Mitigating Disease Spread in the Workplace: Lessons From the COVID-19 Pandemic

November 3, 2022

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Mitigating Disease Spread in the Workplace: Lessons from the COVID-19 Pandemic

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Our presenters

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AECOM

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Senior Director Health, Safety,
and Environmental Affairs
P&G

Agenda

- Impact of infectious diseases on worker absences
- COVID mitigation in the workplace
- CDC and EPA recommendations for use of disinfectants
- Background on different types of microbes and how their structural differences effect efficacy of disinfectants
- Lab methods required by EPA for testing disinfectants for antimicrobial claims
- Incorporating disease mitigation into workplace health and safety plans
- Q&A

Impacts of COVID-19 on Employers

Directly

- Absence of the Work-Force (illness, policy, necessity).
  - Shifting Team Culture
  - Distraction
  - Stress
- Supply and Demand Shifted
  - Supply Chains Disrupted (up and down the supply chain)
  - Greater demand created further stress on taxed systems.
- Changing positions of public health authorities/regulators and attitudes of politicians/public figures and the popular media created physical challenges and challenges in communicating risk.

Indirectly (Peri-Covid)

- Great Resignation (Attrition and Turnover)
- Changing Attitudes about Work
- Decreased Safety Performance
- Increased Costs and Cost Pressure

The role of EH&S Professionals that emerged during COVID-19

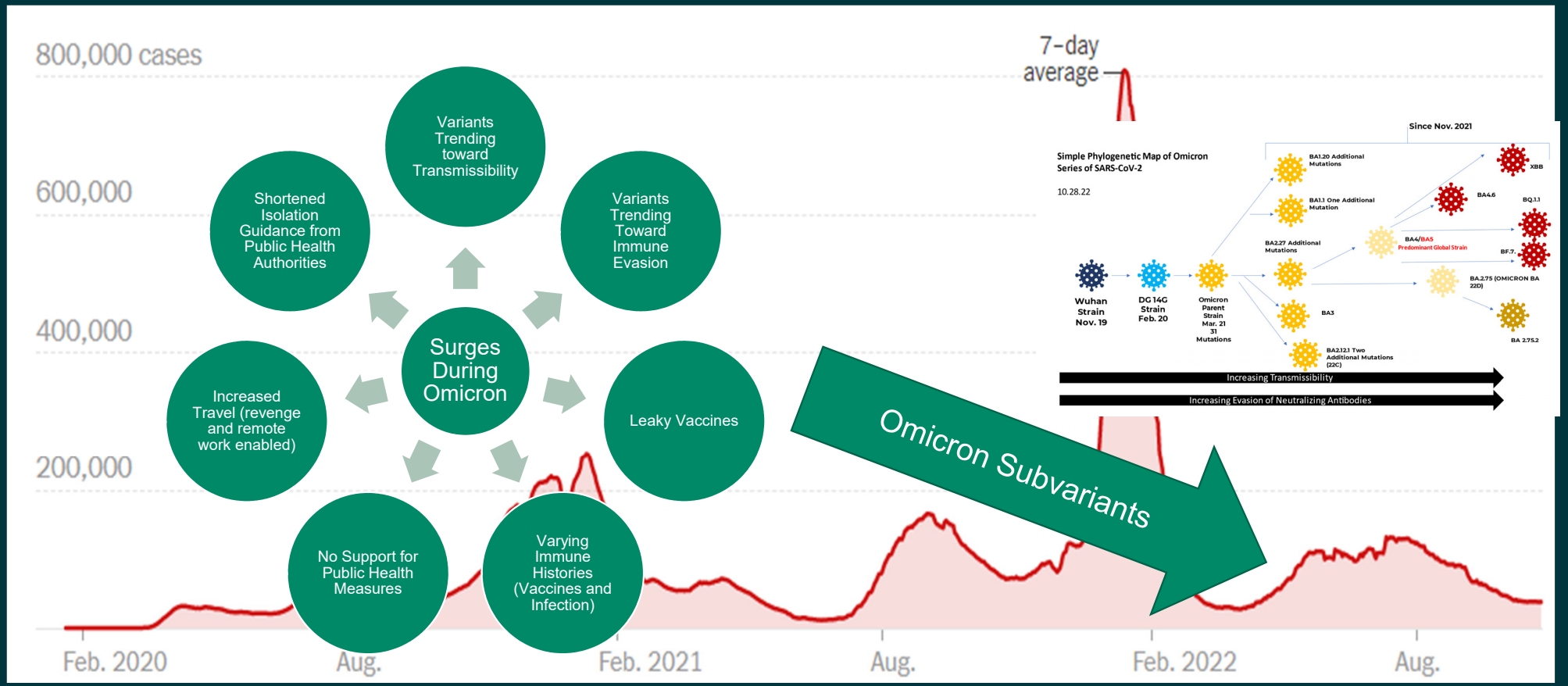
Providing work-force constituency with physical safety by mitigating transmission risks and psychological safety as the trusted source for information on how to protect themselves and their families.

By enabling presence of the work-force we fulfill our stewardship role to permit those employees to work to satisfy providing customers with the desired goods and services they want and need.

- Employees
- Customers
- Consumers
- Shareholders

Providing both compliant and practical operationalized protocols to comply with the myriad of positions/commentary from regulators and public health authorities.

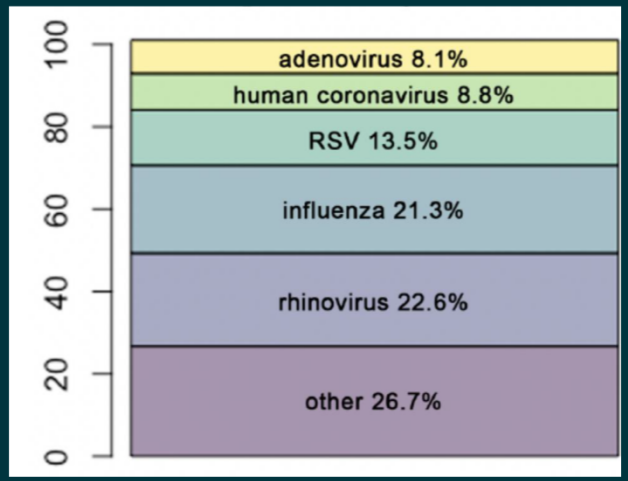
Factors Driving The Trajectory of The Covid-19 Outbreak



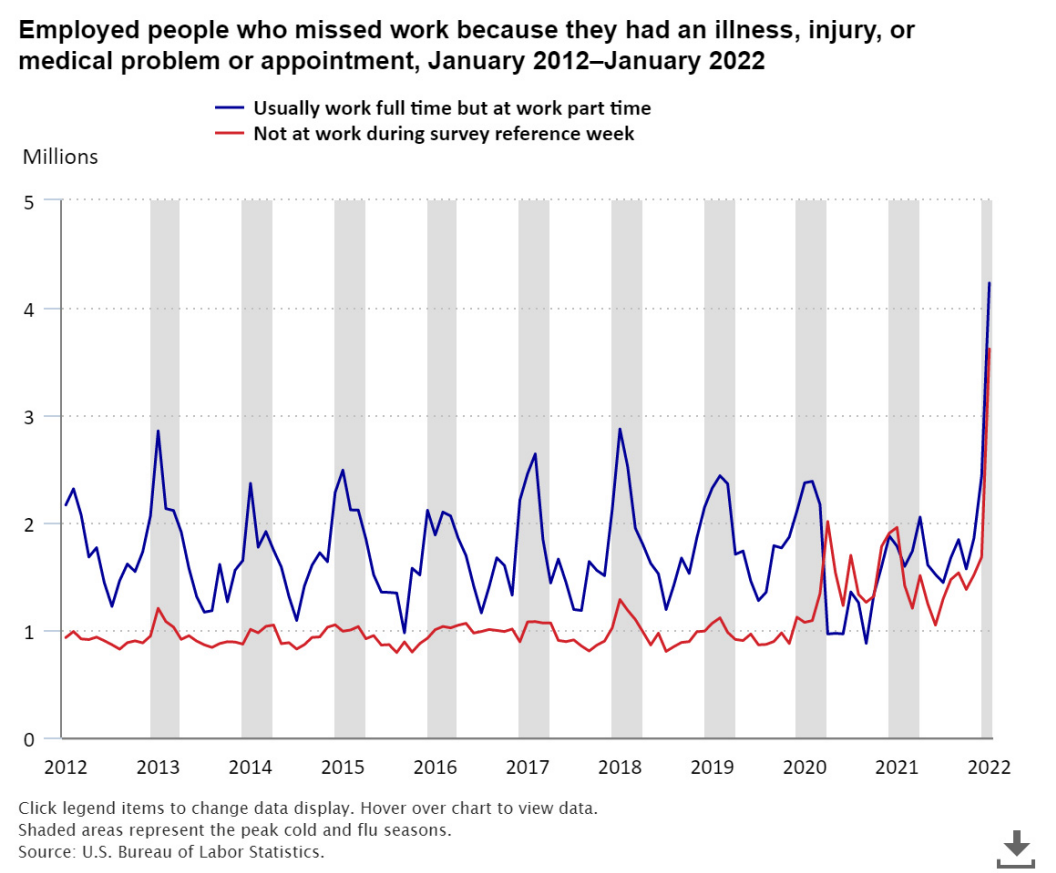
Seasonal Respiratory Infections Impact our Workers and Their Families Every Year

