ENVIRONMENTAL CLEANING IN HEALTH SERVICES

LIMPEZA AMBIENTAL EM SERVIÇOS DE SAÚDE

SÉRIE DE DIÁLOGOS DA PRÁTICA - PREVCOVID-BR
CDC IPC BRAZIL ECHO WEBINAR SERIES

MADISON MOON

INFECTION PREVENTION AND CONTROL SPECIALIST

WORLD HEALTH ORGANIZATION

WORLD HEALTH EMERGENCIES PROGRAMME

World Health Organization

AVOIDING CONTAMINATION RISKS

Protecting yourself

Protecting patients and colleagues

Protecting your family & community

SURFACE CONTAMINATION OF **SARS-COV-2**

- Surfaces contaminated with human respiratory secretions and excretions from persons infected with COVID-19 can contain concentrations of infectious virus which appear infection competent, but surface to mucous membrane transmission is rarely established as the most likely mode of transmission to a susceptible host

- Evidence is developing that SARS-CoV-2 can be more persistent on surfaces in the environment and on the hands than influenza virus.

- SARS-CoV-2 is able to survive on surfaces in a wide range of pH values and ambient temperatures

- Low temperature/humidity/exposure to UV have all been shown to play a role in SARS-CoV-2 environmental stability

- Heat and standard cleaning and disinfection practices have shown to be highly effective at removing SARS-CoV-2 contaminants from environmental surfaces

WHAT WE KNOW

NOTABLE RECENT STUDIES

Survival time under laboratory conditions*

SURFACE TESTED	MATERIAL	DETECTABLE VIRUS TIME		
Bank Note	Polymer	28 days (20°C)	7 days (30°C)	<2 days (40°C)
Cloth	100% Cotton	14 days (20°C)	3 days (30°C)	24 hours (40°C)
Plastic	Vinyl	28 days (20°C)	3 days (30°C)	<2 days (40°C)
Glass	Glass	28 days (20°C)	7 days (30°C)	<2 days (40°C)
Metal	Stainless Steel	28 days (20°C)	7 days (30°C)	<2 days (40°C)
Bank Note	Paper	28 days (20°C)	21 days (30°C)	<2 days (40°C)

**All experiments were carried out in the dark, to negate any effects of UV light. Inoculated surfaces were incubated at 20 °C, 30 °C, and 40 °C and sampled at various time points.*

The effect of temperature on persistence of SARS-CoV-2 on common surfaces – Riddell, et al, 7 October, 2020 – BMC VIROLOGY

NOTABLE RECENT STUDIES

Assessing risk of transmission

- *Survival of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and Influenza Virus on Human Skin: Importance of Hand Hygiene in Coronavirus Disease 2019 (COVID-19) – Hirose, et al, 3 October 2020*

- On human skin, the survival time was significantly longer for SARS-CoV-2 than for Influenza A Virus (9.04 hours [95% confidence interval, 7.96– 10.2 hours] vs 1.82 hours [1.65–2.00 hours])
- Both SARS-CoV-2 and Influenza A Virus in the mucus/medium on human skin were completely inactivated within 15 seconds by ethanol treatment

- *Seeding of outbreaks of COVID-19 by contaminated fresh and frozen food* – Fisher, et al, 18 August, 2020 – bioRxiv preprint

- Persistent environmental stability of SARS-CoV-2 on frozen food and food packaging
- Concerning for the transmission of viruses in processing and packaging facilities
- In consistent low temperature conditions, there is possibility that persistent contamination would survive the process of transport
- Effective hand hygiene, and routine food cleaning/cooking practices will interrupt virus survival for consumers

NOTABLE RECENT STUDIES

Assessing risk of transmission

Detection and infectivity potential of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) environmental contamination in isolation units and quarantine facilities **– Shmuel, et al, 9 September 2020**

- In laboratory-controlled conditions, SARS-CoV-2 gradually lost its infectivity completely by day 4 at ambient temperature, and the decay rate of viral viability on surfaces directly correlated with increase in temperature.
- Viral RNA was detected in 29/55 surface samples (52.7%) and 16/42 surface samples (38%) from the surroundings of symptomatic COVID-19 patients in isolation units of two hospitals and in a quarantine hotel for asymptomatic and very mild COVID-19 patients.
- None of the surface and air samples from the three sites (0/97) were found to contain infectious titres of SARS-Cov-2 on tissue culture assay.

