EMERGENCY PREPAREDNESS TOOLKIT FOR HEALTHCARE PARTNERS
Dear Healthcare Partner,

The Oakland County Health Division (OCHD) is excited to have you join our efforts to make Oakland County a more prepared community! Oakland County continually strategizes and prepares to make sure everyone who works, lives or plays in our county is safe from emerging threats, but we can’t do it alone. It is our hope, that as healthcare providers and caretakers of our community, you will take action to plan for emergencies within your facilities to help keep our community safe.

The information in this binder provides practical tools and resources to help strengthen preparedness efforts. The Centers for Medicare & Medicaid Services (CMS) now requires healthcare providers to establish emergency plans that include risk assessment and emergency planning, a communications plan, policies and procedures, and training and testing. Enclosed are materials that will help you meet your CMS requirements, guidance on water management, and other preparedness resources.

As we all embrace our collective responsibility to be prepared, we contribute to improving the safety and security of the community. Oakland County appreciates your efforts and looks forward to working with you.

Contact the OCHD Preparedness Unit with any questions at 248-858-5645 or at Benezrame@oakgov.com.

Sincerely,

Leigh-Anne Stafford
Health Officer
Oakland County Health Division
Melanie Ben-Ezra, Emergency Preparedness Coordinator. She coordinates Emergency Preparedness unit programs and activities including exercises with staff and partners, development of trainings, partnership development, and sustainability of emergency plans. Contact Melanie for general questions regarding new or existing emergency preparedness initiatives, emergency preparedness plans or requirements. Melanie can be reached at 248-858-1318 or at benezrame@oakgov.com.

Marci Wiegers, Emergency Preparedness Specialist. Marci assists in the development and sustainability of public health emergency plans, protocols, and procedures. Marci facilitates emergency preparedness exercises and drills, and monitors improvement planning initiatives. Contact Marci for emergency preparedness planning or exercise questions. Marci can be reached at 248-858-1357 or at wiegersm@oakgov.com.

Janelle Norton, Technical Assistant. Janelle maintains emergency contact lists, assists with communications, purchasing, and unit projects. She assists in planning partnership meetings, workshops, and events. Contact Janelle for questions with the MIHAN system and information regarding emergency contacts, or inquiries regarding the Oakland County Hospital Partnership Committee or Oakland County Long Term Care Partnership Committee. Janelle can be reached at 248-452-9148 or at nortonj@oakgov.com.

Renee Calkins, Health Educator. Renee assists with public health preparedness planning. She provides support and assistance with projects, health education materials and presentations. Renee is available at 248-858-5117 or at calkinsr@oakgov.com.

Jeanette Henson, Auxiliary Health Worker. Jeanette facilitates closed POD planning with Long Term Care partners, and assists in coordination of workgroup meetings. She also assists with communications, public health preparedness planning, and unit projects. Contact Jeanette for questions regarding MIHAN and Closed POD plans. Jeanette can be reached at 248-858-0204 or at hensonjma@oakgov.com.
HAZARDS VULNERABILITY ASSESSMENT (HVA)
HAZARDS VULNERABILITY ASSESSMENT

A hazards vulnerability assessment (HVA) is the foundation to all emergency planning and should be completed first and foremost. An HVA is a systematic approach to identifying hazards or risks that are most likely to have an impact on your healthcare facility and the surrounding community. An HVA allows healthcare leaders to make risk based choices and provides the stepping stone to address vulnerabilities, mitigate hazards, respond to and recover from events, and create plans to address the greatest risks. There are many different types of threats that you will assess while completing an HVA such as technological, natural, and man-made. You will also measure the human, property and business impacts of those threats at your facility.

As a healthcare facility or provider you will find facility based threats which include specific threats related to where you are located or what services you provide. There are also common threats that impact everyone in Oakland County such as high winds, winter storms, power outages, and flooding. When completing your HVA it may help to review the Oakland County Homeland Security Hazard Mitigation Plan which can be found on the Homeland Security website at www.oakgov.com/homelandsecurity.

There are many tools and resources for HVAs. Many of Oakland County’s healthcare partners utilize the Kaiser Permanente Medical Center Hazard and Vulnerability Analysis tool; which must be completed using Microsoft Excel. This tool allows you to evaluate the potential for an event and provides a summary including the probability of an event happening. A printed version of this HVA is included on the following pages and can be downloaded at: https://www.cal-hospitalprepare.org/hazard-vulnerability-analysis.

Keep in mind that although you may have completed an HVA, unexpected emergency situations can occur that were not accounted for in your initial HVA. Therefore all emergency plans should be continuously reviewed, scalable and adaptable. It is important to review your HVA annually and update as needed.
MEDICAL CENTER HAZARD AND VULNERABILITY ANALYSIS

Instructions:
This tool provides a systematic approach to recognizing hazards that may affect demand for healthcare services or a facility’s ability to provide those services. Evaluate the potential for events and response among the following categories using the hazard specific scale. This tool must be completed using Microsoft Excel.

Issues to consider for probability include, but are not limited to:
1. Known risk
2. Historical data
3. Manufacturer/vendor statistics

Issues to consider for response include, but are not limited to:
1. Time to marshal an on-scene response
2. Scope of response capability
3. Historical evaluation of response success

Issues to consider for human impact include, but are not limited to:
1. Potential for staff death or injury
2. Potential for patient death or injury

Issues to consider for property impact include, but are not limited to:
1. Cost to replace
2. Cost to set up temporary replacement
3. Cost to repair

Issues to consider for business impact include, but are not limited to:
1. Business interruption
2. Employees unable to report to work
3. Customers unable to reach facility
4. Company in violation of contractual agreements
5. Imposition of fines and penalties or legal costs
6. Interruption of critical supplies
7. Interruption of product distribution

Issues to consider for preparedness include, but are not limited to:
1. Status of current plans
2. Training status
3. Insurance
4. Availability of back-up systems
5. Community resources

Issues to consider for internal resources include, but are not limited to:
1. Types of supplies on hand
2. Staff availability
3. Volume of supplies on hand
4. Coordination with MOB’s

Issues to consider for external resources include, but are not limited to:
1. Types of agreements with community agencies
2. Coordination with local and state agencies
3. Coordination with proximal health care facilities
4. Coordination with treatment specific facilities

Complete all worksheets including Natural, Technological, Human and Hazmat. The summary section will automatically provide your specific and overall relative threat.
# Hazard & Vulnerability Assessment Tool

## Naturally Occurring Events

<table>
<thead>
<tr>
<th>EVENT</th>
<th>PROBABILITY</th>
<th>SEVERITY = (MAGNITUDE - MITIGATION)</th>
<th>RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Likelihood this will occur</td>
<td>Possibility of death or injury</td>
<td>Physical losses and damages</td>
</tr>
<tr>
<td>SCORE</td>
<td></td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Possibility of death or injury</td>
<td>Physical losses and damages</td>
</tr>
<tr>
<td>Hurricane</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
<tr>
<td>Tornado</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
<tr>
<td>Severe Thunderstorm</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
<tr>
<td>Snow Fall</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
<tr>
<td>Blizzard</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
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<tr>
<td>Ice Storm</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
<tr>
<td>Tidal Wave</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
<tr>
<td>Temperature Extremes</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
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<td>Flood, External</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
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<tr>
<td>Landslide</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
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<tr>
<td>Dam Inundation</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
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<tr>
<td>Volcano</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
<tr>
<td>Epidemic</td>
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<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
<td>0 = N/A 1 = Low 2 = Moderate 3 = High</td>
</tr>
</tbody>
</table>

*Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY

<p>| AVERAGE SCORE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0% |</p>
<table>
<thead>
<tr>
<th>EVENT</th>
<th>PROBABILITY</th>
<th>SCORE</th>
<th>RISK</th>
<th>RELATIVE THREAT</th>
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<tr>
<td>Electrical Failure</td>
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<td>Generator Failure</td>
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<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Transportation Failure</td>
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<td>0.00</td>
<td>0%</td>
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<tr>
<td>Fuel Shortage</td>
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<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Natural Gas Failure</td>
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<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Water Failure</td>
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<td>0</td>
<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Sewer Failure</td>
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<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Steam Failure</td>
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<td>0.00</td>
<td>0%</td>
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<tr>
<td>Fire Alarm Failure</td>
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<td>0%</td>
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<td>Communications Failure</td>
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<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Medical Gas Failure</td>
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<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Medical Vacuum Failure</td>
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<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>HVAC Failure</td>
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<td>0.00</td>
<td>0%</td>
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<tr>
<td>Fire, Internal</td>
<td>1 = Low</td>
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<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Flood, Internal</td>
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<td>0.00</td>
<td>0%</td>
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<tr>
<td>Hazmat Exposure, Internal</td>
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<tr>
<td>Supply Shortage</td>
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<tr>
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<tr>
<td>2 = Moderate</td>
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<td>0.00</td>
<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>3 = High</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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</tr>
</tbody>
</table>

SEVERITY = (MAGNITUDE - MITIGATION)

RISK = PROBABILITY * SEVERITY

Threat increases with percentage.
<table>
<thead>
<tr>
<th>EVENT</th>
<th>PROBABILITY</th>
<th>SEVERITY = (MAGNITUDE - MITIGATION)</th>
<th>RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Likelihood this will occur</td>
<td>Possibility of death or injury</td>
<td>Physical losses and damages</td>
</tr>
<tr>
<td>Score</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
</tr>
<tr>
<td>Mass Casualty Incident (trauma)</td>
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<td>0 = N/A</td>
<td>0 = N/A</td>
</tr>
<tr>
<td>Mass Casualty Incident (medical/infectious)</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
</tr>
<tr>
<td>Terrorism, Biological</td>
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<td>0 = N/A</td>
<td>0 = N/A</td>
</tr>
<tr>
<td>VIP Situation</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
</tr>
<tr>
<td>Infant Abduction</td>
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<td>0 = N/A</td>
<td>0 = N/A</td>
</tr>
<tr>
<td>Hostage Situation</td>
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<td>0 = N/A</td>
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<tr>
<td>Civil Disturbance</td>
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<td>0 = N/A</td>
<td>0 = N/A</td>
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<tr>
<td>Labor Action</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
</tr>
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<td>Forensic Admission</td>
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<td>0 = N/A</td>
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<tr>
<td>Bomb Threat</td>
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<td><strong>AVERAGE SCORE</strong></td>
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</table>

*Risk increases with percentage.*
# Hazard & Vulnerability Assessment Tool

## Events Involving Hazardous Materials

<table>
<thead>
<tr>
<th>EVENT</th>
<th>PROBABILITY</th>
<th>SEVERITY = (MAGNITUDE - MITIGATION)</th>
<th>RISK</th>
<th>Relative threat*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Likelihood this will occur</td>
<td>Human Impact</td>
<td>Property Impact</td>
<td>Business Impact</td>
</tr>
<tr>
<td>Score</td>
<td>Possibility of death or injury</td>
<td>Physical losses and damages</td>
<td>Interruption of services</td>
<td></td>
</tr>
<tr>
<td>0 = N/A</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
<td>0 = N/A</td>
</tr>
<tr>
<td>1 = Low</td>
<td>1 = Low</td>
<td>1 = Low</td>
<td>2 = Moderate</td>
<td>1 = Low</td>
</tr>
<tr>
<td>2 = Moderate</td>
<td>2 = Moderate</td>
<td>2 = Moderate</td>
<td>3 = High</td>
<td>3 = Moderate</td>
</tr>
<tr>
<td>3 = High</td>
<td>3 = High</td>
<td>3 = High</td>
<td></td>
<td>3 = High</td>
</tr>
<tr>
<td>Mass Casualty Hazmat Incident (From historic events at your MC with &gt;=5 victims)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Casualty Hazmat Incident (From historic events at your MC with &lt;=5 victims)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Chemical Exposure, External</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small-Medium Sized Internal Spill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Internal Spill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrorism, Chemical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiological Exposure, Internal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiological Exposure, External</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrorism, Radiological</td>
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<tr>
<td>Average Score</td>
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*Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY

0.00 0.00 0.00
## MEDICAL CENTER HAZARDS ANALYSIS SUMMARY

<table>
<thead>
<tr>
<th></th>
<th>NATURAL</th>
<th>TECHNOLOGICAL</th>
<th>HUMAN</th>
<th>HAZMAT</th>
<th>TOTAL FOR FACILITY</th>
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<tbody>
<tr>
<td><strong>Probability</strong></td>
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<td>0.00</td>
<td>0.00</td>
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<tr>
<td><strong>Severity</strong></td>
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<td>0.00</td>
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<tr>
<td><strong>Hazard Specific Relative Risk</strong></td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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</tr>
</tbody>
</table>

### Hazard Specific Relative Risk to Medical Center

- **Relative Threat to Facility**
  - 1.00
  - 0.90
  - 0.80
  - 0.70
  - 0.60
  - 0.50
  - 0.40
  - 0.30
  - 0.20
  - 0.10
  - 0.00

### Probability and Severity of Hazards to Medical Center

- **Relative Impact on Facility**
  - 1.00
  - 0.90
  - 0.80
  - 0.70
  - 0.60
  - 0.50
  - 0.40
  - 0.30
  - 0.20
  - 0.10
  - 0.00

- **Probability**
  - 1.00
  - 0.90
  - 0.80
  - 0.70
  - 0.60
  - 0.50
  - 0.40
  - 0.30
  - 0.20
  - 0.10
  - 0.00

- **Severity**
  - 1.00
  - 0.90
  - 0.80
  - 0.70
  - 0.60
  - 0.50
  - 0.40
  - 0.30
  - 0.20
  - 0.10
  - 0.00
POLICIES AND PROCEDURES
POLICIES AND PROCEDURES

After identifying all probable hazards at your facility through a Hazards Vulnerability Assessment (HVA), the next step is to develop policies and procedures to address these hazards. Policies and procedures provide step by step guidance for emergency situations and are the primary portion of your emergency plan. Listed below are several questions regarding evacuation and shelter in place as well as sustenance needs. These are examples of the types of issues to consider while creating policies and procedures. Apply this method to other threats identified in your HVA.

Evacuation and Shelter in Place
• What criteria are used to determine whether your facility will shelter in place or evacuate during an emergency?
• Who has the authority to make decisions?
• What procedures will the facility use to determine which residents can be discharged versus moved to another facility?
• What procedures will the facility use to determine the order in which residents are evacuated?
• How will the treatment needs of residents be identified and addressed during evacuations?
• What evacuation procedures will be used for nonresidents or visitors?
• Which staff members have what responsibilities during the execution of evacuation procedures?
• How will transport of residents be arranged?
• How will identify appropriate facilities to receive residents?

Sustenance Needs for Inpatient Facilities:
• How many residents, on average, does your facility have on site?
• How many staff members does your facility have on site, on average?
• How long could you plan to shelter in place with the individuals?
• What supplies, and in what quantities, would you need to shelter in place for over a 24 hour period? Consider the following items:
  - Food
  - Water
  - Medical supplies (gowns, gloves, oxygen tanks, tubing, bedding, syringes, etc.)
  - Pharmaceuticals
  - Alternate sources of energy
• Where would you stockpile these inventories?
• Who will be responsible for maintaining emergency inventories?
• How would you utilize these supplies during an emergency?
• Where would you get additional supplies when inventories run low?
COMMUNICATION AND COLLABORATION
COMMUNICATION AND COLLABORATION

It is important to know the contact information for emergency officials in Oakland County as they could potentially help mitigate an emergency situation at your facility. The OCHD Emergency Preparedness Unit currently has partnerships with all hospitals and many long term care facilities in Oakland County. We also work with many types of healthcare facilities to provide support for their emergency preparedness efforts.

The CMS Emergency Preparedness for All Provider and Certified Supplier Types Interpretive Guidance states, “While the responsibility for ensuring a coordinated disaster preparedness response lies upon the state and local emergency planning authorities, the facility must document its efforts to contact these officials to engage in collaborative planning for an integrated emergency response. The facility must include this integrated response process in its emergency plan.” (2017)

Although CMS requires facilities to show contact information for local, tribal, regional, state, and federal emergency preparedness officials, all emergencies begin at the local level; therefore, Oakland County Homeland Security should be contacted initially at 248-858-5300. If the event becomes a large scale incident and state level resources are needed, OCHD would act as a liaison with state officials.

The following page lists important contact information for local, regional, state and federal emergency preparedness officials. This information should be included within your emergency plans. Please feel free to contact OCHD Emergency Preparedness Unit at 248-858-5645 for emergency planning support while planning for emergencies at your facility.
LOCAL, REGIONAL, STATE & FEDERAL EMERGENCY PREPAREDNESS OFFICIALS

Oakland County Health Division Emergency Preparedness Unit .......................... 248-858-5645
1200 N. Telegraph Rd. Bldg. 34E • Pontiac, MI 48341

Oakland County Homeland Security Division ....................................................... 248-858-5300
1200 N Telegraph Rd. • Pontiac, MI 48341

Region 2 North Healthcare Coalition ................................................................. 248-759-4748
1000 W University Dr. #203 • Rochester Hills, MI 48307

Michigan Department of Health and Human Services ........................................ 517-335-8150
Division of Emergency Preparedness
PO Box 30207 • Lansing, MI 48909-0207

FEMA - Region V .............................................................................................. 517-408-5365
Regional Watch Center

CMS - Region V ................................................................................................. 312-886-5351
Emergency Coordinator

For notification, resources and additional assistance during an emergency, call the Oakland County 24/7 contact number at:

248-858-5300
WATER MANAGEMENT
WATER MANAGEMENT PLANS
TO REDUCE LEGIONELLA GROWTH

Legionella is a bacterium that is found naturally occurring in freshwater environments like streams and lakes. Legionella occurring naturally generally does not pose a health threat; however, when it gets into man made water systems and grows it can cause Legionnaires’ disease. Legionnaires’ disease is spread when water is aerosolized and people breathe in the contaminated water droplets. There are many factors that can lead to Legionella growth such as water temperature fluctuations, pH fluctuations, low levels of disinfectant, changes in water pressure, water stagnation, and the presence of scale, sediment and biofilm.

Healthcare facilities are at higher risk for having an outbreak of Legionnaires' disease because they serve vulnerable populations. Populations vulnerable to Legionnaires’ disease include older people and those who have certain risk factors, such as being a current or former smoker, having a chronic disease, or having a weakened immune system. Healthcare facilities generally have complex water systems that provide opportunities for Legionella to proliferate and cause Legionnaires’ disease.

Legionella is most likely to grow in areas that are continually wet like:

- Hot and cold water storage tanks
- Water heaters
- Water-hammer arrestors
- Expansion tanks
- Water filters
- Electronic faucets
- Aerators
- Faucet flow restrictors
- Shower heads and hoses
- No steam aerosol-generating humidifiers
- Infrequently used equipment, including eyewash stations
- Ice machines
A water management program at your facility will help identify at risk areas within your water system and help you take the steps needed to minimize the growth and spread of Legionella and other pathogens. Developing and maintaining a water management program is a multi-step process that requires continuous review. Consider establishing a water management team to work together to identify ways to reduce Legionella growth, conduct routine checks of control measures, and to take action if an issue is found. To begin developing a water management program, see the list of activities below or review the flowchart at the end of this section.

- Describe the building water systems using flow diagrams and a written description
- Identify areas where Legionella could grow and spread
- Decide where control measures should be applied and how to monitor them
- Establish ways to intervene when control limits are not met
- Make sure the program is running as designed and is effective
- Document and communicate all activities

Listed below are several different types of control measures used to control the growth of Legionella.

- Use the correct amount of disinfectant
- Keep your water at the recommended temperatures
- Operate and maintain equipment to reduce biofilm and debris
- Prevent stagnation by keeping water flowing
- Be aware of external factors around you such as construction and water main breaks

Your water management team should regularly monitor water control parameters such as disinfectant, pH, and temperature levels. If an issue arises and the efficacy of your water management program comes into question, you may need to test your water for Legionella and other pathogens. The Centers for Disease Control and Prevention (CDC) has established an ELITE accreditation for laboratories that are able to isolate (grow and identify) Legionella from a water sample by using a culture method. These laboratories are certified and are evaluated annually. There are laboratories in Michigan that have earned ELITE status through the CDC and their information can be found at: https://wwwn.cdc.gov/elite/Public/MemberList.aspx.
RESOURCES FOR WATER MANAGEMENT

The CDC has created a user friendly water management toolkit titled Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards. This toolkit will help you develop, implement, and evaluate a Legionella water management program for your building. The CDC toolkit can be found at: https://www.cdc.gov/legionella/downloads/toolkit.pdf. Also, the state of Michigan has a dedicated team that educates and consults with healthcare facilities while developing or changing water management plans.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) is the foremost source of technical and educational information in the sciences of heating, ventilating, air conditioning and refrigerating. The CDC collaborates with ASHRAE to provide up to date comprehensive information available about Legionella. ASHRAE Standard 188 has established minimum Legionella risk management requirements for building water systems. That document is available for purchase at: https://www.ashrae.org/resources--publications/bookstore/an-si-ashrae-standard-188-2015-legionellosis-risk-management-for-building-water-systems.

Be aware that in June of 2017, CMS issued a memorandum that requires Hospitals, Critical Access Hospitals (CAHs), and Long Term Care facilities to establish a water management program that inhibits the growth of Legionella bacteria in water systems. At the time of publication, this requirement was effective immediately. The memorandum can be reviewed at: https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGen-fo/Downloads/Survey-and-Cert-Letter-17-30.pdf.
**STEPS TO CREATING A WATER MANAGEMENT PROGRAM**

1. **Establish a Designated Team**
2. **Develop Water Flow Diagrams**
3. **Determine the Patient Populations at Risk**
4. **Identify Areas, Equipment & Systems at Risk**
5. **Identify Strategies to Mitigate Risk**
6. **Establish Program to Monitor Strategies**
7. **Determine Response Actions**
8. **Review Program Periodically to Confirm Effectiveness**

ASHRAE, 2017
Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings

A PRACTICAL GUIDE TO IMPLEMENTING INDUSTRY STANDARDS
Legionnaires’ disease is a serious type of pneumonia caused by bacteria, called *Legionella*, that live in water. *Legionella* can make people sick when they inhale contaminated water from building water systems that are not adequately maintained. Unfortunately, Legionnaires’ disease is on the rise in the United States. To reverse this trend, we are asking for your help to manage the risk of exposure to *Legionella* from water in your building.

Your building may need a water management program to reduce the risk for Legionnaires’ disease associated with your building water system and devices. This water management program should identify areas or devices in your building where *Legionella* might grow or spread to people so that you can reduce that risk. *Legionella* water management programs are now an industry standard for large buildings in the United States (ASHRAE 188: *Legionellosis: Risk Management for Building Water Systems* June 26, 2015. ASHRAE: Atlanta).

This toolkit will help you develop and implement a water management program to reduce your building’s risk for growing and spreading *Legionella*. If you already have a program, this toolkit will help you assess and strengthen it. Included are practical resources to help you ensure that your water management program is comprehensive, effective, and in line with industry standards. This toolkit also highlights special considerations for healthcare facilities.