Month	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Winter virus						Influenza virus						
							HCoV					
						RSV						
All-year virus	Adenovirus/HBoV											
Type-specific	PIV3		PIV1									
Spring	hMPV											
Spring/Fall	Rhinovirus											
Summer virus	Non-rhinovirus enteroviruses											

Moriyama M, et al. 2020.
Annu. Rev. Virol. 7:83–101

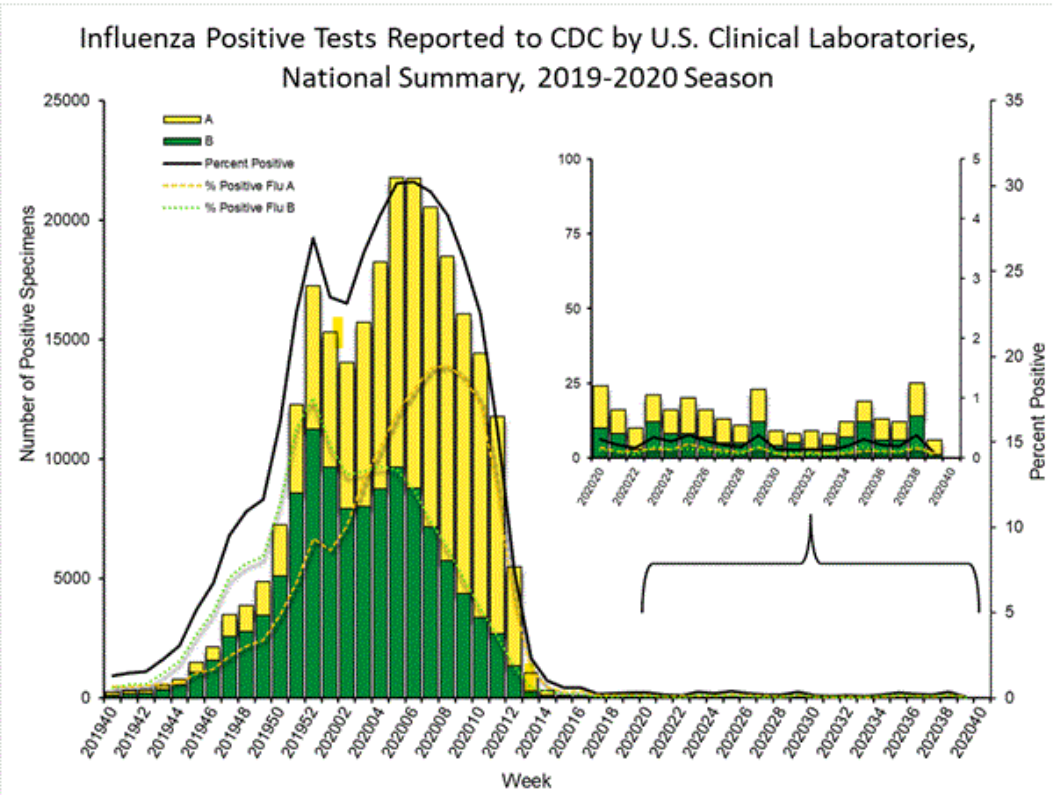


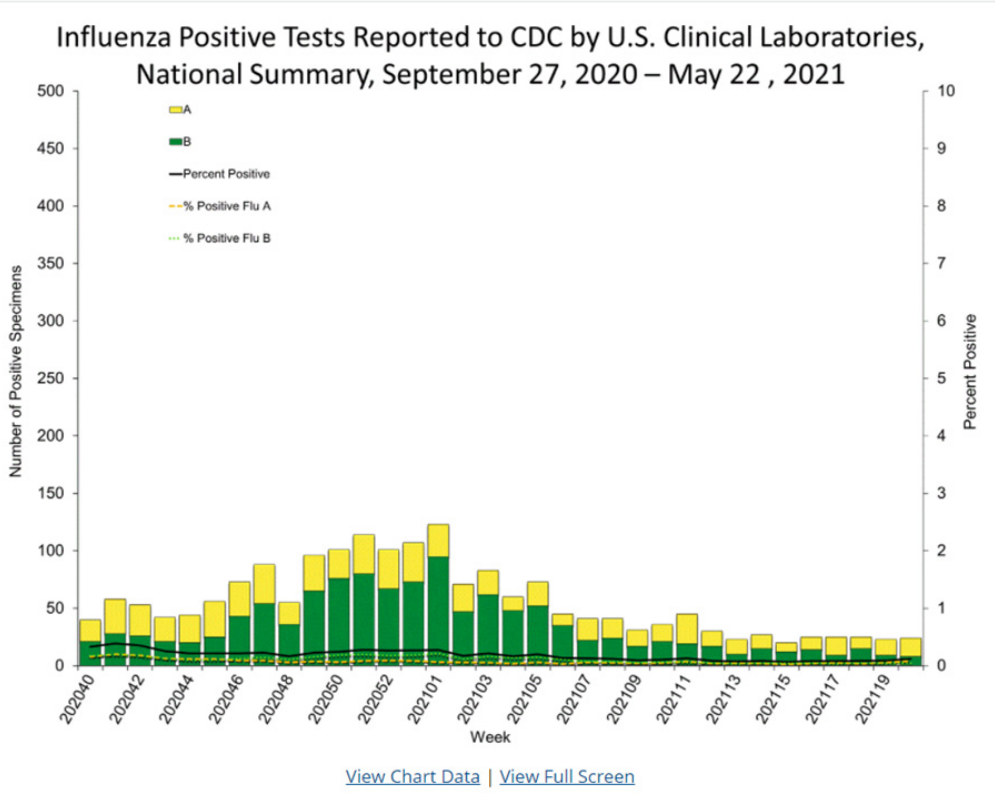
Worker absences due to illness, injury or medical problem



- Absences spike during winter months
- January 2018: 4.2 million workers absent
- Estimated 111 million workdays missed annually due to flu
- 20,000-60,000 American deaths annually due to influenza
- Can we use what we learned during the COVID-19 pandemic to reduce all illness transmission in the workplace?

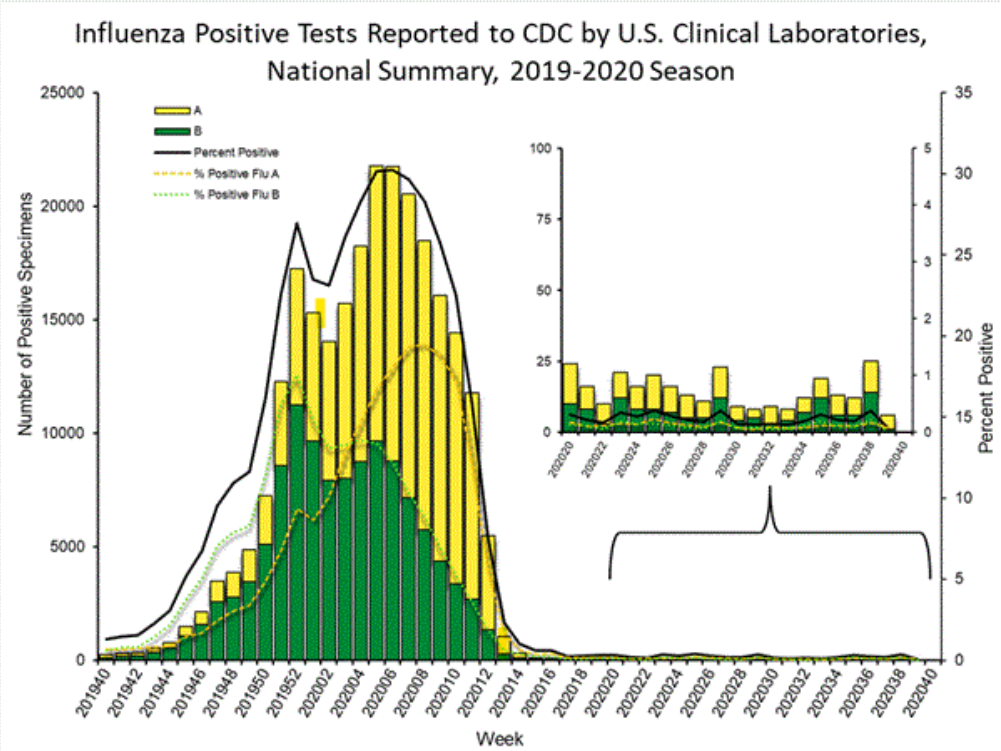
U.S. reported positive influenza tests 2019-2020 vs 2020-2021

