

# FINDING MOLD IN HEALTHCARE FACILITIES: RISKS, OCCURRENCE AND MITIGATION

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<https://spice.unc.edu/ask-spice/>

# FINDING MOLD IN HEALTHCARE FACILITIES: RISKS, OCCURRENCE AND MITIGATION OBJECTIVES

- ▶ Describe the health risk of mold to patients, residents, and populations served.
- ▶ Identify the occurrence of mold in healthcare facilities including:
  - ▶ What conditions affect mold growth such as temperature and humidity
  - ▶ Identification of high risk areas
  - ▶ Identification of common areas mold is found in healthcare facilities with considerations for storage of patient/resident supplies and personal protective equipment with regards to potential mold contamination
- ▶ Identify steps for how to remediate mold.
- ▶ Describe preventative actions.

# MOLD

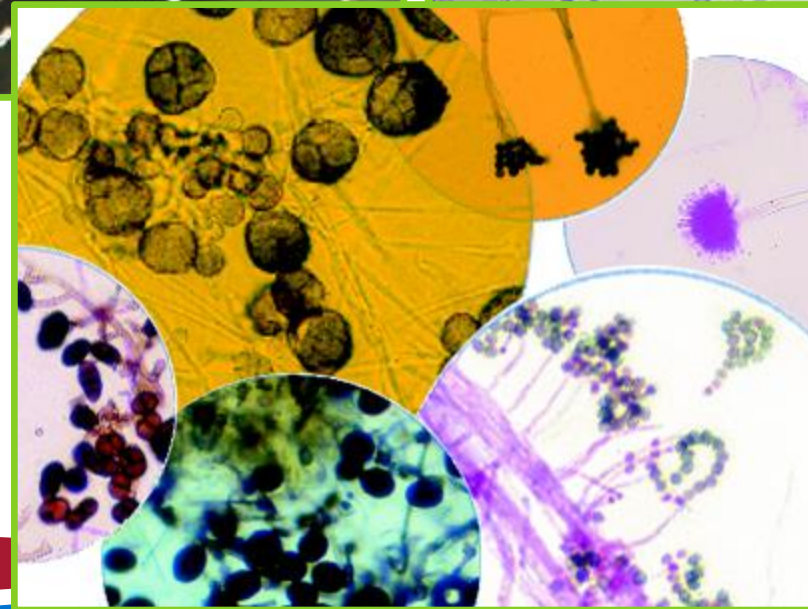
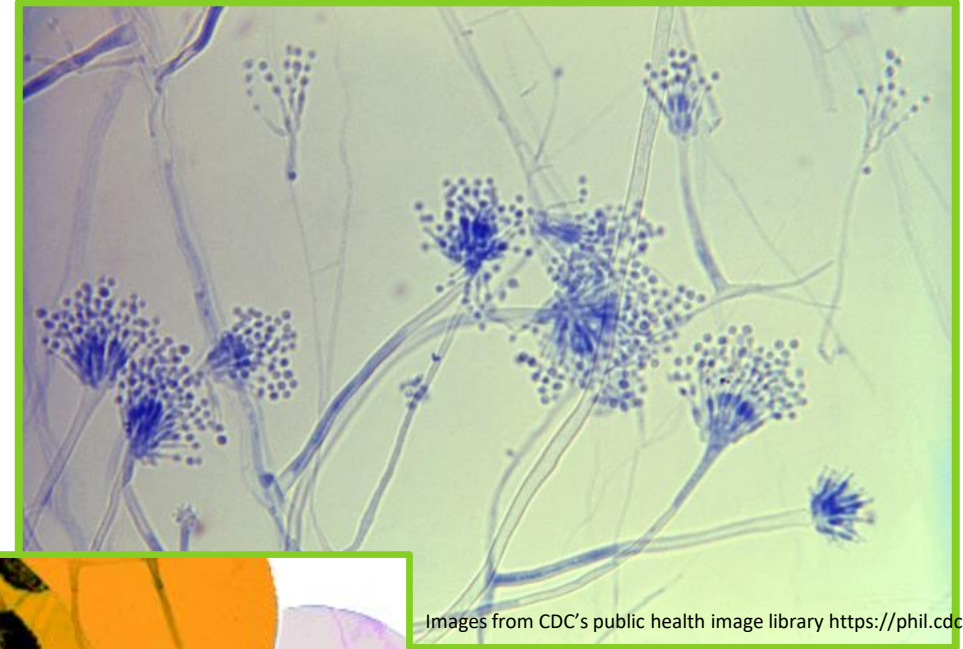
- ▶ Over millions of years old
- ▶ Part of our natural environment:
  - ▶ Breaks down and digests organic materials such as leaves in outdoor areas
- ▶ Can be found indoors and outdoors
- ▶ Need a food source to grow and moisture helps the spore grow
- ▶ Mold like cellulose materials such as:
  - ▶ Drywall
  - ▶ Ceiling Tiles
  - ▶ Behind wall paper and wall coverings