Because building water systems vary in their design and complexity, examples in this toolkit are only meant to help you understand the process. You should develop a water management program to reduce *Legionella* growth and spread that is specific to your building.

We welcome your feedback on this toolkit by emailing RDB@cdc.gov.

For additional information about Legionnaires’ disease, visit www.cdc.gov/legionella. This toolkit can also be found online at www.cdc.gov/legionella/WMPtoolkit.

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**Nancy Messonnier, MD, CAPT USPHS**
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U.S. Centers for Disease Control and Prevention

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How to Use This Toolkit

If you’ve never developed a Legionella water management program (a plan to reduce the risk of Legionella growth and spread), you might not be sure where or how to start. This toolkit will provide guidance to help you develop, implement, and evaluate a Legionella water management program for your building. You do not have to have training or certification in any specific hazard analysis, risk assessment, or risk management methodologies to use this toolkit. However, you may need to seek help from an expert in some cases. Be sure to follow all relevant federal, state, and local laws, regulations, and ordinances. If anything in this toolkit conflicts with these policies, always adhere to the policies.

Where do we start?
The first step is to determine if you even need a program. You can use the worksheet on page 2 to find out if your entire building or parts of it are at increased risk for Legionella growth and spread. If you learn that you need to develop a program, this toolkit will explain what steps you should take and give several examples to clarify the process.

Do we really need a water management program to prevent Legionella growth and spread?
If you answer YES to any of the questions on page 2, then yes! Developing and implementing a program means that you are helping to protect people from getting Legionnaires’ disease, a serious type of pneumonia (see Appendix A for more information on this disease).

Is this toolkit full of scientific terms?
You might come across some technical terms that are unfamiliar. The glossary on page 3 and the introduction to Legionella ecology on pages 4–5 should help you with these terms.

Will this toolkit tell us everything that we need to do?
No. Because every building is unique, only you have access to all the information that is needed to develop and implement a program specific to your building. An example of a building is included to help illustrate some of the steps. It’s important to know that these examples are not comprehensive and you will need to create a program specific to your building water system and devices.

This toolkit looks really long. What’s the bottom line?
You need to actively identify and manage hazardous conditions that support growth and spread of Legionella. As you work through the toolkit, you’ll learn about the importance of identifying and controlling hazardous conditions that increase the chance of Legionella growth and spread. The bottom line is that you need to:

- Identify building water systems for which Legionella control measures are needed
- Assess how much risk the hazardous conditions in those water systems pose
- Apply control measures to reduce the hazardous conditions, whenever possible, to prevent Legionella growth and spread
- Make sure the program is running as designed and is effective

Is there anyone who can help us develop our program?
Yes. As you’ll learn in the toolkit, it’s recommended that you form a water management team. Your team should include a variety of people who bring different skills to the table (learn more on page 7). You might already have all the expertise you need on staff, but sometimes you will need to get outside help. In some cases, you may need to train your in-house personnel or hire professionals with specific experience in Legionella bacteria in building water systems, such as a certified industrial hygienist, a microbiologist, or an environmental health specialist. Blueprints could come in handy, too.

What do all of the gray boxes mean?
The gray boxes throughout the document highlight program elements that are especially relevant for healthcare facilities. The content found outside of the gray boxes is also applicable to these types of facilities.
Identifying Buildings at Increased Risk

Survey your building (or property) to determine if you need a water management program to reduce the risk of Legionella growth and spread.

If you answer YES to any of questions 1 through 4, you should have a water management program for that building’s hot and cold water distribution system.

<table>
<thead>
<tr>
<th>Healthcare Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes ____ No ____ 1. Is your building a healthcare facility where patients stay overnight or does your building house or treat people who have chronic and acute medical problems† or weakened immune systems?</td>
</tr>
<tr>
<td>Yes ____ No ____ 2. Does your building primarily house people older than 65 years (like a retirement home or assisted-living facility)?</td>
</tr>
<tr>
<td>Yes ____ No ____ 3. Does your building have multiple housing units and a centralized hot water system (like a hotel or high-rise apartment complex)?</td>
</tr>
<tr>
<td>Yes ____ No ____ 4. Does your building have more than 10 stories (including basement levels)?</td>
</tr>
</tbody>
</table>

Devices in buildings that can spread contaminated water droplets should have a water management program even if the building itself does not. If you answer NO to all of questions 1 through 4 but YES to any of questions 5 through 8, you should have a water management program for that device.

| Yes ____ No ____ 5. Does your building have a cooling tower*? |
| Yes ____ No ____ 6. Does your building have a hot tub (also known as a spa) that is not drained between each use? |
| Yes ____ No ____ 7. Does your building have a decorative fountain? |
| Yes ____ No ____ 8. Does your building have a centrally-installed mister, atomizer, air washer, or humidifier? |

If you answer NO to questions 1 through 8, you should still maintain water systems according to manufacturer recommendations. On properties with multiple buildings, prioritize buildings that house or treat people who are at increased risk for Legionnaires’ disease (see Appendix A to learn who is at increased risk).

The building standards discussed in this toolkit do not apply to single-family or small multiple-family residences (e.g., duplexes), even those with the devices in questions 6 through 8, but residents do need to take steps to protect themselves from waterborne diseases.

Homeowners should follow local and state guidelines for household water use, and owners of the devices in questions 6 through 8 should follow the manufacturer’s instructions regarding cleaning, disinfecting, and maintenance.


†Burns, cancer, solid organ or bone marrow transplant, kidney disease, diabetes, or chronic lung disease

*For a definition of a cooling tower, visit www.cti.org/whatis/coolingtower.shtml.
Glossary

Biofilm (slime): Germs and the slime they secrete that stick to and grow on any continually moist surface; provides housing, food, and security for many different types of germs, including Legionella

Building water systems: Includes hot and cold water distribution and all devices that use water people can be exposed to, such as hot tubs, decorative fountains, and cooling towers

Control: To manage the conditions within your building according to your water management program

Control measures: Things you do in your building water systems to limit growth and spread of Legionella, such as heating, adding disinfectant, or cleaning

Control limits: The maximum value, minimum value, or range of values that are acceptable for the control measures that you are monitoring to reduce the risk for Legionella growth and spread

Control points: Locations in the water systems where a control measure can be applied

Contingency response: Reaction to control measures that are persistently outside of control limits or events that pose an immediate risk to control of your building water systems; required for all instances when Legionnaires’ disease occurs, but may also be appropriate for unexpected events such as equipment failure or acts of nature that disrupt the water system

Corrective action: Actions taken to reestablish control when monitoring or measurement values are outside control limits

Dead legs: Piping that is subject to low or no flow due to design or decreased water use such as capped pipes or unused faucets

Disinfectant: Chemical or physical treatment used to kill germs, such as chlorine, monochloramine, chlorine dioxide, copper-silver ionization, ultraviolet light, or ozone

Hazardous conditions: Anything that, if not controlled, can contribute to the growth and spread of Legionella to a person

Healthcare facility: A place where patients stay overnight for medical care or where people with chronic or acute medical problems* are treated; this may include inpatient or outpatient care areas

Heterotrophic plate counts: A measure of the number and variety of bacteria that are common in water; a high count may indicate a high microbial load and the need for corrective action, but cannot be substituted for Legionella testing

Legionella: Bacteria that can cause Legionnaires’ disease

Legionnaires’ disease: A serious type of pneumonia caused by Legionella

Residual: The amount of disinfectant available in water to kill germs

Scale and sediment: The mineral build-up in a water system that uses up disinfectant and supports germ growth and/or survival

Stagnation: When water does not flow well; areas of stagnant water encourage biofilm growth and reduce temperature and level of disinfectant

* Burns, cancer, solid organ or bone marrow transplant, kidney disease, diabetes, or chronic lung disease

**Introduction to Legionella Ecology**

*Legionella pneumophila*

*Legionella* is found naturally in freshwater environments, like lakes and streams, but generally the low amounts in freshwater do not lead to disease. *Legionella* can become a health problem in building water systems. To pose a health risk, *Legionella* first has to **grow** (increase in numbers). Then it has to be **aerosolized** so people can breathe in small, contaminated water droplets.

**Factors external to buildings that can lead to Legionella growth**

- **Construction**: Vibrations and changes in water pressure can dislodge biofilm and free *Legionella* into the water entering your building.
- **Water main breaks**: Changes in water pressure can dislodge biofilm and free *Legionella* into the water, while dirt and other materials can be introduced into the water and use up disinfectant.
- **Changes in municipal water quality**: Changes in water quality can increase sediment, lower disinfectant levels, increase turbidity, or cause pH to be outside recommended ranges. Changes in disinfectant type can impact how you should monitor your program.

---

**Where can Legionella grow and/or spread?**

*Legionella* can grow in many parts of building water systems that are continually wet, and certain devices can then spread contaminated water droplets. Examples include:

- Hot and cold water storage tanks
- Water heaters
- Water-hammer arrestors
- Expansion tanks
- Water filters
- Electronic and manual faucets*
- Aerators
- Faucet flow restrictors
- Showerheads* and hoses
- Pipes, valves, and fittings
- Centrally-installed misters*, atomizers*, air washers*, and humidifiers*
- Nonsteam aerosol-generating humidifiers*
- Infrequently used equipment, including eyewash stations*
- Ice machines*
- Hot tubs*
- Decorative fountains*
- Cooling towers*
- Medical devices* (such as CPAP machines, hydrotherapy equipment, bronchoscopes)

*These devices can spread *Legionella* through aerosols or aspiration.
Factors internal to buildings that can lead to Legionella growth

- **Biofilm**: Protects Legionella from heat and disinfectant; provides food and shelter to germs; grows on any surface that is constantly moist and can last for decades
- **Scale and sediment**: Uses up disinfectant and creates a protected home for Legionella and other germs
- **Water temperature fluctuations**: Provide conditions where Legionella grows best (77°F–108°F); Legionella can still grow outside this range
- **Water pressure changes**: Can cause biofilm to dislodge, colonizing downstream devices
- **pH**: Disinfectants are most effective within a narrow range (approximately 6.5 to 8.5)
  Many things can cause the hot water temperature to drop into the range where Legionella can grow, including low settings on water heaters, heat loss as water travels through long pipes away from the heat source, mixing cold and hot water within the plumbing system, heat transfer (when cold and hot water pipes are too close together), or heat loss due to water stagnation. In hot weather, cold water in pipes can heat up into this range.
- **Inadequate disinfectant**: Does not kill or inactivate Legionella.
  Even if the water entering your building is of high quality, it may contain Legionella. In some buildings, processes such as heating, storing, and filtering can degrade the quality of the water. These processes use up the disinfectant the water entered with, allowing the few Legionella that entered to grow into a large number if not controlled.
- **Water stagnation**: Encourages biofilm growth and reduces temperature and levels of disinfectant.
  Common issues that contribute to water stagnation include renovations that lead to ‘dead legs’ and reduced building occupancy, which can occur in hotels during off-peak seasons, for example. Stagnation can also occur when fixtures go unused, like a rarely used shower in a hospital room.
Elements of a Water Management Program

Developing and maintaining a water management program is a multi-step, continuous process. The key steps, listed here, are explained in more detail throughout the toolkit with the associated step number appearing on the page where the specific step is discussed.

