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Guidelines

Cleaning & Disinfection of Environmental Surfaces in a Healthcare Facility

Objective

To provide public health and health care professionals and staff the guidelines regarding the ways of cleaning and disinfecting various environmental surfaces including non-critical medical equipment, furniture, floors, walls, doors and windows etc.

Rationale

Surfaces in the environment of the patient can get contaminated with the pathogenic microorganisms by contact with the body or body secretions, from particles shed from the skin or clothes or transportation through goods, shoes, wheels or wind.

This contamination may result in colonization of various surfaces in the environment of the healthcare facilities. It is therefore prudent to develop procedures of, and make necessary arrangements for periodic cleaning and where necessary, disinfection of these structures.

Fumigation or fogging of antimicrobial agents is no more recommend as a routine procedure in a healthcare environment as hazards of such a use of antimicrobial agent far outweigh the benefits.¹ This procedure may still find its use in abandoned buildings likely to be contaminated by various hazardous biological substances. The procedure of fumigation or fogging will appear under separate guidelines.

Definitions & Abbreviations

Fumigation or fogging is a procedure that results in release of vapors or mist of an antimicrobial agent in the air in a closed or open space.

Antimicrobial agent is a substance that has the property to kill microorganisms.

Cleaning is the removal of visible soil (organic and inorganic materials) from objects and surfaces and is generally accomplished manually or mechanically using water with detergents or enzymatic products.

Disinfection describes a process that eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects.



Non-critical items are those that come in contact with intact skin but not mucous membranes. Blood pressure apparatus and door knobs are examples of non-critical items.

High Level Disinfection destroys all micro-organisms except high numbers of bacterial spores

Intermediate Level Disinfection destroys vegetative bacteria, mycobacteria, most viruses, most fungi but not bacterial spores

Low Level Disinfection destroys vegetative bacteria, some fungi and viruses but not mycobacteria or spores.¹

Procedure

Cleaning of Non-critical Medical Equipment:

- Manufacturers of medical equipment should provide care and maintenance instructions specific to their equipment.
- In the absence of manufacturers' instructions, non-critical medical equipment (for example stethoscopes, blood pressure cuffs, dialysis machines, and equipment knobs and controls) usually require cleansing followed by low- to intermediate-level disinfection, depending on the nature and degree of contamination. Ethyl alcohol or isopropyl alcohol in concentrations of 60%–90% (v/v) can be used to disinfect small surfaces (e.g., rubber stoppers of multiple-dose medication vials, and thermometers)² and occasionally external surfaces of equipment (e.g., stethoscopes and ventilators). However, alcohol evaporates rapidly, which makes extended contact times difficult to achieve unless items are immersed, a factor that precludes its practical use as a large-surface disinfectant.²
- Alcohol may cause discoloration, swelling, hardening, and cracking of rubber and certain plastics after prolonged and repeated use and may damage the shellac mounting of lenses in medical equipment.
- Barrier protection of surfaces and equipment is useful, especially if these surfaces are:
 - a. Touched frequently by gloved hands during the delivery of patient care,
 - b. Likely to become contaminated with body substances, or
 - c. Difficult to clean.
- Impervious-backed paper, aluminum foil, and plastic or fluid-resistant covers are suitable for use as barrier protection.

Housekeeping Surfaces

- Housekeeping surfaces can be divided into **two groups**, those with minimal hand-contact (e.g., floors, and ceilings) and those with frequent hand-contact (bedrails, bedside tables, carts, commodes, door-knobs, and faucet handles etc.). The methods, thoroughness, and frequency of cleaning and the products used are determined by health-care facility policy.
- High-touch housekeeping surfaces in patient-care areas like door knobs, bedrails, light switches, wall areas around the toilet in the patient's room, and the edges of privacy curtains should be cleaned and/or disinfected more frequently than surfaces with minimal hand contact.



- Horizontal surfaces with infrequent hand contact like window sills and hard-surface flooring in routine patient-care areas require cleaning on a regular basis, when soiling or spills occur, and when a patient is discharged from the facility.²
- Most, if not all, housekeeping surfaces need to be cleaned only with soap and water or a detergent/disinfectant, depending on the nature of the surface and the type and degree of contamination. Disinfectant formulations such as sodium hypochlorite with concentration of 5000-6150 ppm to 500-615 ppm free chlorine are used for environmental surface cleaning depending upon the amount of organic material present on the surface to be cleaned or disinfected², but the actual physical removal of microorganisms and soil by wiping or scrubbing is probably as important, if not more so, than any antimicrobial effect of the cleaning agent used. Therefore, cost, safety, product-surface compatibility, and acceptability by housekeepers can be the main criteria for selecting a registered agent. If using a proprietary detergent/disinfectant, the manufacturers' instructions for appropriate use of the product should be followed. If reusable cleaning cloths or mops are used, they should be decontaminated regularly to prevent surface contamination during cleaning with subsequent transfer of organisms from these surfaces to patients or equipment by the hands of health-care workers. Immersing the cloth in hypochlorite (4,000 ppm chlorine) for 2 minutes almost eliminates the possibility of surviving organisms.⁷ Cleaning of walls, blinds, and window curtains is recommended when they are visibly soiled.
- Extraordinary cleaning and decontamination of floors in health-care settings is unwarranted. Studies have demonstrated that disinfection of floors offers no advantage over regular detergent/water cleaning and has minimal or no impact on the occurrence of health-care associated infections. Nevertheless, healthcare institutions or contracted cleaning companies may choose to use an EPA (Environmental Protection Agency)'s registered detergent/disinfectant for cleaning low-touch surfaces (e.g., floors) in patient-care areas because of the difficulty that personnel may have in determining if a spill contains blood or body fluids (requiring a detergent/disinfectant for clean-up) or when a multi-drug resistant organism is likely to be in the environment. Bucket solutions become contaminated almost immediately during cleaning, and continued use of the solution transfers increasing numbers of microorganisms to each subsequent surface to be cleaned.² Replace soiled cloths and mop heads with clean items each time a bucket of detergent/disinfectant is emptied and replaced with fresh, clean solution.

