



World Health  
Organization

# Use of Chemical Disinfectants in the Environment for Infection Prevention and Control Purposes in Health Care

Yves Chartier

Water, Sanitation, Hygiene & Health

Dpt. of Public Health and environment

[www.who.int/water sanitation health](http://www.who.int/water_sanitation_health)

In collaboration with

Dr Carmem Pessoa Da Silva and Dr Sergey Eremin

Infection Prevention and Control

Health Security and Environment

# Background

Infection Prevention and Control strategies are commonly based on:

- Reducing / Eliminating the dissemination of infectious agents from the source;
- Environmental and engineering controls methods to reduce the concentration of infectious pathogens.
- Administrative controls;
- Use of Personal Protective Equipment;

For infectious agents that spread by contact, cleaning and disinfection of contaminated surfaces and items are important environmental control methods.

# Background

## Controversial recommendations (appraisal of WHO guidelines)

### Required active chlorine dilutions in cholera contexts

- Washing hands and skin, rinsing dishes – 0.05%
- Utensils and instruments – soak in 0.2% / 5 to 10 minutes
- Clothes – soak in 0.2% for 10 minutes, rinse and wash
- **Floor, walls in toilet, floor, beds... 0.2%**
- Excreta, vomit – 2%
- Dead body – 2%

Versus /

**Cleaning first, then 0.05% chlorine dilution**

**What are the evidences?**

# Background

## Controversial recommendations (appraisal of WHO guidelines)

- Ineffective practices (e.g. use of bleach in the presence of organic material).
- Ineffective and unsafe practices for the environment and health care workers (e.g. fumigation of the environment with formaldehyde).
- Unsafe practices when handling contaminated equipment

What are the evidences?

## 4 questions (1, 2 / 4)

- Difference between the use of standard cleaning agents compared to a **disinfectant in presence of organic material which may contain microorganisms** of epidemiologic significance
- Difference between the use of standard cleaning agents compared to disinfectant with respect to the **reduction in the bio burden on microorganisms** of epidemiologic significance after cleaning

## 4 questions (3, 4 / 4)

- Difference with the use of soap/detergent and water compared to the use of chemical disinfectant with respect to **toxicity to health care workers**
- Difference in the **transmission of microorganisms and/or infections from the environment to individuals** when using soap/detergent and water compared to a disinfectant product

# Opportunities to move ahead

- Area defined as a priority
- Support provided by the MoH in France
- Support from international experts
- Involvement of WHO experts

# Aim and Scope of the guidelines

## ■ Aim

To provide guidelines on use of disinfectants in the environments in health care settings to provide a reference base for any future infection prevention and control

## ■ Scope

The overall scope of the guideline is infection prevention and control (IPC) precautions in health care. Based on key questions:

- What are the phenomena associated with the problem? (background)
  - What is the frequency of the problem? (background)
  - What causes the problem? (etiology)
  - Who has the problem? (diagnosis)
  - What happens if someone gets the problem? (prognosis)
  - How can we treat the problem? (intervention)
  - What policies should we introduce to alleviate the problem? (policy intervention)
- Questions contribute to achieving the purpose of guideline.

# WHO Guidelines



## Definition

- A WHO guideline is any document containing recommendations about health interventions, whether they are clinical, public health or policy.

## Purpose

- Set norms and standards TO BE ADAPTED locally

## Lifetime

- Suggested a minimum of 2 years and a maximum of 5
- take account of pace of change of research

# Steps in Development of WHO Guidelines (*Standard and Full guidelines*)

- 1. Define the scope of the guidelines**
- 2. Definition of guideline development group (WHO & external experts)**
- 3. Undertake a systematic review of available evidence**
- 4. Develop evidence-based recommendations**
- 5. Define strength of recommendations**
- 6. External and internal peer review**
- 7. Test the guidelines through pilot evaluations (ideally)**
- 8. Outline dissemination strategy – ± 28 months**

