WHO Guideline and systematic review on hand hygiene and the use of chlorine in the context of Ebola

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WHO Patient Safety Challenge
Clean Care is Safer Care

Hosted by Claire Kilpatrick
World Health Organization

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February 25, 2015

Presentation Outline

- Introduction
- PPE and Hand hygiene in the context of Ebola
- Current WHO recommendations for hand hygiene best practices in health care
- Systematic reviews on use of chlorine solutions; efficacy for hand hygiene and adverse events
    - Search Strategy
    - Outline of the Studies
    - Summary of the Studies
- Conclusions

The NEW ENGLAND JOURNAL of MEDICINE

Perspective

Ebola Virus Disease in West Africa — No Early End to the Outbreak

Margaret Chan, M.D.

Many people have asked me why the outbreak of Ebola virus disease in West Africa is so large, so severe, and so difficult to contain. These questions can be answered with a single word: poverty.

disease. The needs are enormous; the prospects for rapid containment are slim. The outbreak, in all its unprecedented dimensions, is an emergency of international concern and a medical and public

Liberia, Ebola treating center (foto van Francis N. Kateh, MD, MHA, MPS/HSL, FLCP, ***Medical Director/CEO,*** Technical Assistant Margibi County Ebola response)

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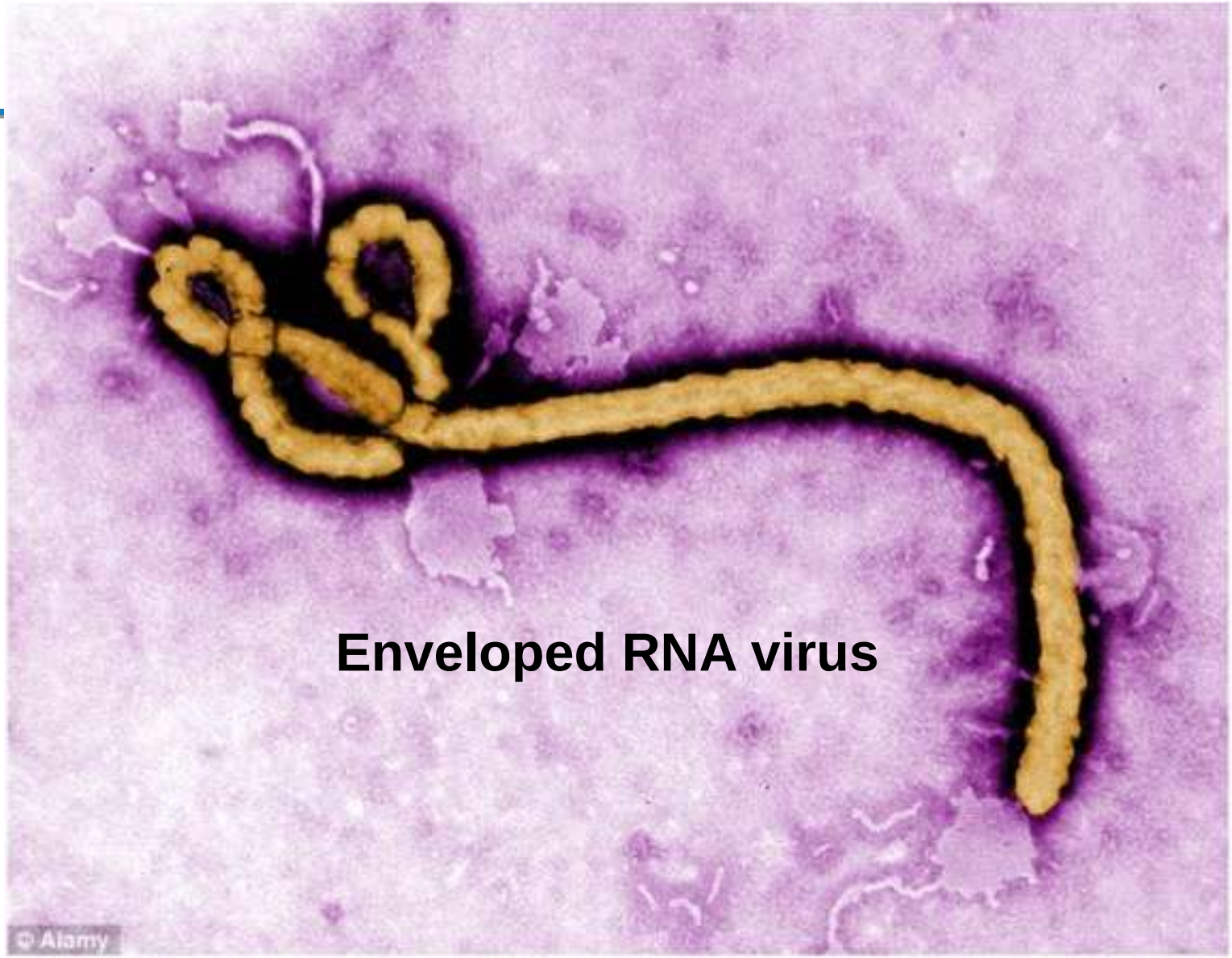
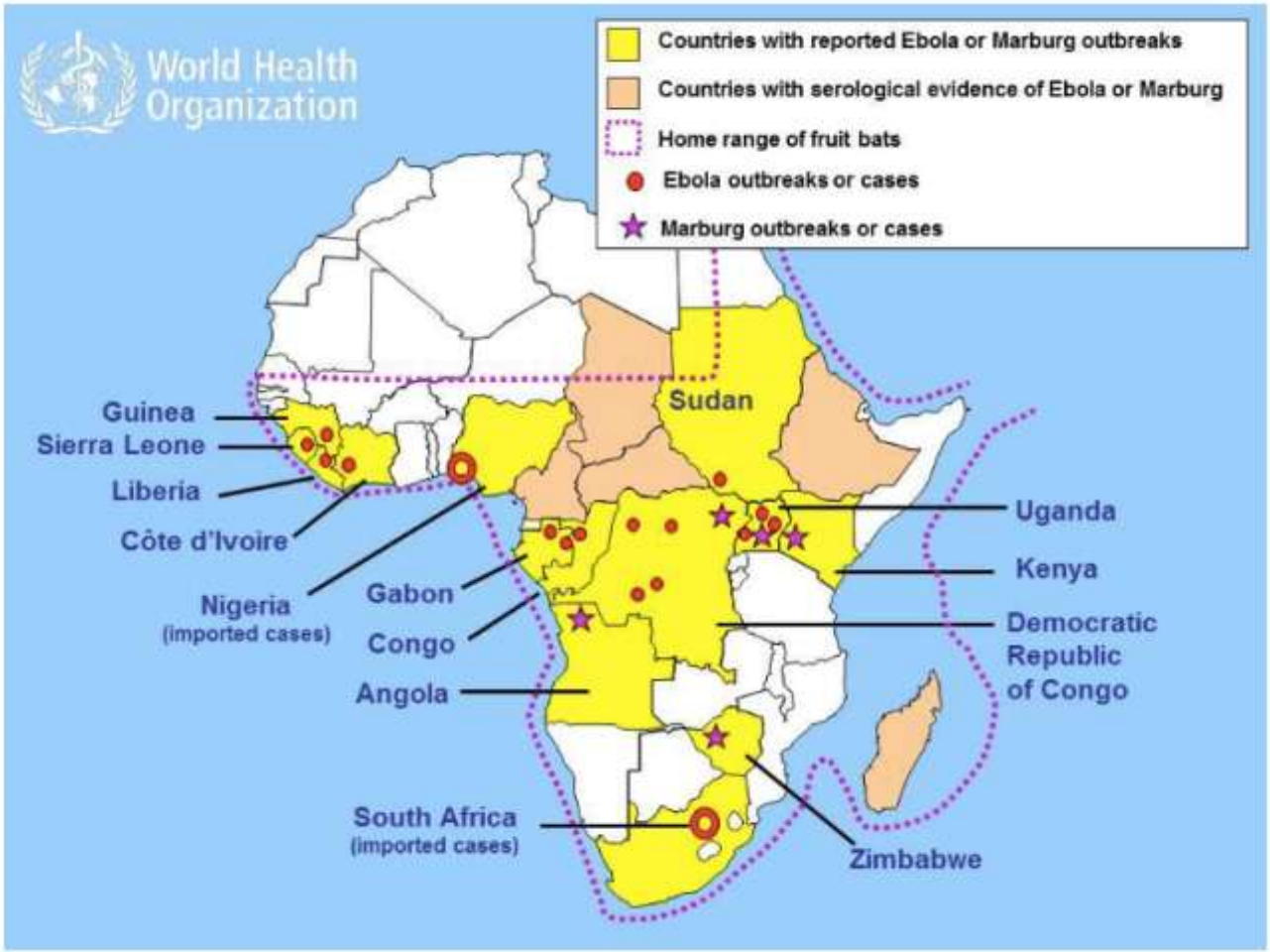
"Ebola threatens everything that makes us human," says Bruce Aylward of the World Health Organization. With calm measure, he walks us through how the Ebola epidemic exploded — and how international alarm only fed the exponential growth of the problem. He shares four strategies critical to beating Ebola — and how they are succeeding, starting in Lofa County,

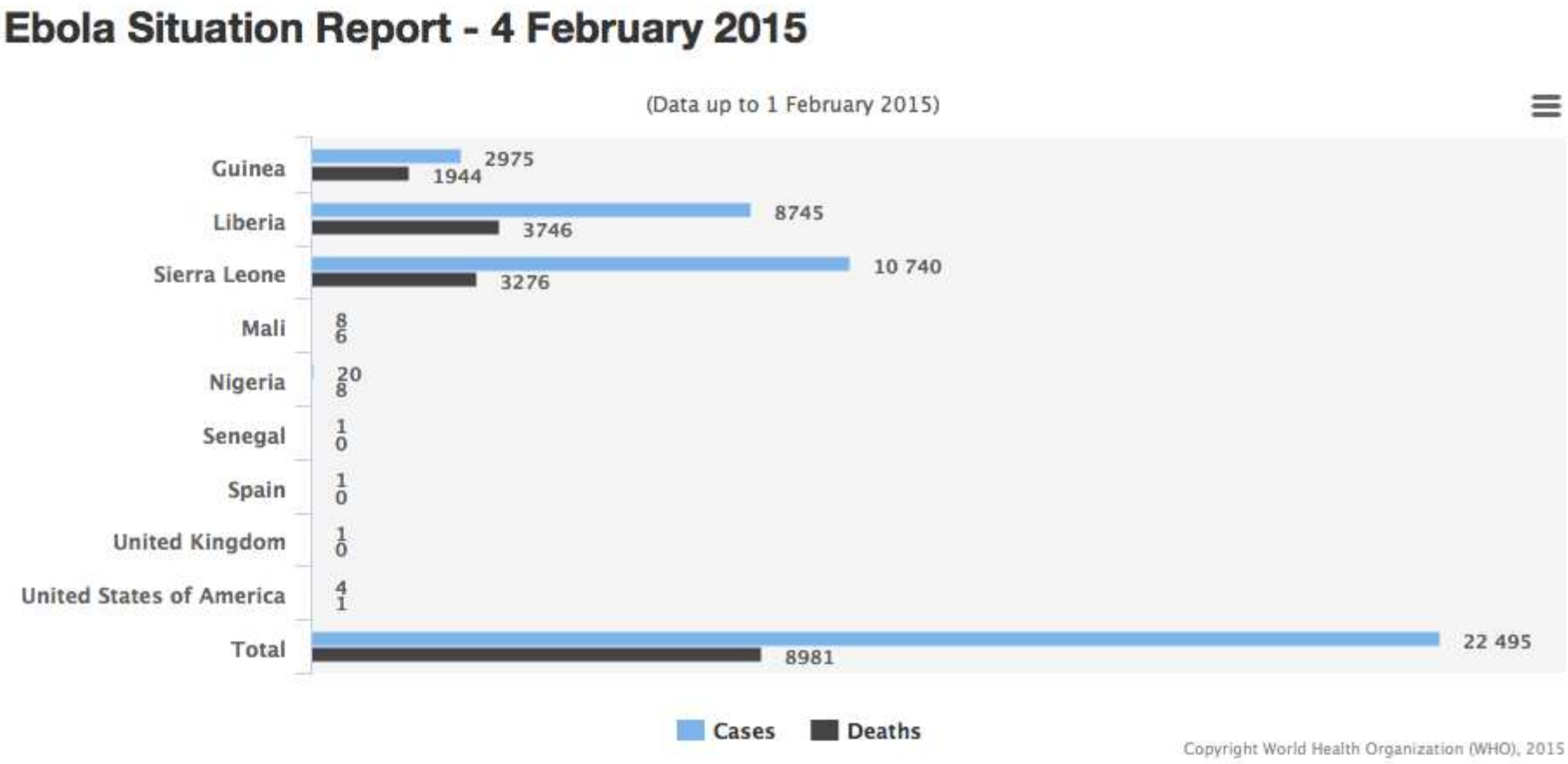
"Mathematics can offer a new way of looking at almost anything—even something as mysterious as love."
HANNAH FRY


Enveloped RNA virus
© Alamy

Geographical distribution of Ebola and Marburg (1967-2014)



Situation February 2015



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Ebola virus disease

Ebola in West Africa: 12-months on

15 January 2015 -- One year after the first Ebola cases started to surface in Guinea, WHO is publishing this series of 14 papers that take an in-depth look at West Africa's first epidemic of Ebola virus disease. The papers explore reasons why the disease evaded detection for several months and the factors, many specific to West Africa, that fueled its subsequent spread.

