Water Damage Management in Healthcare
Michael Buck, University of Minnesota
A Webber Training Teleclass

Water Damage Management in Healthcare

Michael Buck
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Environmental Health and Safety
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Hosted by Russell Olmstead
St Joseph Mercy Health System, Michigan

www.webbertraining.com

Water Damage Management

- Reactive
  - respond to water incident
  - determine extent of water damage
  - cut out or dry

- Proactive
  - water resistant material
  - preservative application
  - proper installation
  - Collect Data

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Water Damage Study

Loss Sources

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Loss Sources

% of Total $$$
- Mechanical Failure 26%
- Shell Failure 16%
- Freeze 12%
- Domestic Failure 9%
- Contactor Error 8%
- Drain Failure 8%
- Vandalism 7%
- Unknown 7%
- Sprinkler Head 4%
- Foundation 2%
- Sewer 1%

Tell tale signs of problems

Obvious problems can be noticed visually. However, the nose knows when the mold is growing in a source such as a fan coil. When they dry they fly.

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Fungal source management

- Recognize fungal potential
  - Outward signs such as colonies on wall
  - Odors
  - Water damage

- Control methods – Source Control
  - Containment
  - HEPA filtration
  - Clean-up
  - Verification
Interior HEPA Exhaust/IC Monitoring

Source Management ΔP/IC Monitoring

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Airflow into the construction area

- Negative .02 to .03” water gauge
- Negative 5 to 7.5 Pascals
- 566-694 fpm
- Too much negative pressure? >1000 fpm

2014 Guidelines for Design and Construction of Hospitals and Outpatient Facilities

NYC guidelines for levels of mold contamination and PPE requirements

<table>
<thead>
<tr>
<th>Level</th>
<th>Area type</th>
<th>Example</th>
<th>PPE requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small isolated areas, 10 sq.ft. or less</td>
<td>Ceiling tiles, small areas on walls</td>
<td>N95 respirator, gloves, eye protection</td>
</tr>
<tr>
<td>2</td>
<td>Midsise isolated areas, 10-30 sq.ft.</td>
<td>Individual wallboard panels</td>
<td>N95 respirator, gloves, eye protection</td>
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<tr>
<td>3</td>
<td>Large isolated areas, 30-100 sq.ft.</td>
<td>Several wallboard panels</td>
<td>N95 respirator, gloves, eye protection</td>
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<tr>
<td>4</td>
<td>Extensive contamination, greater than 100 contiguous sq.ft. in an area</td>
<td>Faulty building designs, improper building material installation, condensation from high humidity environments, buildings affected by natural disaster</td>
<td>Full-face respirator with HEPA cartridges for mold, disposable protective clothing covering head, hands, and shoes</td>
</tr>
</tbody>
</table>

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APIC IP Manual for Construction and Renovation

Process for Mold Remediation & Mitigation

- Recognize and identify mold by smell or sight
- Document the scope of the problem (How big is it?)
- Find and eliminate source of moisture (or control it)
- Dry and maintain an environment free of excess moisture
- Remove and replace saturated building materials (<72 hrs)
- Assess situation & evaluate if pesticide treatment is needed
- Wipe, scrape and clean visible mold from affected area
- Paint, coat or seal building material when conditions indicate
- Treat mold with labeled pesticide
- Consult an expert for best practice

Recognition, Evaluation, and Control of Indoor Mold
AIHA 2008
Asbestos Material Survey

Mold Management Requires Control of Spore Release

When the source is dry the spores fly!

Mold growth should be expected with RH >90% with water content of material >25%
Sink passive eruption of spores at 5.5x10^5 cfu/m^3 per hour.