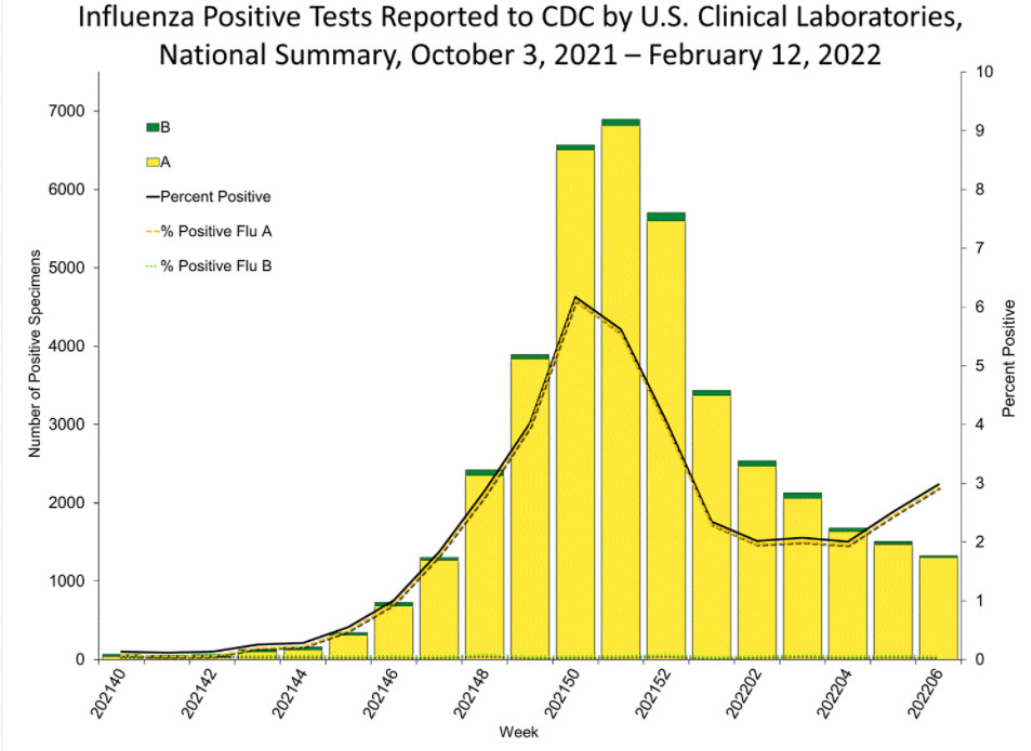




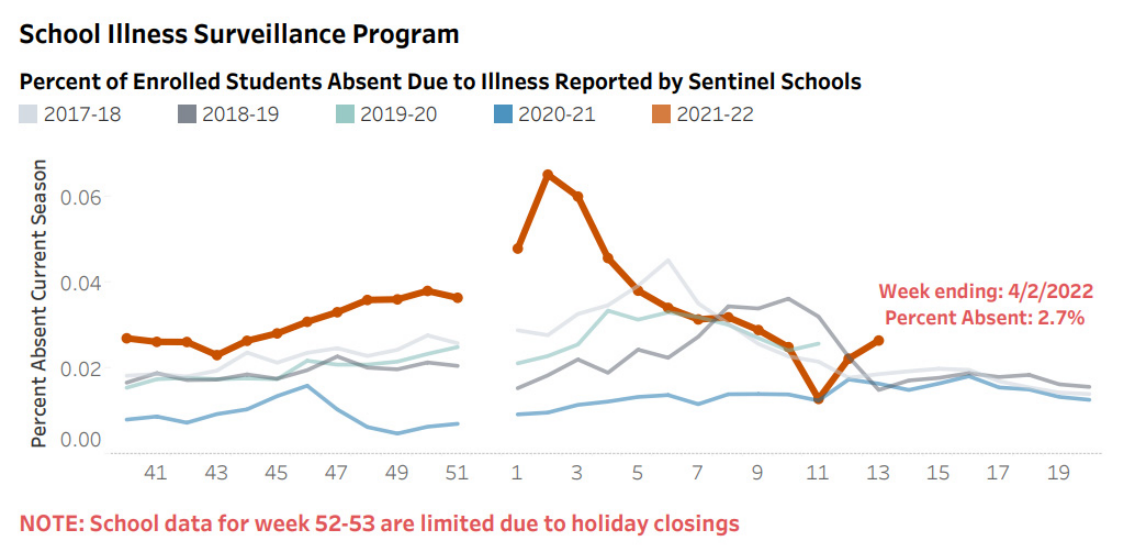
View Chart Data | View Full Screen

U.S. reported positive influenza tests 2019-2020 vs 2021-2022





Effect of mitigation on illnesses other than COVID-19?



- Jan 28, 2021: Iowa Legislature passes law mandating 5 day a week in-person school
- May 2021: Iowa Legislature banned mask mandates in schools
- Ventilation?
- Students encouraged to stay home when sick
- All schools increased disinfection protocols

CDC recommendations for COVID-19 cleaning and dsinfection

When to Clean and When to Disinfect

Cleaning with products containing soap or detergent reduces germs on surfaces by removing contaminants and decreases risk of infection from surfaces.

If no one with confirmed or suspected COVID-19 has been in a space cleaning once a day is usually enough to remove virus that may be on surfaces. This also helps maintain a healthy facility.

Disinfecting using U.S. Environmental Protection Agency (EPA)'s List N disinfectants kills any remaining germs on surfaces, which further reduces any risk of spreading infection.

You may want to either clean more frequently or choose to disinfect in addition to cleaning in shared spaces if the space:

- Is a high traffic area, with a large number of people.
- Is poorly ventilated.
- Does not provide access to handwashing or hand sanitizer.
- Is occupied by people at increased risk for severe illness from COVID-19.

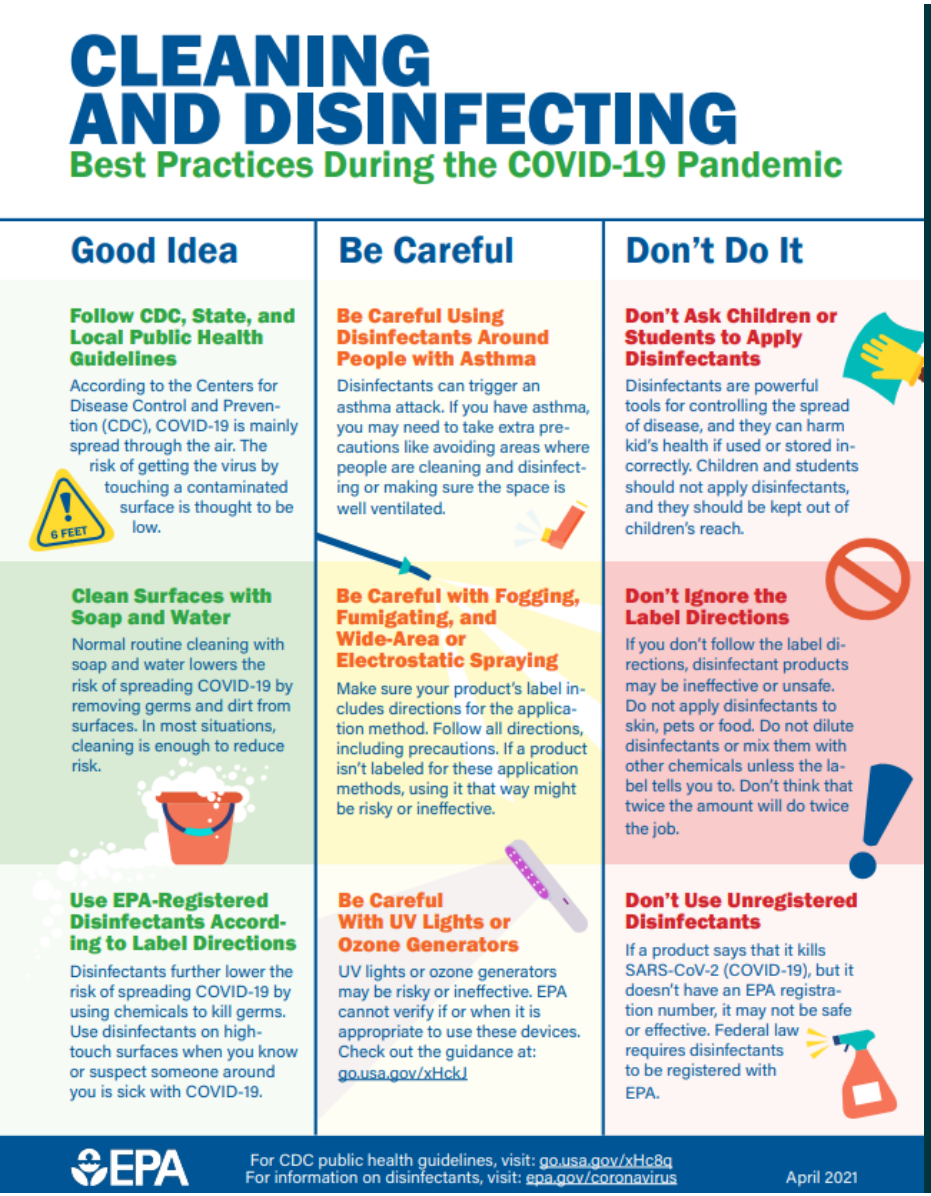
If a sick person or someone who tested positive for COVID-19 has been in your facility within the last 24 hours, you should clean **AND** disinfect the space.