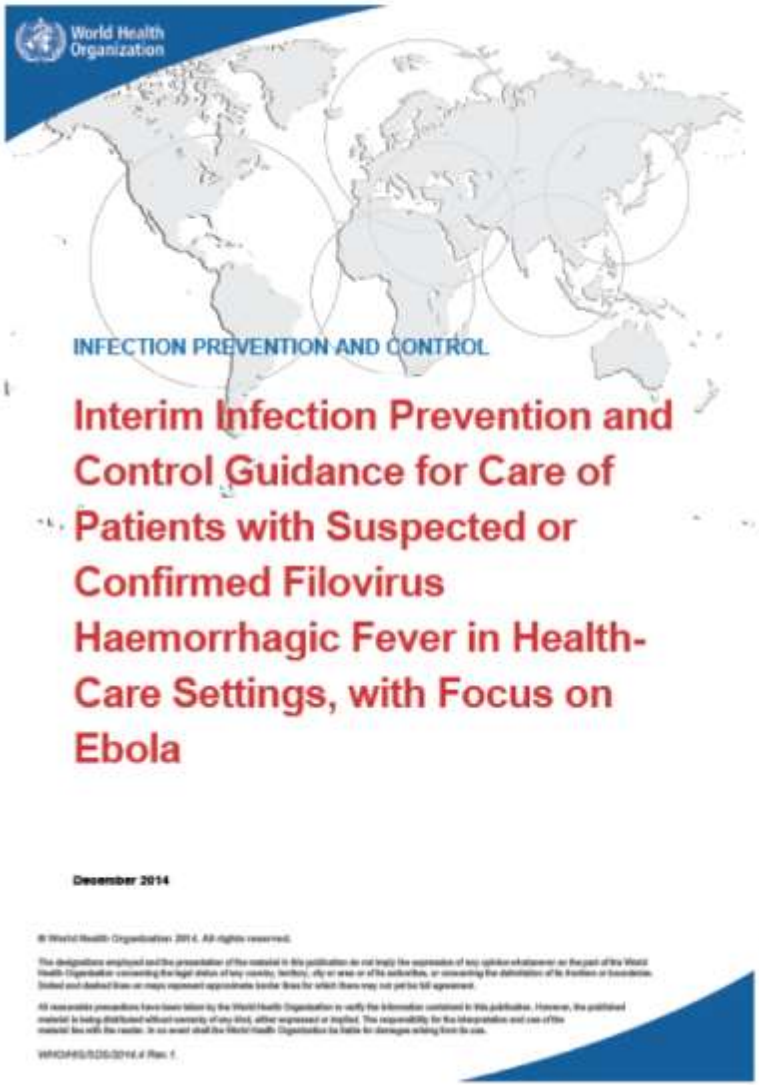
One year into the Ebola epidemic: a deadly, tenacious and unforgiving virus

Read the note for media

Document with essential IPC components

- **Interim manual - Ebola and Marburg virus disease epidemics: preparedness, alert, control, and evaluation**
- **This document describes preparedness, prevention, and control measures that have been implemented successfully during previous epidemics**

http://www.who.int/csr/disease/ebola/manual_EVD/en/



Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Haemorrhagic Fever in Health-Care Settings, with Focus on Ebola

December 2014

http://www.who.int/csr/resources/publications/ebola/filovirus_infection_control/en/

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Principles of infection control

1. Procedures and protocols referred to as “controls”.
2. Standard precautions
3. Health and wellbeing of workforce
4. Implementation.
5. Resource management.

Procedures and protocols referred to as “controls”

In order of Infection Prevention and Control (IPC) effectiveness:

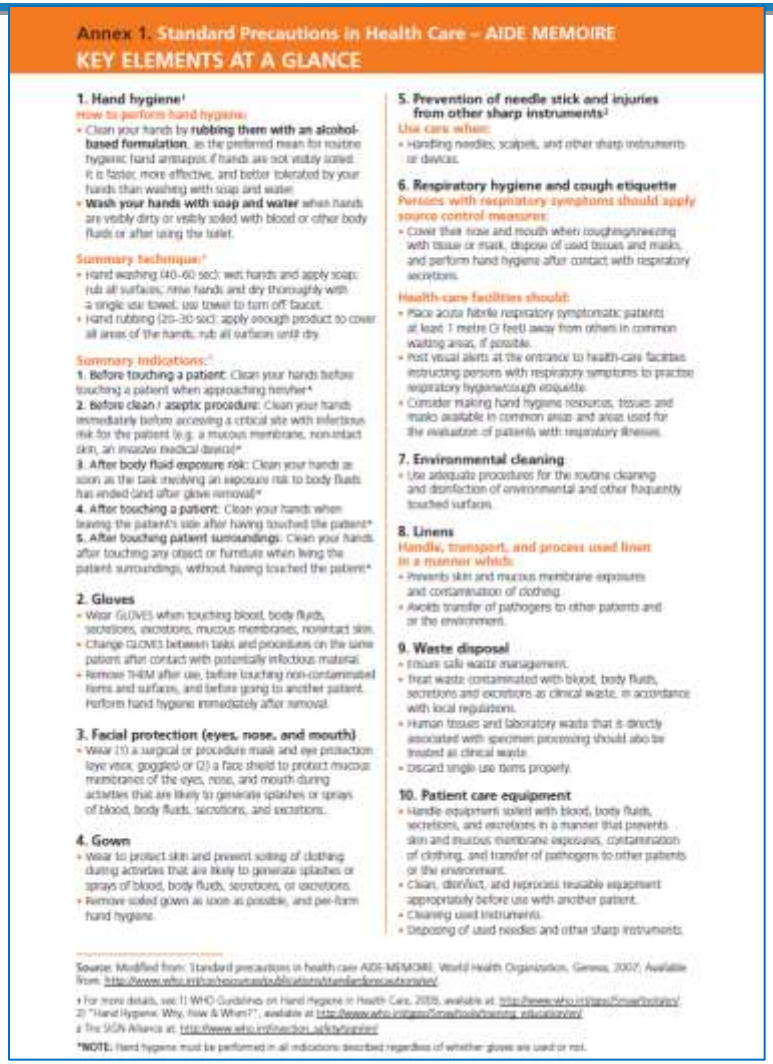
1. administrative controls
2. environmental and engineering controls
3. personal protective equipment (PPE)

Standard Precautions

1. H**and hygiene**
2. Point-of-care risk assessment for appropriate selection and use of PPE to avoid direct contact with patients' body fluids
3. Respiratory hygiene (cough etiquette)
4. Prevention of needle-stick or sharps injuries
5. Safe waste management
6. Cleaning, disinfection (and sterilization, where applicable) of patient-care equipment and linen cleaning and disinfection of the environment.

Standard Precautions

- Routine precautions to be applied in **ALL** situations for **ALL** patients
  - whether or not they appear infectious or symptomatic
  - especially important for EVD because the initial manifestations are non-specific



Annex 1. Standard Precautions in Health Care – AIDE MEMOIRE
KEY ELEMENTS AT A GLANCE

1. Hand hygiene[1]

How to perform hand hygiene:

- Clean your hands by **rubbing them with an alcohol-based formulation**, as the preferred mean for routine hygienic hand antisepsis if hands are not visibly soiled: it is faster, more effective, and better tolerated by your hands than washing with soap and water.
- **Wash your hands with soap and water** when hands are visibly dirty or visibly soiled with blood or other body fluids or after using the toilet.

Summary technique:*

- Hand washing (40–60 sec): wet hands and apply soap; rub all surfaces; rinse hands and dry thoroughly with a single use towel; use towel to turn off faucet.
- Hand rubbing (20–30 sec): apply enough product to cover all areas of the hands; rub all surfaces until dry.

Summary indications:*

1. Before touching a patient: Clean your hands before touching a patient when approaching him/her*

2. Before clean / aseptic procedure: Clean your hands immediately before accessing a critical site with infectious risk for the patient (e.g. a mucous membrane, non-intact skin, an invasive medical device)*

3. After body fluid exposure risk: Clean your hands as soon as the task involving an exposure risk to body fluids has ended (and after glove removal)*

4. After touching a patient: Clean your hands when leaving the patient's side after having touched the patient*

5. After touching patient surroundings: Clean your hands after touching any object or furniture when living the patient surroundings, without having touched the patient*

2. Gloves

- Wear GLOVES when touching blood, body fluids, secretions, excretions, mucous membranes, nonintact skin.
- Change GLOVES between tasks and procedures on the same patient after contact with potentially infectious material.
- Remove THEM after use, before touching non-contaminated items and surfaces, and before going to another patient. Perform hand hygiene immediately after removal.

3. Facial protection (eyes, nose, and mouth)

- Wear (1) a surgical or procedure mask and eye protection (eye visor, goggles or (2) a face shield to protect mucous membranes of the eyes, nose, and mouth during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions.

4. Gown

- Wear to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.
- Remove soiled gown as soon as possible, and perform hand hygiene.

5. Prevention of needle stick and injuries from other sharp instruments[2]

Use care when:

- Handling needles, scalpels, and other sharp instruments or devices.

6. Respiratory hygiene and cough etiquette

Persons with respiratory symptoms should apply source control measures:

- Cover their nose and mouth when coughing/sneezing with tissue or mask, dispose of used tissues and masks, and perform hand hygiene after contact with respiratory secretions.

Health-care facilities should:

- Place acute febrile respiratory symptomatic patients at least 1 metre (3 feet) away from others in common waiting areas, if possible.
- Post visual alerts at the entrance to health-care facilities instructing persons with respiratory symptoms to practise respiratory hygiene/cough etiquette.
- Consider making hand hygiene resources, tissues and masks available in common areas and areas used for the evaluation of patients with respiratory illnesses.

7. Environmental cleaning

- Use adequate procedures for the routine cleaning and disinfection of environmental and other frequently touched surfaces.

8. Linens

Handle, transport, and process used linen in a manner which:

- Prevents skin and mucous membrane exposure and contamination of clothing.
- Avoids transfer of pathogens to other patients and to the environment.

9. Waste disposal

- Ensure safe waste management.
- Treat waste contaminated with blood, body fluids, secretions and excretions as clinical waste, in accordance with local regulations.
- Human tissues and laboratory waste that is directly associated with specimen processing should also be treated as clinical waste.
- Discard single use items properly.

10. Patient care equipment

- Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment.
- Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient.
- Cleaning used instruments.
- Disposing of used needles and other sharp instruments.

Source: Modified from: 'Standard precautions in health care AIDE-MEMOIRE, World Health Organization, Geneva, 2007. Available from: http://www.who.int/csr/resources/publications/standardprecautions/en/

* For more details, see: 1) WHO Guidelines on Hand Hygiene in Health Care, 2009, available at: http://www.who.int/gpsc/5may/en/
2) "Hand Hygiene: Why, How & When?", available at: http://www.who.int/gpsc/5may/tools/training_education/en/
The SIGN Alliance at: http://www.who.int/infection_ip/sign/en/

*NOTE: Hand hygiene must be performed in all indications described regardless of whether gloves are used or not.

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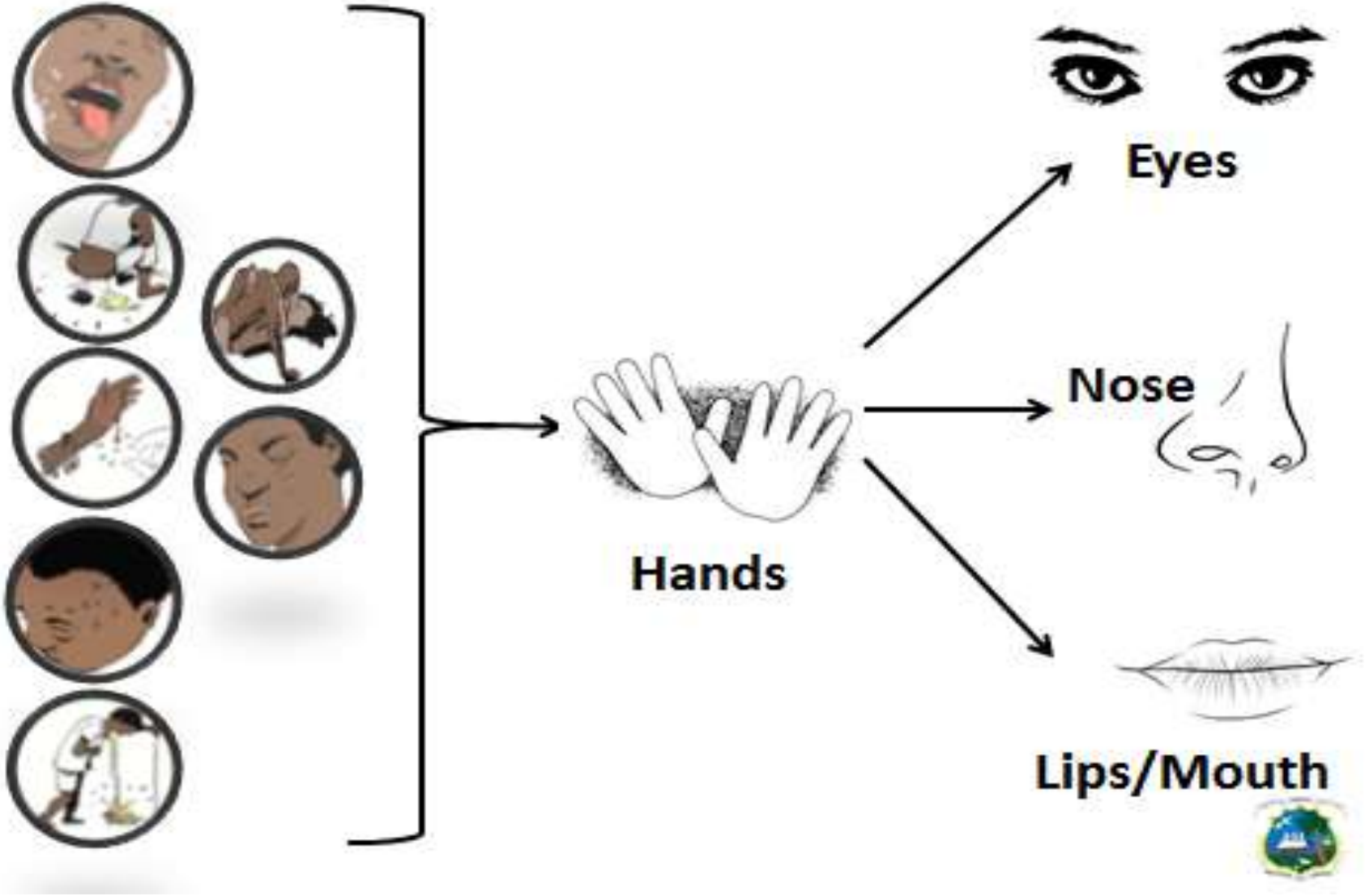
Ebola & Transmission