<https://energyresearchscience-basics/mold-growth/>

# MOLD SPORES

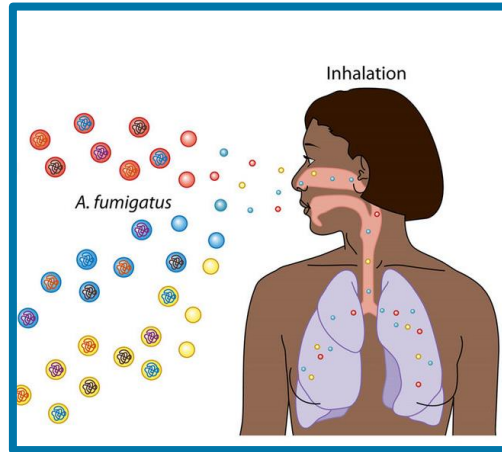
- ▶ Mold spores
- ▶ Dispersed when disrupted
- ▶ Can be transferred by:
  - ▶ Air currents
  - ▶ Unclean hands
  - ▶ Uncleaned materials/equipment



Images from CDC's public health image library <https://phil.cdc.gov/>

# MOLD SPORES

- ▶ Inhalation
- ▶ Ingestion
- ▶ Open wounds
- ▶ Burns



Images from:  
Keller, Nancy. (2017). Heterogeneity Confounds Establishment of "a" Model Microbial Strain. *mBio*. 8. e00135-17. 10.1128/mBio.00135-17. and <https://phil.cdc.gov/>

# HEALTH RISKS AND VULNERABLE POPULATIONS

## ▶ Vulnerable Populations:

- ▶ Immunocompromised
  - ▶ Cancer
  - ▶ Immunosuppressive therapies
- ▶ Allergic
- ▶ Higher risk populations susceptible to mold:
  - ▶ Diabetes mellitus (unregulated)–Dialysis
  - ▶ Cavitory illness (dead lung tissue)–Tuberculosis
  - ▶ Late stage HIV/ AIDS
  - ▶ Chronic granulomatous disease
  - ▶ Severe malnutrition & alcoholism
  - ▶ Surgical patients



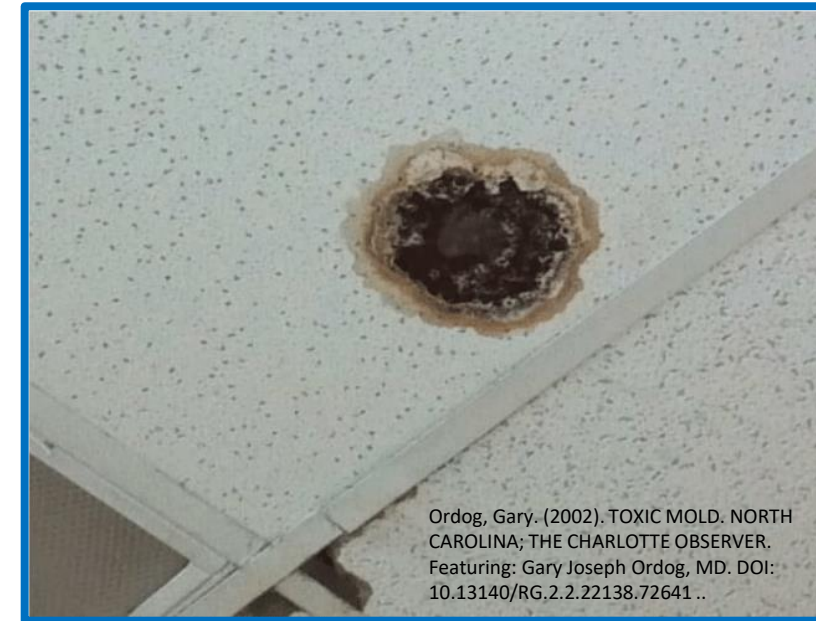
## ▶ Health Risks Include:

- ▶ Allergic reactions
  - ▶ Runny nose, scratchy throat, sneezing
- ▶ Asthma
- ▶ Infection
  - ▶ Can invade lung tissue
  - ▶ Open wounds
- ▶ Toxic Effects

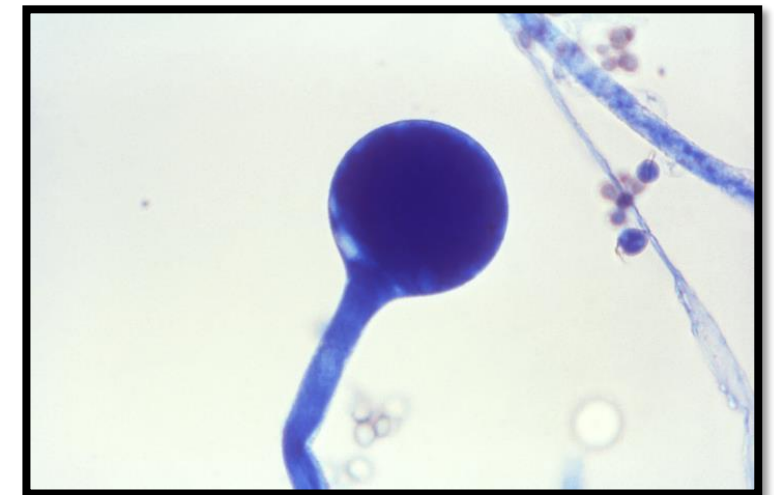
# MOLDS OF CONCERN

## ► Molds of concern

- *Aspergillus* species
  - *Aspergillus versicolor* can also produce harmful toxins.
- *Stachybotrys chartarum* (also known as *Stachybotrys atra*).

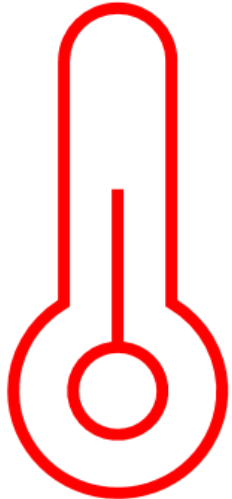


Ordog, Gary. (2002). TOXIC MOLD. NORTH CAROLINA; THE CHARLOTTE OBSERVER. Featuring: Gary Joseph Ordog, MD. DOI: 10.13140/RG.2.2.22138.72641 ..



# CONDITIONS FOR MOLD GROWTH

- ▶ Temperatures ideal for mold growth:
  - ▶ 60-80°F





# CONDITIONS FOR MOLD GROWTH

## ▶ Water intrusion

### ▶ Upon inspections

▶ Look up



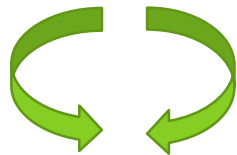
▶ Look down



▶ Look out



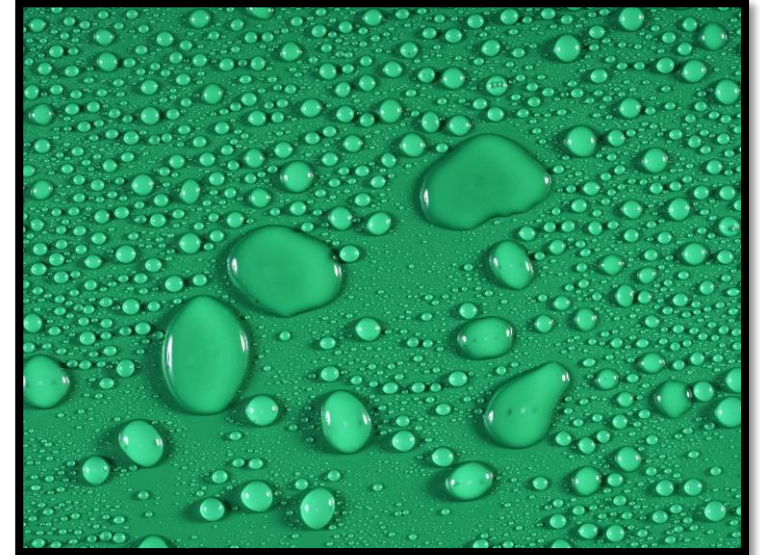
▶ Look all around



# CONDITIONS FOR MOLD GROWTH

## ▶ Relative Humidity

- ▶ Relative humidity above 70% for extended periods of time indoors can aid in mold growth.
- ▶ Condensation can appear on surfaces, especially when there are cold surfaces in the facility.



# COMMON AREAS MOLD FOUND IN HEALTHCARE FACILITIES



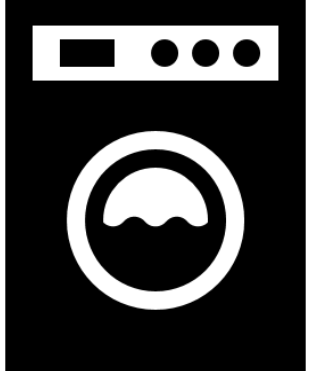
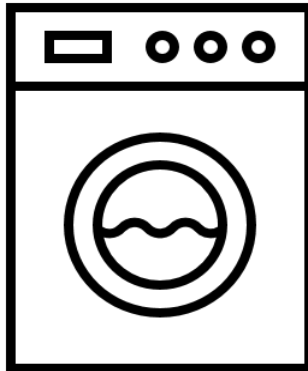
# HIGH RISK AND COMMON AREAS FOR MOLD