Stability of SARS-CoV-2 on Critical Personal Protective Equipment **– Kasloff, et al, 12 June 2020**

- Viable SARS-CoV-2 was recovered after 21 days on plastic, 14 days on stainless steel, 7 days on nitrile gloves and 4 days on chemical resistant gloves.
- Though reduced from baseline, viable SARS-CoV-2 could be recovered from inoculated N-95 and N-100 masks at 14 days. When dried onto Tyvek, infectious SARS-CoV-2 persisted up to 14 days.
- Of all the materials tested, cotton provided the lowest environmental stability to SARS-CoV-2. After only a single hour of drying, over 4 logs of viable virus were lost, representing a 99.995% decrease from input inoculum.

NOTABLE RECENT STUDIES

Assessing risk of transmission

Low risk of SARS-CoV-2 transmission by fomites in real-life conditions **– Mondelli, et al, 29 September 2020**

- Two sequential studies seeking to determine the extent, if any, of contamination of inanimate surfaces in a standard infectious disease ward of a major referral hospital in northern Italy, and whether the risk of contamination was higher in emergency rooms and sub-intensive care wards than on ordinary wards.
- Cleaning procedures were standard (2x daily clean or if surfaces were visibly soiled)
- A number of objects and surfaces were swabbed. Only the continuous positive airway pressure helmet of one patient was positive for SARS-CoV-2 RNA.
- Attempts to culture the positive swabs on Vero E6 cells were unsuccessful, suggesting that patient fomites and surfaces are not contaminated with viable virus.
- Findings suggest that environmental contamination leading to SARS-CoV-2 transmission is unlikely to occur in real-life conditions, provided that standard cleaning procedures and precautions are enforced.

SUMMARY

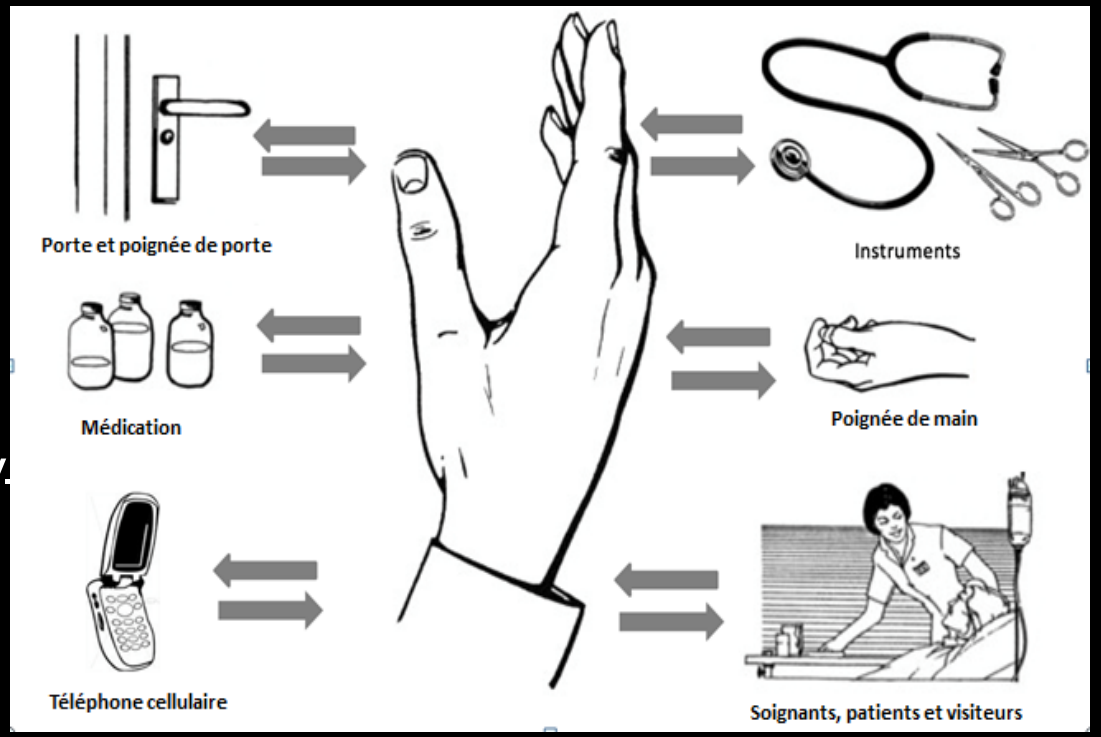
Although the highest risk is in the short period after contamination, there are conditions which will allow for long-term survival of SARS-CoV-2 on surfaces (cold/low light) up to 28 days