Ebola virus spreads through:

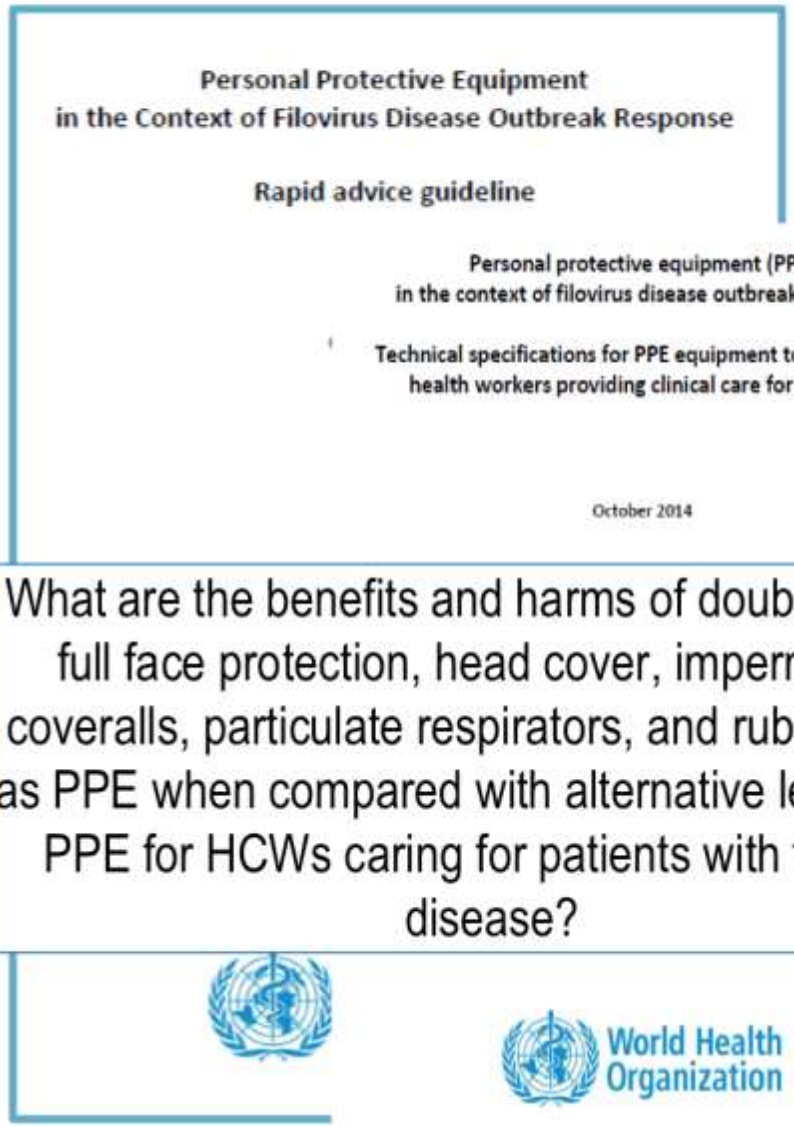
- **direct** contact with body fluids (stool, vomit, blood, urine, saliva, semen, breast milk) of a sick person with EVD
- by contact with surfaces or equipment contaminated by body fluids of an infected person
- Through mucous membranes or non-intact skin (e.g. cuts or abrasions)

- Transmission through intact skin has not been documented


Facts about Ebola
You can't get Ebola through air
You can't get Ebola through water
You can't get Ebola through food


Eyes
Nose
Hands
Lips/Mouth

New WHO Guidelines on Personal Protective Equipment (PPE)


Personal Protective Equipment
in the Context of Filovirus Disease Outbreak Response

Rapid advice guideline

Personal protective equipment (PPE)
in the context of filovirus disease outbreak response

Technical specifications for PPE equipment to be used by health workers providing clinical care for patients

October 2014

What are the benefits and harms of double gloves, full face protection, head cover, impermeable coveralls, particulate respirators, and rubber boots as PPE when compared with alternative less robust PPE for HCWs caring for patients with filovirus disease?

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Guideline development process

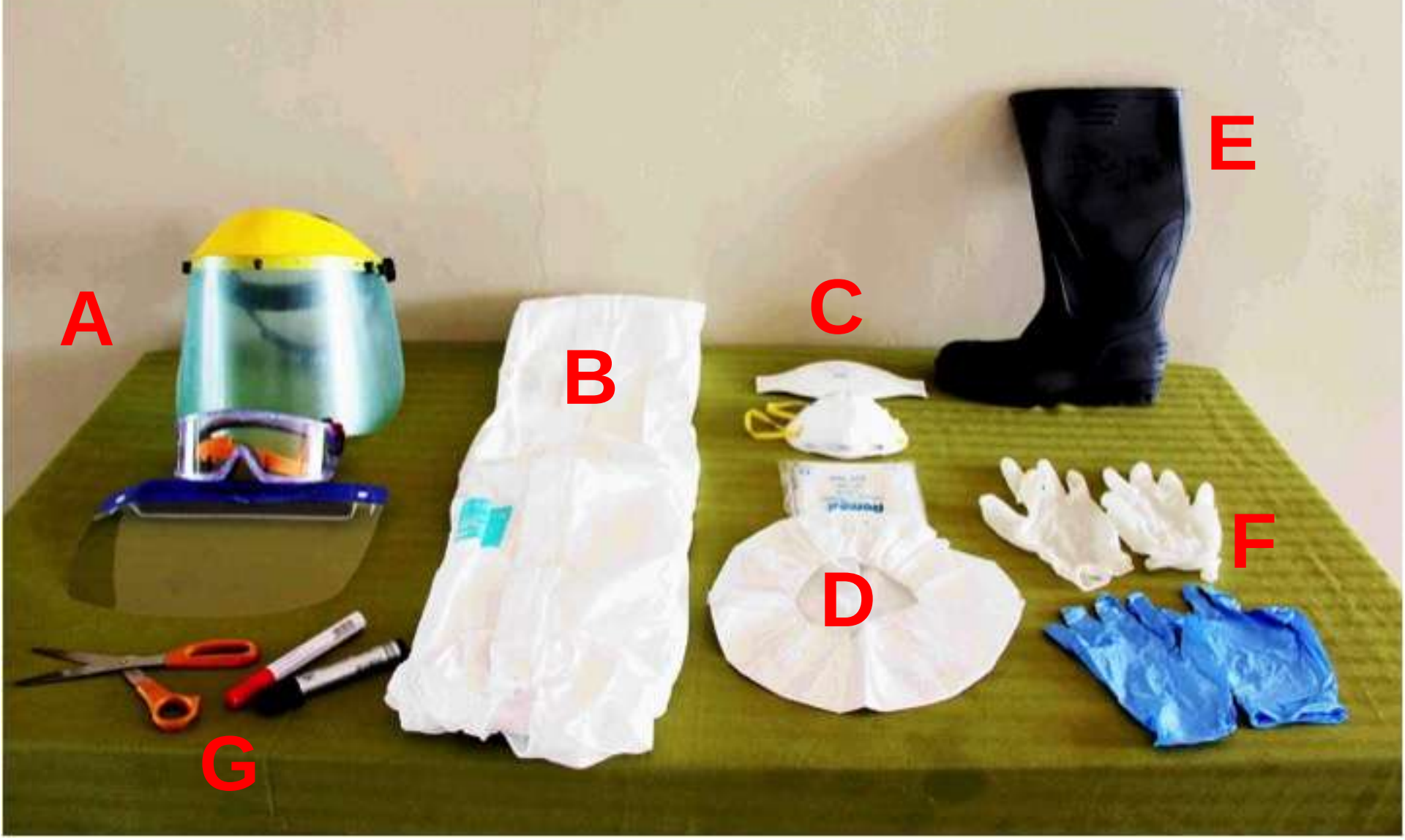
- Development of key research questions
- Systematic literature reviews
- Literature review and an online survey on values and preferences of health workers
- Evidence-to-recommendations exercise using the GRADE framework
- Expert consultation
- WHO Guideline Review Committee

Issued on

31 October 2014

http://www.who.int/mediacentre/news/releases/2014/ebola-ppe-guidelines/en/

Personal Protective Equipment (PPE)


A
B
C
D
E
F
G

Need training and correct PPE!

Approximately 3-4% of infected patients are HCW

IPC training and reinforcement after training

- Importance of standard precautions in all outpatient and inpatient care
  - Many HCW infections from failure to apply standard precautions, rather than PPE in treatment centre
- PPE - putting on and taking off is a skill
  - not just knowledge that can be conveyed by demonstration
  - needs practice
  - needs ongoing supervision by dedicated supervisor
- Importance of safe work set-up and consistent practices



Hand hygiene

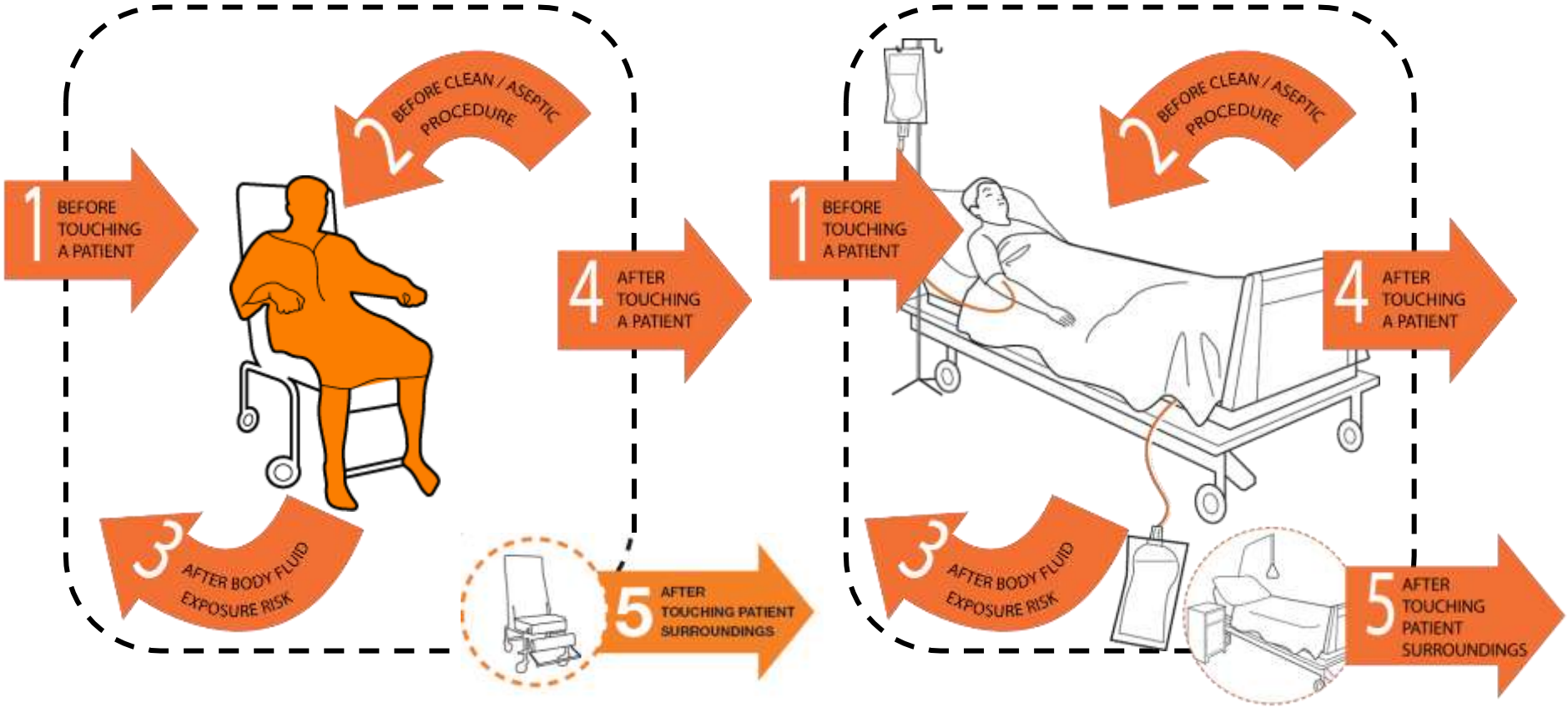

Role of hands and hand hygiene

- **Hands contaminated** with blood or bodily fluids (including when not visible) play a **crucial role in the transmission of filovirus** through direct contact with mucous membranes or non-intact skin.

- As a consequence, **hand hygiene** best practices and appropriate use of gloves are **essential**, both **to protect the health worker** providing care and **to prevent transmission to others.**

Hand hygiene

The 5 Moments apply to any setting where health care involving direct contact with patients takes place



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How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

Duration of the entire procedure: 20-30 seconds

Apply a palmful of the product in a cupped hand, covering all surfaces;

Rub hands palm to palm;

Right palm over left dorsum with interlaced fingers and vice versa;

Palm to palm with fingers interlaced;

Backs of fingers to opposing palms with fingers interlocked;

Rotational rubbing of left thumb clasped in right palm and vice versa;

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

Once dry, your hands are safe.