1. Establish a water management program team
2. Describe the building water systems using text and flow diagrams
3. Identify areas where Legionella could grow and spread
4. Decide where control measures should be applied and how to monitor them
5. Establish ways to intervene when control limits are not met
6. Make sure the program is running as designed and is effective
7. Document and communicate all the activities

Program Review
You need to review the elements of your program at least once per year. Make sure you also review and revise your program when any of the following events occur:

- Data review shows control measures are persistently outside of control limits
- A major maintenance or water service change occurs, such as:
  - New construction
  - Equipment changes (e.g., new hot tub chlorinator pump)
  - Changes in treatment products (e.g., disinfectants)
  - Changes in water usage (e.g., high and low season for hotel)
  - Changes in the municipal water supply
- One or more cases of disease are thought to be associated with your system(s)
- Changes occur in applicable laws, regulations, standards, or guidelines

If an event triggers you to review and update your water management program, remember to:

- Update the process flow diagram, associated control points, control limits, and corrective actions
- Update the written description of your building water systems
- Train those responsible for implementing and monitoring the updated program

Establish a Water Management Program Team

Certain skills, described in the diagram below, are needed to develop and implement your water management program. These skills would typically be provided by a combination of people, some of whom may have multiple skills (examples shown below).

Consider who among your employees, partners, and outside experts can provide these skills so that you can develop the most effective program possible. Those who might be part of your water management program team include:

- Building owner
- Building manager/administrator
- Maintenance or engineering employees
- Safety officers
- Equipment or chemical suppliers
- Contractors/consultants (e.g., water treatment professionals)
- Certified industrial hygienists
- Microbiologists
- Environmental health specialists
- State and local health officials

In some cases, you may need to train your in-house personnel or hire professionals with specific experience in Legionella bacteria in building water systems.

Healthcare Facilities
The team should also include:

- Someone who understands accreditation standards and licensing requirements
- Someone with expertise in infection prevention
- A clinician with expertise in infectious diseases
- Risk and quality management staff

Describe Your Building Water Systems Using Text

EXAMPLE: BUILDING A

You will need to write a simple description of your building water system and devices you answered YES to on page 2. This description should include details like where the building connects to the municipal water supply, how water is distributed, and where pools, hot tubs, cooling towers, and water heaters or boilers are located. An existing as-built diagram of the plumbing system and fixtures may be useful in developing this description. Below is a description of the water systems* for an example building (Building A). You will see how this text gets turned into a diagram in the next section (page 10).

1. Water enters the basement of the property via a 4-inch main from the municipal water line at Maple Street. Water is immediately drawn off to charge the fire suppression system. The rest of the water is sent through cold water distribution. There is backflow prevention throughout the system, including between the cold water distribution and the city water main and between the cold water distribution and the fire suppression system.

   Note: Problems with entering water are usually beyond the building manager’s control, such as main breaks or construction that disrupts water service. However, an essential part of a water management program is monitoring water and responding to changes coming in from the municipal water line. You can contact your drinking water provider to report any changes you notice in the quality of water being delivered to your building.

2. Cold water is distributed directly to the lit decorative fountain in the lobby, the cooling tower on the roof, the hot tub and pool on the first floor, ice machines on floors 2, 4, 6, 8, and 10, and shower and faucet fixtures in rooms on all 12 floors. All internal plumbing consists of 2-inch copper and polyvinyl chloride (PVC) piping. There is backflow prevention between cold water distribution and the utility lines that serve the cooling tower and hot tub/pool room.

   Note: In warm climates, water in pipes that typically carry cold water may reach a temperature that allows for growth of Legionella. Detectable residual disinfectant added by your water provider helps to limit growth of Legionella and other germs. Additionally, decorative fountains with submerged lighting and devices such as cooling towers and ice machines may contain areas where cold water can be heated to temperatures that allow Legionella to grow. Swimming pools do not usually generate hazardous conditions because they rarely reach adequate temperature for growth or generate water droplets small enough to be inhaled.

3. Cold water is heated to 140°F by two joined 120-gallon water heaters. The heaters supply a 500-gallon storage tank. Cold water is also delivered to an 80-gallon water heater in the basement that serves the kitchen and staff break room.

   Note: Even water heaters set to the correct temperature may contain zones of lower temperature water where cold and hot water mix or where excessive sediment blocks heating elements. Most residual disinfectants are reduced by heating the water.

*Examples of water systems not included in Building A that may be of concern include, but are not limited to, recycled or reused water, eyewash stations, and solar water heaters.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

4. **Hot water is distributed** to plumbing fixtures in the basement through floor 5 from the joined water heaters in the basement on a direct (non-recirculating) line. Hot water is distributed to floors 6 through 11 from the storage tank with a recirculating line designed to return to the joined water heaters in the basement. Note that hot water is tempered (mixed with cold water) at the fixtures by thermostatic mixing valves.

   **Note:** Water in direct hot and cold water pipes can pose multiple hazardous conditions. First, the process of heating the water can reduce disinfectant levels. Second, if hot water is allowed to sit in the pipes (stagnation), it might reach a temperature where Legionella can grow and could encourage sediment to accumulate or biofilm to form. With recirculating hot water pipes, the greatest risk is that returning water with reduced or no disinfectant cools to a temperature where Legionella can grow. If this happens, Legionella in the return line can travel to central distribution points and contaminate the entire plumbing system of the building.

5. **Hot, cold, and tempered waste water is discarded** through the sanitary sewer line.

   **Note:** It is not known at this time if Legionella can grow and spread in sources such as harvested rainwater or reclaimed graywater (i.e., bath, laundry).

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Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Describe Your Building Water Systems Using a Flow Diagram

EXAMPLE: BUILDING A

In addition to developing a written description of your building water systems, you should develop a process flow diagram. Below is an example of a process flow diagram for Building A. Note that this diagram does not need to be as detailed as your building plans. In fact, it’s best if the process flow diagram can be understood easily by all members of your team.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Identify Areas Where Legionella Could Grow & Spread

EXAMPLE: BUILDING A

Once you have developed your process flow diagram, identify where potentially hazardous conditions could occur in your building water systems. The below diagram points out locations and types of hazardous conditions you could expect in Building A. Each potentially hazardous condition should be addressed individually with a control point, measure, and limit.

**Healthcare Facilities**

Think about:
- Areas where medical procedures may expose patients to water droplets, such as hydrotherapy
- Areas where patients are more vulnerable to infection, such as bone marrow transplant units, oncology floors, or intensive care units

In Building A, the ice machine is included to illustrate that patients with problems swallowing may be at increased risk for Legionella spread by aspiration.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

3 Control Measures & Corrective Actions: The Basics

The diagram below shows the process of implementing and monitoring control measures. If you find that a control limit (i.e., temperature levels, disinfectant levels) is not being met, you need to take corrective actions to get conditions back to within an acceptable range. The right side, in yellow, illustrates the routine process of monitoring control measures to make sure they are within limits. The left side, in orange, shows the process of what to do if control measures are found to be outside of their limits.

Remember, any time there is a suspected case of Legionnaires’ disease associated with your building you should:

- Contact your local and/or state health department or work with them if they contact you
- Notify anyone who could be affected by the growth and spread of Legionella in your building if the health department asks you to
- Decontaminate the building water systems if necessary (you may need to get additional help from outside experts)
- Review the water management program and revise it, if necessary

**Healthcare Facilities**

In addition to the steps listed above that you would take in all buildings, if a case of healthcare-associated Legionnaires’ disease is discovered in a healthcare facility:

- Make sure the person with expertise in infection prevention on your team is aware
- **Important:** Tell clinicians so they can test patients with healthcare-associated pneumonia for Legionnaires’ disease with both culture of lower respiratory secretions and the Legionella urinary antigen test
- Report the case to your local and/or state health department; a full investigation may be needed

For more details on identifying and investigating Legionnaires’ disease cases in healthcare facilities, see page 24.

Decide Where Control Measures Should Be Applied

Control measures and limits should be established for each control point. See the diagram on the next page for the types of monitoring that could occur in Building A. You will need to monitor to ensure your control measures are performing as designed. Control limits, in which a chemical or physical parameter must be maintained, should include a minimum and a maximum value.

Examples of chemical and physical control measures and limits to reduce the risk of *Legionella* growth:

- Water quality should be measured throughout the system to ensure that changes that may lead to *Legionella* growth (such as a drop in chlorine levels) are not occurring.
- Water heaters should be maintained at appropriate temperatures.
- Decorative fountains should be kept free of debris and visible biofilm.
- Disinfectant and other chemical levels in cooling towers and hot tubs should be continuously maintained and regularly monitored. Surfaces with any visible biofilm (i.e., slime) should be cleaned.

### Healthcare Facilities

Clinicians should test patients with healthcare-associated pneumonia (pneumonia with onset ≥48 hours after admission) for Legionnaires’ disease. This is especially important among patients at increased risk for developing Legionnaires’ disease (see Appendix B), among patients with severe pneumonia (particularly those requiring intensive care), or if any of the following are identified in your facility:

- Other patients with healthcare-associated Legionnaires’ disease diagnosed in the past 12 months
- Positive environmental tests for *Legionella* in the past 2 months
- Current changes in water quality that may lead to *Legionella* growth (such as low chlorine levels)

The preferred diagnostic tests for Legionnaires’ disease are culture of lower respiratory secretions on selective media and the *Legionella* urinary antigen test.

Additionally, certain commonly-encountered changes in building water system design or management might require increasing the extent and frequency of monitoring. It’s a good idea to anticipate additional hazardous conditions that could be associated with scheduled or unanticipated changes in water quality, such as:

- System start up
- System shut down
- Regularly scheduled maintenance
- Renovations, construction, and installation of new equipment on your property
- Equipment failure
- Water main break or other service interruptions

**Anti-scald Regulation**

You should follow local and state anti-scald regulations. However, maximum temperatures allowed by your state may be too low to limit *Legionella* growth. Engineering controls that mix hot and cold water together at or near the point of use can reduce the risk of scalding while allowing water in pipes to remain hot enough to limit *Legionella* growth.

4 Decide How to Monitor Your Control Measures

EXAMPLE: BUILDING A

The diagram below shows which types of monitoring could occur at different locations within Building A’s water system to reduce the risk of growth and spread of Legionella.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.


Note: In addition to whatever you do to prevent Legionella, state and local regulations may exist that govern the design, construction, operation, and maintenance of public aquatic facilities (e.g., pools and hot tubs). See CDC’s Model Aquatic Health Code at www.cdc.gov/mahc/index.html for helpful information, but this document is not a substitute for state and local regulations.

Note: Heterotrophic plate counts can aid in your monitoring program as an indicator of water quality, but should not be used as a control measure.
Establish Ways to Intervene When Control Limits Are Not Met

CORRECTIVE ACTION EXAMPLES

Building water systems are dynamic. You should plan for your monitoring results to vary over time and be prepared to apply corrective actions. Corrective actions are taken in response to systems performing outside of control limits. The following are examples of corrective actions.

Example 1—Biofilm growth in the decorative fountain

1. During her weekly inspection of the fountain in the first floor lobby, Michelle Patterson notes that the fountain walls have accumulated a slimy growth.
2. As dictated by her water management program, Michelle immediately shuts off the fountain, drains it to the sanitary sewer, and scrub with a detergent recommended by the manufacturer.
3. She then follows the program’s start up procedure to refill the fountain with water and checks the residual disinfectant levels to make sure that they are within control limits.
4. Michelle documents her observations and the performance of interim cleaning in her log book. She informs her supervisor.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Example 2—Unoccupied floor

1. The eighth floor of the building is being renovated and is closed to the public. Jason Hernandez understands that this may cause a temporary hazardous condition because water usage will decrease, which means that stagnation is possible.

