



Caring for Heritage Collections during the COVID-19 Pandemic

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Cultural heritage institutions are coping with many challenges as the world deals with the COVID-19 pandemic. While collections are not directly at risk, the pandemic complicates their care. This note compiles information and recommendations to help those responsible ensure that collections and heritage materials remain safe. We recognize that knowledge about COVID-19 continues to evolve, which may require us to adapt recommendations.

First a summary of key points:

- Protect people first: follow the advice of your local public health authorities, including practicing physical distancing. If you have not already done so, seriously consider closing your institution, even if it is not yet required.
- Use isolation to prevent or deal with contamination of collection spaces and objects whenever possible. The virus will deactivate naturally within six to nine days. Disinfecting solutions, on the other hand, will damage many heritage materials.
- If disinfection of non-heritage surfaces in collection spaces is required, use methods that permit controlled application of cleaning solutions and disinfectants. Always use disinfectants that have been approved by authorities (Health Canada, US Environmental Protection Agency).
- If your institution needs to close indefinitely, do so in a manner that provides adequate security, fire protection, pest management and environmental control. Implement regular exterior and, if possible, interior inspections. Consider how you would respond to other kinds of emergencies, such as water leaks or fires, if needed.

More detailed information is provided below through answers to frequently asked questions about [contamination of heritage materials](#), [disinfection of collection spaces](#), and [dealing with facility closure and reopening](#). Additional [resources](#) are listed at the end of this note.



COVID-19 CONTAMINATION OF COLLECTION MATERIALS

1. Can the COVID-19 virus be transmitted via collection objects or heritage surfaces?

According to the World Health Organization (WHO), people can catch COVID-19 by touching contaminated surfaces or objects and then touching their eyes, nose or mouth. If an infected person coughs or exhales in the direction of collection objects or handles objects with contaminated hands, the object materials could be contaminated with the virus which could, in theory, be transmitted to those who handle the objects afterwards. Since collection objects tend to be handled infrequently and the virus deactivates naturally outside of the human body, the chance of transmission is probably low. The risk may be higher where people work in heritage interiors and use heritage furnishings.

2. How long does the COVID-19 virus persist on surfaces?

The COVID-19 virus has a finite time of activity. SARS-CoV-2 is a membrane envelope virus with glycoprotein spikes. Without disruption by disinfectants, the bi-layer lipid membranes which envelope microorganisms, including these types of viruses, degrades with drying and exposure to air. As the information on persistence of the COVID-19 virus is still developing, guidance is based on research on previous human coronaviruses. The SARS virus, SARS-CoV, was found to lose most infectivity by 6 days and all infectivity by 9 days at room temperature. This conservative estimate for persistence, a week to 9 days, will likely stand as a recommendation until more testing of SARS-CoV-2 is done.

INFLUENCE OF CONTAMINANTS AND SURFACE CHARACTERISTICS ON VIRAL PERSISTENCE

Research examines added materials to suspensions and dry surface tests of viruses to measure their effect on persistence. Proteins have stabilized viruses on dry surfaces extending persistence significantly by slowing degradation. Viruses mixed with contaminants are most often tested on representative hospital surface materials as there is elevated cause for concern for infection in hospital settings. Metals (stainless steel and copper are common test coupons) exhibit some differences in persistence among themselves and can overlap with organic porous substrates (paper, cardboard, cloth). Metal ions (zinc in particular) are part of essential virus protein structures and there is evidence that copper and silver interfere with virus proteins which is a basis for these two metals in disinfectants. Hard plastics sometimes stand out with longer persistences. High surface texture (fabric) versus smooth can reduce transfer from the surface to human skin, but make it harder to see or treat contaminations. Contaminations which are obvious may attract disinfection activity leaving less obvious overlooked areas more likely to cause infection.

Persistence does vary with characteristics of the surface material and the presence of other contaminants (see box). Smooth surfaces, like metal and hard plastics, exhibit greater viral persistence and permit more transfer than porous surfaces, like paper and textiles.