World Health Organization | Patient Safety | SAVE LIVES Clean Your Hands

How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

Duration of the entire procedure: 40-60 seconds

Wet hands with water;

Apply enough soap to cover all hand surfaces;

Rub hands palm to palm;

Right palm over left dorsum with interlaced fingers and vice versa;

Palm to palm with fingers interlaced;

Backs of fingers to opposing palms with fingers interlocked;

Rotational rubbing of left thumb clasped in right palm and vice versa;

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

Rinse hands with water;

Dry hands thoroughly with a single use towel;

Use towel to turn off faucet;

Your hands are now safe.

World Health Organization | Patient Safety | SAVE LIVES Clean Your Hands

Hand hygiene and glove use

GLOVES PLUS

HAND HYGIENE

= CLEAN HANDS

GLOVES WITHOUT

HAND HYGIENE

= GERM TRANSMISSION

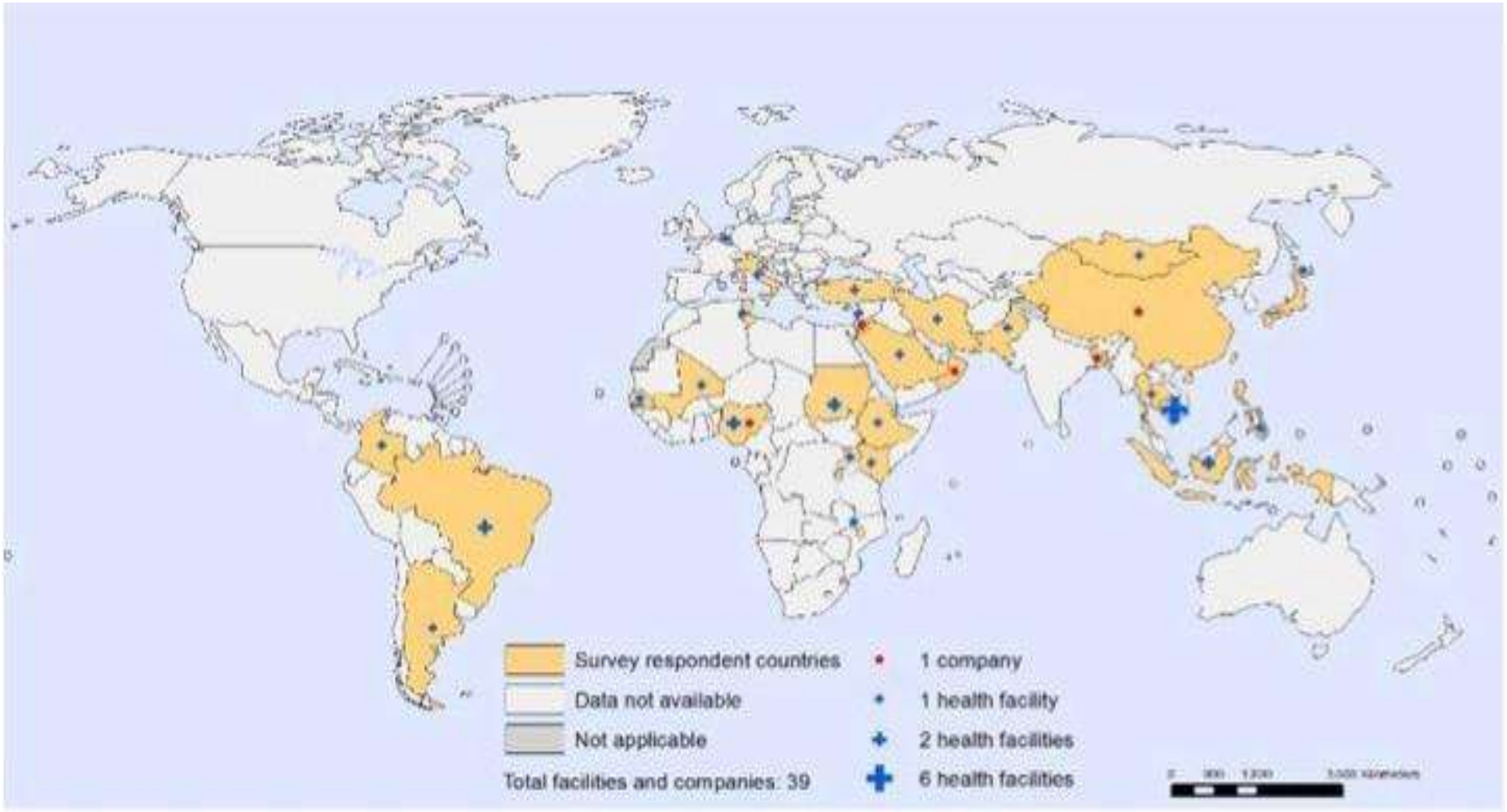
The use of gloves does not replace the need for cleaning your hands!

Guide for the local production of the WHO alcohol-based handrub formulations

From sugar can,
at low cost
(0.30 $US) = 0.006%
of the total annual
hospital budget

Mali, Africa, 2007

System change made possible
WHO alcohol-based formulation local production
Global Survey 2012



39 sites in 28 countries

Joanna Bauer-Savage et al. Bulletin of the World Health Organization 2013, available online

The use of Chlorine solutions for Hand hygiene

(Photo's from Francis N. Kateh, MD, MHA, MPS/HSL, FLCP, ***Medical Director/CEO,*** Technical Assistant Margibi County Ebola response)

Systematic review
Chlorine and hand hygiene

1. Are chlorine solutions effective for hand hygiene in health care?

2. Are chlorine solutions effective for disinfection of gloves?

3. Does the use of chlorine solutions for hand hygiene cause health workers' skin irritation or lesions, respiratory side effects or any other adverse reactions?

PICO question 1

Are chlorine solutions effective for hand hygiene in health care?

- **P:** Health Workers (individuals who provide direct or indirect to patients, in particular affected by filovirus infection or pathogens with a similar route of transmission and infectivity)
- **I:** Hand hygiene with chlorine solutions,
- **C:** Hand hygiene with alcohol-based handrub or other agents including water and soap
- **O:** Primary outcome: Reduction of pathogen including Ebola virus, transmission to health workers or patients

  Secondary outcome: reduction of bacterial or viral load on hands

PICO question 2

Are chlorine solutions effective for disinfection of gloves?

- **P:** Health Workers
- **I:** Disinfection of gloves with chlorine solutions
- **C:** Disinfection with alcohol-based handrub or other agents including water and soap
- **O:** Primary outcome: Reduction of pathogen, including Ebola virus, transmission to patients

  Secondary outcome: reduction of bacterial or viral load on hands

Search methods

- Limited to PubMed (including MEDLINE) and Ovid EMBASE databases
- Performed on 26 September 2014
- No time, age, human, language limit or geographical restrictions.
- Refs of Retrieved papers

Pubmed search strategy

#	Searches	Results
1	“Hand hygiene”[MeSH] OR “hand hygiene” OR “hand washing” OR “handwashing” OR” hand rubbing” OR “handrubbing” OR “hand disinfection” OR “hand antisepsis” OR “alcohol-based hand rub” OR “alcohol-based handrub” OR “personal protective equipment” OR “Gloves, Protective”[Mesh] OR gloves [TW] OR glove [TW] OR gloving [TW] OR “glove disinfection” OR “Infection Control”[Mesh] OR disinfection [TIAB] OR “infection control”[TIAB] OR “natural rubber latex medical devices” OR “saturation” OR “microperforation” OR “handwash”, OR “handrub” OR “Disinfection”[TIAB] OR “glove hydration”	146426
2	“Filoviridae” [MH] OR “Filoviridae Infections” [MH] OR filovirida*[TW] OR Ebolavir*[TW] OR Marburgvir*[TW] OR Filovir*[TW] OR Filo vir*[TW] OR BDBV [TW] OR EBOV [TW] OR RESTV [TW] OR SUDV[TW] OR TAFV6 [TW] OR “Hemorrhagic Fever, Ebola” [MH] OR EBOLA [TW] OR “Marburg Virus Disease” [MH] OR Marburg [TW] OR “Hemorrhagic Fevers, Viral” [MH] OR hemorrhagic fever*[TW] OR haemorrhagic fever*[TW] OR “Nairovirus” [MH] OR nairovir*[TW] OR nairovir* [TW] OR dugbevir* [TW] OR dugbevir*[TW] OR “Hemorrhagic Fever Virus, Crimean-Congo” [MH] OR “Hemorrhagic Fever, Crimean” [MH] OR ((congo*[TW] OR crimean*[TW]) AND (disease*[TW] OR fever*[TW] OR infected[TW] OR infection[TW] OR infections [TW] OR strain [TW] OR strains[TW] OR virus*[TW] OR epidemic*[TW] OR outbreak*[TW] OR pandemic*[TW])) OR “Arenaviridae Infections”[MH] OR arenavir*[TW] OR arena virus*[TW] OR “Lassa Fever”[MH] OR “Lassa virus” [MH] OR (lassa[TW] AND (disease*[TW] OR fever*[TW] OR infect*[TW] OR strain*[TW] OR virus*[TW] OR epidemic*[TW] OR outbreak*[TW] OR pandemic*[TW])) OR “Viruses”[MeSH] OR “Virus” OR viruses OR “Enveloped virus” OR “RNA virus” OR “Viral hemorrhagic fever” OR “microorganism” OR “Bacteria”[Mesh]	1893808
3	(“chlorine”[Mesh] OR “chlorine” OR “sodium hypochlorite” OR “calcium hypochlorite” OR “organic chloramines” OR “Chlorine Compounds”[Mesh] OR “chlorine dioxide” [Supplementary Concept]) OR chlorin* OR "Solvents"[Mesh] OR "bleach" OR "Dettol" OR "Chloramine" OR "Clorox"	256196
4	1 AND 2 AND 3	1808
5	"Water Supply"[Mesh] OR "Water Purification"[Mesh] OR "Water Microbiology"[Mesh] OR “Waste Water” [Mesh] OR “Drinking Water”[Mesh]	84191
6	4 NOT 5	1172

EMBASE search strategy

#	Searches	Results
1	'hand hygiene'/exp OR 'hand hygiene' OR 'hand washing'/exp OR 'hand washing' OR 'handwashing'/exp OR 'handwashing' OR 'hand rubbing' OR 'handrubbing' OR 'hand disinfection'/exp OR 'hand disinfection' OR 'hand antisepsis' OR 'scrubbing' OR 'scrub'/exp OR 'scrub' OR 'hand preparation' OR 'alcohol based hand rub' OR 'alcohol based handrub' OR ('povidone iodine'/exp OR 'povidone iodine' OR 'povidone'/exp OR povidone OR 'iodophor'/exp OR 'iodophor' OR 'iodophor'/exp OR iodophor OR 'iodophors'/exp OR iodophors OR 'iodine'/exp OR 'iodine' OR 'iodine'/exp OR iodine OR 'betadine'/exp OR betadine OR 'triclosan'/exp OR 'triclosan' OR 'triclosan'/exp OR triclosan OR 'chlorhexidine'/exp OR 'chlorhexidine' OR 'chlorhexidine'/exp OR chlorhexidine OR 'hibiscrub'/exp OR hibiscrub OR 'hibisol'/exp OR hibisol OR 'alcohol'/exp OR alcohol OR 'alcohols'/exp OR alcohols OR 'gel'/exp OR gel OR 'soap'/exp OR 'soap' OR soap*:ab,ti AND ('hand'/exp OR hand) AND ('disinfectants'/exp OR disinfectants OR 'antisepsis'/exp OR 'antisepsis' OR 'antisepsis'/exp OR antisepsis OR antiseptics OR 'detergents'/exp OR detergents)) OR 'surgical glove'/exp OR 'surgical glove' OR glove:ab,ti OR gloves:ab,ti OR gloving:ab,ti OR handrub:ab,ti OR 'disinfectant agent'/exp OR 'disinfectant agent' OR 'disinfection'/exp OR 'disinfection' OR disinfection:ab,ti OR saturation:ab,ti OR microperforation:ab,ti OR handwash:ab,ti	297123
2	'filoviridae'/exp OR 'filoviridae' OR 'filovirus infection'/exp OR 'filovirus infection' OR filovirida*:ab,ti OR ebolavir*:ab,ti OR 'ebola virus':ab,ti OR marburgvir*:ab,ti OR (marburg:ab,ti AND viru*:ab,ti) OR filovir* OR (filo:ab,ti AND virus*:ab,ti) OR bdbv:ab,ti OR ebov:ab,ti OR restv:ab,ti OR sudv:ab,ti OR tafv:ab,ti OR (ebola*:ab,ti OR marburg*:ab,ti OR congo*:ab,ti OR crimean*:ab,ti OR lassa:ab,ti AND (disease*:ab,ti OR fever*:ab,ti OR infect*:ab,ti OR strains:ab,ti OR strain:ab,ti OR virus*:ab,ti OR epidemic*:ab,ti OR outbreak*:ab,ti OR pandemic*:ab,ti)) OR 'hemorrhagic fever, ebola'/exp OR 'hemorrhagic fever, ebola' OR (h?emorrhagic AND fever* AND (virus*:ab,ti OR viral*:ab,ti)) OR 'nairo virus'/exp OR 'nairo virus' OR 'nairovirus infection'/exp OR 'nairovirus infection' OR nairovir*:ab,ti OR dugbevir*:ab,ti OR 'crimean congo hemorrhagic fever'/exp OR 'crimean congo hemorrhagic fever' OR 'arenavirus infection'/exp OR 'arenavirus infection' OR arenavir*:ab,ti OR 'arena virus':ab,ti OR 'arena viruses':ab,ti OR 'lassa fever'/exp OR 'lassa fever' OR 'lassa virus'/exp OR 'lassa virus' OR 'virus'/exp OR 'virus' OR 'bacterium'/exp OR 'bacterium' OR 'microorganism'/exp OR 'microorganism'	2535685
3	'chlorine'/exp OR 'chlorine derivative'/exp OR 'hypochlorite sodium'/exp OR 'chloramine derivative'/exp OR 'chlorine dioxide'/exp OR chlorine:ab,ti OR 'chlorine derivative':ab,ti OR 'chlorine derivatives':ab,ti OR 'hypochlorite sodium':ab,ti OR 'chloramine derivative':ab,ti OR 'chloramine derivatives':ab,ti OR 'chlorine dioxide':ab,ti	29833
4	#1 AND #2 AND #3	3322
5	'waste water'/exp OR 'drinking water'/exp OR 'fluoridation'/exp	106278
6	#4 NOT #5	2805

Inclusion criteria

- All chlorine compounds
- Stated population
- In-vivo experiments on hands
- In-vivo experiments on gloves

Based on consultation with the WHO Steering Group, we modified the inclusion criteria for the rapid review so that only manuscripts that addressed sodium or calcium hypochlorite solutions were included.