With protective isolation 1/109 nasal swab positive for fungal isolate

Contamination from a mold source condensation pan in tissue culture lab
FUNGAL SOURCES

- Air diffuser growth due to high humidity
- Mold cancer clinic pharmacy
- 60 bed hospital pharmacy

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Construction-Related Roof Leak

Construction schedules: difficult to coordinate
Roofer behind schedule while sheetrock ahead

Water damage requires immediate response

Temporary Drying Unit

Quick drying with warm dry air helps speed dry
<20% water content
<95% RH

Medical records dried the old-fashioned way
Infection Prevention control issues

• What is your role?
  • Assist in damage assessment?
• Do you have equipment to make assessment?
  • ICRA for clean-up activities
  • Attend Construction Meetings?
• Require Environmental Sampling prior to turning area back to staff
IC CONSIDERATION EXAMPLES

Moisture detectors are useful decision makers for water detection & drying

- Keep moisture content <20%
- Maintain air movement
- Remove moisture physically or by evaporation

NICU Case Study of water management
NICU – Case Study

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Patient Care Unit Air Samples, After Water Damage and Clean-up

<table>
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<tr>
<th></th>
<th>Total 25C Fungi</th>
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Key principal: get the water out of the building.
Flood day 72F RH 70%
2 days later 72F RH 30%

Mold grows quickly so removal is essential to minimize growth and sporulation.
- Germination in 4 hours
- Sporulation in 96 hours

When water intrusion occurs equipment must be gathered through contingencies to respond to drying.
Water content of surface <20% & ambient RH <95%.

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Response after flooding:

- Stop water
- Remove wet material
  1) to dry
  2) water damaged
- Turn up temperature
  1) for 23F increase
  2) air hold 50% more water vapor
- Move air to decrease RH
- Dehumidify
  1) depends on outside humidity
  2) inside humidity level
- Reduce to RH 30%
  1) seasonal issues
  2) climate issues
- Environmental conditions
  1) growth = surface <20% water content
  2) RH < 95%

Being Prepared for Floods in Prudent Best Practice

Tools for quick response
Transport gurney plus vacuum
And extension cords in waiting
Mold growth inhibitors

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Mold Sources are Abundant!!

- Ceiling tile
- Sink removal in ICU
- MRI table support
- Mold even likes antiseptics in a drippy shower

Using pesticide to mitigate mold growth

- Water damage needs time to dry
- Mold spores germinate in 4 hours under ideal conditions
- Applying a pesticide containing mold inhibiting chemicals will minimize growth
- This method provides mitigation without major disruption

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Questions?

THANK YOU!

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| August 18, 2018    | **INTERPRETING RESEARCH EVIDENCE: A KEY SKILL FOR INFECTION CONTROL PROFESSIONALS**  
Speaker: Prof. Donna Moralez, Memorial University School of Nursing, Newfoundland |
| September 6, 2018  | **MOLECULAR DIAGNOSTICS AND ITS ROLE IN INFECTION PREVENTION**  
Speaker: Sanchita Das, University of Chicago |
| September 13, 2018 | **NEONATAL SEPSIS PREVENTION IN LOW-RESOURCE SETTINGS**  
Speaker: Prof. Dr Angela Dramowski, Stellenbosch University, Cape Town |
| September 20, 2018 | **THE SILENT TSUNAMI OF AZOLE-RESISTANCE IN THE OPPORTUNISTIC FUNGUS ASPERGILLUS FUMIGATUS**  
Speaker: Prof. Paul E. Verweij, Radboud University Center of Expertise in Mycology, The Netherlands |
| September 27, 2018 | **CHLORHEXIDINE USE AND BACTERIAL RESISTANCE**  
Speaker: Prof. Jean Yves Maillard, Cardiff University, Wales |
| September 30, 2018 | **FREE European Teleclass - Broadcast live from the 2018 IPS conference**  
Cottrell Lecture — SURVEILLANCE BY OBJECTIVES: USING MEASUREMENT IN THE PREVENTION OF HEALTHCARE ASSOCIATED INFECTIONS  
Speaker: Prof. Jennie Wilson, University of West London |

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