Pesticide use in workplaces during COVID-19

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Outline

• How is SARS-CoV-2 transmitted?
  • Worsening numbers
  • What is the real risk of infection by touching surfaces?
• Mechanism of action of soap, alcohol, bleach, H2O2, quats
• Are we abusing the use of disinfectants?
• EPA’s list N of approved disinfectants. Are all safe?
• Are there safer options?
• Where are people most exposed? Who?
  • The use of spraying/fogging technology
• What can we do to reduce over-use and exposure
What do we know about how SARS-CoV-2 is transmitted?

- We know the virus is transmitted primarily person to person
- by respiratory droplets of many sizes that are emitted when a person talks, coughs or sneezes

https://www.cebm.net/covid-19/covid-19-what-proportion-are-asymptomatic/
What do we know about how SARS-CoV-2 is transmitted?

Droplets

1. Some of the larger droplets can travel a few feet in the air and infect someone that is close by (droplet transmission)

2. Some of the larger droplets deposit on surfaces and can remain infectious for up to several days (fomite transmission)

3. The smallest droplets can stay suspended in the air, and if they contain virus, they can be infectious for several hours at long distances (aerosol transmission)

• To date, we don’t know with certainty the relative importance of each of these mechanisms
  • All three are possible, but aerosols probably more important route

• We also know that between 40% and 60% of infected are asymptomatic
What is the real risk of infection by touching surfaces?

• “…this isn’t thought to be the main way the virus spreads.” CDC

• There’s a long chain of events that need to happen for someone to become infected through contact with surfaces

• The last step in that chain is touching your eyes, nose or mouth with your contaminated hand, so the best way to make sure the chain is broken is washing your hands
Mechanism of action of cleaning agents

- **Soap**
  - Hydrophilic head (bonds to H\(_2\)O)
  - Lipophilic tail (disrupts lipid membrane)

- **Alcohol (60% - 80%)**

- **Bleach**

- **H\(_2\)O\(_2\)**

- **Quaternary Ammonium Compounds**

SOAP, alcohol, bleach and H\(_2\)O\(_2\) destroy lipid by-layer that holds the virus together
Alcohol

• Alcohol kills germs through denaturation.
  • Alcohol molecules bond with the fat membrane encasing the virus cell, breaking it down
  • As the fat membrane is broken down, the inside becomes exposed and the virus quickly dies.

• At least 60 % ethanol or 70 % isopropanol is required.
  • Must be allowed to evaporate until dry

• Cons:
  • Higher than 80% evaporates too quickly and will not be effective
  • Alcohol is flammable and should be kept away from flames.
  • Keep sealed to prevent evaporation, which reduces the concentration.
H₂O₂ = Hydrogen Peroxide

• Destroys essential components of cells.
  • 3% hydrogen peroxide is an effective disinfectant typically found in stores.
  • Inactivate viruses within eight minutes.

• Hydrogen peroxide is safe to use alone

• Found to be more effective in killing some bacteria than quaternary ammonium compounds.

• Cons:
  • Concentrations greater than 30% can cause explosions when combined with metals like copper and iron
  • Shouldn't be mixed with other household cleaning agents, like vinegar or bleach.
Bleach (Sodium Hypochlorite)

• Strong disinfectant effective in killing bacteria, fungi and viruses
  • 1:100 diluted household bleach disinfects within 10–60 minutes **contact time**
  • Widely available at a low cost

• Cons:
  • easily inactivated by organic material (e.g. human secretions).
  • irritates mucous membranes, skin and airways
  • decomposes under heat and light
  • reacts easily with other chemicals → toxic fumes

• Safer alternatives available; If used, only in well-ventilated areas

https://www.ncbi.nlm.nih.gov/books/NBK214356/
Quaternary Ammonium Compounds (Quats or QACs)

- Mechanism of action is not clear, but believed to disrupt molecular interactions.
  - Inactivate energy-producing enzymes
  - Denature essential cell proteins
  - Disrupt cell membranes

- Cons:
  - Lose effectiveness when mixed with organic matter
  - Irritate the lungs — asthma and other breathing problems
  - Irritate skin — rashes
  - Have been linked to reproductive and developmental problems in animals
  - Release formaldehyde
  - Quats will linger on surfaces days to months after it has been cleaned
    - Exposure continues every time the surface is touched (kid’s desk).
    - In mice experiments it took months of re-sanitizing the animal cages until the mice were reproducing normally again.
    - Safer alternatives available to protect from respiratory system exacerbation

Human bodies are composed of these same elements that can be harmed
A Concerned Warning for Health Care Workers
by Paxson Barker, RN, PhD

• In the 1990s, started using Quat in her workplace to disinfect the room between patients.
  • Believed to be safe, it was used indiscriminately
• After 2-3 years of Quat use, developed adult onset asthma
• Source responsible was not identified so exposure to Quat continued, eventually sensitized her airway
  • Developed a condition known as Reactive Airway Dysfunction Syndrome (RADS).
• Exposure to disinfectants, other cleaning chemicals, cigarette smoke, synthetic fragrances, strong odors, causes closure of her airways.
• The damage from Quat seriously limited her life.
• By 2003, was unable to care for patients and had to leave her job
Are we abusing disinfectant use?

• Initial CDC and WHO emphasis on surface cleaning
  • New evidence indicates main route of infection is airborne

• Over-using chemicals that were meant to be for periodic use

• Disinfecting protective equipment such as face shields
  • Need for re-using items that were previously not used daily

• Not reading or understanding labels for safe use
  • Increasing concentrations (or not diluting appropriately)

• Many labels are not clear nor give full list of ingredients
Concerns About Fogger and Sprayer Technology

• By design, they create an aerosol (small particles that stay in the air)
  • Increase potential for inhalation exposure

• Will NOT clean the air
  • Particle physics prevent most particles from colliding with each other

• Does NOT efficiently cover a surface
  • Based on direction of spray, particle size, distance, and gravity

• Spraying has been associated with increased risk of asthma and respiratory symptoms

• Used in workplace, schools, airports, planes, churches, etc.

• They create a false sense of security
Where are people most exposed? Who?

• Health Care Facilities
  • Cleaning staff, HCW that clean their PPE (face shields, goggles) regularly

• Schools
  • Janitorial staff, people sitting at cleaned desks / tables (Children, teachers)

• Public transit
  • Operators, Users

• FOOD WORKERS –
  • Food processing plant workers (meat and poultry)

• Workplaces / Home
  • Whoever is cleaning / disinfecting
EPA’s list N: Are all products safe?

Pesticide Registration

List N: Disinfectants for Coronavirus (COVID-19)

Find a Product to Kill Coronavirus (COVID-19)

Infographic: How to use disinfectants safely and effectively - IMPORTANT, PLEASE READ

Use our advanced search option to find a product

Things to know:
- EPA expects all products on List N to kill the coronavirus SARS-
EPA’s list N: Are all products safe?

• As of July 30 2020, there were 469 approved products on List N.
  • 231 quats, some mixed with other chemicals
  • 69 sodium hypochlorite products, one with sodium carbonate

• Pre-market safety testing is not required for most chemicals or products

• Consult the MD Pesticide Education Network safety alert flyer
Disinfectant & Pesticide Use During COVID-19

Protect patients and staff by avoiding disinfectants containing respiratory-irritating toxic substances. Instead, choose safer effective disinfectants.

Many disinfectants on EPA’s List N for institutional use against SARS-CoV-2 contain the active ingredient Quatammonium. Quatammonium ammonium compounds (QACs) are registered with the EPA as pesticides and increasingly are being found to cause serious health effects. Mount Sinai Selkirk Centers for Occupational Health report on QuatammoniumCompounds (QACs) for health professionals only because it is common exposure from cleaning products for triggering asthma symptoms even in people with no prior asthma history, among other serious harmful impacts. Chlorinated-based disinfectants also cause respiratory irritation and bronchospasm. (see sidebar)

Nurse’s regular use of disinfectant is associated with developing COPD, 24-32% better.