# WHO Recommended Steps in Guideline Development

## *(Standard and Full guidelines)*

1. ✓ Define the scope of the guidelines
2. ✓ Definition of guideline development group
3. ✓ Undertake a systematic review of available evidence
4. **Develop evidence-based recommendations**
5. **Define strength of recommendations (GRADE)**
6. **External and internal peer review**

# Search for evidence

## Systematic review by external partners

- 🔍 MEDLINE (1948 to May 2011), Cochrane Central Register of Controlled Trials (CCTR) (All dates to May 2011), EMBASE (1980 to May 2011), CINAHL (1937 to May 2011) and references of identified publications
- 🔍 RCTs, controlled clinical trials, observational studies, and before and after studies; participants were doctors, nurses, allied health professionals and other employees in any healthcare setting and in any country; several exposures/outcomes; risk of bias assessed

	PICOT questions			
	1	2	3	4
• Total citations from electronic search	7,444		730	454
• Citations excluded from title & abstract	7,240	7,263	679	431
• Citations identified from other sources	0	7	8	38
• Potentially relevant reports retrieved for scrutiny (full text, if available) and screened	204	188	59	61
• Reports excluded:	201	173	52	41
• Reports included for clinical review	3	15	7	20

# Strength of recommendations according to GRADE

## Recommendation Spatial Separation :

- Spatial separation (distance of at least one meter between beds) should be used for patients with ARIs to reduce the transmission of and infection with respiratory pathogens to other patients. Spatial separation (distance of at least one meter between the patient and the HCW without the use of PPE should be used for patients with ARIs to reduce the transmission of and infection with respiratory pathogens to the HCW.

**Population:** Persons with ARI in health-care settings

**Intervention:** Spatial separation

Factor	Decision	Explanation
• <b>Quality of evidence</b>	Very low to low	<ul style="list-style-type: none"> <li>• There is some limited evidence available to suggest respiratory virus spread, particularly RSV and SARS, can be reduced by the use of spatial separation or distancing between those infected and those non-infected, when combined with other hygienic measures.<sup>1,2,3</sup> There is some limited evidence to suggest that a distance of <math>\leq</math> one meter, has been associated with increase in risk of ARI pathogen transmission.<sup>4,5</sup></li> </ul>
• <b>Balance of benefits or desired effects versus Disadvantages or undesired effects</b>	Strong	<ul style="list-style-type: none"> <li>• Reduction of ARI exposure and infection of health-care workers and other patients by respiratory pathogens during care delivery to patients with ARI in health-care settings.</li> <li>• There are cost and resource implications to health-care facilities for the use of spatial separation combined with other measures.</li> </ul>
• <b>Values and Preferences</b>	Strong	<ul style="list-style-type: none"> <li>• Reduction of ARI exposure and infection to health-care workers and other patients by respiratory pathogens during care delivery to patients with ARI in health-care settings.</li> </ul>
• <b>Costs</b>	Conditional	<ul style="list-style-type: none"> <li>• There are cost and resource implications for the use of spatial separation to health-care facilities.</li> </ul>
• <b>Feasibility</b>	Conditional	<ul style="list-style-type: none"> <li>• The use of spatial separation for patients with ARIs depends on availability of space and surge capacity (beds) and may not be readily implementable in all health care settings. .</li> </ul>
• <b>Overall ranking</b>	<b>STRONG RECOMMENDATION</b>	
• <b>Research gap</b>	<ul style="list-style-type: none"> <li>• Additional research is required to fully elucidate the epidemiology of the risk of transmission of specific pathogens causing acute respiratory diseases from infected patients to HCWs and other patients with the use of spatial separation alone versus spatial separation with the use of other selected precautions. A significant research gap exists for well done epidemiologic studies which examine discrete parameters (e.g. one meter, two meters) of spatial separation with respect to the impact on the reduction of transmission and infection by ARIs.</li> </ul>	

# Findings for Quest 1

Is there any difference between the use of standard cleaning agents and water compared to a disinfectant, in the **presence of organic material which may contain microorganisms** of epidemiologic significance?