Survival of infectious SARS-CoV-2 on hands and surfaces presents a risk of fomite transmission, especially immediately after the surface is contaminated by an infected person

Cleaning and disinfection of surfaces, as well as hand hygiene has been shown to effectively remove SARS-CoV-2, reducing the risk of fomite transmission

HAND HYGIENE

- Best way to prevent the spread of germs
- Proven effectiveness against SARS-CoV-
- Key link in the chain of transmission
- Must be performed thoroughly and often



Inactivation of Severe Acute Respiratory Syndrome Coronavirus 2 by WHO-Recommended Hand Rub Formulations and Alcohols, Kratzel, et al, July 2020

- SARS-CoV-2 was efficiently inactivated by WHO-recommended formulations, supporting their use in healthcare systems and viral outbreaks.
- Both the original and modified formulations were able to reduce viral titers to background level within 30 s.
- Alcohol constitutes the basis for many hand rubs routinely used in healthcare settings. One caveat of this study is the defined inactivation time of exactly 30 s, which is the time recommended but not routinely performed in practice.

GLOVES

- Not a substitute for hand hygiene
- If gloves are not removed and replaced at the same intervals as appropriate hand hygiene, there is no improvement of either personal safety or potential spread of contamination
- Gloves should be used and discarded appropriately to the risk of an activity (e.g. when worn for occupational safety reasons)
- Global shortage of gloves has required many healthcare institutions to move to non-optimal use scenarios for the use of gloves
  - (e.g. only for chemotherapy administration, surgical/oral health settings, **preparation of chemical disinfectants**, procedures with high body fluid exposure risk, **cleaning of excrement or large spills of blood**)

MASKS AS SOURCE CONTROL

- Masks (medical masks, respirators, and fabric masks) can reduce the amount of respiratory secretions expelled into the environment
- Masks which do not facilitate source control (e.g. with exhalation valves) are less effective at reducing environmental contamination
- Masks can also be a source of contamination themselves and should be handled appropriately when adjusting, removing, and discarding

CLEANING

BEST PRACTICE CONSIDERATIONS IN HEALTHCARE FACILITIES

CLEANING - SUPPLY MANAGEMENT

- Maintain supply of fresh cloths at the start of each cleaning session (e.g., routine daily cleaning in a general inpatient ward and use a fresh cloth for each patient bed).
- Discard cloths that are no longer saturated with solution. Soiled cloths should be reprocessed properly after each use and standard operating procedures should be available for the frequency of changing cloths.
- Cleaning equipment (e.g. buckets) should be well maintained. Equipment used for isolation areas for patients with COVID-19 should be colour-coded and separated from other equipment.
- Detergent or disinfectant solutions can become contaminated during cleaning; becoming progressively less effective if the organic load is too high; therefore, the continued use of the same solution may transfer the microorganisms to each subsequent surface.
- Detergent and/or disinfectant solutions must be discarded after use in areas with suspected/confirmed patients with COVID-19.
- It is recommended that fresh solution be prepared on a daily basis or for each cleaning shift.
- Buckets should be washed with detergent, rinsed, dried and stored inverted to drain fully when not in use.