Patient and resident care areas and rooms



Storage areas



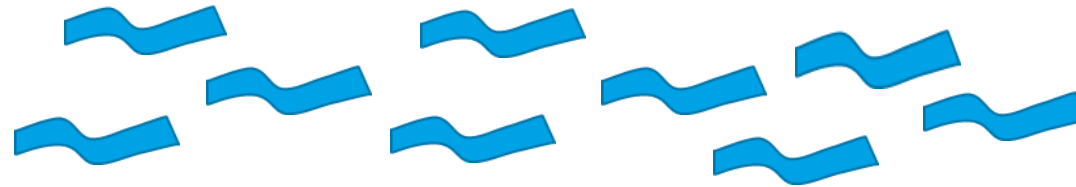
Laundry areas

# HIGH RISK AND COMMON AREAS FOR MOLD

## ▶ Air ventilation

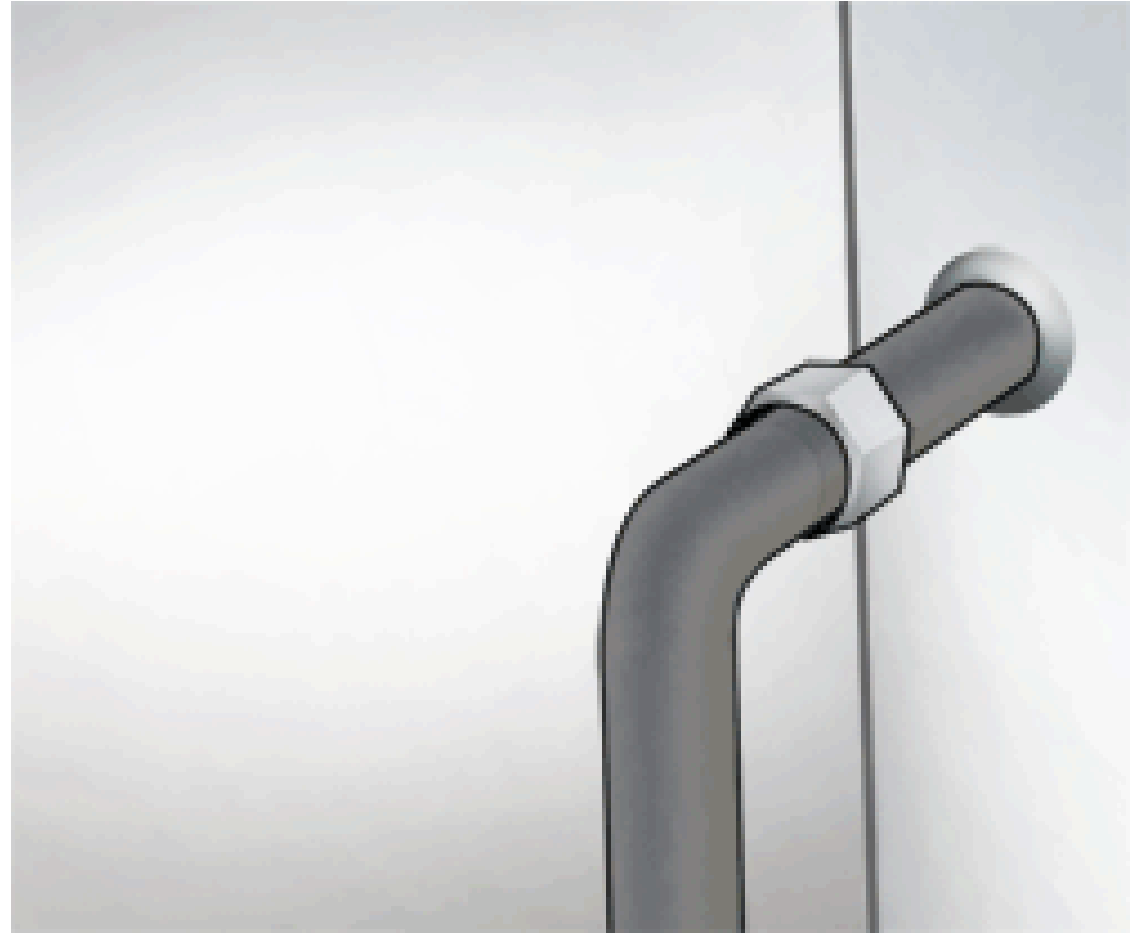
- ▶ Return air intakes
- ▶ Register
- ▶ Duct systems

## ▶ Exhaust fans



# MOLD REMEDIATION

- ▶ Identify the problem
- ▶ Assess the problem
- ▶ Consult with a professional company skilled in mold remediation



# PPE AND CONTAINMENT

- ▶ Respiratory protection (N95 respirator).
- ▶ Protective clothing
- ▶ Wear gloves and eye protection.
- ▶ Ensure all contaminated materials are contained.

**WHAT TO WEAR**  
BEFORE ENTERING A HOME OR BUILDING WITH  
**MOLD DAMAGE**

N-95 respirator or one that provides even more protection (check packaging for "N-95")

Goggles or eye protection

Long-sleeved shirt

Protective gloves

Long pants

Waterproof boots

**CAUTION!**

If you have a breathing problem like asthma, do not enter a building with mold damage. Mold can make asthma symptoms worse.

If you have a weakened immune system (such as from cancer treatment or medicines that suppress the immune system), do not enter a building with mold damage. People with a weakened immune system are more likely to get a serious illness from mold.

Children should also not enter buildings with mold damage.