If less than 24 hours have passed since the person who is sick or diagnosed with COVID-19 has been in the space, clean and disinfect the space.

If more than 24 hours have passed since the person who is sick or diagnosed with COVID-19 has been in the space, cleaning is enough. You may choose to also disinfect depending on certain conditions or everyday practices required by your facility.

If more than 3 days have passed since the person who is sick or diagnosed with COVID-19 has been in the space, no additional cleaning (beyond regular cleaning practices) is needed.

- Clean daily, disinfect when needed
- High touch surfaces
- If employee tests positive for COVID and less than 24h have passed, clean and disinfect spaces they occupied



READ LABELS

- Use EPA-registered disinfectants according to label directions
- Use products from EPA-N list
- https://cfpub.epa.gov/wizards/disinfectants/

Which disinfectants work against microbes? Depends on the microbe.

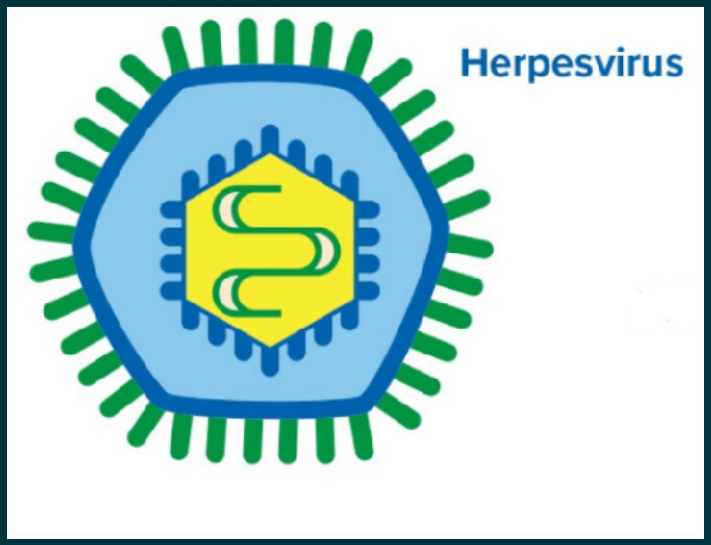
	Microorganism	Examples
More Resistant	Prions	Scrapie, Creutzfeld-Jacob disease, Chronic wasting disease
	Bacterial Spores	*Bacillus, Geobacillus, Clostridium*
	Protozoal Oocysts	*Cryptosporidium*
	Helminth Eggs	*Ascaris, Enterobius*
	Mycobacteria	*Mycobacterium tuberculosis, M. terrae, M. chelonae*
	Small, Non-Enveloped Viruses	Poliovirus, Parvoviruses, Papilloma viruses
	Protozoal Cysts	*Giardia, Acanthamoeba*
	Fungal Spores	*Aspergillus, Penicillium*
	Gram negative bacteria	*Pseudomonas, Providencia, Escherichia*
	Vegetative Fungi and Algae	*Aspergillus, Trichophyton, Candida, Chlamydomonas*
	Vegetative Helminths and Protozoa	*Ascaris, Cryptosporidium, Giardia*
	Large, non-enveloped viruses	Adenoviruses, Rotaviruses
	Gram positive bacteria	*Staphylococcus, Streptococcus, Enterococcus*
Less Resistant	Enveloped viruses	HIV, Hepatitis B virus, Herpes Simplex virus And SARS COV-2

From: McDonnell, "Antisepsis, Disinfection and Sterilization: Types, Action, and Resistance" 2007, ASM Press

Enveloped and non-enveloped viruses

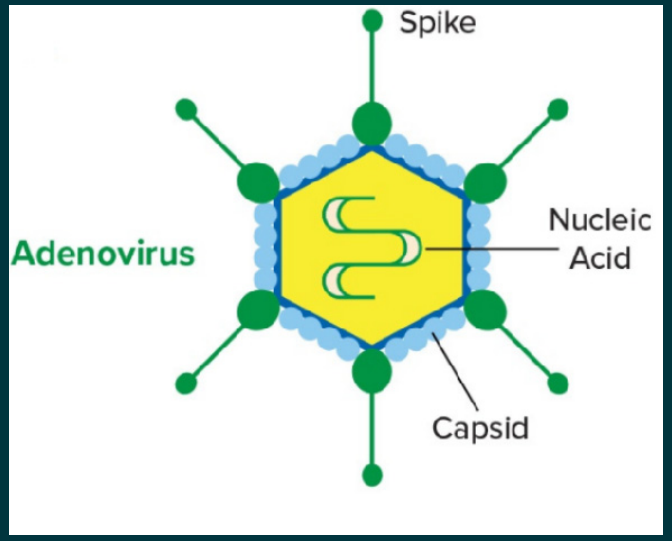
Enveloped viruses

- Have a lipid membrane (envelope) that is derived from a host cell
- Envelopes help virus evade host immune response
- Envelopes are fragile and more sensitive to heat, dryness, and disinfectants



Non-enveloped viruses (virion)

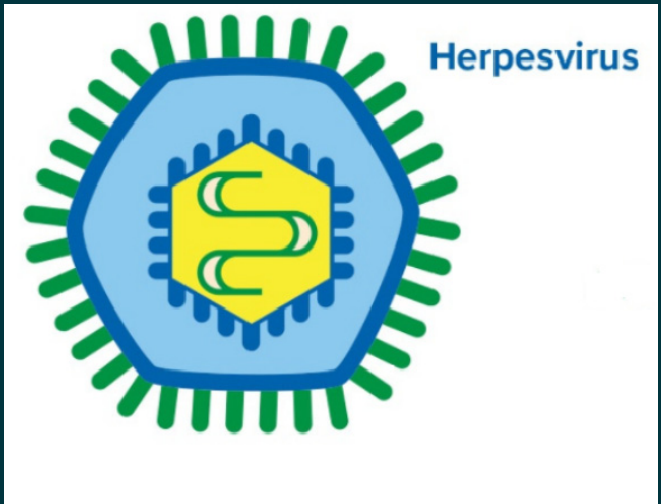
- Lack a membrane



Viral pathogens that can survive on and may be transmitted via surfaces

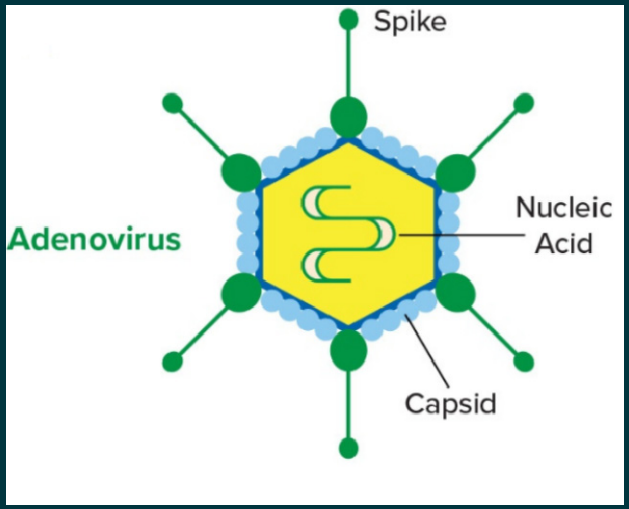
Enveloped viruses

- Coronaviruses = respiratory illness
- Hepatitis A and B
- Influenza
- Respiratory Syncytial Virus (RSV) = respiratory illness



Nonenveloped viruses

- Adenovirus = colds, bronchitis, diarrhea, pink eye
- Rhinovirus = common cold
- Enterovirus = hand, foot, and mouth
- Rotavirus = gastroenteritis
- Norovirus = acute gastroenteritis “stomach flu”, “cruise ship virus”



Gram positive and gram negative bacteria

- Gram stain
- Differential stain
  - Gram positive (purple)
  - Gram negative (red)