Exclusion criteria

- Animal studies
- In-vitro studies
- Environmental studies
- Studies addressing therapy

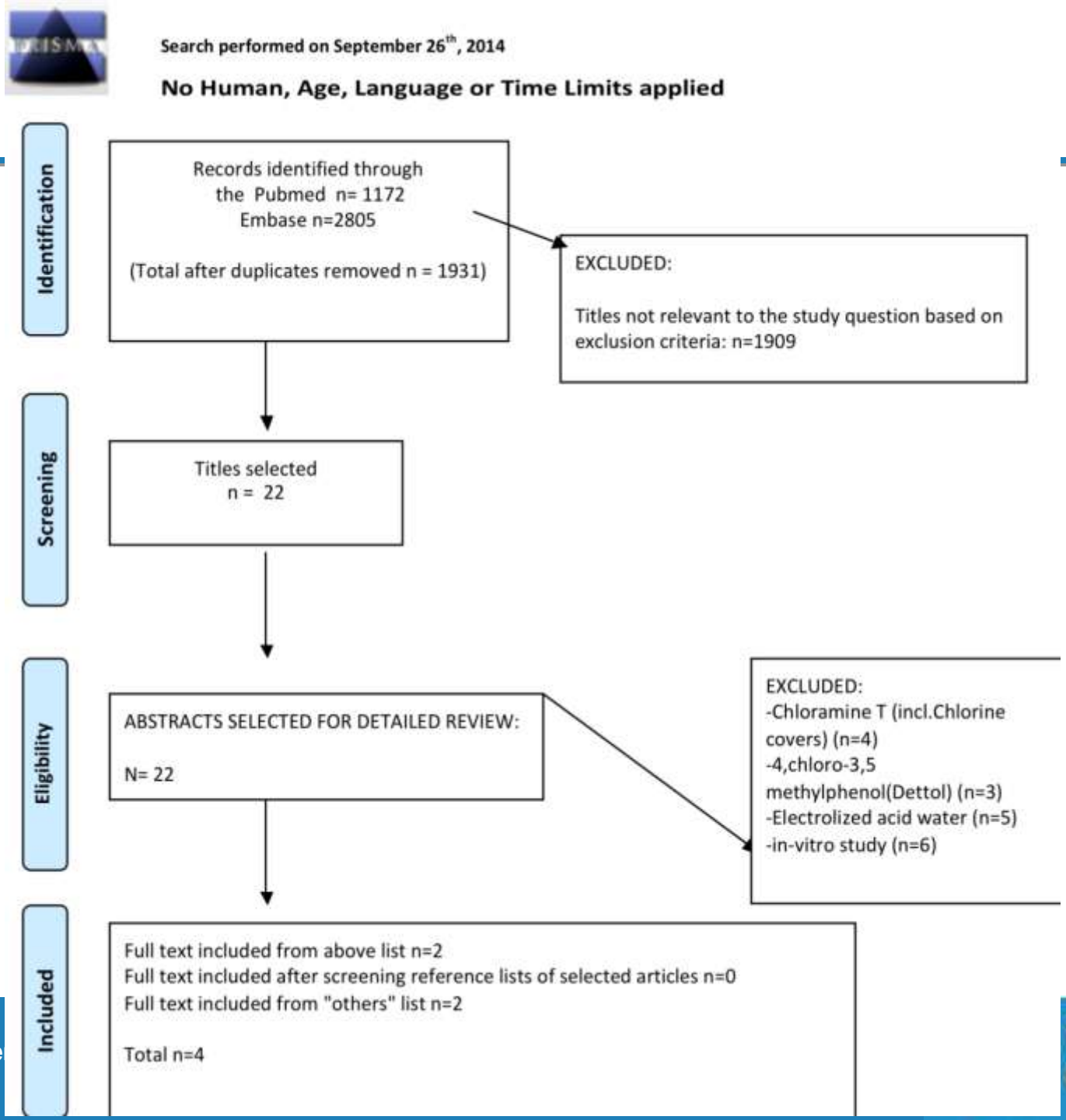

Search performed on September 26th, 2014
No Human, Age, Language or Time Limits applied
Identification
Records identified through the Pubmed n= 1172
Embase n=2805
(Total after duplicates removed n = 1931)
EXCLUDED:
Titles not relevant to the study question based on exclusion criteria: n=1909
Screening
Titles selected
n = 22
Eligibility
ABSTRACTS SELECTED FOR DETAILED REVIEW:
N= 22
EXCLUDED:
-Chloramine T (incl.Chlorine covers) (n=4)
-4,chloro-3,5 methylphenol(Dettol) (n=3)
-Electrolized acid water (n=5)
-in-vitro study (n=6)
Included
Full text included from above list n=2
Full text included after screening reference lists of selected articles n=0
Full text included from "others" list n=2
Total n=4

Table 1. FOUR SELECTED STUDIES For Q1&Q2

First Author	Year	Compounds	Contact time	Comparator	Contact time	Sample Size (N)	Hands or gloves	Microbiological Test Used	Microorganism	Results
Lowbury, E	1964	Sodium hypochlorite (Milton 1:80)	30 seconds	Chlorhexidine solutions	30 seconds	4 volunteers	hands	Bacterial cell count	*Staphylococcus aureus*	Chlorhexidine significantly higher bacterial reduction than hypochlorite ($p<0.001$)
Rotter, M	1998	Sodium hypochlorite (4%=40000ppm)	5 minutes	Isopropanol 60% and water/soap	1 minute	15 volunteers	hands	Bacterial cell count	*Escherichia coli* K 12	Sodium hypochlorite significantly higher bacterial reduction than isopropanol 60% or water and soap ($p<0.001$)
Edmonds, S	2013	Bleach (0.5%) and surfactant (Triton-X) prototype	Not specifically mentioned	Tap water, 4% chlorhexidine gluconate, Nonantimicrobial hand wash, Nonantimicrobial body wash, 0.3% triclosan hand wash, 8% hydrogen peroxide and surfactant (Triton-X) prototype, Peracetic acid wipe , Sodium tetraborate decahydrate , Ink and stain remover, Ink and stain remover with brush, 2000 ppm peracetic acid and surfactant (Triton-X) prototype	tap water 2 minutes, other agents not specifically mentioned	6 volunteers	hands	Bacterial cell count	*Clostridium difficile* spores, *Bacillus atrophaeus*, *Clostridium sporogenes*	Peracid and surfactant formulation significantly superior compared to bleach 0.5% ($p<0.05$). Bleach 0.5% non-significant with tap water and other agents
Weber, D	2003	Antibacterial microfiber towel (400ppm sodium hypochlorite)	10-30-60 seconds	61% ethyl alcohol, a 2% chlorhexidine gluconate preparation, and a non antimicrobial soap (control).	10-30-60 seconds	6 volunteers	hands	Bacterial cell count	*Bacillus atrophaeus*	At 60 seconds, chlorine-towels significantly superior effect compared to chlorhexidine ($p=0.008$) and NS with non antimicrobial soap and water. At 10 seconds, both soap and chlorhexidine were significantly better than chlorine-towels.

Summary

- Chlorhexidine significantly higher bacterial reduction than hypochlorite ($p<0.001$) (Lowbury)
- Bleach 0.5% non-significant difference compared with tap water and other agents (Edmonds)
- Peracid and surfactant formulation significantly superior compared to bleach 0.5% ($p<0.05$) (Edmonds)
- At 60 seconds, chlorine-towels NS higher effect compared to non antimicrobial soap and water.(Weber)

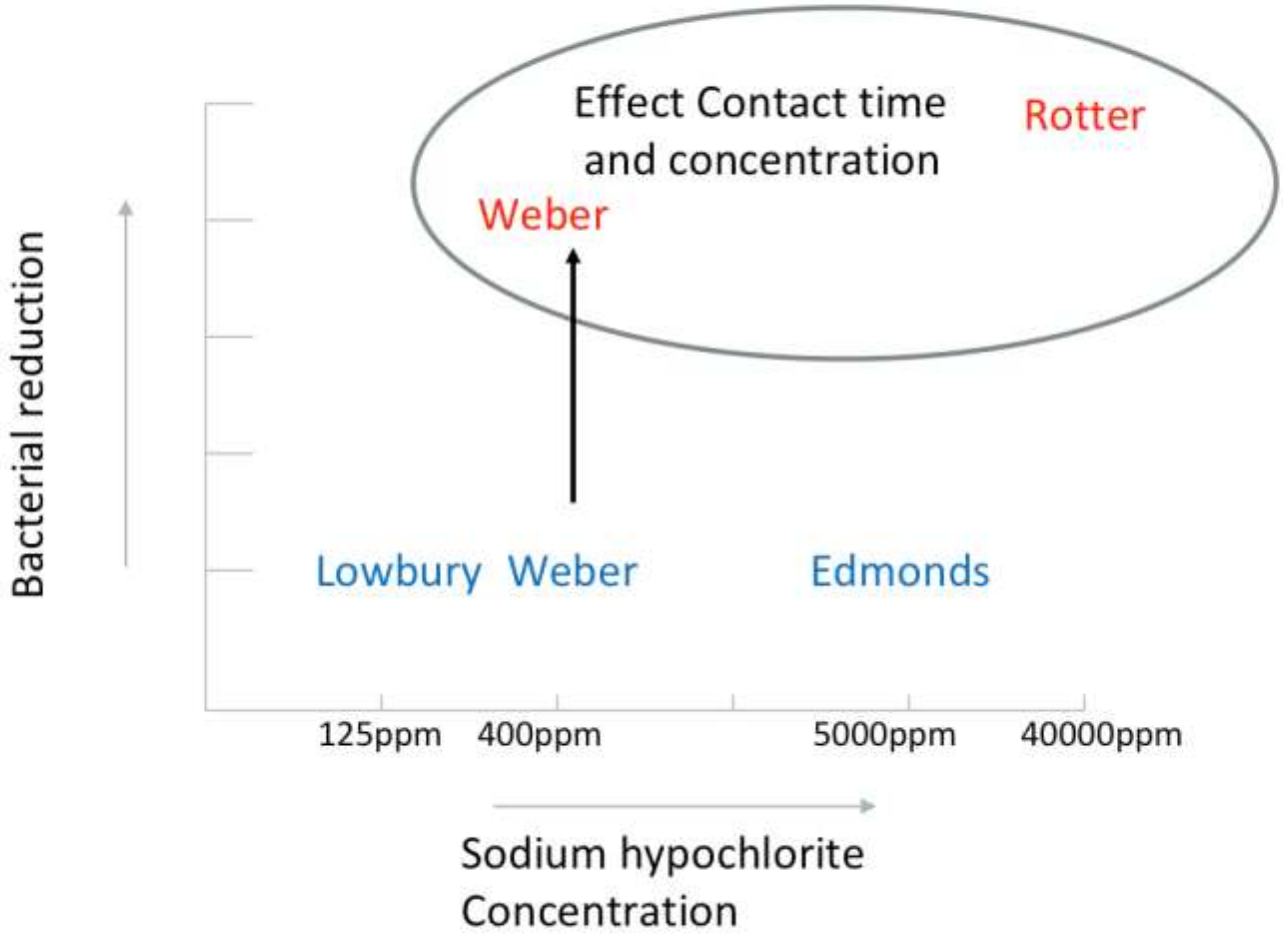
- Sodium hypochlorite significantly higher bacterial reduction than isopropanol 60% or water and soap ($p<0.001$) (Rotter)
- At 60 seconds, chlorine-towels significantly superior effect compared to chlorhexidine ($p=0.008$) (Weber)

Summary

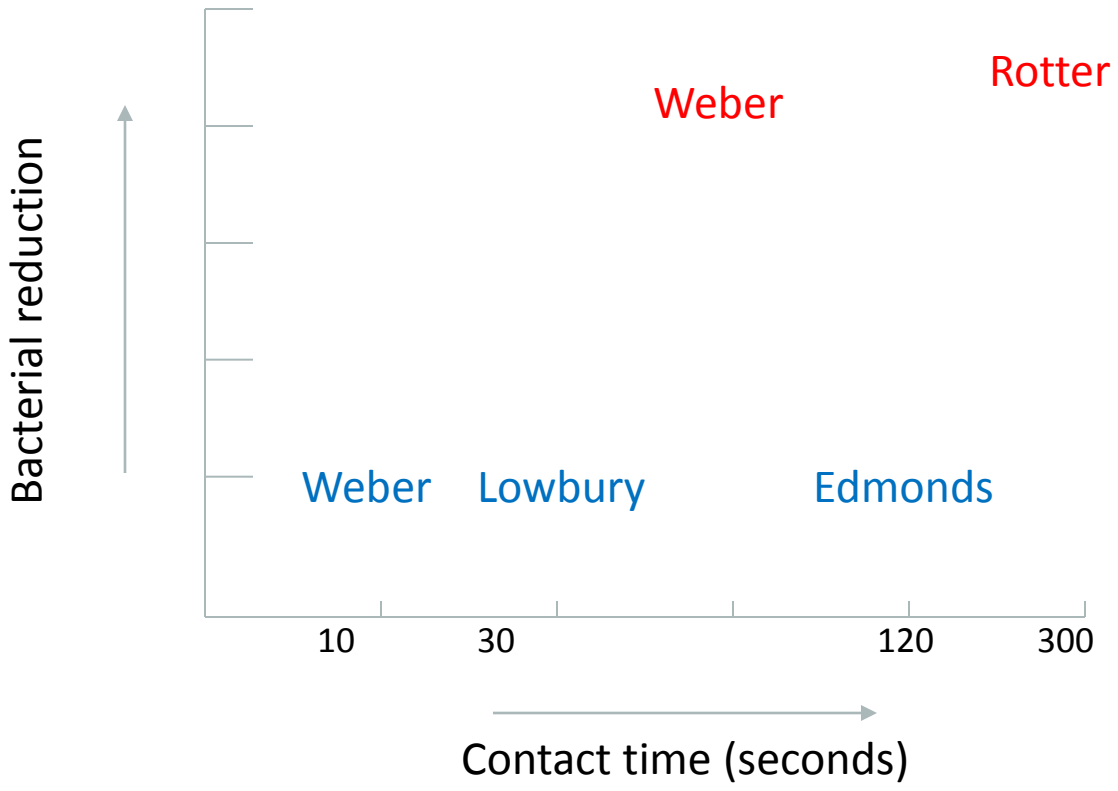
- **Different concentrations of chlorine** solution were used
  - aqueous sodium hypochlorite solution (Milton 1:80, 125ppm)
  - sodium hypochlorite solution 4% (40000ppm)
  - bleach 0.5% (5000ppm)
  - microfiber releasing 400 ppm bleach.