3. *Does the environment affect the how long the coronavirus persists?*

Although research on the COVID-19 virus (SARS-CoV-2) is limited, studies of other similar coronaviruses indicate that environmental conditions, such as temperature, relative humidity, pH and the presence of UV radiation, do affect how long viruses persist on a surface. The effects are often complex and based on laboratory research (see box) that may not reflect conditions in collection spaces.

Effects of the environment on viral persistence, in brief

Environmental conditions affect the duration of infectivity of viruses on a surface. The COVID-19 virus (SARS-CoV-2) has not yet been studied in as many conditions as the previous coronaviruses. These viruses have been studied in two ways: suspension in liquids or dried onto carriers. Advice on the COVID-19 virus is based in large part on the accumulation of knowledge from studying SARS and viruses with similar properties.

Temperature: In general, refrigeration temperatures (4°C, 6°C) prolong viral persistence. Between room temperature to about 37°C there is not much change in persistence. There is little data in the region of 37°C to the mid 50's where membrane structural degradation shortens viral persistence so that at 60°C and above sees rapid loss of virulence.

Relative humidity (% RH): In general, low RH (20-30%) prolongs virulence. Room tests on influenza indicated that dust raised in dry conditions can be problematic as it re-aerosolizes attached viruses. Median (40-60%) and high RH (80%) shorten viral persistence. Moderate to high RH will also prolong the necessary contact period of wet disinfectants. In tests examining the transfer of bacteria or viruses from materials to skin, median humidity was shown to enhance the transfer while low humidity reduced the transfer, with smooth surfaces allowing higher transfer than porous surfaces (factors were two to ten-fold). Proper personal protective equipment (PPE) in handling eliminates the transfer risk. Some work on aerosolized cold virus indicates high and low RH diminishes infectivity of the aerosol.

pH: In general, neutral pH prolongs, while the acid and basic regions shorten viral persistence. Low temperature requires more extreme pH (acid or base) to achieve similar loss of infectivity as at room temperature.

UV: One study assessed ultraviolet disinfection of SARS virus in suspension and demonstrated loss of virulence after one hour exposure at 260 nm and more than 90 mW/cm². When considered for aircraft disinfection, however, complicating factors such as shadow zones from complex shapes or dust layers reduced efficacy. Application risks seem too high for utility with most cultural material.

A few observations are possible. In general, cool temperatures (4-6°C) prolong viral persistence while very warm temperatures (60°C and above) result in rapid loss of virulence. The recommendations given in this note assume normal room temperature conditions. Greater caution is suggested if contamination occurs in cooler collection spaces, such as walk-in freezers or unheated rooms. Low relative humidity (20-30%), which is common in heated museum spaces that are not humidified in winter in Canada, also prolongs virulence, but may reduce surface to surface transfer. Dust raised in such dry conditions can be problematic as it re-aerosolizes attached viruses.

4. Should collection objects or heritage materials be disinfected due to COVID-19?

Disinfecting collection objects or heritage materials is NOT recommended. Disinfecting solutions contain alcohol, bleach or other chemicals that can damage many of the surfaces and materials in heritage collections. Although certain solutions might be appropriate for some materials (e.g. 70 % ethanol on metal surfaces), inappropriate use can cause permanent damage or fail to disinfect properly. Always consult a professional conservator before doing any kind of treatment.

To reduce the risk of transfer of viruses from contaminated objects to people, object quarantine is recommended. Wait until the virus deactivates naturally on surfaces before handling any objects or resuming operations. Cleaning with mild detergent solutions followed by rinsing could be sufficient for low-touch heritage surfaces.

5. Should hand sanitizing products be used by people handling heritage materials?

Hand washing and hand sanitizing are highly recommended for reducing the transfer of the COVID-19 virus. Washing hands with soap and water prior to handling objects and records is an accepted alternative where gloves may not be appropriate. Hand sanitizers provide an alternate way to reduce disease transmission. Hand sanitizers approved for use against the COVID-19 virus in Canada are listed on the [Health Canada website](#). In the USA, sanitizers and antiseptics are regulated by the FDA and disinfectants by the EPA.

Some heritage institutions may provide hand sanitizers to staff and visitors, particularly during pandemics. Hand sanitizers could leave residues on objects or records that could eventually damage some materials. A [small study by the Library of Congress](#) of the effects of hand sanitizers on the degradation of paper indicated the potential for such an effect, although the testing methods used differ considerably from what would be

expected during collection use. Hand washing or use of disposable gloves might be preferred for those who handle collection items directly.

DISINFECTION OF COLLECTION SPACES

6. A person infected with COVID-19 has been working in collection spaces. What should we do?

First, follow [public health guidelines](#) for people who were in close contact with the infected person or who shared work spaces. Next, follow official public health [guidelines for cleaning and disinfecting](#). Close off areas used by the infected person and increase air circulation. Wait at least 24 hours before cleaning and disinfecting all areas accessed by the infected person. If it has been more than 7 days since the infected person was in the building, further cleaning and disinfecting is not required.

SOME USEFUL DEFINITIONS

Cleaning is a general reduction of filth including viral and bacterial loads on surfaces which makes subsequent disinfection more effective.

Disinfection is the application of a solution or method that kills/deactivates any pathogens that remain after cleaning.

Sanitizing more commonly refers to the practice of using antimicrobial solutions or methods to reduce food pathogens on food, surfaces that are in contact with food, or pathogens on human skin. This distinguishes them from disinfectant solutions that are not approved for these sensitive uses and particularly on the human body.

The CDC gives [clear guidelines](#) for cleaning, then disinfecting a number of surfaces (high touch hard surfaces, soft surfaces, electronics, and items that can be laundered)

7. Can collection workspaces be disinfected safely?

Yes, it is possible to safely disinfect non-heritage surfaces – tables, desks and shelves – that are used for work with collection artifacts or archival records. Heavily touched hard surfaces may need regular cleaning and disinfecting. Hard surfaces are the easiest surfaces to disinfect; they are also the surfaces on which the virus can persist the longest and with the highest transfer concentration to skin. Disinfecting compounds (alcohols, oxidizing agents, acids and bases, etc.) and their application methods (wet spraying, wiping, contact times) have to be appropriate for the surface to which they are applied. Test first and consider the effects of overspray or dripping on any nearby collection items.

Disinfectants are most effective when surface dirt is removed by cleaning prior to disinfection. Personal protective equipment should be worn to reduce contact hazards from contaminated surfaces and from the disinfectant solutions.

Cleaning and disinfecting should leave no potentially harmful residues on surfaces that will come into direct contact with collection objects (e.g. reading room tables, shelves for storing artefacts). The easiest way to avoid residues is to use simple solutions: diluted household bleach (solutions that are too concentrated will leave sodium chloride residues; see box for concentration information), or alcohol/water solutions that are above 70% (v/v) alcohol in concentration. Although commercial products can also be used, the effects of additives (colorants, scents, foaming agents, etc.) may be problematic. After the required contact time or drying time, make sure to follow any rinsing instructions (usually a clean water wipe-down). [Health Canada](#) requires that rinsing instructions, as well as any information on incompatible surfaces be noted on the product label.

8. Can I use the same protocols as for mould-infested objects?

No, viruses have their own properties of resistance to disinfectant chemicals. That said, similar or identically formulated disinfectants can have strong efficacy against both mould and viruses, such as commonly employed solutions of 70% ethanol in water and appropriately diluted sodium hypochlorite bleach for frequently touched surfaces.

9. What disinfectants are appropriate for non-historic surfaces in collection spaces and heritage interiors?

Many disinfectants can be used on non-collection surfaces in collection spaces (see box). In Canada, check that household and commercial products have been [approved by Health Canada](#) for use against the COVID-19 virus, and follow manufacture guidelines for application (pre-cleaning, rinsing, incompatible surfaces, etc.). Diluted common household bleach and alcohol/water blends can also be prepared in-house.

GUIDELINES FOR SPECIFIC DISINFECTANTS

Commercial and household disinfectants: For commercial products, Health Canada has generated a [list of disinfectants approved for use in Canada against the COVID-19 virus](#). As contact time information is not listed on the Health Canada site, consult the product label or cross-reference with the EPA "[List N](#)" that indicates recommended contact times (minimum time the surface is visibly wet). Contact times depend on both which active disinfecting ingredient is present and its concentration.