AVOID and replace disinfectants and cleaners containing these chemicals:
- Quatammonium ammonium compounds. Label does not specify which is a QAC but often ends in “ammonium chloride.”
- Most common QACs in disinfectants are the Benzalkonium Clorides.
- Chlorine compounds / Bleach (sodium hypochlorite, hypochlorous acid, sodium bicarbonate, sodium citrate).
- Sodium Dichloro-S-Biscyanurate.

CHOOSE SAFER disinfectant ingredients approved by CDC and EPA N List:
- Hydrogen peroxide
- Isopropyl alcohol / Isopropanol
- Ethanol

Respiratory Impacts & Disinfectants

“Virtually all products that irritate the respiratory system and cause acute respiratory distress. This is not a normal part of their use, or expected by or acceptable to high consumers.”

“New evidence shows that disinfectants can cause irritable respiratory disease in a significant number of healthcare workers.”

“Disinfectants are used frequently, often in the intensive care unit, where they are a potential source of respiratory irritation. A recent study showed that 60% of patients had respiratory symptoms even after using chlorhexidine hand sanitizer for 30 seconds.”

Airborne exposure is a primary route of exposure to disinfectants, including respiratory irritation.

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Respiratory Finding: Indications of respiratory irritation.

- Assays and insights from the new CDC study of disinfectant exposure.
- #15400: Respiratory irritation: 2%

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Finding Safer Disinfectant Products

SEARCH the EPA List N database to find safer disinfectant products:
- Use this link: https://www.epa.gov/sites/default/files/2015-04/documents/20150429_listn_0.pdf
- Go to the following website: https://www.epa.gov/Rodent Control/Searchable Database of Rat Poisons for Performance Criteria. This database includes information on rodent control products that have been shown to be effective and safe for use in your institution. When using this database, it is important to consult with your institution’s pest control professional to ensure that the products are appropriate for your specific needs.

Or download these PDF files of List N products with safer active ingredients:

Commonly used toxic pesticides in healthcare facilities that may impact respiratory outcomes:
- Metolachlor 3-15% - often used to control weeds, ants, and cockroaches
- Diazinon 2-25% - often used to control ants and cockroaches
- ECOCOQ 0L/K闎ticed Insecticide - often used to eliminate cockroaches, ants
- TalaBP - often used for ants, bees, flies, and cockroaches

We urge facilities to ensure they are using proper maintenance and housekeeping practices that reduces pest pressures and during this pandemic especially using the safer effective disinfectant products. More questions? Contact us today for fact sheets, resources and to ask your questions on implementing a high level, prioritized IPM Program to protect your facility, staff, and patients.

Our team at the IPM in Healthcare Facilities Project provides pro-bono consulting, training and resources throughout the year to healthcare facilities. Contact Gina Navarro, project director, gnavarro@ipmhealthcare.org or call 434-655-4850 for information.

Are there safer options?

• YES!!
• Soap and Water
• Cradle to Cradle (silver or gold levels)
• Green Seal
• Safer Choice
How can we reduce over-use and exposure

• ask: *Is it necessary?*
  • *if so* use least toxic products and methods for cleaning and disinfecting
• make a health and safety plan in which cleaning is a key component
• Train and re-train those using the products
• include workers in the plan
  • their representatives / unions
  • procurement / purchasing staff

• **Consider changing the process**
  • Is soap and water an option?
  • Follow ALL other recommendations
  • **Increase ventilation**
Thank You
Questions?
Survival of SARS-CoV-2 on surfaces

• Podcast:

• False sense of security
• Significant cost
• Quats that linger on surfaces re-exposing students
• Soap and water, alcohol are as effective