	Microorganism	Examples
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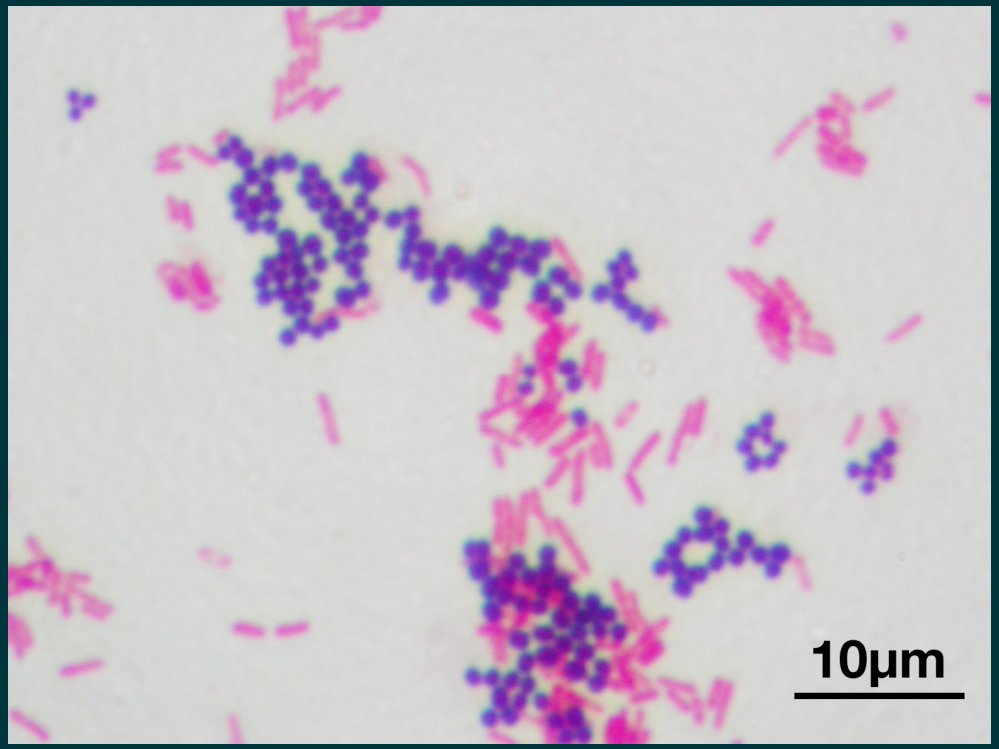

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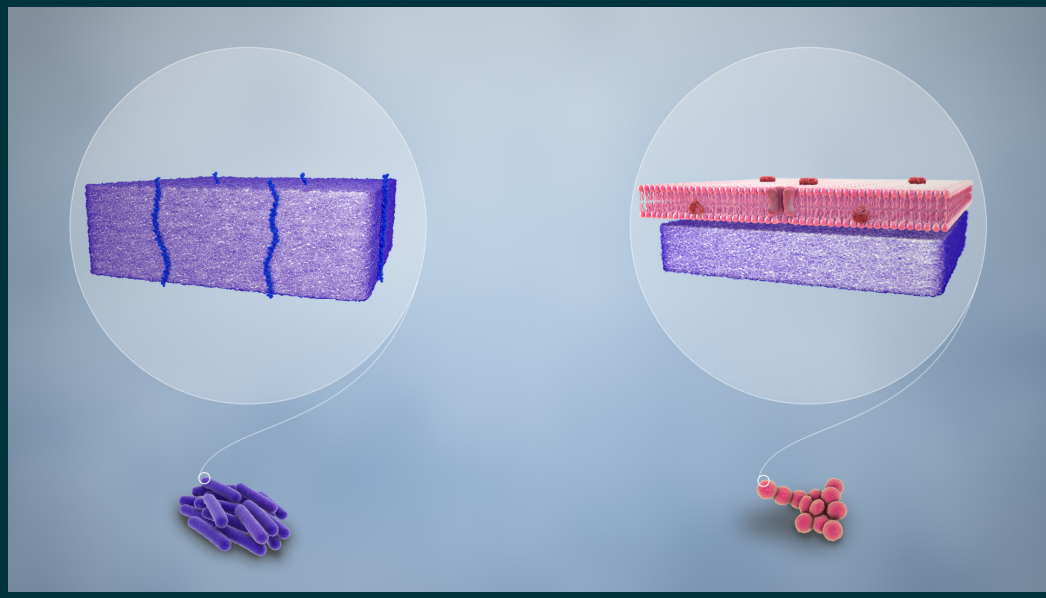
Gram Stain

- Based on structural differences in cell walls
- **Gram positive**
- Thick peptidoglycan layer
- **Gram negative**
- Outer membrane covers thin peptidoglycan layer

- Broad spectrum = effective against both gram positive and gram negative cells
- Limited spectrum = effective against either gram positive or gram negative, but not both



By https://www.scientificanimations.com/ - http://www.scientificanimations.com/wiki-images/, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=72339939

Bacterial pathogens that can survive on surfaces

Gram positives

- Group A *Streptococcus* = strep throat
- *Streptococcus pneumoniae* = pneumonia, ear infections
- *Staphylococcus aureus* = skin infections, MRSA
- *Neiseria mengitidis* = meningitis
- *Bordatella pertussis* = whooping cough
- *Haemophilus influenzae* = pneumonia
- *Clostridium difficile** = C. diff

Gram negatives

- *Salmonella*
- *E. coli* O157:H7
- *Shigella*
- *Psuedomonas aeruginosa*

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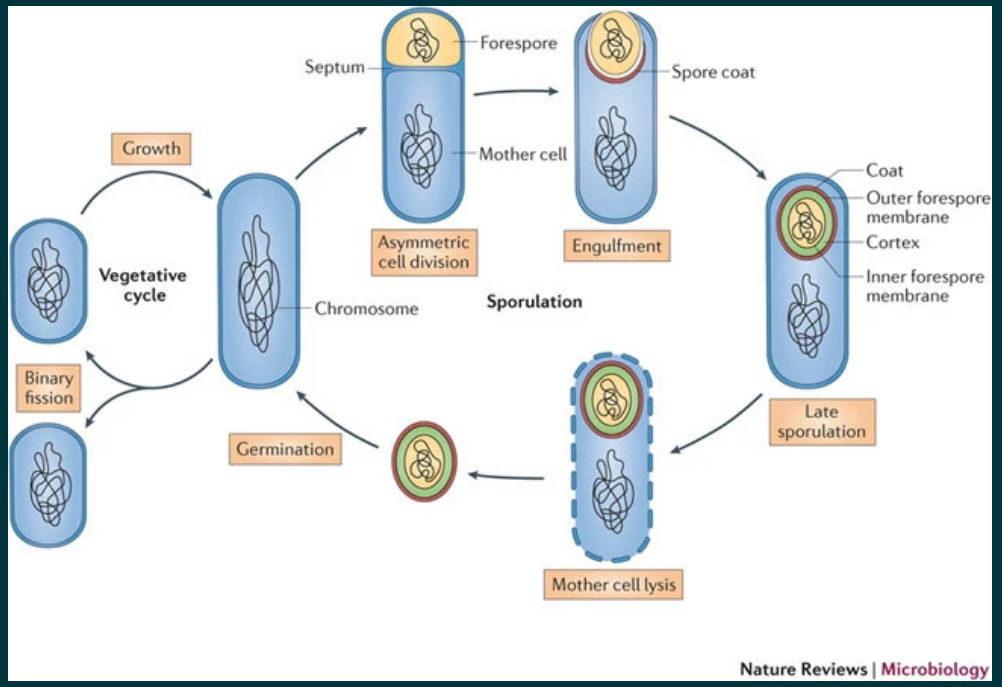
From: McDonnell, “Antisepsis, Disinfection and Sterilization: Types, Action, and Resistance” 2007, ASM Press

Bacterial endospores

- Dormant structures formed by certain bacteria when environmental conditions are unfavorable (temperature, oxygen, nutrients)
- Endospores are resistant to desiccation, 100℃, UV, disinfectants
- Endospores can potentially remain dormant for thousands of years and will reactivate to vegetative state when placed in favorable conditions
- *Clostridium difficile, Bacillus anthrasis*



From: McKenney *et al.* The *Bacillus subtilis* endospore: assembly and functions of the multilayer coat. Nature Reviews Microbiology. 2012.

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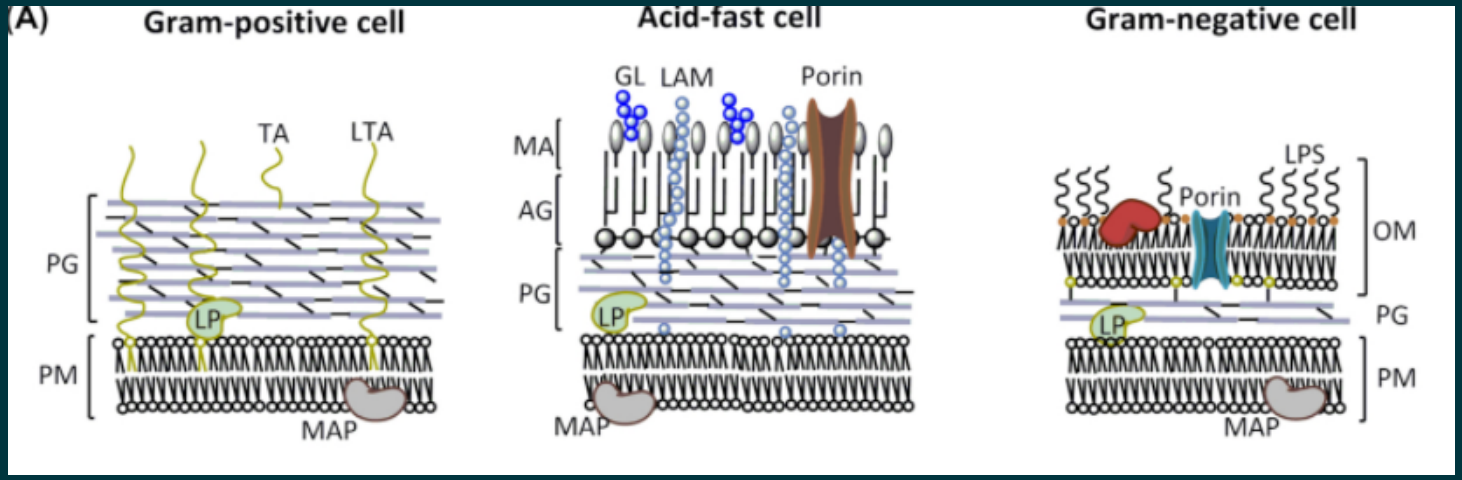
Mycobacteria

- Mycobacteria are acid-fast cells
- Acid-fast cell wall is different than either gram-positive or gram-negative
- *Mycobacterium tuberculosis*
- Disinfectants that kill mycobacteria are labelled as tuberculocidal



From: Maitra *et al.* Cell wall peptidoglycan in *Mycobacterium tuberculosis*: An Achilles' hell for the TB-causing pathogen. FEMS Microbiology Reviews 2019.

EPA Test Methods – Office of Pesticide Programs

(7) Claims. Tables 1 and 2 below provide a summary of disinfectant claims and testing methods addressed in this guideline.

Table 1. Summary of Testing for Base Disinfectant Claims*

Claim	Formulation/Test Methods		Test Organisms	No. of Batches/ Carriers
Limited spectrum disinfectant/hard non-porous surfaces	Water soluble powders/liquids	AOAC Use-Dilution Method (UDM) (ref. 1)	*Staphylococcus aureus* (ATCC 6538) or *Salmonella enterica* (ATCC 10708)	For each organism: 3 batches at the LCL; 60 carriers per batch. Note: For UDM, for *Staphylococcus aureus* (ATCC 6538), each batch should be tested on a different day.
	Spray products**	AOAC Germicidal Spray Products as Disinfectants Test (ref. 2)		
	Towelettes	AOAC Germicidal Spray Products as Disinfectants Test modified for towelettes or ASTM E2362 (ref. 3)		
Broad spectrum disinfectant/hard non-porous surfaces	Water soluble powders/liquids	AOAC Use-Dilution Method (ref. 1)	*Staphylococcus aureus* (ATCC 6538) and *Salmonella enterica* (ATCC 10708) or *Pseudomonas aeruginosa* (ATCC 15442)	For each organism: 3 batches at the LCL; 60 carriers per batch. Note: For UDM, for *Staphylococcus aureus* (ATCC 6538) and *Pseudomonas aeruginosa* (ATCC 15442), each batch should be tested on a different day.
	Spray products**	AOAC Germicidal Spray Products as Disinfectants Test (ref. 2)		
	Towelettes	AOAC Germicidal Spray Products as Disinfectants Test modified for towelettes or ASTM E2362 (ref. 3)		
Hospital or healthcare disinfectant/hard non-porous surfaces	Water soluble powders/liquids	AOAC Use-Dilution Method (ref. 1)	*Staphylococcus aureus* (ATCC 6538) and *Pseudomonas aeruginosa* (ATCC 15442)	For each organism: 3 batches at the LCL; 60 carriers per batch. For UDM, each batch should be tested on a different day.
	Spray products**	AOAC Germicidal Spray Products as Disinfectants Test (ref. 2)		
	Towelettes	AOAC Germicidal Spray Products as Disinfectants Test modified for towelettes or ASTM E2362 (ref. 3)		

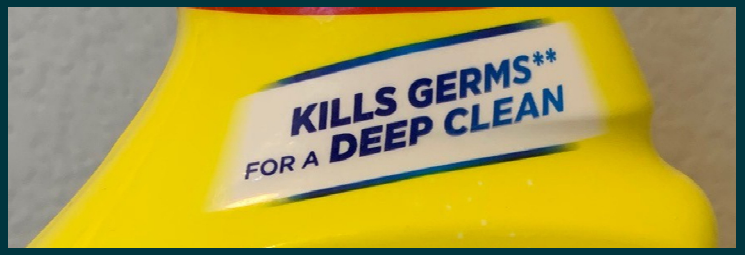
* Table 1 does not include confirmatory testing. For guidance on conducting confirmatory testing, see the respective section for each claim.

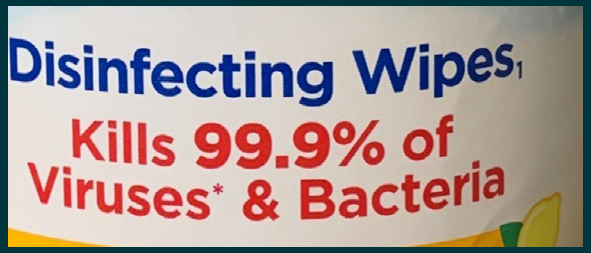
** Foaming, fogging, gas, and vapor applications are not included in this category. Applicants should consult with the agency prior to testing to determine the appropriate methodology for product performance testing.

- Antimicrobial product with public health claim must be registered through EPA
- Must submit efficacy data
- EPA Antimicrobial Testing Program tests disinfectants to ensure efficacy

Major considerations for disinfectant testing

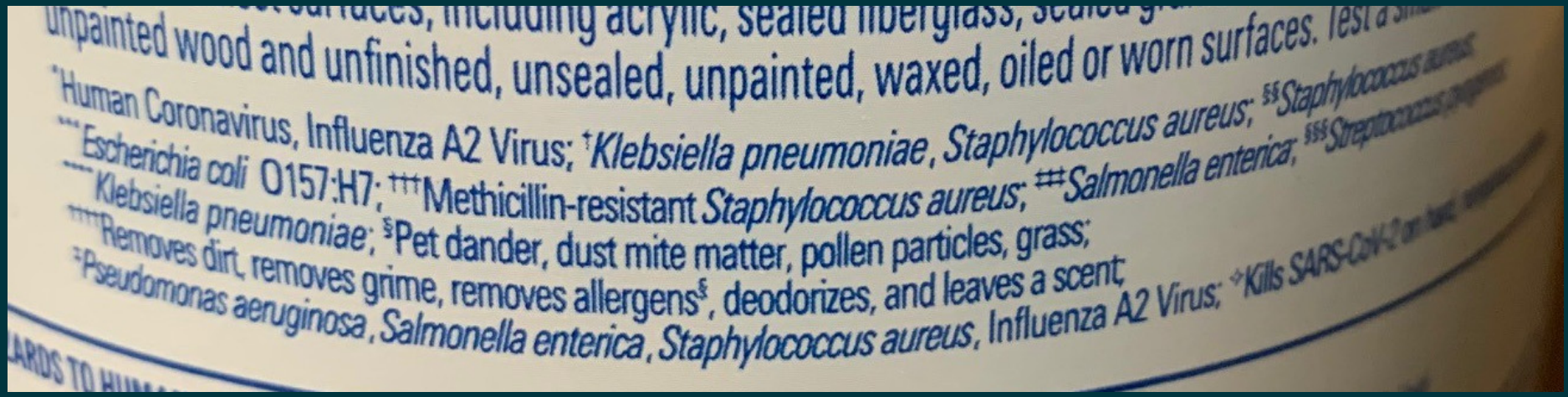
- Concentration
- Time of contact
- Safety of use





