Title: **Systematic Review of QUAT disinfection of viruses**

Prepared by: **Anne Vescovi, Elyse Stachler**

Systematic Review (PRISMA-P 2015 - checklist)

INTRODUCTION

RATIONALE

Recent virus caused disease outbreaks, such as Coronaviruses (COVID-19, MERS, SARS), Ebola, … have raised questions about the persistence and the effectiveness of disinfectants to different viruses, especially on surfaces and in water. To work with disease causing viruses, it is often mandatory to have a laboratory with a biosafety level (BSL) of 3 or 4. Access to these laboratories are limited and expensive.

In the past, different virus surrogates, viruses that conduct like the pathogen, but require a lower BSL, were used to observe the behaviour of pathogens. Mostly selected by physiological or family similarity.

This review will compare different viruses and disinfectants to screen for factors of similarities in resistance and sensitivity.

The review is targeted to researchers, by highlighting possible new factors, which might be related to the virus response to disinfectants new researches can rely on this review.

OBJECTIVE:

To describe and understand the context and difference between different virus interactions with disinfectants.

Different factors should be compared. 1. Enveloped/ unenveloped 2. Family 3. Bacteriophage/ Mammalian virus 4. nucleic acid 5. Capsid 6. Size 7. shape 8. Disinfectant type

METHODS

ELIGIBILITY CRITERIA:

All studies that look at disinfection of viruses (regardless of host type) with sodium hypochlorite and quaternary ammonium compounds will be considered, including both for surface and in liquid applications.

INFORMATION SOURCES:

All data will come from peer reviewed literature published before May 2020.

SEARCH STRATEGY:

Search will be done with the following databases: PubMed, EMBASE, Web of Science

We will use the following generic search string, adapted for the databases listed above: (disinfection OR disinfectant OR inactivation) AND (virus OR bacteriophage OR viral) AND (quaternary ammonium compounds OR benzalkonium chloride OR QUAT OR ammonium)

*PubMed: (disinfection OR disinfectant OR inactivation) AND (virus OR bacteriophage OR viral) AND (quaternary ammonium compounds OR benzalkonium chloride OR QUAT OR ammonium) 302*

*EMBASE:(disinfection OR disinfectant OR inactivation) AND (virus OR bacteriophage OR viral) AND ('quaternary ammonium compounds' OR quaternary OR 'benzalkonium chloride' OR quat OR ammonium) 357*

*Web of Science: (disinfection OR disinfectant OR inactivation) AND (virus OR bacteriophage OR viral) AND ('quaternary ammonium compounds' OR quaternary OR 'benzalkonium chloride' OR quat OR ammonium) 207*

DATA MANAGEMENT:

Databases will be searched directly and records downloaded into Zotero. Zotero software will be used to delete duplicates and as a library. Data will be transferred into an Excel table, transferred to a Dataset and analysed with the open source software “R”.

SELECTION PROCESS:

Titles and abstracts are initially screened to exclude irrelevant studies. Studies are excluded if they: 1) are about microorganisms that are not viruses, 2) do not include the affect of disinfectants 3) do not include screened disinfectants.

Two independent reviewers screen records using titles and abstracts.

<https://www.covidence.org/reviews/91294/review_studies/screen?filter=vote_required_from#>

DATA COLLECTION PROCESS:

A standardized form will be used to extract data. Two or more reviewers will extract data from 3 studies to pilot the standardized form. Reviewers will continue to extract data with 10% record duplication (verified periodically) to ensure consistency.

DATA ITEMS:

Specific data from each study we are interested in, for every combination of virus and disinfectant:

* First Author
* Year
* Study Link (ncbi or PDF) or DOI
* Virus name
* bacteria or mammalian Virus
* Host
* Family
* Disease (if mammalian)
* nucleic acid
* Enveloped vs. unenveloped
* Capdis (Icosahedral/Prolate/Helical)
* Size (3 categories?)
* Shape
* Used disinfectants
* Concentration
* Number of samples
* log reduction
* temperature
* time
* matrix and/or surface

OUTCOMES AND PRIORITIZATION:

Logarithmic reduction and CT-factors (concentratrion \* time) will be correlated with different qualitative factors to understand if there are characteristics that dominate the affect of QUATs on viruses. Also, comparisons will be made on whether there are bacteriophages that could be used as a surrogate for studying viral disinfection.

RISK OF BIAS IN INDIVIDUAL STUDIES:

There will be a discussion included in the manuscript of the risk of bias in individual studies related to each indicator.

DATA SYNTHESIS:

The mean prevalence/concentration and standard deviation will be extracted for each indicator available. Overall mean prevalence and mean concentration will be estimated.

META-BIAS:

This is not applicable to this objective considering there won’t be an intervention.

CONFIDENCE IN CUMULATIVE EVIDENCE:

There will be a qualitative discussion of the strength of the data summarized in the review.

REFERENCES:

1. Moher et al. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Systematic Reviews

2. Shamsheer et al. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ.