COVID-19 causing viruses can survive on surfaces from several hours to days depending on circumstances. According to Van Doremalen et al (3) SARS-CoV-2 remained active on plastic and stainless steel surfaces for two to three days in laboratory setting. It remained infectious for up to 24 hours on cardboard and 4 hours on copper. The virus was detectable in aerosols for up to three hours. Virus stability may very in real-world conditions, depending on factors including temperature, humidity, ventilation, and the amount of virus deposited.

Since coronaviruses are enveloped viruses, they are one of the easiest types of viruses to kill with appropriate disinfectant products when used according to manufacturer instructions. In order to limit CoVid-19 spread Health Canada recommends to use only approved hard-surface disinfectants that have a Drug Identification Number (DIN). A DIN is an 8-digit number given by Health Canada that confirms the disinfectant product is approved and safe for use in Canada. (see Appendix 1)

In the absence of DIN disinfectants bleach solution (0.1% sodium hypochlorite) or alcohol solution (min 70% alcohol) are viable alternatives.

The Province of Manitoba recommends that where possible wash your hands using soap and water. If this is not possible using an alcohol based solution is acceptable.

**0.1% Sodium Hypochlorite (bleach) solution recipe:**

Dilute 20 ml of 5% commercial bleach with 980 ml distilled water. Prepare weekly. *At least 1 min (preferably 3-5 min) of contact with contaminated surfaces is recommended. 30 sec immersions where feasible is preferred.*

**70% alcohol solution recipe:**

Dilute 740 ml of 95% alcohol with 260 ml of distilled water. *A minimum of 30 sec of contact with contaminated surface is recommended. 70% alcohol solution is shelf stable if sealed.*

**Best practices suggestions for laboratory and work room settings**

Due to the dynamic nature of CoVid-19 related research and rapidly changing recommendations for personal and workplace safety issued by health authorities in Canada and around the world, going above and beyond in terms of personal safety while utilizing the absolute minimum of PPE to achieve the aforementioned, seems to be a prudent step forward to assure continued operation of non-essential work places. Therefore, the following best
practices suggestions are based, in part, on recommendations on how to care for a person suffering from CoVid-19 at home and in a hospital setting of various jurisdictions:


- Implement 3h window between workers performing duties in (smaller) closed spaces with high air flow for prolonged period of time i.e. flow food room, seed rooms, to allow any potential airborne SARS-CoV-2 to disintegrate (3).

On the way to work:

- Arrive at work via personal mode of transportation.
- Consider using easy to disinfect “work” shoes such as closed crocs where steel toe shoes are not required. Example: https://www.amazon.ca/Crocs-Clock-Slipon-Medical-Professional/dp/B071P3PR35/ref=sr_1_3?dchild=1&keywords=closed+crocs&qid=1585667146&sr=8-3
- Use the footwear sanitising stations at the greenhouse when entering the building.

Work space disinfection and prep:

- Upon entering a lab/room sanitize door knobs, light switches, elevator buttons etc. with 70% alcohol thus preventing potential virus transmission.
- Place your coat and personal belongings at your individual designated spot (Individual spaces for personal items including coats should be designated and clearly labelled to avoid cross contamination. The same goes for lab coats. Common coat closets should not be used.)
- Disinfect common surfaces in the labs such as keyboards and other peripherals, light switches, door knobs, armrests, work tables, water taps, fridge handles, cart handles etc. with 70% alcohol or 0.1% bleach before every shift.
- When possible utilize only your individual designated work space. (Bench spaces should be designated.)
- Unless absolutely necessary tools/equipment should not be shared, or should be disinfected thoroughly before use.
**In the lab:**

- Working in isolation is strongly recommended. When 2 people must share a space, maintain physical distancing and wear a mask or respirator and face shield/googles/glasses. (See Appendix 2 for proper handling of face masks) If there is a shortage of N95, 4 ply, high tread cotton, home made masks are potential alternatives.
- Use individual (labeled) glove boxes, kim-wipes boxes, tissue stacks, marker sets etc.
- Any activity that may result in splashing should be done in isolation and while using appropriate PPE (gloves, face shield).
- Do not use fans in closed spaces, especially when there is more than one worker present.
- Use of textiles should be avoided (i.e. cloth towels to dry inoculum flasks and bottles).
- Floor cleaning should be done with wet mops or push broom if working alone. Where possible a hepa filter vacuum is an advisable way to clean.
- Establish garbage containers for PPE. Garbage should be disposed of by lab personnel only.

**Lunch/breaks:**

- Place your water bottle and lunch boxes in your individual designated spot (these should be established.) Using a cold pack as opposed to the department fridge is strongly recommended. Microwave use is discouraged.
- Plan to have lunch in your vehicle or in a designated area that allows physical distancing. Avoid lunch rooms. Sanitize your hands with disinfecting wipes or hand sanitizer before and after lunch or washing with soap and water.
- Hand hygiene should be performed every time PPE, such as gloves, are removed.

**Growth rooms:**

- Ideally only one person will be servicing a growth room/space. Should more than one person need to work in a growth room/space fans should be switched off while tasks are performed and all frequently touched surfaces (i.e. door handles, water wand etc.) should be disinfected on a daily basis.
Appendix 1. List of some common disinfectants recommended by Health Canada to use against SARS-CoV-2 as of March 30, 2020. The full list can be found here:

https://www.canada.ca/en/health-canada/services/drugs-health-products/disinfectants/covid-19/list.html#tbl1

<table>
<thead>
<tr>
<th>Drug identification number (DIN)</th>
<th>Product name</th>
<th>Company</th>
<th>Active ingredient(s)</th>
<th>Product form</th>
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<td>Swish Miracle Disinfectant Spray ‘N Wipe</td>
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<td>Benzalkonium Chloride; Alkyl Dimethyl Ethylbenzyl Ammonium Chloride</td>
<td>Spray</td>
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<td>Charlotte Products Limited</td>
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<td>Ecolab Inc</td>
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<td>Spray</td>
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Appendix 2. How to properly use and dispose of face masks. Source:


(1) Face masks should be placed carefully over mouth and nose and tied securely.
   (a) Secure ties or elastic bands at middle of head and neck.
   (b) Fit flexible band to nose bridge.
   (c) Fit snug to face and below chin.
(2) While being worn, avoid touching the face mask with your hands.
   (a) Any time a used face mask is touched, e.g., when removing a face mask, hands need to be cleaned by means of washing with soap and water or with an alcohol-based hand sanitiser.
(3) Replace face masks when they become damp/humid.
   (a) After prolonged use, face masks may become damp/humid. At this point they should be replaced by a new or a clean, dry face mask.
(4) To properly remove and dispose of a face mask:
   (a) Assume that the front of the respirator or surgical mask is contaminated.
   (b) Untie or break the bottom ties, followed by the top ties or elastic, and remove the respirator or mask by handling the ties only.
   (c) Discard appropriately. Single-use face masks should be discarded after one use. Once removed, face masks should preferably be disposed of in a plastic bag, which should then be secured. This bag can be put in normal household rubbish.
(5) After removing face mask:
   (a) After removing a face mask, hands need to be cleaned by means of washing with soap and water or with an alcohol-based hand sanitizer.

Appendix 3. How to remove gloves. Source:

https://www.who.int/gpsc/5may/Glove_Use_Information_Leaflet.pdf

1. Pinch one end of glove at wrist level and peel away from hand turning glove inside out.
2. Holding removed glove with gloved hand repeat removal process on second hand.
3. Discard the removed gloves.
References:


5. Accepted manuscript: Guoqing Qian et al. (2020) A COVID-19 Transmission within a family cluster by presymptomatic infectors in China https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa316/5810900