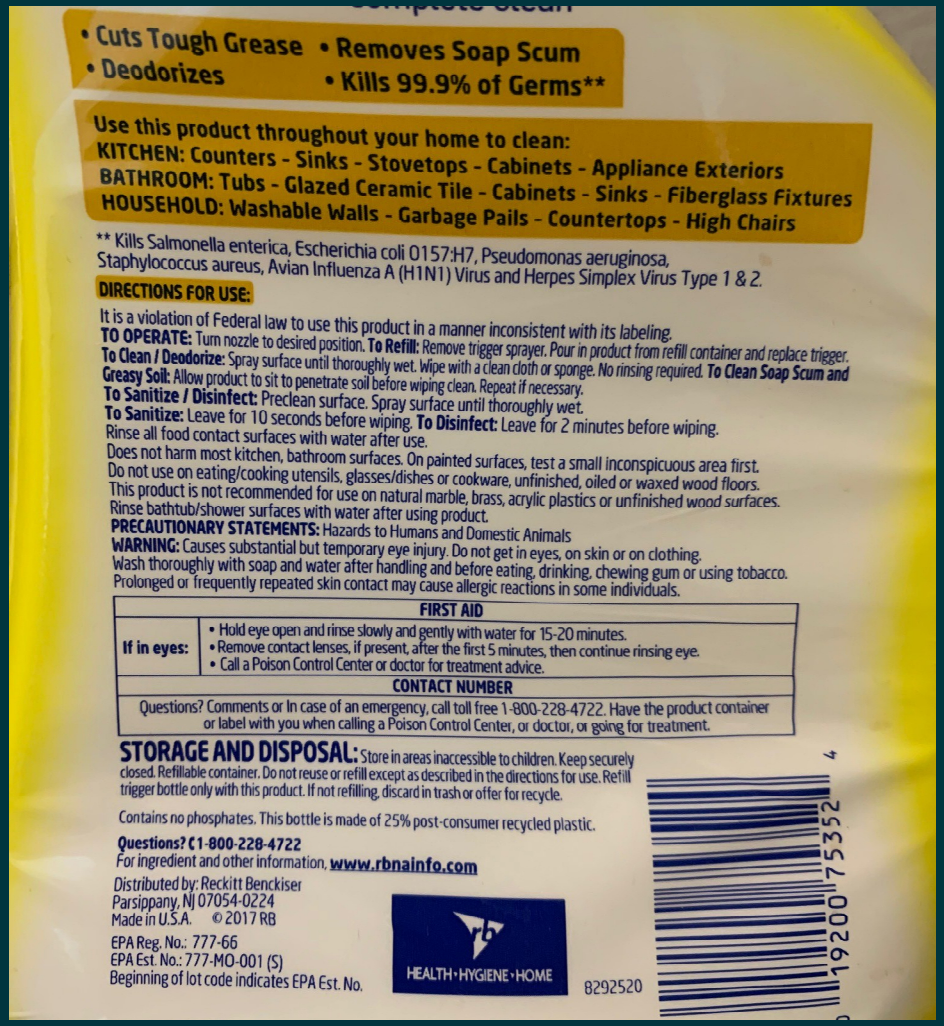
Additional Disinfectant Claims

– Must provide efficacy data for every organism listed on label



Reading labels

- What are the active ingredients?
- Does it have a registration number?
- Do you need to preclean surfaces?
- Is dilution required?
- How long is the contact time?
- Do you need to wipe clean after disinfection?



• Cuts Tough Grease • Removes Soap Scum
• Deodorizes • Kills 99.9% of Germs**

Use this product throughout your home to clean:
KITCHEN: Counters - Sinks - Stovetops - Cabinets - Appliance Exteriors
BATHROOM: Tubs - Glazed Ceramic Tile - Cabinets - Sinks - Fiberglass Fixtures
HOUSEHOLD: Washable Walls - Garbage Pails - Countertops - High Chairs

** Kills Salmonella enterica, Escherichia coli O157:H7, Pseudomonas aeruginosa, Staphylococcus aureus, Avian Influenza A (H1N1) Virus and Herpes Simplex Virus Type 1 & 2.

DIRECTIONS FOR USE:

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
TO OPERATE: Turn nozzle to desired position. **To Refill:** Remove trigger sprayer. Pour in product from refill container and replace trigger.
To Clean / Deodorize: Spray surface until thoroughly wet. Wipe with a clean cloth or sponge. No rinsing required. **To Clean Soap Scum and Greasy Soil:** Allow product to sit to penetrate soil before wiping clean. Repeat if necessary.
To Sanitize / Disinfect: Preclean surface. Spray surface until thoroughly wet.
To Sanitize: Leave for 10 seconds before wiping. **To Disinfect:** Leave for 2 minutes before wiping.
Rinse all food contact surfaces with water after use.
Does not harm most kitchen, bathroom surfaces. On painted surfaces, test a small inconspicuous area first.
Do not use on eating/cooking utensils, glasses/dishes or cookware, unfinished, oiled or waxed wood floors.
This product is not recommended for use on natural marble, brass, acrylic plastics or unfinished wood surfaces.
Rinse bathtub/shower surfaces with water after using product.
PRECAUTIONARY STATEMENTS: Hazards to Humans and Domestic Animals
WARNING: Causes substantial but temporary eye injury. Do not get in eyes, on skin or on clothing.
Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum or using tobacco.
Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

FIRST AID	
If in eyes:	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a Poison Control Center or doctor for treatment advice.

CONTACT NUMBER
Questions? Comments or In case of an emergency, call toll free 1-800-228-4722. Have the product container or label with you when calling a Poison Control Center, or doctor, or going for treatment.

STORAGE AND DISPOSAL: Store in areas inaccessible to children. Keep securely closed. Refillable container. Do not reuse or refill except as described in the directions for use. Refill trigger bottle only with this product. If not refilling, discard in trash or offer for recycle.

Contains no phosphates. This bottle is made of 25% post-consumer recycled plastic.

Questions? 1-800-228-4722
For ingredient and other information, **www.rbnainfo.com**

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Parsippany, NJ 07054-0224
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HEALTH • HYGIENE • HOME

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Directions

To disinfect: Use on hard, nonporous surfaces. Wipe surface to be disinfected. Use enough wipes for treated surface to remain visibly wet for 4 minutes. Let surface dry.

To sanitize and deodorize: Use on hard, nonporous non-food contact surfaces. Wipe surface. Use enough wipes for treated surfaces to remain visibly wet for 10 seconds. Let surface dry.

Mitigation methods that work for COVID-19 and other diseases

- Disinfection of high touch surfaces
- Good hand hygiene
- Increased ventilation, HEPA filtration
- Worker sick leave policies that encourage workers to stay home when sick
- Face coverings
- Vaccinations

Encourage Good Hand Hygiene

- Wash hands regularly, especially before eating
- Provide handwashing facilities
- Hand washing with soap and water is more effective than hand sanitizer
- Cold water works
- Wash for 20 seconds

ENVIRONMENT

Mitigation methods that work for COVID-19 and other diseases

- Disinfection of high touch surfaces
- Good hand hygiene
- Increased ventilation, HEPA filtration
- Worker sick leave policies that encourage workers to stay home when sick
- Face coverings
- Vaccinations

Clean Air in Buildings Challenge – Launched March 17, 2022

White House National COVID-19 Preparedness Plan

"The Clean Air in Buildings Challenge is a call to action for leaders and building owners and operators of all types to assess their indoor air quality and make ventilation and air filtration improvements to help keep occupants safe."

1. *Create a clean indoor air action plan* that assesses indoor air quality, plans for upgrades and improvements, and includes HVAC inspections and maintenance.
2. *Optimize fresh air ventilation* by bringing in and circulating clean outdoor air indoors.
3. *Enhance air filtration and cleaning* using the central HVAC system and in-room air cleaning devices.
4. *Engage the building community* by communicating with building occupants to increase awareness, commitment, and participation.

"Over the decades, we've worked so hard on improving the water we drink that it's now time for policy to focus on improving the air we breathe."

–Dr. Katelyn Jetelina, Your Local Epidemiologist

1. Create a Clean Indoor Air Action Plan

- How many people in the building
- Outdoor air quality
- Climate/weather
- Energy consumption
- Some actions may be appropriate as temporary measures when disease transmission is high

- Work with HVAC expert to verify building systems are functioning properly
- Indoor air quality assessments such as carbon dioxide monitors
- Assessment of space, air delivery, and air flow
- Regular maintenance and training

2. Optimize Fresh Air Ventilation

- Maximize amount of outdoor air supplied
- Run HVAC during all occupied hours
- During times of high risk, adjust HVAC settings to increase volume of clean, outdoor air
- Open windows where feasible, optimizing cross ventilation

3. Enhance Air Filtration and Cleaning

- Install air filters with ≥ MERV 13 (or as high as feasible with HVAC system)
- Increase ventilation and/or airflow in areas with high airborne particle emissions (gyms, cafeterias, choir rooms)
- Consider upper-room Ultraviolet Germicidal Irradiation system (must be designed and installed by a professional)
- Use portable air cleaners with HEPA filters in areas where air flow and central filtration are insufficient

Portable Air Cleaners with HEPA filtration

- Used to supplement building-wide HVAC system
- Provide 5-6 Air Changes per Hour (ACH)
- Must remove small airborne particles (0.1-1 μm)
- Must be correct size for space (square feet of room) as measure by Cubic Feet per Minute
- Clean Air Delivery Rate (CADR) = how quickly contaminants are removed from air in room. >CADR = faster cleaning

Providing 5-6 ACH is recommended as it will replace about 99% of the volume of air in an indoor space with fresh filtered or outdoor air every 45 – 60 minutes.

i. **Cubic Feet per Minute (CFM) Calculation:**
Multiply 5 ACH with the cubic feet of the room, then divide this number by 60.