Quaternary ammonium compounds (QACs, "quats"): Quaternary ammonium formulations are a large fraction of commercially produced anti-viral disinfectants so they are readily available. Any QAC can have a variety of organic molecules attached to a central nitrogen atom which is commonly forming a salt with bromine or chlorine. To improve their efficacy, the QACs are blended with detergents, chelating agents and pH adjusters (strong acids and bases), although some formulations are near neutral. Strongly acidic or basic solutions can have harmful effects on heritage materials so careful decisions are required. Quaternary ammonium formulations are more prone to leaving residues than simple solutions like ethanol/water or hydrogen peroxide, and often require thorough rinsing.

Household bleach (sodium hypochlorite): Use only freshly prepared solutions of unexpired bleach, and do not mix with other cleaners (particularly those containing ammonia). Most safety data sheets (SDS) list the concentration of sodium hypochlorite in household bleach as 5-10 wt% (consult section 3 of the SDS, if available, and assume the lower end when calculating concentrations). Both the [CDC](#) and [Health Canada](#) are recommending at least 1000ppm (0.1%) sodium hypochlorite for disinfecting hard surfaces, ensuring contact time of at least 1 minute. The following dilution guidelines assume a starting 5% concentration:

- i) Metric: 20mL of bleach per litre of water (1000mL) or 5mL per cup (250mL)
- ii) Imperial: 5 tablespoons (1/3cup) of bleach per gallon of water; 1 teaspoon per quart

Other recommendations (dilute 1 part bleach in 9 parts water) achieve concentrations as high as 5000-10,000ppm (0.5-1%), and may be applicable in situations where contact times need to be shorter (30 seconds). Bleach, particularly at higher concentrations can damage surfaces such as metals. Bleach use also requires good ventilation, protective gloves and eyewear.

Alcohols: Use concentrations of 70:30 (70%) alcohol in water of either ethyl alcohol (ethanol) or isopropyl alcohol (2-propanol, rubbing alcohol, isopropanol). The strength of rubbing alcohol sold at pharmacies is usually either 70% or 90%; 90% rubbing alcohol can be further diluted in water, to extend its use. Some liquor stores sell high proof ethanol (e.g. grain alcohol of at least 140 proof). Be cautious of denatured alcohol such as that sold at hardware stores, as the denaturing elements can be more harmful to human health (methanol, methyl ethyl ketone, etc.) than ethanol alone. Contact times of 30 seconds appear to be effective against [corona-type viruses](#). Alcohols have been recommended for cleaning electronic surfaces by the [CDC](#); caution is necessary if disinfecting acrylic (e.g. Plexiglas) surfaces as cracking can result. Use of alcohols should be avoided on finished wood surfaces, as many finishes are sensitive to alcohols.

It is important in all cases to consider contact times (which depend on concentration and type of active ingredient), as well as incompatible surfaces for each type of disinfectant. Consider both the bulk material and any surface finishes before choosing a disinfectant and test first. Look to public health guidelines, like those from the [CDC](#) for cleaning soft surfaces, electronics and for laundering. [WHO guidance](#) for control of infectious agents in public spaces such as airports advises carpets can be steam cleaned with machines that can heat to 70 °C, but some carpets may not tolerate this temperature.

10. My institution wants to use electrostatic disinfectant sprayers in all spaces, including collection rooms. Is this appropriate?

Electrostatic spray technology is one method of applying approved disinfectant solutions. The technology is being adopted as a more efficient application method particularly over complex surfaces. There is little research comparing its efficacy relative to other methods of disinfection. Since the key component is the disinfectant, there is no reason to think that it doesn't work. However, the method may permit less control over where the disinfectant is applied than manual application. Since heritage objects and surfaces could be sprayed inadvertently with disinfectant, the use of this application technique in collection spaces or heritage interiors is not recommended.