2. After discussing the issue with his supervisor, Jason counteracts the potential for stagnation by daily flushing of the sinks and fixtures with hot and cold water in several rooms including those at the end of the hall, which are farthest from the vertical pipe serving that floor (riser).

3. Jason also increases the frequency of measuring temperature and chlorine levels on the eighth floor from weekly to daily for the duration of the renovation.

4. He documents the method and duration of flushing and records his daily temperature and chlorine readings in his log book. He reviews his documentation with his supervisor.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Example 3—Debris in the cooling tower

1. During weekly inspection of the cooling tower, Michelle discovers that leaf litter has accumulated in the reservoir.

2. Upon further investigation, she finds that a panel has become dislodged, allowing windblown debris to enter.

3. After replacing the panel and skimming out the debris, Michelle checks the disinfectant levels and performs a heterotrophic plate count as an indicator of water quality.

4. She documents her actions in her log book. She also makes a note to check the disinfectant levels daily for a week to make sure that the cooling tower remains within control limits. She reviews her actions and documentation with her supervisor.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

CONTINGENCY RESPONSE EXAMPLES

Even the most closely monitored systems will sometimes require adjustments, as shown in the following examples. You should be prepared to respond, even to unexpected problems, based on your knowledge of the building water systems and how Legionella grows and spreads. You may need to initiate a customized contingency response to gain control of a building water system. Contingency responses may involve several steps and often require follow up. A contingency response is always required when a case of Legionnaires’ disease has been linked to a building and is also appropriate in other situations.

Example 1—Biofilm growth in the fountain

1. During the annual review of the water management program, supervisor Anson Cho notes that Michelle and Jason performed six interim cleanings of the lobby fountain due to excessive biofilm growth in the past year.

2. Upon further review of the logs, he discovers that the biofilm growth was observed near the inner wall where incandescent lighting illuminates the water.

3. Anson decides to replace the incandescent bulbs with LED bulbs to prevent the lights from heating the water to a temperature that allows biofilm to grow.

4. After three months of routine inspections show that this corrective action reduces biofilm growth and eliminates the need for interim cleaning, Anson amends the water management program to specify use of only LED bulbs in the fountain and he informs the owner.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Example 2—Water main break

1. Jason receives several complaints from building occupants of foul-tasting water. He also notes a brownish tint to the water entering the building during his daily visual inspection. Jason immediately contacts the water provider and discovers that there was a water main break nearby but that a boil water advisory was not issued. He sends a notice to building occupants about the main break and that they should limit water usage for the next 4 hours while facilities clear the line.

2. To improve building water quality, Jason flushes the water at multiple sinks and fixtures near the entry until the water runs clear and falls within established water quality parameter control limits. He also flushes fixtures in areas where he received taste and odor complaints and at pre-determined flushing locations per the water management program.

3. Jason increases the frequency of measuring chlorine levels at the taps from weekly to daily to ensure that adequate residual disinfectant is moving through the system.

4. Jason informs his supervisor, documents his actions, and records chlorine readings in his log book.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Example 3—Broken chlorinator in the hot tub

1. Michelle notes chlorine levels of zero within the hot tub during her daily inspection. On further inspection she notices that disinfectant in the automatic delivery system reservoir is full.

2. Michelle immediately closes the hot tub and calls the pool contractor.

3. The contractor arrives the next day to discover that the chlorinator pump has malfunctioned and replaces the unit.

4. Michelle documents the action and follows the water management program’s protocol for start up, which includes cleaning the hot tub, shocking it with a high dose of disinfectant, and back-flushing the filter. Michelle also recommends that the supervisor amend the water management program to include a daily check of equipment operation and disinfectant levels in the reservoir, in addition to the daily visual inspection and chlorine measurements, so that such equipment failures may be detected more quickly in the future.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Make Sure the Program Is Running as Designed & Is Effective

**Verification: Are we doing what we said we would do?**

Your program team should establish procedures to confirm, both initially and on an ongoing basis, that the water management program is being implemented as designed. This step is called “verification.” For example, if you said you would test the hot tub daily for chlorine and record and communicate those results, have you been doing that? If you found a problem, did you take the action included in your program?

People should not verify the program activity for which they are responsible. For example, if one person is responsible for maintaining the hot tub and another is responsible for the cooling tower, they could verify each other’s work, not their own.

**Validation: Is our program actually working?**

Now that you have a water management program, you need to be sure that it is effective. Your program team should establish procedures to confirm, both initially and on an ongoing basis, that the water management program effectively controls the hazardous conditions throughout the building water systems. This step is called “validation.”

Environmental testing for *Legionella* is useful to validate the effectiveness of control measures. The program team should determine if environmental testing for *Legionella* should be performed and, if so, how test results will be used to validate the program. Factors that might make testing for *Legionella* more important include:

- Having difficulty maintaining the building water systems within control limits
- Having a prior history of Legionnaires’ disease associated with the building water systems
- Being a healthcare facility that provides inpatient services to people who are at increased risk for Legionnaires’ disease (see Appendix B)

If the program team decides to test for *Legionella*, then the testing protocol should be specified and documented in advance. You should also be familiar with and adhere to local and state regulations and accreditation standards for this testing.

**Healthcare Facilities**

Water management program teams that include infection control staff may also choose to use their facility’s routine surveillance for healthcare-associated Legionnaires’ disease to validate their program. To look for healthcare-associated cases, histories for all patients with diagnosed Legionnaires’ disease should be reviewed for possible healthcare exposures and certain patients with healthcare-associated pneumonia (see gray box on page 13) should be tested for Legionnaires’ disease.

Document & Communicate All the Activities of Your Water Management Program

Documentation
Now that you have done all of the work required to create your water management program, write it down. This information will be important to improve your program and if you or others want to review your records. Your written program should include at least the following:

- Program team, including names, titles, contact information, and roles on the team
- Building description, including location, age, uses, and occupants and visitors
- Water system description, including general summary, uses of water, aerosol-generating devices (e.g., hot tubs, decorative fountains, cooling towers), and process flow diagrams
- Control measures, including points in the system where critical limits can be monitored and where control can be applied
- Confirmatory procedures, including verification steps to show that the program is being followed as written and validation to show that the program is effective
- Document collection and transport methods and which lab will perform the testing if environmental testing is conducted

Communication
You have worked hard to develop your water management program and you have carefully documented all aspects of it. Resist the temptation to put it on a shelf and walk away. Consider notifying building occupants that you have a plan in place to keep the building water systems safe, just as you would for an elevator inspection. Be sure to communicate with your employees and colleagues about your program on a regular basis and train those responsible for implementing and monitoring the program. Use this communication as an opportunity to identify strategies for improving the management and efficiency of your water systems.

Special Considerations for Healthcare Facilities

ELEMENS OF A WATER MANAGEMENT PROGRAM

Developing and maintaining a water management program in healthcare facilities requires a few more considerations than the ones explained on page 6. All healthcare facilities should have a Legionella water management program.

1. Establish a water management program team
   - The team should include someone who understands accreditation standards and someone with expertise in infection prevention.

2. Describe the building water systems using text and flow diagrams
   - Include all areas where hazardous conditions may contribute to Legionella growth and spread:
     - Patient care areas (such as patient rooms and ICUs, but don’t forget other places like dialysis, respiratory therapy, and hydrotherapy)
     - Clinical support areas (including dietary and central supply) which could contribute to spread by aspiration
   - Include all components and devices that can contribute to Legionella growth and spread, as listed in the glossary on page 3. Think about all of the places where patients can be exposed to contaminated water. Don’t forget about ice machines, heater-cooler units,* and respiratory therapy equipment.

3. Identify areas where Legionella could grow and spread
   - Include all areas where hazardous conditions may contribute to Legionella growth and spread:

4. Decide where control measures should be applied and how to monitor them
   - Think about:
     - Areas where medical procedures may expose patients to water mists, such as hydrotherapy and respiratory therapy devices
     - Areas where patients are more vulnerable to infection, such as bone marrow transplant units, oncology floors, or intensive care units
   - Include all components and devices that can contribute to Legionella growth and spread, as listed in the glossary on page 3. Think about all of the places where patients can be exposed to contaminated water. Don’t forget about ice machines, heater-cooler units,* and respiratory therapy equipment.

5. Establish ways to intervene when control limits are not met
   - Make sure the program is running as designed and is effective.

6. Make sure the program is running as designed and is effective
   - Document and communicate all the activities

Continuous program review (see page 6)

*Devices that are commonly used during cardiac surgical procedures to warm and cool a patient’s blood during cardiopulmonary bypass


Note: ASHRAE 188 Normative Annex A applies to accredited healthcare facilities that have a Certification Board of Infection Control and Epidemiology (CBIC) certified infection preventionist or a master’s-level epidemiologist.
IDENTIFYING & INVESTIGATING LEGIONNAIRES’ DISEASE CASES

Healthcare facilities are often uniquely positioned to identify and respond to cases of Legionnaires’ disease. A healthcare facility’s water management program to limit Legionella growth and spread should include the actions to take when a patient is diagnosed with Legionnaires’ disease or environmental triggers occur. If you decide to conduct a full investigation of the source of an infection, key elements should be included, as noted on the next page. A full investigation following a diagnosis of Legionnaires’ disease can help determine whether the infection was acquired in the facility or the community.

Clinicians should test patients with healthcare-associated pneumonia (pneumonia with onset ≥48 hours after admission) for Legionnaires’ disease. This is especially important among patients at increased risk for developing Legionnaires’ disease (see Appendix B), among patients with severe pneumonia (particularly those requiring intensive care), or if any of the following are identified in your facility:

- Other patients with healthcare-associated Legionnaires’ disease diagnosed in the past 12 months
- Positive environmental tests for Legionella in the past 2 months
- Current changes in water quality that may lead to Legionella growth (e.g., low residual disinfectant levels, temperatures permissive to Legionella growth, nearby construction, areas of stagnation)

Other patients, besides those with healthcare-associated pneumonia, should also be tested for Legionnaires’ disease (see Appendix B). The preferred diagnostic tests for Legionnaires’ disease are culture of lower respiratory secretions on selective media and the Legionella urinary antigen test.
Perform a full investigation for the source of Legionella when:

- ≥1 case of definite healthcare-associated Legionnaires’ disease (a case in a patient who spent the entire 10 days prior to onset of illness in the facility) is identified at any time
- ≥2 cases of possible healthcare-associated Legionnaires’ disease (cases in patients who spent part of the 10 days before symptoms began at the same facility) are identified within 12 months of each other (note that under certain circumstances, during a cooling tower outbreak for example, the interval may be shorter)

Key elements of a full public health investigation include:

- Working with healthcare facility leaders*
- Performing a retrospective review of cases in the health department surveillance database to identify earlier cases with possible exposures to the healthcare facility
- Developing a line list of possible and definite cases associated with the healthcare facility
- Working with infection control and clinical staff to actively identify all new and recent patients with healthcare-associated pneumonia and test them for Legionella using both culture of lower respiratory secretions on selective media and the Legionella urinary antigen test
- Obtaining postmortem specimens, when applicable
- Considering recommendations for restricting water in the facility or other immediate control measures
- Performing an environmental assessment to evaluate possible environmental exposures
- Performing environmental sampling, as indicated by the environmental assessment
- Decontaminating possible environmental source(s)
- Subtyping and comparing clinical and environmental isolates, if available
- Working with healthcare facility leaders to determine how long heightened disease surveillance and environmental sampling should continue to ensure the outbreak is over
- Working with healthcare facility leaders to review and possibly revise the water management program, if indicated

* Leaders may include infection control practitioners, facility managers, hospital administrators, quality assurance staff, or others.