**MORE INFORMATION ON REMOVING MOLD:**  
[www.cdc.gov/mold/cleanup-guide.html](http://www.cdc.gov/mold/cleanup-guide.html)

**MORE INFORMATION ON WEARING RESPIRATORS:**  
[www.cdc.gov/disasters/disease/respiratory.html](http://www.cdc.gov/disasters/disease/respiratory.html)

# MOLD REMEDIATION

## ▶ Resources

- ▶ EPA
- ▶ CDC
- ▶ NC DHHS





**Table 1: Water Damage – Cleanup and Mold Prevention**

Guidelines for Response to Clean Water Damage within 24 – 48 Hours to Prevent Mold Growth*	
Water-Damaged Material†	Actions
Books and papers	<ul style="list-style-type: none"> <li>* For non-valuable items, discard books and papers.</li> <li>* Photocopy valuable/important items, discard originals.</li> <li>* Freeze (in frost-free freezer or meat locker) or freeze-dry.</li> </ul>
Carpet and backing – dry within 24 – 48 hours‡	<ul style="list-style-type: none"> <li>* Remove water with water extraction vacuum.</li> <li>* Reduce ambient humidity levels with dehumidifier.</li> <li>* Accelerate drying process with fans.</li> </ul>
Ceiling tiles	<ul style="list-style-type: none"> <li>* Discard and replace.</li> </ul>
Cellulose insulation	<ul style="list-style-type: none"> <li>* Discard and replace.</li> </ul>
Concrete or cinder block surfaces	<ul style="list-style-type: none"> <li>* Remove water with water extraction vacuum.</li> <li>* Accelerate drying process with dehumidifiers, fans, and/or heaters.</li> </ul>
Fiberglass insulation	<ul style="list-style-type: none"> <li>* Discard and replace.</li> </ul>
Hard surface, porous flooring§ (Linoleum, ceramic tile, vinyl)	<ul style="list-style-type: none"> <li>* Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.</li> <li>* Check to make sure underflooring is dry; dry underflooring if necessary.</li> </ul>
Non-porous, hard surfaces (Plastics, metals)	<ul style="list-style-type: none"> <li>* Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.</li> </ul>
Upholstered furniture	<ul style="list-style-type: none"> <li>* Remove water with water extraction vacuum.</li> <li>* Accelerate drying process with dehumidifiers, fans, and/or heaters.</li> <li>* May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture.</li> </ul>
Wallboard (Drywall and gypsum board)	<ul style="list-style-type: none"> <li>* May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace.</li> <li>* Ventilate the wall cavity, if possible.</li> </ul>
Window drapes	<ul style="list-style-type: none"> <li>* Follow laundering or cleaning instructions recommended by the manufacturer.</li> </ul>
Wood surfaces	<ul style="list-style-type: none"> <li>* Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.)</li> <li>* Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry.</li> <li>* Wet paneling should be pried away from wall for drying.</li> </ul>

\*If mold growth has occurred or materials have been wet for more than 48 hours, consult Table 2 guidelines. Even if materials are dried within 48 hours, mold growth may have occurred. Items may be tested by professionals if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.

These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then Personal Protective Equipment and containment are required by the Occupational Safety and Health Administration (OSHA). An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.

† If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.

‡ The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.

# EPA'S MOLD REMEDIATION IN SCHOOLS AND COMMERCIAL BUILDINGS TABLES 1 & 2

**Table 2: Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water\***

Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
<b>SMALL – Total Surface Area Affected Less Than 10 square feet (ft²)</b>			
Books and papers	3	Minimum  N-95 respirator, gloves, and goggles	None required
Carpet and backing	1, 3		
Concrete or cinder block	1, 3		
Hard surface, porous flooring (Linoleum, ceramic tile, vinyl)	1, 2, 3		
Non-porous, hard surfaces (Plastics, metals)	1, 2, 3		
Upholstered furniture & drapes	1, 3		
Wallboard (Drywall and gypsum board)	3		
Wood surfaces	1, 2, 3		
<b>MEDIUM – Total Surface Area Affected Between 10 and 100 (ft²)</b>			
Books and papers	3	Limited or Full  Use professional judgment, consider potential for remediator exposure and size of contaminated area	Limited  Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated area
Carpet and backing	1, 3, 4		
Concrete or cinder block	1, 3		
Hard surface, porous flooring (Linoleum, ceramic tile, vinyl)	1, 2, 3		
Non-porous, hard surfaces (Plastics, metals)	1, 2, 3		
Upholstered furniture & drapes	1, 3, 4		
Wallboard (Drywall and gypsum board)	3, 4		
Wood surfaces	1, 2, 3		
<b>LARGE – Total Surface Area Affected Greater Than 100 (ft²) or Potential for Increased Occupant or Remediation Exposure During Remediation Estimated to be Significant</b>			
Books and papers	3	Full  Use professional judgment, consider potential for remediator exposure and size of contaminated area	Full  Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated area
Carpet and backing	1, 3, 4		
Concrete or cinder block	1, 3		
Hard surface, porous flooring (Linoleum, ceramic tile, vinyl)	1, 2, 3, 4		
Non-porous, hard surfaces (Plastics, metals)	1, 2, 3		
Upholstered furniture & drapes	1, 3, 4		
Wallboard (Drywall and gypsum board)	3, 4		
Wood surfaces	1, 2, 3, 4		