11. Should we remove heritage objects like artworks or furniture from rooms that need to be disinfected?

Removal from spaces due to COVID-19 concerns is not recommended in most cases. Handling and transport of collection objects brings its own risks, and the objects themselves could potentially be contaminated. Collection staff could be put at risk of infection. In heritage interiors, certain components will not be able to be moved. Isolation of spaces with collection objects or heritage finishes for a week to nine days, followed by thorough regular cleaning is the preferred method of controlling viral spread. If faster access is required, isolation for 24 hours to allow aerosols to settle, followed by cleaning and disinfecting of high touch, non-heritage surfaces using disinfectant application methods that can be well controlled is suggested, along with daily cleaning of heritage finishes that are likely to be touched, such as handrails or door knobs. Instruct cleaners to take care when working around heritage materials. Consult a conservator before disinfecting any heritage finishes.

DEALING WITH CLOSURE AND RE-OPENING

12. Our institution is closed indefinitely due to the COVID-19 pandemic. How do we ensure that collections remain safe with few or no staff regularly on site?

Much preventive conservation care of collections depends on the regular presence of collections, security and facilities staff. When this presence is disrupted, some risks to collections may increase, while others may decrease.

Good security is vital during long-term closure. Criminals may take advantage of reduced staff presence on site. The economic downturn may motivate criminal behaviour. Ensure that security protocols and monitoring systems are maintained. Document all entry into the facility.

Turning off or blocking light in collection spaces, except for security lighting, will limit the effects of light and UV.

Decreasing the air exchange rate when few or no people are on site can provide a more stable, less dusty environment. In newer buildings HVAC systems can probably be monitored and adjusted remotely. If portable equipment, such as humidifiers, is used to maintain environmental conditions, provide ongoing maintenance or consider shutting it down, particularly if it is prone to malfunction or leaks. Consider dropping the temperature set point a few degrees if this can be done without increasing the risk of mould: lower temperature slows degradation rates, reduces pest activity and saves on heating costs.

A BRIEF SECURITY PRIMER FOR LONG-TERM CLOSURE

Secure the building: Make sure that all doors and windows are properly closed and locked. Check that the intrusion detection and fire protection systems are working properly.

Secure valuables: Think beyond the collection to items such as cash boxes, computer screens, laptops, and other electronic equipment that may be attractive for thieves.

Secure important documents: Ensure that desks and offices are left clean, that all sensitive documents and information is secure.

Secure the collection: Consider returning vulnerable collection objects in workspaces or galleries to storage, if that is more secure. In particular, think about collection items with respect to windows and ensure that no collection items are vulnerable to smash-and-grab thefts.

Maintain a presence: Check the site and perimeter daily to identify problems and initiate corrective action quickly. Demonstrate that the building is being monitored by maintaining walkways and landscaping.

Pest risks could be problematic, especially where chronic problems are no longer monitored closely. Remove food from gift shops, cafés and offices unless stored in reliable refrigeration or freezer units to curb rodents. Remove all food waste and garbage to outside receptacles. If possible, replace sticky traps prior to closing and monthly thereafter if site inspections are possible to remove dead insects that can attract certain museum pests. Since infestations are common in spring, plan for response in advance.

Review building maintenance tasks and ensure that essential projects are completed. In addition to checking the site and building perimeter, conduct regular inspections inside the building if possible, paying particular attention to areas of concern, such as locations prone to leaks. A checklist is recommended to guide such inspections. If non-collection staff are responsible for inspections, provide virtual collections care training, highlighting key issues, or set up a system for remote reporting and consulting.

If your institution has not yet closed or if you are reviewing long-term closure protocol, the Australian guide "[Closed by COVID-19](#)" or CCI recommendations for [seasonal museum closure](#) offer useful practical advice.

13. If our institution has another emergency such as fire or flood that damages the collection while we are closed, what should we do?

As at any time, quick response to emergencies can limit damage to collections and enhance recovery. Response will be more challenging during the COVID-19 pandemic. Local regulations may prevent gatherings of the number of people needed to respond quickly and effectively. Staff may be ill, self-isolating or laid off. Personal protective equipment (PPE) required for responders may have been donated to local hospitals.