Note: ASHRAE 188 Normative Annex A applies to accredited healthcare facilities that have a Certification Board of Infection Control and Epidemiology (CBIC) certified infection preventionist or a master’s-level epidemiologist.
References & Resources

There are many references and resources that can help you develop and implement your Legionella water management program, some of which are listed below.

Standard

**Standard 188—Legionellosis: Risk Management for Building Water Systems (ANSI Approved)**
ASHRAE
Published 2015
www.techstreet.com/ashrae/products/1897561

Guidelines

**Guideline 12—Minimizing the Risk of Legionellosis Associated with Building Water Systems**
ASHRAE
Published 2000
www.techstreet.com/ashrae/products/232891
(currently under revision)

**Legionellosis Guideline: Best Practices for Control of Legionella**
Cooling Technology Institute
Published 2008

**Model Aquatic Health Code Guidance**
Centers for Disease Control and Prevention
Published 2014
www.cdc.gov/mahc/index.html

Laboratory Resources

**ELITE Program**
Centers for Disease Control and Prevention and Wisconsin State Laboratory of Hygiene
www.cdc.gov/ELITE/Public/EliteHome.aspx
## Planning Guides & Toolkits

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<tr>
<td>Investigation Tools for Clusters and Outbreaks of Legionnaires’ Disease</td>
<td>Centers for Disease Control and Prevention</td>
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<td><a href="http://www.cdc.gov/legionella/outbreak-toolkit">www.cdc.gov/legionella/outbreak-toolkit</a></td>
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## Healthcare Resources

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### Legionnaires’ Disease Information

**Legionnaires’ Disease Website**  
Centers for Disease Control and Prevention  
[www.cdc.gov/legionella](http://www.cdc.gov/legionella)

### Laws

**Safe Drinking Water Act**  
Environmental Protection Agency  
[www.epa.gov/sdwa](http://www.epa.gov/sdwa)

### Literature Reviews

**Technologies for Legionella Control in Premise Plumbing Systems**  
Environmental Protection Agency  
LEGIONNAIRES’ DISEASE

Legionnaires’ (LEE-juh- nares) disease is a very serious type of pneumonia (lung infection) caused by bacteria called Legionella. If you develop pneumonia symptoms and may have been exposed to Legionella, see a doctor right away. Be sure to mention if you have used a hot tub, spent any nights away from home, or stayed in a hospital in the last two weeks.

Legionnaires’ Disease Can Cause Pneumonia Symptoms
Signs and symptoms of Legionnaires’ disease can include:
- Cough
- Muscle aches
- High fever
- Shortness of breath
- Headache

Doctors use chest x-rays or physical exams to check for pneumonia. Your doctor may also order tests on a sample of urine and sputum (phlegm) to see if your lung infection is caused by Legionella.

Legionnaires’ Disease Is Serious, but Can Be Treated with Antibiotics
Legionnaires’ disease is treated with antibiotics (drugs that kill bacteria in the body). Most people who get sick need care in a hospital but make a full recovery. However, about 1 out of 10 people who get Legionnaires’ disease will die from the infection.

Certain People Are at Increased Risk for Legionnaires’ Disease
Most healthy people do not get Legionnaires’ disease after being exposed to Legionella. Being 50 years or older or having certain risk factors can increase your chances of getting sick. These risk factors include:
- Being a current or former smoker
- Having chronic lung disease, such as emphysema or chronic obstructive pulmonary disease (COPD)
- Having a weakened immune system from diseases like cancer, diabetes, or kidney failure
- Taking medication that weakens your immune system

Legionella Are Usually Spread through Water Droplets in the Air
In nature, Legionella live in fresh water and rarely cause illness. In man-made settings, Legionella can grow if water is not properly maintained. These man-made water sources become a health problem when small droplets of water that contain the bacteria get into the air and people breathe them in. In rare cases, someone breathes in Legionella while they are drinking water and it “goes down the wrong pipe” into the lungs. In general, Legionnaires’ disease is not spread from one person to another. However, this may be possible in rare cases.

cdc.gov/legionella  CS300481  03/07/2016
What Clinicians Need to Know about LEGIONNAIRES’ DISEASE

Legionnaires’ disease is a sometimes fatal form of pneumonia that is on the rise in the United States. Unfortunately, this disease is also underrecognized and underdiagnosed. Clinicians are in a unique position to make sure cases are detected, allowing rapid investigation by public health officials and prevention of additional cases.

Diagnosis and Testing
Clinical features of Legionnaires’ disease include cough, fever, and radiographic pneumonia. Signs and symptoms for Legionnaires’ disease are similar to pneumonia caused by other pathogens; the only way to tell if a pneumonia patient has Legionnaires’ disease is by getting a specific diagnostic test. Indications that warrant testing include:

- Patients who have failed outpatient antibiotic therapy for community-acquired pneumonia
- Patients with severe pneumonia, in particular those requiring intensive care
- Immunocompromised patients with pneumonia*
- Patients with a travel history (patients who have traveled away from their home within 10 days before the onset of illness)
- All patients with pneumonia in the setting of a Legionnaires’ disease outbreak
- Patients at risk for Legionnaires’ disease with healthcare-associated pneumonia (pneumonia with onset ≥48 hours after admission)

* Clinicians may also consider testing for Legionnaires’ disease in patients with other risk factors for this infection (see page 2).

Testing for healthcare-associated Legionnaires’ disease is especially important if any of the following are identified in your facility:

- Other patients with healthcare-associated Legionnaires’ disease diagnosed in the past 12 months
- Positive environmental tests for Legionella in the past 2 months
- Current changes in water quality that may lead to Legionella growth (such as low chlorine levels)

Infection control staff may have more information about these situations in your facility.

The preferred diagnostic tests for Legionnaires’ disease are culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on selective media and the Legionella urinary antigen test. Serological assays can be nonspecific and are not recommended in most situations. Best practice is to obtain both sputum culture and a urinary antigen test concurrently. Sputum should ideally be obtained prior to antibiotic administration, but antibiotic treatment should not be delayed to facilitate this process. The urinary antigen test can detect Legionella infections in some cases for days to weeks after treatment. The urinary antigen test detects *Legionella pneumophila* serogroup 1, the most common cause of Legionnaires’ disease; isolation of *Legionella* by culture is important for detection of other species and serogroups and for public health investigation. Molecular techniques can be used to compare clinical isolates to environmental isolates and confirm the outbreak source.

In the United States, reported cases of Legionnaires’ disease have grown by nearly four and a half times since 2000. More than 6,000 cases of Legionnaires’ disease were reported in 2015, but this number is likely an underestimate as the illness is thought to be underdiagnosed.

More illness occurs in the summer and early fall, but Legionnaires’ disease can happen any time of year.
DEVELOPING A LEGIONELLA WATER MANAGEMENT PROGRAM

Treatment
If your patient has Legionnaires’ disease, see the most recent guidelines for treatment of community-acquired pneumonia (http://bit.ly/CommunityPneumonia) and hospital-acquired pneumonia (http://bit.ly/HospitalPneumonia). Macrolides and respiratory fluoroquinolones are currently the preferred agents for treating Legionnaires’ disease.

Reporting
Make sure your infection control department or lab are promptly reporting cases of Legionnaires’ disease to your local health department. Timely identification and reporting of cases is important, as this allows public health officials to quickly identify and stop potential clusters and outbreaks by linking new cases to previously reported ones.

Etiology
Legionnaires’ disease is a severe form of pneumonia that often requires hospitalization and is fatal in about 10% of cases overall, and in 25% of healthcare-associated cases. Legionnaires’ disease is caused by Legionella bacteria. There are at least 60 different species of Legionella, and most are considered capable of causing disease. However, most disease is caused by L. pneumophila, particularly serogroup 1.

Transmission
While Legionella is found in natural, freshwater environments, it can become a health concern in human-made water systems (e.g., plumbing system of large buildings, cooling towers, certain medical devices, decorative fountains, hot tubs) where conditions allow it to multiply and come in contact with vulnerable persons. People contract Legionella by inhaling aerosolized water droplets containing the bacteria, or, less commonly, by aspiration of contaminated drinking water. Legionella is usually not transmitted from person to person; however, a single episode of person-to-person transmission has been reported. Fortunately, most people exposed to the bacteria do not become ill.

Risk Factors
Risk factors for developing Legionnaires’ disease include:
• Age ≥50 years
• Smoking (current or historical)
• Chronic lung disease, such as emphysema or COPD
• Immune system disorders due to disease or medication
• Systemic malignancy
• Underlying illness, such as diabetes, renal failure, or hepatic failure

Prevention
The key to preventing Legionnaires’ disease is maintenance of the water systems in which Legionella may grow. If Legionella is found in a healthcare facility’s water system, the facility should work to eliminate the bacteria. CDC encourages all building owners, and especially those in healthcare facilities, to develop comprehensive water management programs to reduce the risk of Legionella growth and spread. Learn more about how to develop a water management program at www.cdc.gov/legionella/WMPtoolkit.

cdc.gov/legionella | CS278126-A 05/15/2017

Timely reporting of Legionnaires’ disease cases is important for controlling clusters and outbreaks.

Commons Sources of Infection
Outbreaks of Legionnaires’ disease are most often associated with large or complex water systems, like those found in hospitals, long-term care facilities, hotels, and cruise ships.

The most likely sources of infection include:

- Water used for showering (potable water)
- Cooling towers (parts of large air conditioning systems)
- Decorative fountains
- Hot tubs

cdc.gov/legionella | CS278126-A 05/15/2017
Legionnaires’ Disease

What You Need to Know

What is Legionnaires’ Disease?

Legionnaires’ Disease (Legionellosis) is a respiratory infection (pneumonia) caused by bacteria called *Legionella*.

Who can get Legionnaires’ Disease?

Anyone can get Legionnaires’ Disease. People at highest risk are 50 years and older, as well as those who smoke or have chronic lung disease. Also at risk are persons with poor immune systems, such as people with cancer, diabetes, kidney disease, transplant recipients, and those taking certain medications such as tumor necrosis factor alpha inhibitors.

What are the symptoms of Legionnaires’ Disease?

- Fever (typically between 102-105 degrees)
- Chills
- Cough
- Shortness of breath
- Muscle aches
- Headache

Other common symptoms include:

- Confusion
- Nausea
- Diarrhea
- Chest pain

How long after exposure do symptoms begin?

2-10 days after exposure, though it can take up to 2 weeks for symptoms to appear after exposure.

How is Legionnaires’ Disease spread?

People get Legionnaires’ Disease when they breathe in droplets of water in the air that contain the bacteria. Common sources of exposure include:

- Cooling towers (large building air conditioning systems)
- Whirlpool spas and hot tubs
- Hot water tanks
- Decorative fountains
- Showers

People can be exposed inside or outside of buildings. Home and car air conditioners do not use water to cool the air, so they are not a risk for Legionella growth.
How long is a person contagious?

The bacteria are not spread from one person to another, so there is no contagious period.

Are there complications?

Legionnaires’ Disease can be very serious and can cause death in 10% to 25% of cases. Most healthy people usually recover.

Is there a treatment for Legionnaires’ Disease?

The prompt diagnosis of Legionnaires’ Disease can save lives. Antibiotics are used to treat Legionnaires’ Disease.

How can Legionnaires’ Disease be prevented?

To prevent Legionnaires’ Disease, make sure water systems in buildings are maintained. Examples of water systems include cooling towers, large plumbing systems, hot tubs, and hot water tanks and heaters.