- **Variability in the applied contact time** for both the chlorine compound and the comparators.
  - Contact time ranged from 10 seconds up to 5 minutes.

Sodium hypochlorite concentration dependent



Sodium hypochlorite efficacy contact time dependent



Conclusion

- No evidence about efficacy of sodium hypochlorite used for hand hygiene to prevent filovirus transmission in health care
- No evidence about efficacy to reduce or eliminate filovirus or other (enveloped) viruses on hands in laboratory studies
- Limited evidence about the efficacy of sodium hypochlorite in comparison to other agents to reduce or eliminate other microorganisms in laboratory studies
- Very limited number of manuscripts and the quality of the performed comparative studies
- Differences in sodium hypochlorite concentrations, contact time and microorganisms were observed.
- No evidence that the advocated concentration of 500ppm sodium hypochlorite has a sufficient efficacy for hand hygiene with the current advocated contact time of 30 sec.

Adverse events related to use of chlorine solutions for hand hygiene

Z. Kubilay, J. Hopman, H. Edrees,
T. Allen, B. Allegranzi
Service Delivery Safety
Geneva, WHO HQ

PICO question 3

Does the use of chlorine solutions for hand hygiene cause health workers' skin irritation or lesions, respiratory side effects or any other adverse reactions?

- **P:** Any person who performs the hand hygiene with chlorine solutions
- **I**: Hand hygiene or glove disinfection with chlorine solutions
- **C**: Hand hygiene or glove disinfection with alcohol-based handrub or other agents including water and soap
- **O**: Skin irritation or other skin lesions, respiratory adverse events or any other adverse reactions

Search methods

- PubMed (including MEDLINE) and Ovid EMBASE databases
- Performed on 26 September 2014
- No time, age, human, language limit or geographical restrictions.
- References of retrieved papers
- *Contact Dermatitis Journal* using the terms "sodium hypochlorite" and "chlorine".

Pubmed search strategy

#	Searches	Results
1	("chlorine"[Mesh] OR "chlorine" OR "sodium hypochlorite" OR "calcium hypochlorite" OR "organic chloramines" OR "Chlorine Compounds"[Mesh] OR "chlorine dioxide" [Supplementary Concept]) OR chlorin* OR "Solvents"[Mesh] OR "bleach" OR "Dettol" OR "Chloramine" OR "Clorox"	256196
2	"Dermatitis"[Mesh] OR eczema [TIAB] OR dermatitis [TIAB] OR skin lesions [TIAB] OR skin lesion [TIAB] OR "skin care" [MH] OR skin conditions [TIAB] OR Skin condition [TIAB] OR nonintact skin [TIAB] OR "Hypersensitivity"[Mesh] OR allergy [TIAB] OR allergies [TIAB] OR allergic [TIAB] OR "Asthma"[Mesh] OR asthma [TIAB] OR asthmatic [TIAB]	415131
3	#1 AND #2	2598

Inclusion criteria

Initial inclusion criteria

Comparative studies on adverse events due to use of chlorine solutions for hand hygiene or glove disinfection compared to use of alcohol-based handrubs or other agents incl. water and soap

Revised inclusion criteria

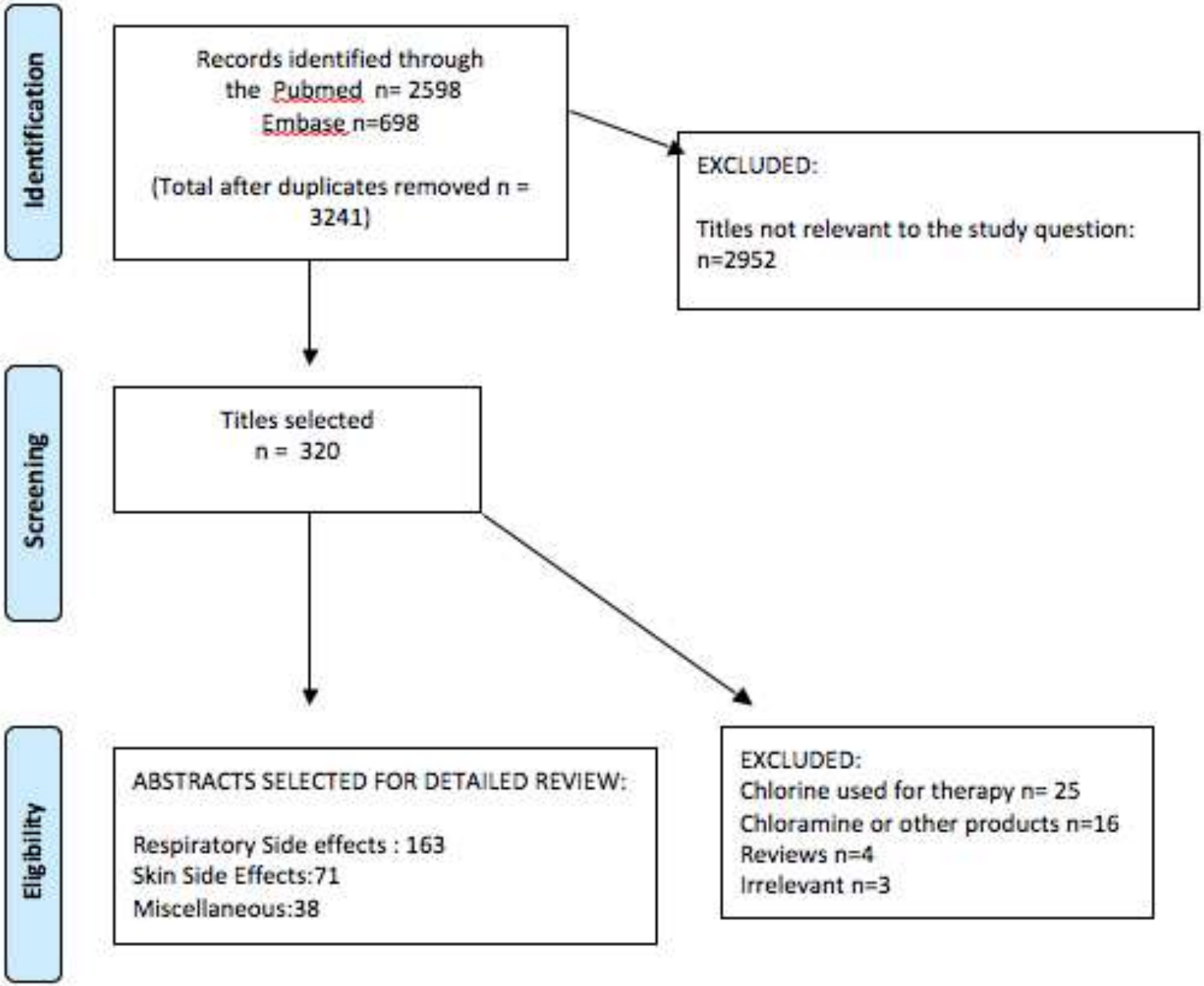
•Any kind of population

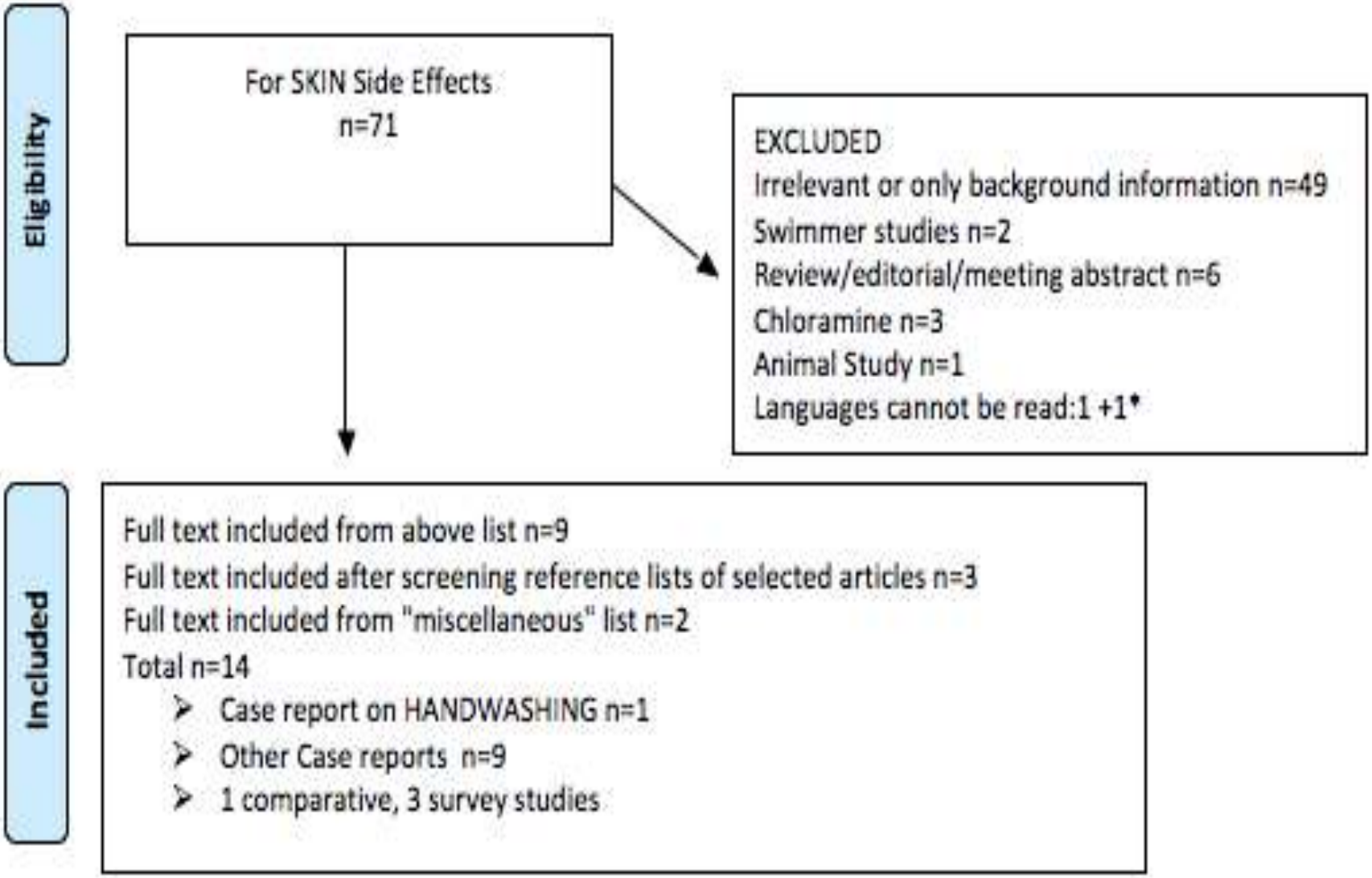
- exposed to sodium hypochlorite
- developed any kind of reaction, mostly skin or respiratory side effects

regardless of the concentration of the product, type of the setting or the method of exposure.