Certain measures can be taken to reduce the likelihood or negative consequences of another kind of emergency. We highly recommend that institutions check doors, windows, and alarm systems to make sure they are working correctly and inspect facilities regularly during closure so that other emergencies are detected early. Turn off and unplug non-essential electrical equipment. Cover collections with plastic sheeting in areas prone to leaks. Drain plumbing if there is a risk of freezing. For institutions in areas prone to spring flooding, we suggest moving collections potentially at risk to higher ground prior to indefinite closure.

We encourage institutions to review and update emergency plans and discuss options

for response by teleconference, email or chat using a simple tabletop exercise. Basic training may be essential if you need to bring new people into your emergency response team. If your plan depends on securing materials and equipment as needed, or on the services of external contractors, check to see if these will still be available. Contact your insurance company to see how closure might affect your coverage. Document your response to the pandemic, as this could be useful should a similar situation occur in the future.

In the event that an emergency does occur, implement response as best you can. Inform local authorities of the need to respond and request guidelines for safe working conditions. Use methods to buy time, such as freezing wet materials, wherever possible. Take particular care of responders, since high stress and fatigue can increase chance of infection. Canadian institutions are encouraged to contact the Canadian Conservation Institute for expert advice at 1-866-998-3721.

14. Do I need to clean and disinfect the building when we reopen?

Given public anxieties and the possibility of resurgence of the virus, establishing good cleaning and disinfecting protocol is prudent even if persistence of the virus in the building is unlikely due to closure. Follow [Health Canada guidelines for cleaning public spaces](#). Normal cleaning procedures should be sufficient for lower traffic collection spaces.

15. What is an appropriate protocol for receiving incoming collections materials, like returning library books, artifact loans, natural history specimens, or new acquisitions?

During institutional closure, delaying returns and extending loans will minimize risks to artifacts and people alike. Even after reopening, isolating incoming materials in order to give time for any possible viral contamination to naturally degrade is a prudent protective measure. Application of any chemical disinfectant or sanitizer on collection material is not recommended. To date, conservative isolation periods of a week to nine days have been recommended (see question 2). Cultural heritage collections with significantly drier or colder conditions might want to extend the isolation period (see question 3).

Depending on the amount of space available, managing the incoming material could

involve setting up a temporary isolation room, or at least a sectioned off space. Receive the incoming materials while wearing PPE (minimally gloves), and develop a method for tracking when items go into isolation and when they are ready to be moved out. Depending on space constraints and receiving requirements, materials may be unpacked before isolation or left as received. Bear in mind that less unpacking (and therefore less handling) minimizes staff exposure. Either safely discard unwanted packing materials (remembering to care for human health at each stage of disposal), or store packing materials for their own isolation period before reuse.

16. Should our experience with the COVID-19 pandemic change how we manage collection objects and records that are regularly handled by clients and staff?

During a pandemic, transmission of infection could be linked to working with library, archival and study collections. Temporary changes to return to storage and client request protocols that incorporate an isolation period between uses during an epidemic or resurgence in your region could be prudent. Isolate items for an appropriate period of time (see question 2) in a designated zone and post quarantine notification. When space for quarantine is not available, return materials to their permanent storage location and consider bagging if the material will be in direct contact with other items, such as in archival or library collections. Where possible, identify isolated items in collection databases and indicate the isolation period. Create labels that will accompany the items to storage. Labels should include, at minimum, the object's unique identifier, the standard quarantine statement, as well as the start and end dates of the isolation period. They should be prominent and visible to all staff.

Clean and disinfect carts each time they are used to transport potentially contaminated material. Follow conscientious hand hygiene protocol or use gloves. Clean and disinfect quarantine space (see questions 5 and 6), if used, before using it for other purposes. Incorporate new or updated procedures into collections management and emergency plans and procedures.

Digitization provides safe access to collection materials and information during a pandemic. The experience of the COVID-19 pandemic could inform digitization strategies in order to make more materials accessible while minimizing health risks to staff and visitors.