Talk to your doctor if you believe you were exposed to Legionella and develop symptoms such as fever, cough, chills, or muscle aches.
TRAINING AND TESTING
TRAINING AND TESTING

The most common and effective method to evaluate your emergency plans is to test them by conducting exercises. Exercises are generally categorized into two types: discussion based exercises and functional exercises. Discussion based exercises, including Tabletop exercises (TTX), provide an informal environment where staff can discuss their roles during an emergency in response to a particular situation. When conducting a TTX, be sure to include all relevant people within your organization such as your Administrator, Director of Nursing, Infection Control, Nutrition, Environmental Services, Director of Maintenance, and Security. The main elements to a TTX include:

1. A Situation Manual (SitMan) which provides participants with all the necessary information about the exercise.
2. A PowerPoint Presentation which guides exercise participants through the exercise and provides prompts for discussion questions.
3. Group Discussion which addresses the given scenario and response actions.
4. Hotwash /After Action Report/ Improvement Plan (AAR/IP) is an opportunity to discuss and document what went well, what needs improvement, and how you will improve it.

After conducting a TTX, you may take your testing a step further by organizing a functional exercise at your facility. Functional exercises are action based while staff walks through what they would do during an emergency according to your plan.

The main elements to a functional include:

1. Identify what you would like to test.
2. Assemble an exercise planning team to determine objectives, a scenario and to develop supporting documentation.
3. Establish objectives to ensure your goals for the exercise are clear and achievable.
4. Develop an Exercise Plan (ExPlan) which provides general information about exercise objectives, roles and responsibilities, exercise schedule, and evaluation.
5. Conduct your exercise.
6. Hotwash /After Action Report/ Improvement Plan (AAR/IP) is an opportunity to discuss and document what went well, what needs improvement, and how you will improve it.
If you are new to testing emergency plans, test a small portion of your plan first. For example, consider exercising how you will communicate with or notify staff during an emergency. While this seems like a simple procedure, a tabletop exercise among facility leaders may identify issues with internal communication. Will you use email to notify staff of an emergency or do you have a system that sends mass texts or automated calls? Do you have a staff call down procedure in place? These types of questions can be discussed at a tabletop exercise and then you can plan a drill or functional exercise to test the procedure.

Facilitating any exercise requires some basic emergency management knowledge and understanding. We have included exercise documentation templates within this toolkit. When possible, the OCHD Emergency Preparedness Unit provides trainings to community partners and is available for questions, planning, and support. For training and testing resources:

- Contact OCHD Emergency Preparedness Unit at 248-858-5645
- Complete the FEMA free online course, IS-120.A: An Introduction to Exercises which can be found at: https://training.fema.gov/is/courseoverview.aspx?code=IS-120.a

The Homeland Security Exercise and Evaluation Program (HSEEP) provides multiple tools for the design, development, and evaluation of exercises. However, CMS does not currently require facilities to follow guidance for training and testing emergency plans. For more information about HSEEP Guidance and emergency management review FEMA’s website here: https://www.fema.gov/media-library/assets/documents/32326
This Situation Manual (SitMan) provides exercise participants with all the necessary tools for their roles in the exercise. Some exercise material is intended for the exclusive use of exercise planners, facilitators, and evaluators, but players may view other materials that are necessary to their performance. All exercise participants may view the SitMan.

Disclaimer: This document is a general outline of information used in a Situation Manual. Accurate and complete exercise documentation is the responsibility of the facility.

[Insert Agency Logo Here]
Administrative Handling Instructions

1. The title of this document is the [Insert Document Title] Situation Manual.

2. The information gathered in this document is classified as For Official Use Only (FOUO) and should be handled as sensitive information not to be disclosed. This document should be safeguarded, handled, transmitted, and stored in accordance with appropriate security directives. Reproduction of this document, in whole or in part, without prior approval from the [Insert Agency Name] is prohibited.

3. At a minimum, the attached materials will be disseminated only on a need-to-know basis and when unattended, will be stored securely in an area offering sufficient protection against theft, compromise, inadvertent access, and unauthorized disclosure.

4. Point of Contact:

[Insert Full Name]
[Insert Job Title]
[Insert Facility Name]
[Insert Address]
[Insert Phone Number]
[Insert Email]
Exercise Summary
[Insert a brief description highlighting key points of the exercise. For example: “Quiet Meadows Long Term Care is conducting a Tabletop Exercise (TTX) on July 25, 2017 to ensure that staff have the ability to maintain sufficient care and management of residents when faced with an evacuation. Quiet Meadows will discuss how emergency communications should take place with community partners, how family members of residents would be notified of the incident, and how resident records would be maintained throughout the incident, among other things.”]

Exercise Overview

Exercise Name: [Insert name of exercise, which should match the name on the title page]

Exercise Date: [Insert the month, day and year of the exercise]

Type of Exercise: [Select one: Seminar/Workshop/Drill/Game/Tabletop Exercise/Functional Exercise/Full-Scale Exercise]

Exercise Scenario Type: [Insert the topic of the exercise. Example: Communicable Disease Outbreak, Closed POD Activation, Evacuation, Biological Threat, etc.]

Location: [Identify where the exercise took place]

Duration: [Insert the total length of the exercise, in days or hours, as appropriate for Example: Friday, November 10, 2017 from 8:00 AM-10:00 AM]

Purpose: All of the components of exercise design, development and execution provide a means to:

- Assess the organization’s current capabilities.
- Identify current strengths and best practices.
- Evaluate weaknesses and areas for improvement.
- Develop an Improvement Plan to enhance future performance.

Participant Roles and Responsibilities
The term participant encompasses many groups of people, not just those playing in the exercise. Groups of participants involved in the exercise, and their respective roles and responsibilities, are as follows:

- Players. Players are personnel who have an active role in discussing or performing their regular roles and responsibilities during the exercise. Players discuss or initiate actions in response to the simulated emergency.
• **Controllers.** Controllers plan and manage exercise play, set up and operate the exercise site, and act in the roles of organizations or individuals that are not playing in the exercise. Controllers direct the pace of the exercise, provide key data to players, and may prompt or initiate certain player actions to ensure exercise continuity. In addition, they issue exercise material to players as required, monitor the exercise timeline, and supervise the safety of all exercise participants.

• **Evaluators.** Evaluators evaluate and provide feedback on a designated functional area of the exercise. Evaluators observe and document performance against established capability targets and critical tasks, in accordance with the Exercise Evaluation Guides (EEGs).

• **Observers.** Observers visit or view selected segments of the exercise. Observers do not play in the exercise, nor do they perform any control or evaluation functions. They do not communicate or interact with the exercise participants. Observers view the exercise from a designated observation area and must remain within the observation area during the exercise.

• **Support Staff.** The exercise support staff includes individuals who perform administrative and logistical support tasks during the exercise (e.g., registration, catering).

**Exercise Participants**
The following is a list of exercise participants and their roles. [List all physical or virtual exercise participants and the agency they represent. Identify the exercise position these individuals are assigned such as Player, Controller, etc. Add additional lines as needed.]

<table>
<thead>
<tr>
<th>Name</th>
<th>Agency/Position (Player, Controller, Evaluator, Observer, Support Staff)</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
Exercise Objectives

Objectives are established to determine exercise performance. The Exercise Planning Team developed the following objectives to test during the exercise: [Adjust the amount of objectives as needed. Typically, anywhere from 3-5 objectives are created for an exercise.]

1. [Insert Objective 1]
   [Example Objective: Demonstrate the ability to implement Incident Command to effectively respond to and manage an evacuation incident.]

2. [Insert Objective 2]
   [Example Objective: Demonstrate the ability to identify, notify and communicate with the appropriate agencies, organizations and personnel to effectively respond to and manage the incident.]

3. [Insert Objective 3]
   [Example Objective: Demonstrate the ability to utilize the facility’s plan to track patients from current area of care to the receiving facility.]

Scenario

[Enter scenario information (3-5 sentences) that briefly details the events that led up to the start of the exercise and sets the scene to identify the reasons for conducting the exercise. For example, “On July 25, 2017, forecasters identified a dangerous weather front expected to move across Oakland County throughout the day with the most severe weather hitting the area in the heat of the day, around 4:00PM. Forecasts predicted heavy rain, hail, wind gusts up to 65mph and a heightened risk of tornadic activity. Quiet Meadows, a 50-bed skilled nursing facility currently housing 47 residents, is located in Oakland County. Staff monitored the weather throughout the day and took actions to ensure flashlights, a radio and the weather radio are accessible and ready in case the facility is affected by a power outage.”]
MODULE 1: [Insert Module Name] [Example: Inclement Weather Alert]

[Module 1 basically “sets the scene” for the exercise and objectives that need to be achieved. It identifies the type of incident that has occurred and briefly states the Who, What, Where, When and Why of the exercise and includes details like locations and relevant persons/groups involved. See the example paragraph below.]

[Insert Month, Day, Year]: [Insert Time]

[Example: July 25, 2017: 3:30PM]

[Insert a brief summary of initial incident information: “On July 25, 2017, at 3:00PM, while staff is briefing one another during shift change, the National Weather Service issues a Severe Thunderstorm Warning for the surrounding area where Quiet Meadows is located. Though it has been raining most of the day, the weather has increased in intensity and the wind is picking up, bringing a dark storm front in. The staff briefing concludes and the afternoon shift takes over and begins rounds.”]

[Insert Month, Day, Year]: [Insert Time]

[Example: July 25, 2017: 5:00PM]

[Continue summary of incident information to extend the severity of the scenario: “Staff is beginning to prepare residents for the dinner rush when the weather radio at the main desk alerts that there is a tornado watch for the area, effective immediately. Shelter-in-place protocol is activated and supervisors begin to move residents from the dining room, which is surrounded by large windows, to the pre-identified internal rooms in the building with cement walls, so they can be settled until the storm passes. One of the supervisors has only been at the facility a few months and is not entirely sure where residents should be instructed to shelter-in-place because she was never trained. There is confusion as she sends some people to their apartments and some to the front lobby. The administrator isn’t sure if she is the one who is supposed to alert staff, residents and visitors that there is a shelter-in-place situation. The written protocol is buried in the plan and it’s taking too long to find it. Minutes later, the weather radio announces a confirmed tornado touchdown one mile away and Quiet Meadows is in the direct path with damage to be expected.”]
[Insert Month, Day, Year]: [Insert Time]

[Example: July 25, 2017: 5:20PM]

[Continue summary of incident information to extend the severity of the scenario: “The tornado passed by Quiet Meadows causing significant damage to the exterior structure on one side of the facility. There is no power and there is water coming into the building where the roof was damaged. Residents, staff, and visitors are safe, but minor injuries from flying debris have been identified. The Administrator attempts to use the phone to contact the Oakland County 24/7 emergency contact number but the lines are down. She searches for her cell phone but she can’t remember if she programmed the number into her contact list. Patients are visibly upset and due to the structure damage, need to be moved from the building. Quiet Meadows has a Memorandum of Understanding with the school across the street to be utilized as a temporary shelter location. The Administrator finds this information in the plan and reaches out to their emergency liaison for the school.”]

Key Issues
[Under Key Issues, pull specific information from the Module 1 summary listed above and identify 2-4 details. Specifically highlight things that need to be addressed to reach exercise objectives.]

- [Some staff do not know the protocol for sheltering-in-place at the facility.]
- [Communications to alert staff, residents, and visitors to the incident is not timely and the procedures for releasing information are not clear.]
- [Emergency contact numbers are not readily available.]
- [Quiet Meadows experienced structural damage and evacuation is required.]
Questions

Based on the information provided, participate in the discussion concerning the issues raised in Module 1. Identify any critical issues, decisions, requirements, or questions that should be addressed at this time.