# PREVENTION

- ▶ Routine rounding is important for prevention of mold in healthcare facilities.



# PREVENTION

- ▶ Facilities should have a competent heating and air conditioning system
- ▶ **CHANGE** filters routinely based on manufacturer's recommendations
- ▶ Portable fans should be cleaned routinely
- ▶ Allow air to flow freely.



# PREVENTION

- ▶ Keep humidity levels low.
  - ▶ Use dehumidifiers to control humidity
    - ▶ Humidifiers should be maintained and cleaned based on manufacturer's guidelines
- ▶ Use exhaust fans that vent outside in the kitchen and bathroom
- ▶ Bathrooms should be cleaned on a routine basis using an EPA registered disinfectant.



# PREVENTION

- ▶ Fix any leaks in the roof, wall, or plumbing.
- ▶ After a flood, clean up and dry quickly.
  - ▶ Remove upholstery or carpets if they are soaked and can't be dried right away.
- ▶ Construction/renovation/repair projects are closely monitored to ensure contamination does not occur.
- ▶ Be aware of any construction going on outside (close to the building), especially if windows are open.



# QUESTIONS?

# RESOURCES

## ▶ Images:

- ▶ CDC's public health image library <https://phil.cdc.gov/>
- ▶ EPA Mold Image Library <https://www.epa.gov/mold/mold-image-library>
- ▶ Microsoft Powerpoint Stock Photos

▶ Centers for Disease Control and Prevention- Aspergillosis <https://www.cdc.gov/fungal/diseases/aspergillosis/index.html>

▶ Centers for Disease Control and Prevention- Guidelines for Environmental Infection Control in Healthcare Facilities. <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm>

▶ Centers for Disease Control and Prevention- Mold [https://www.cdc.gov/mold/control\\_mold.htm](https://www.cdc.gov/mold/control_mold.htm)

▶ Centers for Disease Control and Prevention- Mucormycosis <https://www.cdc.gov/fungal/diseases/mucormycosis/definition.html>

▶ Environmental Protection Agency (EPA). Mold Remediation in Schools and Commercial Buildings <https://www.epa.gov/sites/default/files/2014-08/documents/moldremediation.pdf>

▶ North Carolina Department of Health and Human Services (NC DHHS)- Mold and Human Health <https://epi.dph.ncdhhs.gov/oii/pdf/Mold%20and%20Human%20Health%208-18-05.pdf>

▶ Occupational Health and Safety Administration- A Brief Guide to Mold in the Workplace- <https://www.osha.gov/publications/shib101003>

▶ Sundermann AJ, Clancy CJ, Pasculle AW, Liu G, Cheng S, Cumbie RB, Driscoll E, Ayres A, Donahue L, Buck M, Streifel A, Muto CA, Nguyen MH. Remediation of Mucorales-contaminated Healthcare Linens at a Laundry Facility Following an Investigation of a Case Cluster of Hospital-acquired Mucormycosis. Clin Infect Dis. 2022 Apr 28;74(8):1401-1407. doi: 10.1093/cid/ciab638. PMID: 34282829.

▶ United States Environmental Protection Agency (EPA). <https://www.epa.gov/mold>