CLEANING PRACTICE

- Cleaning helps to remove pathogens or significantly reduce their load on contaminated surfaces and is an essential first step in any disinfection process.
- Cleaning with water, soap (or a neutral detergent) and mechanical action (brushing or scrubbing) removes and reduces dirt, debris and other organic matter such as blood, secretions and excretions, but does not kill microorganisms.
- Organic matter can impede direct contact of a disinfectant to a surface and inactivate the germicidal properties or mode of action of several disinfectants

CLEANING PRACTICE - Continued

- Cleaning should progress from the least soiled (cleanest) to the most soiled (dirtiest) areas, and from the higher to lower levels so that debris may fall on the floor and is cleaned last
- Cleaning should be performed in a systematic manner to avoid missing any areas which may be a source of contamination
- Particular attention should be paid to environmental cleaning of high-touch surfaces and items, such as light switches, bed rails, door handles, intravenous pumps, tables, water/beverage pitchers, trays, mobile cart rails and sinks
- Cleaning practices and cleanliness should be routinely monitored. The number of cleaning staff should be planned to optimize cleaning practices

TRAINING

- General IPC training including risk assessment, standard precautions, and transmission-based precautions
- Safe chemical handling and preparation of disinfectants
- Mechanical cleaning practices and equipment use
- Cleaning technique (high to low, systematic process of cleaning)
- Ongoing monitoring and feedback on cleaning practices:
  - observational monitoring and feedback
  - Auditing methods
  - use of adenosine triphosphate (ATP) testing after cleaning procedures

DISINFECTION

SAFETY AND PRODUCT SELECTION

SELECTING AN APPROPRIATE DISINFECTANT

- WHO has provided considerations for 3 disinfectant solutions for use in healthcare settings based on their global availability and ability to inactivate most other pathogens present in the healthcare facility with a recommended 1 minute contact time (or per manufacturer specifications)
  - Sodium Hypochlorite (0.1% or 1000ppm)
  - Ethanol (70-90%)
  - Hydrogen Peroxide (≥0.5%)
- The US Environmental Protection Agency has prepared an extensive list of disinfectants effective against Coronavirus disease

Local selection processes should take into consideration:

- The ability of disinfectants to inactivate other microorganisms (beyond SARS-CoV-2) as well as the contact time required of the disinfectant solution
- Which products are already being used (or in available supply) as mixing disinfectants can have serious health effects

SAFETY

- Manufacturers’ recommendations for safe use should always be considered when preparing, diluting or applying a disinfectant.
- Avoid combining disinfectants, both during preparation and usage, as such mixtures cause respiratory irritation and can release potentially fatal gases, in particular when combined with hypochlorite solutions.
- If disinfectant solutions are prepared at point of use, they should always be prepared in well-ventilated areas.
- Cleaners should wear adequate personal protective equipment (PPE) and be trained to use it safely.
- When working in places where suspected or confirmed COVID-19 patients are present, or where screening, triage and clinical consultations are carried out, cleaners should wear the following PPE: gown, heavy duty gloves, medical mask, eye protection (if risk of splash from organic material or chemicals), and boots or closed work shoes

STORAGE

- Disinfectant solutions and cleaning supplies should be stored in a clean storage area which does not risk becoming contaminated
- Disinfectant solutions used in healthcare environments can decay depending on environmental conditions, for example ambient temperature or UV exposure.
- Chlorine solutions should be stored in opaque containers, in a well-ventilated, covered area that is not exposed to direct sunlight.

USE OF DISINFECTANTS

- Always applied after cleaning with water/detergent to remove organic matter (as organic matter may inactivate disinfectants and shield contaminants)
- Disinfectants should be applied manually to surfaces (via cloth or wipe) and be allowed to sit on the surface undisturbed for the manufacturers recommended contact time
- The disinfectant concentration and contact time are also critical for effective surface disinfection
- Application of disinfectants should be predictably scheduled so that health workers are aware of when surfaces may be wet, require contact time, and the relative risk of contamination when manipulating surfaces in any health service setting (including community and home care settings)

COMMUNITY SETTINGS

- Cleaning and disinfection practices are important to reduce the potential for COVID-19 virus contamination in non-healthcare settings, such as in the home, office, schools, gyms, publicly accessible buildings, faith-based community centres, markets, transportation and business settings or restaurants.