🕒 3 before-after studies included

🕒 Presence of organic matter was not addressed

🕒 Authors' conclusions:

- The use of disinfectant for standard environmental cleaning has an added value of further decreasing the bio-burden of microorganisms in the healthcare setting when compared with soap/detergent and water.

- 👉 Depends on the type of disinfectant

- 👉 Skilful and trained cleaning teams and the frequency of cleaning are important

- 👉 No correlated reduction in acquisition rates of bacterial pathogens

## Findings for Quest 2

Is there any difference between the use of standard cleaning agents and water compared to a disinfectant with respect to **the reduction in the bio-burden of microorganisms** of epidemiologic significance?

👓 15 studies included. No SRs or RCTs.

👓 Cleaning is compared with cleaning+disinfection, some included studies comparing different disinfectants (?!)

👓 Authors' conclusions:

- 14/15 of the studies show that there is significant reduction in bacterial counts once disinfection is performed after prior environmental cleaning.

## Findings for Quest 3

Is there any difference in the use of standard cleaning agents and water compared to the use of chemical disinfectants with respect to **causing toxicity to the environment or individuals** in the healthcare setting?

🕒 Seven studies included. No SRs or RCTs.

🕒 Authors' conclusions:

- Exposures to both cleaning agents and disinfectants may be associated with certain adverse outcomes, namely asthma and skin diseases for individuals; and toxicity effects on aquatic organisms.
- However, the overall evidence is weak and the individual effect of either standard cleaning agents or disinfectants alone on individuals or environment could not be properly assessed due to limitations related to lack of exposure information, aggregate level of analysis for both standard cleaning agents and disinfectants, and lack of information on relevant confounders

## Findings for Quest 4

Is there any difference in the **transmission of microorganisms and/ or infections from the environment to individuals** in the healthcare setting, when using standard cleaning agents and water compared to using a disinfectant product?

- 20 studies incl. 2 SR
- Inconclusive

## Next steps

- Panel of experts
  - ☞ November 2011
- Review of the SR
  - ☞ November 2011-January 2012
- Meeting of external experts and WHO GL development group
  - ☞ 3 February 2011
  - ☞ Refining the GL scope, defining additional Qs, next steps, timeline

A light blue world map is centered in the background of the slide. The continents are shown in a light beige color. The text is overlaid on the map.

## Questions?


Does the use of disinfectant lead to resistances and if so, at what extend?

# Related Tools



**Essential Environmental Health Standards in Health Care**

John Adams, Jamie Bartram, Yves Chartier


 **World Health Organization**

WHO/CDS/EPR/2007.6

**Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care**

WHO Interim Guidelines

June 2007




**World Health Organization**

EPIDEMIC AND PANDEMIC ALERT AND RESPONSE

Interim Infection Control Recommendations for Care of Patients with Suspected or Confirmed Filovirus (Ebola, Marburg) Haemorrhagic Fever. BDI/EPR/WHO, Geneva March 2008.

**Interim Infection Control Recommendations for Care of Patients with Suspected or Confirmed Filovirus (Ebola, Marburg) Haemorrhagic Fever**

March 2008



**World Health Organization**



*"Water and Sanitation is one of the primary drivers of public health. I often refer to it as "Health 101", which means that once we can secure access to clean water and to adequate sanitation facilities for all people, irrespective of the difference in their living conditions, a huge battle against all kinds of diseases will be won."*

*Dr LEE Jong-wook, Director-General, World Health Organization.*



**Yves CHARTIER**  
**Public Health Engineer**  
**Department of Public Health and Environment**  
**World Health Organization**

**chartier@who.int**

**Tel: (41) 22 791 16 07**

**[http://www.who.int/water\\_sanitation\\_health](http://www.who.int/water_sanitation_health)**

**<http://www.healthcarewaste.org>**