Calculate CFM for a room

$$\text{CFM} = \frac{5 \text{ ACH} \times \text{Width} \times \text{Length} \times \text{Height}}{60}$$

Source: NIH EHS Worker Training Program "Selection and use of Portable Air Cleaners to Protect Workers from Exposure to SARS-CoV-2"

4. Get Community Engaged in Your Action Plan

Communicate

Collect Feedback

Mitigation methods that work for COVID-19 and other diseases

- Disinfection of high touch surfaces
- Good hand hygiene
- Increased ventilation, HEPA filtration
- Worker sick leave policies that encourage workers to stay home when sick
- Face coverings
- Vaccinations

Worker sick leave policies that encourage workers to stay home when sick

Presenteeism – working while sick – leads to reduced productivity and can have huge impacts if disease is spread through the workplace

- Costs of presenteeism estimated to exceed $150 billion annually in U.S.
- Costs for reduced productivity exceed costs for absences

University of AZ study showed that norovirus can spread from one contaminated surface to 40-60% of all surfaces in an office within 2-4 hours

Worker sick leave policies that encourage workers to stay home when sick

Develop workplace policies that communicate guidelines on when employees should stay home

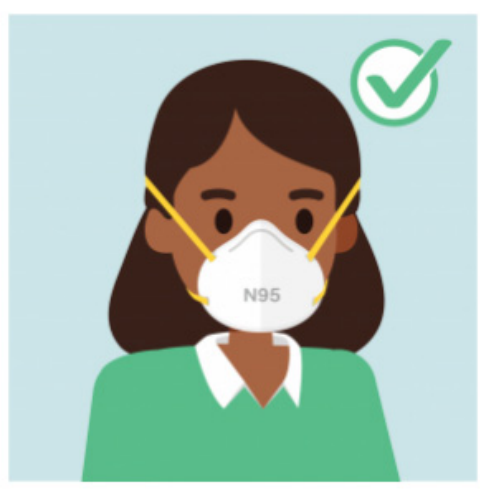
- Fever within 24 hours
- Acute and new onset of respiratory or gastrointestinal illness
- Positive COVID test
- Paid sick leave

Develop policies with guidelines on when workers can return

- No fever and symptoms are getting better
- If feasible, remote work until past infectious period (5-10 days)
- If remote work is not feasible, require face coverings until past infectious period or until symptoms are gone, daily disinfect work area, regularly wash hands

Face coverings for employees recovering from illness or displaying symptoms

- NIOSH approved N95 respirators or KN95 respirators are most effective
- Good fitting surgical masks also reduce transmission



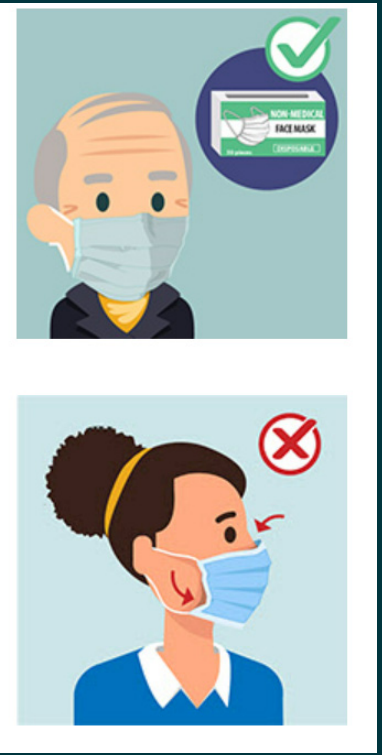


Image source: cdc.gov

Vaccinations

- Science is clear, vaccines prevent severe disease and death, prevent long COVID
- Bivalent COVID booster now available to people who have had two previous COVID vaccinations
- Very likely we will have annual COVID boosters along with annual flu shots

ENVIRONMENT

How to increase vaccinations

Make access easy

- Bring in vaccine clinic to workplace

Default scheduling

- Workers are allowed to opt-out and cancel appointment
- Text message reminders

Monetary incentives

- Cash or gift card
- Decrease in health insurance rates as part of wellness program
- Increase in health insurance rates for those who do not get vaccinated

Conclusions

- Infection control should be part of workplace health and safety plans to keep workers healthy and reduce absences
- Efficacy of disinfectants varies among microbes
- Read labels carefully to find disinfectant that is appropriate for your use and use as directed
- Plan should include disinfection, hand hygiene, ventilation, sick leave policies that encourage workers to stay home when sick, masking, and vaccinations
- Create an Action Plan for Clean Indoor Air

Upcoming Conferences

Topics include net-positive business models, principles & processes of the Just Transition and more!

Virtual Events: Dec 1st

IMPACT22 | VIRTUAL EVENT 12.1.22

SUSTAINABILITY IMPACT QUARTERLY SERIES

Preparing for the Future of Business Accountability

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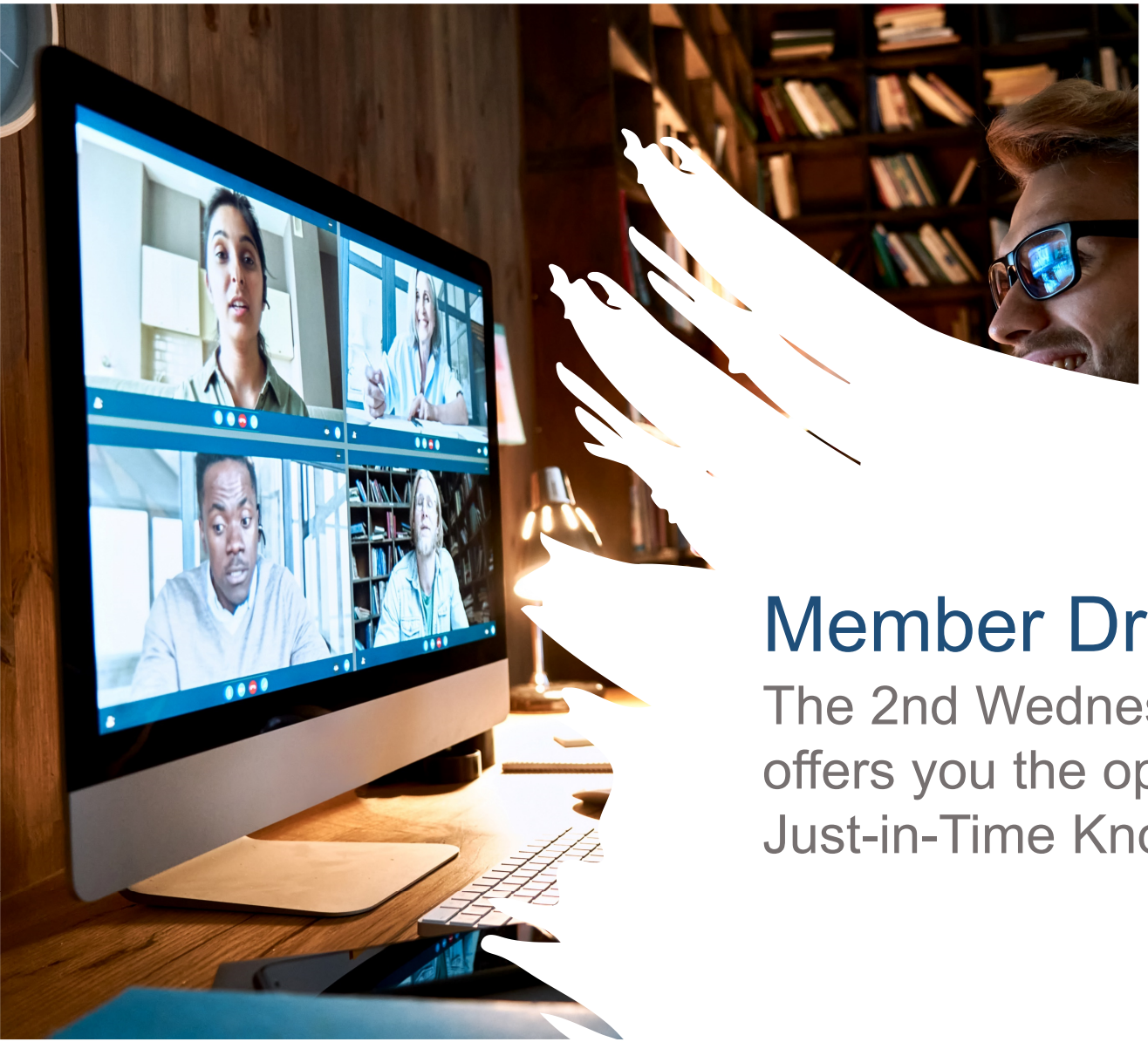
Upcoming Webinars on EHS&S Management

Task Creation & Standardization: The Next Level of AI Support for EHS

November 14



Member Drop-Ins

The 2nd Wednesday of every month offers you the opportunity for Just-in-Time Knowledge Sharing

Connect with NAEM!

- Online: www.naem.org
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  - Twitter: @NAEMorg
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  - LinkedIn: https://www.linkedin.com/company/naem

Thank you for Attending!

A recording will be available in 3-4 days.

You will receive an email once it's posted to our site.

Have a safe & healthy day!