- High-touch surfaces (frequently touched) in public settings should be identified for priority cleaning and disinfection such as door and window handles, kitchen and food preparation areas, counter tops, bathroom surfaces, toilets and taps, touchscreen personal devices, personal computer keyboards, and work surfaces.

- Surfaces and objects that are not frequently touched and/or are outside of public spaces only need to be cleaned with soap and water.

- Warmer temperatures and exposure to sunlight will reduce the time the virus survives on surfaces and objects.

- Disinfectants should typically not be applied on items used by children, especially any items that children might put in their mouths.

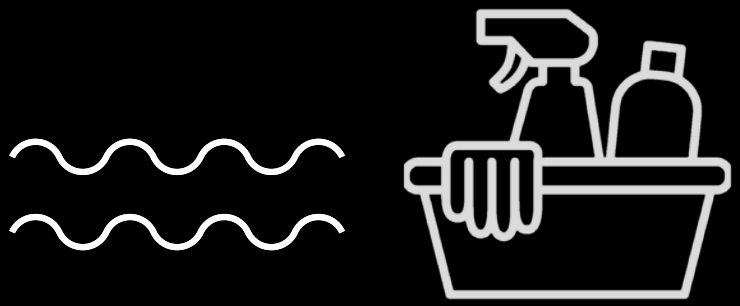
NOT ADVISED

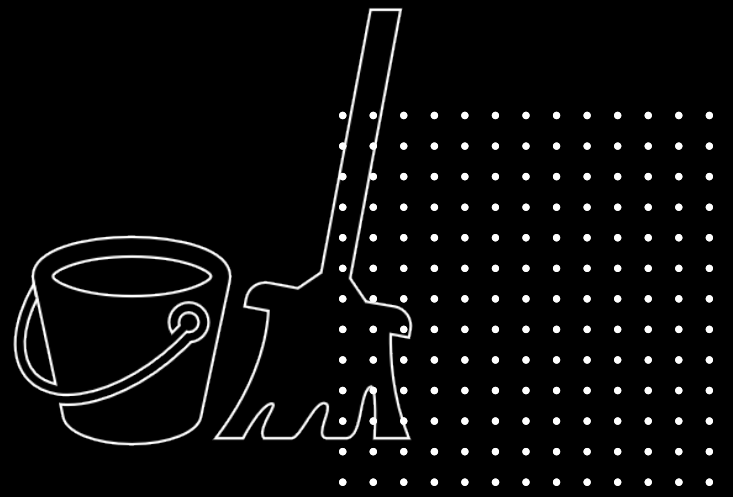
- Use of spray/mist/fogging of disinfectants
  - Ineffective at disinfecting surfaces outside of direct spray zones
  - If spray bottles are used, they should be applied to cloths or wipes to apply disinfectants evenly on surfaces
  - Spraying disinfectants can result in risks to the eyes, respiratory or skin irritation
- Use of spray disinfectants on humans
  - Strongly discouraged
  - Would not reduce an infected person’s ability to spread the virus through droplets or contact
  - A variety of chemicals have been demonstrated to produce adverse health effects in spray form: formaldehyde, chlorine based agents or quaternary ammonium compounds

RESOURCES

- WHO Cleaning and Disinfection of Environmental Surfaces in the Context of COVID-19 https://www.who.int/publications/i/item/cleaning-and-disinfection-of-environmental-surfaces-inthe-context-of-covid-19
- WHO/CDC Best Practices for Environmental Cleaning in Healthcare Facilities in Resource-Limited Settings: https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-RLS-H.pdf
- WHO Hand Hygiene Formulation Guide to Local Production: https://www.who.int/gpsc/5may/Guide_to_Local_Production.pdf
- PAHO Recommendations for the Preparation of Disinfectant Solutions: https://www.paho.org/en/documents/covid-19-recommendations-preparation-disinfectant-solutions-11-may-2020
- EPA List N: Disinfectants for Coronavirus (COVID-19): https://www.epa.gov/pesticide-registration/list-n-disinfectants-coronavirus-covid-19

THANK YOU





FOR QUESTIONS AND INQUIRIES ABOUT WHO INFECTION PREVENTION AND CONTROL PRACTICES

PLEASE CONTACT
WHEIPC@WHO.INT

World Health Organization