Note: The above recommendations are being regularly reviewed by the Ministry of National Health Services, Regulations & Coordination and will be updated based on the international & national recommendations and best practices.

The Ministry acknowledges the contribution of Irfan Mirza, Saira Kanwal and HSA/ HPSIU/ NIH team to compile these guidelines.

References:

1. Disinfection and Sterilization: An Overview. Rutala, William A et al, American Journal of Infection Control, 2013, 41:5, S2-S5
2. Guidelines for environmental infection Control in Health-Care Facilities. Recommendations of CDC and Health-Care Infection Control Practices Advisory Committee (HICPAC), 2003 (Updated July 2019).

For more information, please contact:

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<http://nhsrco.gov.pk/>

<https://www.facebook.com/NHSRCOOfficial>

<http://covid.gov.pk/>

<https://twitter.com/nhsrcoofficial>

<https://www.nih.org.pk/>

https://www.youtube.com/channel/UCdYuzeSP4Ug1f_ZZKLDiYg



Viability of COVID19 in different environmental conditions

According to the Centers for Disease Control and Prevention, the coronavirus is usually transmitted through respiratory droplets (from an infected person sneezing or coughing) rather than through fomites, objects and materials that when contaminated can transfer disease.

1. Surfaces

Surface	Viability Duration	Source
Plastic and stainless steel	2-3 days	https://www.businessinsider.com/study-how-long-coronavirus-lasts-on-surfaces-stainless-steel-plastic-2020-3?amp
Copper surfaces	4 hours	
Cardboard	24 hours	https://www.niaid.nih.gov/news-events/new-coronavirus-stable-hours-surfaces Published in New England Journal of Medicine Stability of SARS-CoV-2 in different environmental conditions, School of Public Health, LKS Faculty of Medicine, The University of Hong Kong, Hong Kong Special Administrative Region, China.
Air Droplets	3-4 hours	
Surgical Mask (outer layer)	7 days	
Printing Paper & Tissue paper	3 hours	https://www.reviewed.com/laundry/features/can-the-covid-19-coronavirus-live-on-your-clothes
Duration of the virus depends on fabric of the clothing	2 hours to few days	

2. Temperature

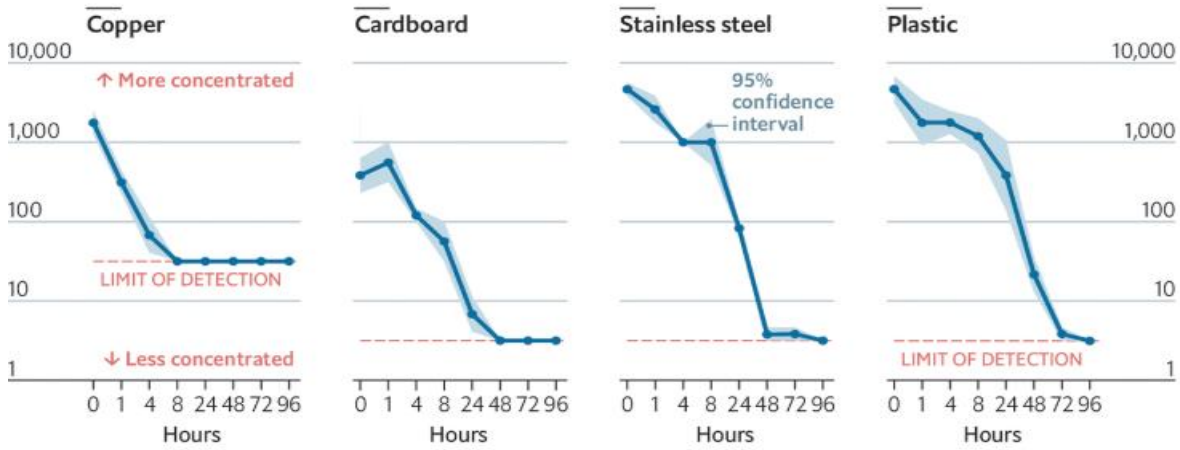
The virus was diluted by virus transport medium (VTM; final concentration: 6.7 log *TCID50/mL) was incubated for up to 14 days		
Temperature	Duration	Unit log reduction in TCID
Highly stable-4°C	Extended Period	0.6-unit log reduction
22°C	7 Day 14 day	3-log unit reduction No virus detected
37°C	24 Hours After 24 hours	3-log unit reduction No virus detected
56°C	30 minutes	No virus detected
70°C	5 minutes	No virus detected

*TCID: Tissue culture infectious dose

As covid19 is a lipid containing virus, it can be killed with wipes. Copper surfaces tend to kill virus in 4 hours, while disinfecting surface with 62-71% alcohol or 5% hydrogen peroxide bleach kills virus within a minute.



Concentration of viable SARS-Cov-2 virus in a sample, TCID₅₀* per litre of air, log scale



Source: "Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1" by Doremalen, Bushmaker & Morris, *New England Journal of Medicine*.

*Tissue-culture infectious dose