USEFUL RESOURCES:

Australian Institute for Conservation of Cultural Material (AICCM):

- "Closed by COVID-19: A practical guide for managers of heritage collections that are closed at short notice because of an epidemic or pandemic" provides guidance for various levels of access (all hands on deck, skeleton staff and evacuation/lockdown) as well as preliminary advice for getting back to normal:

<https://aiccm.org.au/sites/default/files/Closed%20by%20COVID19%20-%20ver%201.1%20-%2027Mar2020.pdf>

American Library Association (ALA) Preservation Resources:

- Aggregates info about handling library materials and collections, including policies being developed for circulating collections:

<http://www.ala.org/alcts/preservationweek/resources/pandemic>

American Alliance of Museums (AAM):

- Aggregates information for the museum sector, including a subsection on reviewing cleaning and collections care policies: <https://www.aam-us.org/programs/about-museums/covid-19-resources-information-for-the-museum-field/>

Canadian Conservation Institute (CCI):

- Guidelines for seasonal museum closure: <https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/closing-museum-winter.html>

Centres for Disease Control and Prevention (CDC):

- Guidelines for Community Facilities: <https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/cleaning-disinfection.html>
- Recommendations for cleaning and disinfecting surfaces: <https://www.cdc.gov/coronavirus/2019-ncov/prepare/disinfecting-building-facility.html>

Collections Trust:

- "Collections in lockdown:" <https://collectionstrust.org.uk/collections-in-lockdown/>
- "Location and movement control":
<https://collectionstrust.org.uk/spectrum/procedures/location-and-movement-control-spectrum-5-0/>

Environmental Protection Agency (EPA):

- List of disinfectants approved for use against SARS-CoV-2 in the USA ("List N") with guidance on contact time: <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>

Health Canada:

- List of hard-surface disinfectants approved for use in Canada (consult the EPA List N for guidance on contact time): <https://www.canada.ca/en/health-canada/services/drugs-health-products/disinfectants/covid-19/list.html>
- List of hand sanitizers approved for use in Canada: <https://www.canada.ca/en/health-canada/services/drugs-health-products/disinfectants/covid-19/hand-sanitizer.html>
- Guidelines for prevention and risk: <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks.html?topic=tilelink#self>
- Guidelines for cleaning and disinfecting public spaces:
<https://www.canada.ca/en/public-health/services/publications/diseases-conditions/cleaning-disinfecting-public-spaces.html>

ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property):

- Heritage in times of COVID: <https://www.iccrom.org/heritage-times-covid>

International Council of Museums (ICOM):

- Conservation of museum collection: <https://icom.museum/en/covid-19/resources/conservation-of-museum-collections/>

Institute for Museum and Library Services (IMLS):

- Aggregates links in museum and library world: <https://www.imls.gov/covid-19-resources-libraries-and-museums>
- Webinar, "Mitigating COVID-19 When Managing Paper-Based, Circulating, and Other Types of Collections": <https://www.imls.gov/webinars/mitigating-covid-19-when-managing-paper-based-circulating-and-other-types-collections>

Library of Congress:

- Report on the study, "The Impact of Hand Sanitizers on Collection Materials": <https://www.loc.gov/preservation/scientists/projects/sanitize.html>

Maryland State Library Resource Centre:

- Resource for safe handling of circulating library collections during a pandemic: <https://www.slrc.info/uploadedfiles/slrc/home/slides/handling%20materials%20during%20covid-19-update03.30.2020.pdf>

National Center for Preservation Technology and Training (NCPTT):

- NCPTT has been creating a series of webcasts (with transcriptions) as well as a reference leaflet "Preservation in Practice: Disasters Cultural Resources and COVID-19": <https://www.ncptt.nps.gov/>

Northeast Document Conservation Center (NEDCC):

- "Disinfecting Books and Other Collections" recommends 72 hour quarantine and avoidance of disinfecting treatments: <https://www.nedcc.org/free-resources/preservation-leaflets/3.-emergency-management/3.5-disinfecting-books>

Smithsonian Cultural Rescue Initiative:

- Collections Care During a Pandemic resource: <https://culturalrescue.si.edu/hentf/major-disasters/current-disasters/#section5>

World Health Organization (WHO):

- *Guide to Hygiene and Sanitation in Aviation*, 2009, Annex E gives guidance for cleaning public areas in airports: https://www.who.int/water_sanitation_health/publications/aviation_guide/en/