Exclusion criteria

- Studies about swimmers or chlorination of swimming pools,
- Chlorine use for therapeutic purposes,
- Chlorine gas/vapor exposures,
- Products used other than sodium and/or calcium hypochlorite i.e. chloramine, benzalkonyum chloride,
- Animal studies


Identification
Records identified through the Pubmed n= 2598
Embase n=698
(Total after duplicates removed n = 3241)
EXCLUDED:
Titles not relevant to the study question: n=2952
Screening
Titles selected
n = 320
Eligibility
ABSTRACTS SELECTED FOR DETAILED REVIEW:
Respiratory Side effects : 163
Skin Side Effects:71
Miscellaneous:38
EXCLUDED:
Chlorine used for therapy n= 25
Chloramine or other products n=16
Reviews n=4
Irrelevant n=3



*One possible article found for other side effects had to be excluded because in language cannot be read. (Lithuanian)

1 CASE REPORT – Veterinary surgeon handwashing w/ 4-6% sodium hypochlorite

Article Title, Author, Year	Type of Participants	Sodium Hypochlorite (NaOCl) - INTERVENTION		COMPARATOR	Description of Skin reaction
		Exposure method	Concentration of the sodium hypochlorite		
Sodium hypochlorite dermatitis Eun et.al, 1984	Veterinary Surgeon	Hand washing	4-6% sodium hypochlorite (Halasol®) used for handwashing	Iodine and antibiotics	allergic contact dermatitis-itchy skin lesions of 3-4 years duration on both hands and forearms + patch test to all concentartions of NaOCl, (-) to comparator
	3 healthy volunteers	Patch test as described	Patch test: Halasol® (undiluted, 1 in 10, and 1 in 100), Sodium hypochlorite (2% aq, 1% aq, 0.5% aq, 0.25% aq)	N/A	all negative patch test results except to undiluted 4-6% NaOCl

Other CASE REPORTS COMBINED WITH EXPERIMENTAL CONTROLS n=5 (1)

Sensitization to sodium hypochlorite causing hand dermatitis Habets, et.al 1986	2 housewives	Domestic cleaning w/o gloves	Kristal product: 10% sodium hypochlorite (bleach) Both patients had positive patch test Kristal 1% aq, Kristal 0.5% aq, NaOCl 2% aq, NaOCl 1% aq, NaOCl 0.5% aq, NaOCl 0.1% aq	N/A	chronic itchy dermatitis on the dorsum of the fingers for 9 months (case 1); chronic hand eczema for more than 15 years-sym. dermatitis of the palms, periungual areas and dorsa of the fingers (case 2)
	69 control patients, randomly selected with suspect allergic contact dermatitis	Patch Test	sodium hypochlorite 2% in aq. (for 69 patients); sodium hypochlorite 1% and 0.5% in aq (for 20/69 patients)	N/A	15/69 a weak or moderate irritant reaction 20/20 no reaction
Contact dermatitis due to sodium hypochlorite Osmundsen et.al, 1989	1 patient developed dermatitis after chloramine was used for disinfection in the genital area	Chloramine use for disinfection purposes	Patch test positive to sodium hypochlorite 0.5% aq and chloramine 0.5% aq (Extreme reaction to NaOCl)	N/A	Extreme reaction to NaOCl patch test characterized by palm sized, red grossly edematous and infiltrated reaction
	225 patients with dermatitits	Patch test as described		N/A	3/225 positive reaction - 1 patient with history of eczema, 2 with contact dermatitits

Other CASE REPORTS COMBINED WITH EXPERIMENTAL CONTROLS n=5 (1)

Sensitization to sodium hypochlorite causing hand dermatitis Habets, et.al 1986	2 housewives	Domestic cleaning w/o gloves	Kristal product: 10% sodium hypochlorite (bleach)	N/A	chronic itchy dermatitis on the dorsum of the fingers for 9 months (case 1); chronic hand
Contact dermatitis du hypochlorite Osmundsen et.al, 19					
		described			patient with history of eczema, 2 with contact dermatitits

- 15/ 69 weak or moderate irritant reaction- 2% Sodium hypochlorite
- 20/20 no reaction 0.5-1 %
- 3/225 positive reaction 0.5%
- 2/40 positive reaction 1%
- 20/20 negative reaction to 0.3%
- 4/10 + low intensity reaction 6%

4 additional case reports with severe reaction

- Two case reports from the ‘30s severe dermatitis following use of bleach (reported concentration 1:10) for environmental cleaning; the patch test was positive in both cases.

- Accidental contact exposure to unknown concentrations of bleach- linear IgA bullous dermatosis with systemic reaction

- The use of diluted Clorox® (one part of 6% NaOCl to five parts of water) for bathing the foot to treat an infected big toe for several weeks- severe allergic contact dermatitis characterized by diffuse swelling, scalling, vesiculation of the foot and hands.

Comparative study *(Tupker,1997)*

Article Title, Author, Year	Type of Participants	Sodium Hypochlorite (NaOCl) -INTERVENTION		COMPARATOR	OUTCOME	Description of Skin reaction
		Exposure method	Concentration			
COMPARATIVE STUDY n=1						
Irritancy of antiseptics tested by repeated open exposures on the human skin, evaluated by non-invasive methods Tupker et.al.1997	20 subjects without any skin disease Experimental study open exposure model for all products	Open exposure model of 30 mins duration x2 (3h in between) on daily on 4 consecutive days. With a plastic strip 0.8 ml of solution applied thru 20 mm diameter.	Sodium Hypochlorite (SH) 0.25% aq	• Chlorhexidine gluconate 0.5% in 70% ethanol (CE) • Chlorhexidine gluconate 4%, (CG) • Ethanol 70%,(ET) • Iodine 1% in ethanol 70%, (IE) • Povidone-iodine 10% aq (PI)	• Visual scoring for erythema, scalling, and fissures • Subjective score of burning, stinginig • Stratum corneum hydration • Transepidermal water loss • Cutenous blood flow	• 5/20 erythamous reaction + after 1 exposure to SH • In majority SH had to be stopped after 4 applications because of subjective irritation sensation. • For all the outcomes SH was significantly the worst, followed by IE.

One survey on occupational skin diseases in nurses

Article Title, Author, Year	Type of Participants	Sodium Hypochlorite (NaOCl) -INTERVENTION		COMPARATOR	OUTCOME
		Exposure method	Concentration		
Occupational skin diseases in nurses Telksniene et.al, 2003	706 nurses from Lithuania	exposure to chemical disinfecting materials in occupational environment	Chlorine compounds *presumably 0.02 or 0.1% chlorine in Haz-Tab® or 3% chloramine	Alcohols, aldehydes, hydrogenium peroxide	Allergic contact dermatitis associated with skin redness and itching Irritant contact dermatitis- rash and redness

- 62.5% of nurses who worked with chemical disinfecting materials for more than 9 hours were suffering from skin damage and 33.5% of cases induced by chlorine.

- The risk of developing occupational skin disease is higher for chlorine than alcohol. (OR – 3.6; CI = 2.1–6.2; 1.85 CI=0.9-3.9 respectively) Highest with aldehydes and H2O2

2 surveys among cleaners

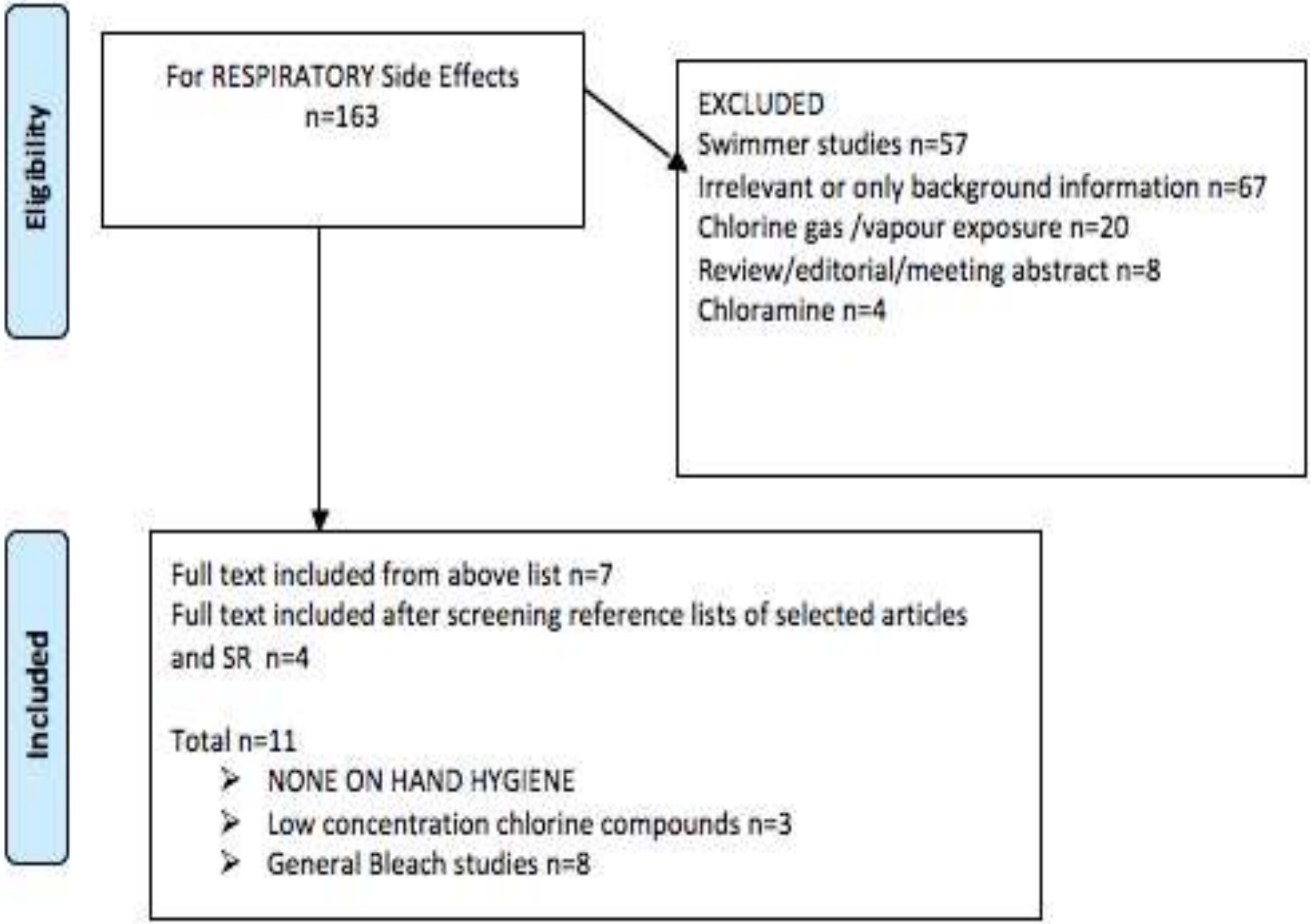
- 818 professional cleaners in Spain *(Mirabelli, 2012)*
  - did not show significantly higher prevalence rate of hand dermatitis in health care settings,
  - Significantly higher prevalence rate of hand dermatitis among all cleaning workers who reported frequent use of bleach (≥4 days per week)

- 25 day care workers – *(Sheretz,1992)*
  - used 1:1000 dilution of sodium hypochlorite-50 ppm chlorine for disinfection purposes
  - 13/25 workers who had hand dermatitis were exposed to wet work and latex gloves along with sodium hypochlorite.

CONCLUSION - Skin Side Effects

- Extremely limited evidence related to contact dermatitis following sodium hypochlorite use for hand hygiene purposes (only one case report but using high concentrations)
- Other studies - exposure to sodium hypochlorite as a disinfectant for other uses
- The quality of the studies was low or very low
- Great variability was found in the type of setting, concentrations used (high in most of these studies), study designs and exposure methods

- Overall, low or very low quality evidence shows that sodium hypochlorite can cause skin irritations even at low concentrations with bare skin exposure


Eligibility
For RESPIRATORY Side Effects
n=163
EXCLUDED
Swimmer studies n=57
Irrelevant or only background information n=67
Chlorine gas /vapour exposure n=20
Review/editorial/meeting abstract n=8
Chloramine n=4
Included
Full text included from above list n=7
Full text included after screening reference lists of selected articles and SR n=4
Total n=11
NONE ON HAND HYGIENE
Low concentration chlorine compounds n=3
General Bleach studies n=8

HCW Survey study (Glumbakaite, 2003)

- 314 medical personnel surveyed in 9 different hospitals in Lithuania
- 0.02 or 0.1% chlorine solutions and a 3% chloramine solution, glutaraldehyde, hydrogen peroxide, isopropyl and ethyl alcohol
- Significantly more frequent skin reddening, itching symptoms and chronic bronchitis when using chlorine compounds,

Table 6. Prevalence of symptoms and diseases of the medical personnel[1] disinfecting with chlorine compounds

	Prevalence *n* (%)	95% CI
Symptoms		
Reddening and itching of skin	80(58.4)*	49.67–66.74
Allergic conjunctivitis	57(41.6)	33.25–50.33
Allergic rhinitis	51(37.2)	29.12–45.89
Weakness	39(28.5)	21.09–36.80
Headache	38(27.7)	20.43–36.03
Dizziness	31(22.6)	15.92–30.55
Cough	28(20.4)	14.03–28.16
Hoarseness	21(15.3)	9.74–22.47
Chest tightness	15(10.9)	6.26–17.41
Dyspnea	13(9.5)	5.15–15.68
Difficulty in breathing	8(5.8)	2.55–11.18
Wheeze	5(3.6)	1.19–8.31
Diseases		
Chronic bronchitis	17(12.4)**	7.39–19.12
Allergic contact dermatitis	10(7.3)	3.55–13.01
Allergic rhinitis	10(7.3)	3.55–13.01
Allergic conjunctivitis	10(7.3)	3.55–13.01
Contact dermatitis	7(5.1)	2.08–10.24
Chronic laryngitis	6(4.4)	1.62–9.29
Chronic rhinitis	5(3.6)	1.19–8.31
Contact urticaria	4(2.9)	0.80–7.30
Asthma	4(2.9)	0.80–7.30

[1] No. of people tested = 137; *$p < 0.001$; **$p < 0.05$.

One patient survey study (Aronhalt 2012)

- USA hospital during the "*Wipe Out C.Difficile"* intervention
- 94 patients and 6 environmental cleaning staff
- Bleach wipes containing 0.55% sodium hypochlorite (5,200 ppm) while their rooms were cleaned.
- Only 7% of patients from the medical units (*n* = 2) but half of the patients from the hematology–oncology units (*n* = 50) noticed the odor of the bleach used for cleaning; 44% of them found it bothersome and either used a mask or left their room during cleaning.
- All participating cleaners (n=6) reported respiratory irritation and less satisfaction from using the bleach wipes; however, later their satisfaction improved.

