiseptics/disinfectants in the community or long-term care facilities;

- animal infections or veterinary medicine;

- infection prevention and control measures implementation and assessment (i.e. hand hygiene, environmental cleaning and decontamination) with no investigation on bacterial contamination of antiseptics and disinfectants.

Intervention(s), exposure(s)
Not applicable

Comparator(s)/control
Not applicable

Context
Review question1:

This part of the review considers the frequency and microbiological spectrum of bacteria contaminating in-use disinfectants, antiseptics and hand hygiene products in hospital in low- and middle-income countries. A focus will be pointed on the products recommended by WHO and the products commonly used in these countries.

Review question 2:

In this paragraph of the review, the known as well as previously non-described risk practices contributing to the contamination of disinfectants, antiseptics and hand hygiene products will be scrutinized, with a particular focus on the healthcare settings in low and middle-income countries.

Review question 3:

This part of the review will compile recommendations about best practices to mitigate the bacterial contamination of the products. These best practices will be based on guidelines as well as on individual study findings.

Main outcome(s)
Review question 1:

- Frequency and spectrum of bacteria found in disinfectants, antiseptics and products used for hand hygiene in low- and middle-income countries, associated with outbreaks or pseudo-outbreaks (according to author's definition and/or Outbreak Reports and Intervention Studies Of Nosocomial infection (ORION) guideline);

- Cross-sectional assessment of frequency and bacterial spectrum of contamination of disinfectants, antiseptics and products used for hand hygiene used in hospitals in low- and middle-income countries.

Review question 2:

- Risk practices contributing to bacterial contamination of disinfectants, antiseptics and products used for hand hygiene in hospitals in low- and middle-income countries. Risk practices involving both intrinsic and extrinsic contamination:

• Intrinsic contamination: contamination during manufacturing of products;

• Extrinsic contamination: contamination caused during dilution/preparation, storage, distribution, use, status and reprocessing of products' containers.

Review question 3:

Best practices to mitigate bacterial contamination of disinfectants, antiseptics and products used for hand hygiene in low- and middle-income countries adapted to the context:

• Procurement: selection of provider, products,…;

• Storage: place, temperature and humidity condition, sunlight, expiration date after opening,…;

• Preparation/dilution: work place, materials, use of water, concentration of working solution,…;

• Refilling (containers used and practice of refilling);

• Reprocessing of containers: washing, disinfection;

• Training of staff;

• Quality management system.

Measures of effect

Not applicable

Additional outcome(s)

Review question 1:

Distribution , bacterial counts and antibiotic susceptibility of bacterial species contaminating products used for hand hygiene, antisepsis and disinfection.

Review question 2:

Not applicable

Review question 3:

All corrective actions implemented to cease outbreaks (in case of outbreak) or to solve the problem of contamination of the products.

Measures of effect

Not applicable

Data extraction (selection and coding)

Article titles will be retrieved using the above described search strategy. Titles will be first screened by two independent authors, followed by abstract-screening if relevant. Afterward, full texts will be screened by the same review team. Discrepancy analysis will be done by direct discussion. Finally, data will be extracted following a study data collection form.

The following data will be recorded in Excel format:

General data:

(1) Year of publication;

(2) Country;

(3) Setting: high-, middle or low-income country;

(4) Products: the type and concentration of the antimicrobial compound in the antiseptics, disinfectants and hand hygiene products that were investigated;

(5) Population, including affected wards;

(6) Type of study (incl. prospective or retrospective);

(7) Risk of bias.

Data for review question 1:

(1) Bacterial species identification and antimicrobial susceptibility profile,

(2) Microbiological methods: sampling technique, culture methods, colony count, identification methods and methods used for antimicrobial susceptibility testing;

(3) Proportion of contamination of sampled products;

(4) Clinical aspects:

a. Link with clinical infection: proven – suspected – not clear/not investigated;

b. Clinical site of microbe isolation;

c. Clinical outcome if applicable;

(5) Adherence to ORION guidelines.

Data for review question 2:

(1) Presence of a known risk factor (checklist);

(2) Presence of a previously not-described risk factor;

(3) Strength and evidence of risk factor;

(4) Interventions to contain outbreaks and/or to cease product's contamination.

Data for the review question 3:

(1) Preventive measures to avoid bacterial contamination of disinfectants, antiseptics and products used for hand hygiene

Data from the review question 3 will be gathered from both international guidelines and individual studies, which make recommendations to mitigate the risk practices, which have been the cause of bacterial contamination of products.

Risk of bias (quality) assessment

A checklist will be used by the two independent authors to appraise the risks of bias of included studies. Discrepancies will be discussed before the final risk bias assessment report.

The checklist will include following topics:

- In case of (pseudo)outbreak:

• Were ORION guidelines followed?

• Were samples properly collected and analyzed? were neutralizing agents for antiseptics/disinfectants used for culture?

• Were appropriate microbiological techniques used for bacterial colony count, species identification and antimicrobial susceptibility testing?

• What is the evidence of relatedness of bacterial isolates between products and clinical isolates?

• Were risk factors assessed?

• Did the authors assess the risk practices contributing to the contamination or only hypotheses were made?

• Did the authors assess sealed stock containers or only open in-use containers?

• Was any intervention regarding products implemented to sorted out the outbreak?

- In case of cross-sectional studies

• Were all hospital products sampled?

• Were samples properly collected and analyzed?

• Was a product considered as contaminated independently of the abundance of bacterial growth?

• Were bacterial colonies counted ?

• Were appropriate microbiological techniques used for bacterial identification and antimicrobial susceptibility testing?

• What is the evidence of relatedness of bacterial isolates between products and clinical isolates?

Strategy for data synthesis

Review question 1:

Data will be recorded in an Excel data base. Antiseptics, disinfectants and hand hygiene products will be considered contaminated when the authors reported bacteria isolated from the products. The contamination rate is established by the number of contaminated products on the total number of products assessed. The body of evidence of the relatedness between bacteria isolated from products and from clinical samples will be assessed. A pseudo-outbreak will be considered when the clinical sample was inadvertency contaminated by identical bacterial species contaminating products without evidence of patient infection.

Cross-sectional investigations will be categorized apart.

Review question 2:

The risk practices contributing to the bacterial contamination of disinfectants, antiseptics, and products used for hand hygiene in hospital in low- and middle-income countries in terms of product storage, preparation/dilution, use and containers' processing will be analyzed to synthetize adequate information for best practices.

Review question 3:

The standard guidelines combined with the risk practices detected in the individual studies will be used to summarize recommendations for best practices from manufacturing to final use of products adapted to the low- and middle-income countries context. Relevant articles with substantial data regarding the reprocessing of containers will be taken in account, particularly when they can be adapted to low-resource context.

Analysis of subgroups or subsets

Not applicable

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Type and method of review

Cost effectiveness, Epidemiologic, Intervention, Methodology, Narrative synthesis, Prevention, Synthesis of qualitative studies, Systematic review

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Not applicable

Conflicts of interest

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Belgium, Burkina Faso

Not applicable

Stage of review

Review Ongoing

Subject index terms status

Subject indexing assigned by CRD

Subject index terms

MeSH headings have not been applied to this record

Date of registration in PROSPERO

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Details of any existing review of the same topic by the same authors

Not applicable

Stage of review at time of this submission

Stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	No
Formal screening of search results against eligibility criteria	Yes	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

The record owner confirms that the information they have supplied for this submission is accurate and complete and they understand that deliberate provision of inaccurate information or omission of data may be construed as scientific misconduct.
The record owner confirms that they will update the status of the review when it is completed and will add publication details in due course.

Versions

06 August 2021