CONCLUSION - Respiratory side effects

- No evidence in the literature that shows that low level of sodium hypochlorite used for hand hygiene may cause respiratory irritation, other respiratory symptoms or asthma.
- However, respiratory symptoms are clearly reported in patients, health workers and other users as a consequence of exposure to chlorine solutions used for environmental decontamination also with low concentrations (0.02 or 0.1% chlorine solutions)

Other Side Effects

- No studies were identified addressing other possible side effects except the Glumbakaite, 2003 Lithuanian study.

Table 6. Prevalence of symptoms and diseases of the medical personnel[1] disinfecting with chlorine compounds

	Prevalence *n* (%)	95% CI
Symptoms		
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Asthma	4(2.9)	0.80–7.30

[1] No. of people tested = 137; *$p < 0.001$; **$p < 0.05$.

Caveats regarding washing, decontaminating and reprocessing gloves – *WHO Guidelines on Hand Hygiene (2009), section 23.1.6*

- Any practice of **glove washing, decontamination or reprocessing is not recommended** as it may damage the material integrity and jeopardize the glove's protective function.
- Although these practices are common in many health-care settings, essentially in developing countries, where glove supply is limited, **no recommendation exists concerning the washing and reuse of gloves, nor the washing or decontamination of gloved hands** followed by reuse on another patient.
- Although the antibacterial efficacy of glove washing and decontamination is demonstrated (1 study using 4% chlorhexidine + 7.5% povidone-iodine liquid soap, and 1 study using ABHR+ chlorhexidine)**, the consequences of such processes on material integrity still remain unknown.**

Caveats regarding washing, decontaminating and reprocessing gloves – *WHO Guidelines on Hand Hygiene, section 23.1.6*

- **Some evidence exists that cleansing latex-gloved hands using an alcohol-based handrub solution is effective** in removing micro-organisms and shows increasing contamination rates of hands only after 9–10 cycles of cleansing.
- However, cleansing plastic-gloved hands with an ABHR **leads to early dissolving of the plastic material**.
- It should be noted that this process may be applied **only in the framework of contact precautions implementation and as long as gloves are not soiled with blood and other body fluids.**

Conclusions on glove reprocessing

- The opinion of international experts consulted by WHO is that **glove reprocessing must be strongly discouraged and avoided,** mainly because at present no standardized, validated, and affordable procedure for safe glove reprocessing exists.

- Every possible effort should be made to prevent glove reuse in health-care settings, and financial constraints in developing countries leading to such practices should be assessed and tackled. Institutions and health-care settings **should firmly avoid the reuse of gloves**.

- In circumstances **where the reprocessing of gloves has been carefully evaluated but cannot be avoided, a clear policy should be in place** to limit reprocessing and reuse of gloves until a budget is allocated to ensure a secure supply of single-use gloves.

- Policies for exceptional reprocessing should ensure **a process that follows strict procedures for collection, selection and reprocessing,** including instructions for quality/integrity control and discarding of unusable gloves.

Does glove disinfection with chlorine solutions cause damage to permeability or increased perforations?

Rapid review upon request by the WHO Guidelines Review Committee

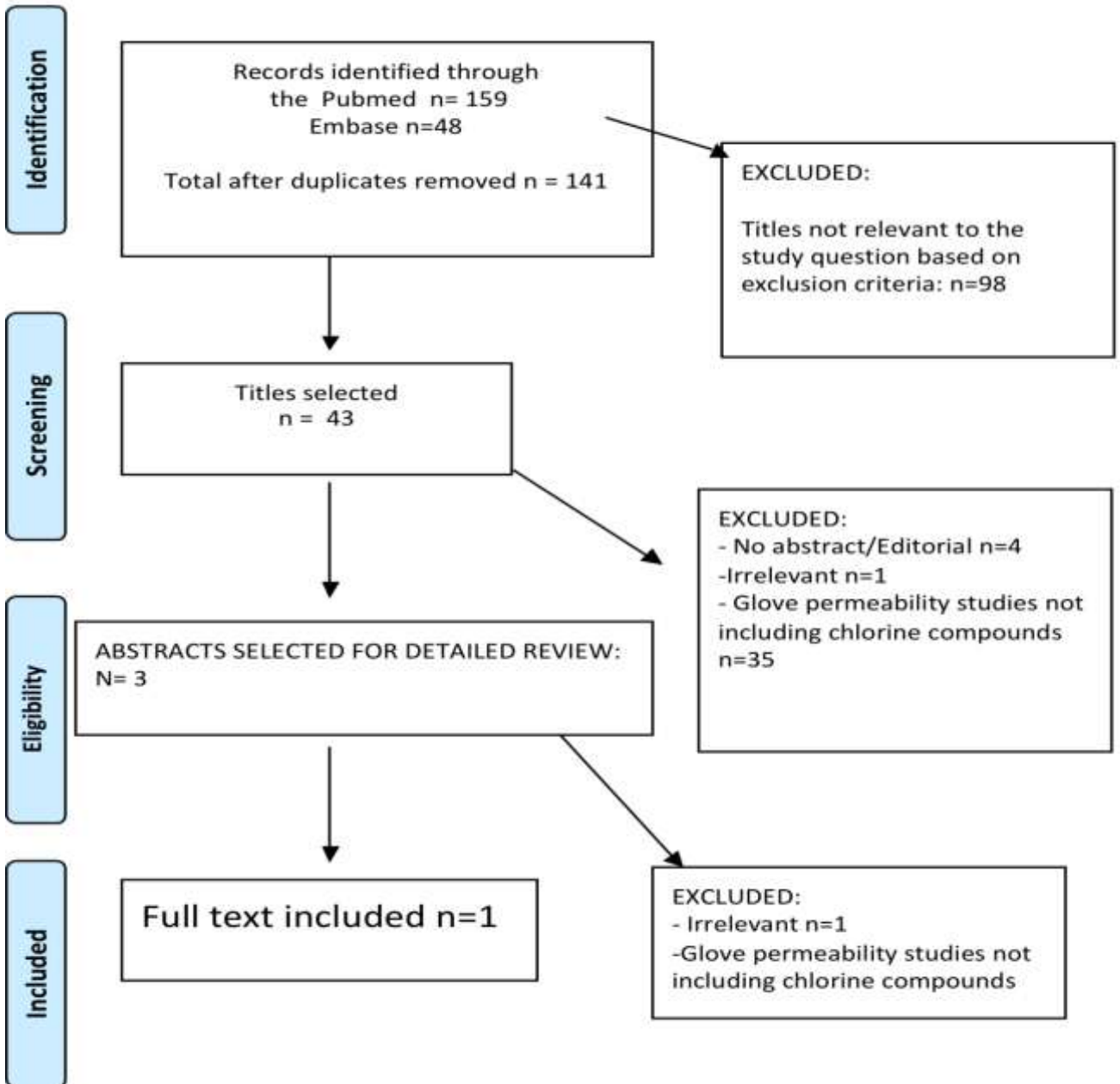
Search Methods

- PubMed (including MEDLINE) and Ovid EMBASE databases
- Performed on 11 November 2014
- No time, age, human, language limit or geographical restrictions.

Pubmed search strategy

#	Searches
1	(“chlorine”[Mesh] OR “chlorine” OR “sodium hypochlorite” OR “calcium hypochlorite” OR “organic chloramines” OR “Chlorine Compounds”[Mesh] OR “chlorine dioxide” [Supplementary Concept]) OR chlorin* OR "Solvents"[Mesh] OR "bleach" OR "Dettol" OR "Chloramine" OR "Clorox"
2	(((“Gloves, Protective”[Mesh] OR gloves [TW] OR glove [TW] OR gloving [TW]))
3	#1 AND #2

Flowchart


Identification
Records identified through the Pubmed n= 159
Embase n=48
Total after duplicates removed n = 141
EXCLUDED:
Titles not relevant to the study question based on exclusion criteria: n=98
Screening
Titles selected
n = 43
EXCLUDED:
- No abstract/Editorial n=4
-Irrelevant n=1
- Glove permeability studies not including chlorine compounds
n=35
Eligibility
ABSTRACTS SELECTED FOR DETAILED REVIEW:
N= 3
Included
Full text included n=1
EXCLUDED:
- Irrelevant n=1
-Glove permeability studies not including chlorine compounds

The Permeability of Surgical Gloves to Seven Chemicals Commonly Used in Hospitals

ERJA A. MÄKELÄ*, SINIKKA VAINIOTALO and KIMMO PELTONEN†

Ann. occup. Hyg., Vol. 47, No. 4, pp. 313–323, 2003

- Seven brands of surgical gloves tested for permeation against seven chemicals according to the European and the American standards
- **The gloves did not exhibit permeation of potassium hydroxide (45%), sodium hypochlorite (13%) or hydrogen peroxide (30%).**
- Neither glutaraldehyde (2%) nor chlorhexidine digluconate (4%) in the commercial disinfectant solutions studied exhibited permeation.
- The surgical gloves studied are able to protect against sodium hypochlorite 13% (available chlorine > 12%) in conventional hospital work where there is usually contact with less concentrated chemicals and where contact is for short periods of chemical usage. However, should this chemical be used in mixtures with highly glove- permeable or glove-degrading chemicals or the mechanical stress is greater than the gloves can stand, then the results will be not applicable.

Conclusions (1)

1.Very limited evidence to evaluate the efficacy of sodium hypochlorite (bleach/chlorine solutions) compared with other agents when used for hand hygiene or glove disinfection.

2. Available data indicates that for hand hygiene efficacy there is a relation between bleach/chlorine concentration and contact time.

3.With regards to glove disinfection, no study on efficacy of chlorine solutions compared with alcohol-based hand rub or other antisepsis products, including water and soap was retrieved. Only one study assessed the permeability of surgical gloves to sodium hypochlorite 13% and showed no permeation or glove damage.

Conclusions (2)

4. Limited evidence (only one case report) showing that sodium hypochlorite used for hand hygiene purposes can cause skin irritation or lesions; however, the concentration in this case was much higher than is currently used for hand hygiene.

5. No evidence that low concentrations of sodium hypochlorite used for hand hygiene cause respiratory irritation, other respiratory symptoms or asthma.

6.Risk for irritative conjunctivitis is noted

7.The use of bleach/chlorine solutions at the concentrations currently used for hand hygiene (500 ppm sodium hypochlorite or a 0.05% chlorine solution) can be acceptable from the tolerability point of view, if other products are unavailable.

Hand hygiene in health care in the context of Filovirus disease outbreak response

Rapid advice guideline

Authors:
WHO

Publication details

Number of pages: 12
Publication date: November 2014
Languages: English
WHO reference number:
WHO/HIS/SDS/2014.15

Downloads

– Guideline on hand hygiene in health care in the context of Filovirus disease outbreak response
pdf, 1.05 Mb

Overview

This document provides a summary of the recommendations for hand hygiene best practices to be performed by health workers providing care and/or support to patients with filovirus infection (Ebola and Marburg viruses).

The recommendations were developed in accordance with the WHO Rapid Advice Guideline procedures and are based on systematic reviews of the scientific evidence and the consensus of experts.

Related links

– Five moments for hand hygiene in health care - tools
– Ebola virus disease - website

Recommendation 1

- We recommend performing hand hygiene, by using either an alcohol-based hand rub or soap and running water applying the correct technique recommended by WHO.
- Alcohol-based hand rubs should be made available at every point of care (at the entrance and within the isolation rooms/areas) and are the standard of care.
- If alcohol-based hand rubs are unavailable, hand hygiene should be performed with soap and running water whenever necessary. When hands are visibly soiled, hand hygiene should always be performed with soap and running water.

Strong recommendation, high-quality evidence for the effectiveness of alcohol-based handrub or soap and water.

http://apps.who.int/iris/bitstream/10665/144578/1/WHO_HIS_SDS_2014.15_eng.pdf?ua=1

Recommendation 2

•In settings where bleach/chlorine solutions are currently used for hand hygiene, we recommend implementing a strategy to change to alcohol-based hand rub or soap and water.

Strong recommendation, very strong evidence for the in-vivo effectiveness of alcohol-based hand rubs or soap and water.

http://apps.who.int/iris/bitstream/10665/144578/1/WHO_HIS_SDS_2014.15_eng.pdf?ua=1

Recommendation 3

•Bleach/chlorine solutions currently in use for hand hygiene and glove disinfection can be used in the interim period in emergency situations until alcohol-based hand rubs or soap and water become available.

Conditional recommendation, very low-quality evidence for the comparative efficacy of bleach /chlorine solutions compared with alcohol-based handrub or soap and water, and very low-quality evidence about tolerance to bleach or chlorine solutions for hand hygiene and glove disinfection.

http://apps.who.int/iris/bitstream/10665/144578/1/WHO_HIS_SDS_2014.15_eng.pdf?ua=1

Final conclusions

- Handwashing with soap and running water is effective
- Ideally, for hand hygiene an alcohol-based handrub should be used as it is highly effective
- On the medium-/longterm, procurement of alcohol based handrub in developing countries including Africa, should be increased (with associated price reduction) and local production should be strongly encouraged and supported

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The next WHO teleclass ....

March 11, 2015

USING THE CORE COMPONENTS OF INFECTION CONTROL DURING THE EBOLA OUTBREAK

Dr. Sergey Eremin
Medical Officer, World Health Organization

Objectives ....

- To introduce the WHO concept of the core components of infection prevention and control programmes in health care.
- To understand the challenges and share the experience in implementing core components of IPC in the countries affected by the current EVD outbreak.
- To discuss minimum standards needed for health facilities in the EVD outbreak setting to operate and provide care in an environment that is safe for both patients and staff.
- To define strategy for building sustainable IPC capacity in the Ebola affected countries.

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