The questions below are not meant to constitute a definitive list of concerns to be addressed, nor is there a requirement to address every question. They should be used as guidance or prompts as the discussion progresses.

During discussion, it is easy to get caught up in the incident and start to plan for things that haven’t happened yet or to create additional incidents that deviate from the module and what is being asked of participants. Stick to the information provided in the module to stay on track and collect answers to the questions.

[Identify 2-4 questions that need to be answered from Module 1. Leave space between each question so participants can handwrite answers on their own printed Situation Manual.]

1. [How can Quiet Meadows improve activation of their plans and ensure staff understands the role they fill?]

2. [How can staff communicate faster to those in the building at the time of an incident? And how documents be restructured so that emergency numbers are easier to access?]  

3. [How will Quiet Meadows activate evacuation procedures? Who should they call and how will they prepare residents for departure?]

1. [Insert question stemming from information provided in Module 1]
2. [Insert question stemming from information provided in Module 1]

3. [Insert question stemming from information provided in Module 1]

4. [Insert question stemming from information provided in Module 1]

5. [Insert question stemming from information provided in Module 1]
MODULE 2: [Insert Module Name]

[Module 2 extends the narrative of the incident by providing additional information that allows Module 1 to grow into a larger situation and opens more options for dialogue amongst participants. The timeframe can be extended by hours or days, depending on the topic of the exercise.]

[Insert Month, Day, Year]: [Insert Time]

Key Issues
- [Insert key point from Module 2]
- [Insert key point from Module 2]
- [Insert key point from Module 2]
- [Insert key point from Module 2]

Questions
Based on the information provided, participate in the discussion concerning the issues raised in Module 2. Identify any critical issues, decisions, requirements, or questions that should be addressed at this time.

The questions below are not meant to constitute a definitive list of concerns to be addressed, nor is there a requirement to address every question. They should be used as guidance or prompts as the discussion progresses.

During discussion, it is easy to get caught up in the incident and start to plan for things that haven’t happened yet or to create additional incidents that deviate from the module and what is being asked of participants. Stick to the information provided in the module to stay on track and collect answers to the questions.

[Identify 2-4 questions that need to be answered from Module 2. Leave space between each question so participants can handwritten answers on their own printed Situation Manual.]

1. [Insert question stemming from information provided in Module 1]
2. [Insert question stemming from information provided in Module 1]

3. [Insert question stemming from information provided in Module 1]

4. [Insert question stemming from information provided in Module 1]
MODULE 3: [Insert Module Name]

[Typically, Module 3 is the final module of a TTX and it provides a conclusion to the incident that occurred throughout the exercise. Example, “Weeks/months later, Quiet Meadows has been restored to pre-incident conditions with new updates making it more resistant to future hazards. Residents are moving back into the facility but bring some post-traumatic feelings with them, etc.”]

Key Issues

- [Insert key point from Module 3]
- [Insert key point from Module 3]
- [Insert key point from Module 3]

Questions

Based on the information provided, participate in the discussion concerning the issues raised in Module 3. Identify any critical issues, decisions, requirements, or questions that should be addressed at this time.

The questions below are not meant to constitute a definitive list of concerns to be addressed, nor is there a requirement to address every question. They should be used as guidance or prompts as the discussion progresses.

During discussion, it is easy to get caught up in the incident and start to plan for things that haven’t happened yet or to create additional incidents that deviate from the module and what is being asked of participants. Stick to the information provided in the module to stay on track and collect answers to the questions.

[Identify 2-4 questions that need to be answered from Module 3. Leave space between each question so participants can handwrite answers on their own printed Situation Manual.]

1. [Insert question stemming from information provided in Module 3]

2. [Insert question stemming from information provided in Module 3]

3. [Insert question stemming from information provided in Module 3]

4. [Insert question stemming from information provided in Module 3]
Exercise Schedule

[The exercise schedule lays out a specific timeframe for the amount of time provided to discuss each portion of the exercise. When planning your exercise, allow participants 20-30 minutes to discuss each module. Stay on track and follow the timeline to ensure all modules are completed and objectives are met. See the example schedule below.]

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0945 – 1000]</td>
<td>[Registration]</td>
</tr>
<tr>
<td>[1000]</td>
<td>[STARTEX] [This is when the Start of exercise play/discussion occurs]</td>
</tr>
<tr>
<td>[1000 – 1010]</td>
<td>[Welcome and Opening Remarks]</td>
</tr>
<tr>
<td>[1010 – 1030]</td>
<td>[Module 1: Presentation – Inclement Weather Alert]</td>
</tr>
<tr>
<td>[1030 – 1040]</td>
<td>[Module 1: Discussion]</td>
</tr>
<tr>
<td>[1040 – 1110]</td>
<td>[Module 2: Presentation – Module 2 Title]</td>
</tr>
<tr>
<td>[1110 – 1120]</td>
<td>[Module 2: Discussion]</td>
</tr>
<tr>
<td>[1120 – 1135]</td>
<td>[Module 3: Presentation – Module 3 Title]</td>
</tr>
<tr>
<td>[1135 – 1145]</td>
<td>[Module 3: Discussion]</td>
</tr>
<tr>
<td>[1145]</td>
<td>[ENDEX] [This is when the end of exercise play/discussion occurs]</td>
</tr>
<tr>
<td>[1145 – 1200]</td>
<td>[Hotwash]</td>
</tr>
</tbody>
</table>
**Acronym List**

[Complete the chart below by filling in an alphabetized list of any additional acronyms added to and utilized throughout this document. See the examples below]

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAR/IP</td>
<td>After Action Report and Improvement Plan</td>
</tr>
<tr>
<td>EEG</td>
<td>Exercise Evaluation Guide</td>
</tr>
<tr>
<td>FOUO</td>
<td>For Official Use Only</td>
</tr>
<tr>
<td>TTX</td>
<td>Tabletop Exercise</td>
</tr>
</tbody>
</table>
Attachment 1: [Insert Exercise Location Map] [This attachment is optional. If you are inviting external partners or individuals who are unfamiliar with your location or facility layout, consider adding a map and instructions.]
[Insert Exercise Name] for [Insert Facility Name] [Insert Exercise Date] After Action Report and Improvement Plan [Insert Publication Date]

Disclaimer: This document is a general outline of information used in an After Action Report. Accurate and complete exercise documentation is the responsibility of the facility.
Administrative Handling Instructions

1. The title of this document is the [Insert Document Title] After Action Report (AAR) and Improvement Plan (IP).

2. The information gathered in this document is classified as For Official Use Only (FOUO) and should be handled as sensitive information not to be disclosed. This document should be safeguarded, handled, transmitted, and stored in accordance with appropriate security directives. Reproduction of this document, in whole or in part, without prior approval from the [Insert Agency Name] is prohibited.

3. At a minimum, the attached materials will be disseminated only on a need-to-know basis and when unattended, will be stored securely in an area offering sufficient protection against theft, compromise, inadvertent access, and unauthorized disclosure.

4. Point of Contact:

[Insert Full Name]
[Insert Job Title]
[Insert Facility Name]
[Insert Address]
[Insert Phone Number]
[Insert Email]
**Exercise Summary**

The purpose of this report is to analyze exercise results, identify strengths to be maintained and built upon, identify potential areas for further improvement, and support development of corrective actions. *[Provide a brief overview discussing why the exercise was conducted and identify any observations or capabilities and activities conducted to reach the objectives.]*

**Exercise Details**

**Exercise Name:** [Insert name of exercise, which should match the name on the title page]

**Exercise Date:** [Insert the month, day and year of the exercise]

**Type of Exercise:** [Select one: Seminar/Workshop/Drill/Game/Functional Exercise/Full-Scale Exercise]

**Exercise Scenario Type:** [Insert the topic of the exercise. Example: Communicable Disease Outbreak, Closed POD Activation, Evacuation, Biological Threat, etc.]

**Location:** [Identify where the exercise took place]

**Duration:** [Insert the total length of the exercise, in days or hours, as appropriate]

**Exercise Planning Team**

The following individuals assisted with exercise development by participating on the Exercise Planning Team. *[Insert a list of individuals from your agency or partner agencies who assisted with planning and developing the exercise.]*

<table>
<thead>
<tr>
<th>Name</th>
<th>Agency/Position</th>
<th>Phone Number</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>
Participating Organizations
The following agencies and community partners played a role by participating during the exercise: [List the organizations or agencies that participated during the exercise including any Federal, State, non-governmental organizations (NGOs), local and international agencies, and other support agencies as applicable.]

- [Enter agency name]
- [Enter agency name]
- [Enter agency name]
- [Enter agency name]
- [Enter agency name]
- [Enter additional agency names as needed.]

Objectives
Objectives are established to determine exercise performance. The following objectives were set for this exercise: [Add additional objectives if needed.]

1. [Insert objective here]
2. [Insert objective here]
3. [Insert objective here]

Major Strengths
The major strengths identified during this exercise are as follows:

- [Insert first major strength]
- [Insert second major strength]
- [Insert third major strength]

Primary Areas for Improvement
Throughout the exercise, opportunities for improvement in [Insert Agency Name]’s ability to respond to the incident were identified. The primary areas for improvement, including recommendations, are as follows:

- [Insert first area for improvement]
- [Insert second area for improvement]
- [Insert third area for improvement]
**Improvement Plan**

This IP has been developed specifically for [Insert Agency Name] as a result of [Insert exercise name] conducted on [date of exercise]. These key recommendations and corrective actions draw on information from the exercise hotwash, Exercise Evaluation Guides (EEGs) and the After Action Report. [*Enter additional rows to the chart as needed*]

<table>
<thead>
<tr>
<th>Improvement Item</th>
<th>Corrective Action</th>
<th>Dept./Person Assigned</th>
<th>Goal Date to Complete</th>
<th>Date Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Key staff were not included on the call-down list and missed important communications throughout the exercise]</td>
<td>[Update call-down list to include key staff to be alerted during an incident]</td>
<td>[John Doe]</td>
<td>[12/1/2017]</td>
<td>[11/30/17]</td>
</tr>
</tbody>
</table>

For Official Use Only (FOUO)
After Action Review Meeting

An After Action Review Meeting should be held within 90 days post-exercise to review the status and progress of the tasks identified on the IP. An After Action Review Meeting is scheduled for [Insert the month, day and year of the meeting].

Conclusion

[This section is a conclusion for the entire document and provides an overall summary to the AAR. The conclusion can be brief in summary and should include the lessons learned, major recommendations, and a description of what steps should be taken to ensure that the concluding results will help to further refine plans, policies, procedures, and training for this type of incident.]

Acronym List

[Complete the chart below by filling in an alphabetized list of any additional acronyms added to and utilized throughout this document. See the examples below]

<table>
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<tr>
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<tr>
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<td>Emergency Operations Center</td>
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<td>For Official Use Only</td>
</tr>
<tr>
<td>TTX</td>
<td>Tabletop Exercise</td>
</tr>
</tbody>
</table>
**EXERCISE EVALUATION GUIDE**

Evaluator Name______________________________

Evaluator E-mail______________________________

Phone________________________________________

<table>
<thead>
<tr>
<th>Ratings Definitions</th>
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<tbody>
<tr>
<td><strong>Performed without Challenges (P)</strong></td>
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<tr>
<td>The objectives and associated tasks were completed in a manner that achieved the objective(s) and did not negatively impact the performance of other activities. Performance of this activity did not contribute to additional health and/or safety risks for the public or for emergency workers, and it was conducted in accordance with applicable plans, policies, procedures, regulations, and laws.</td>
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<tr>
<td><strong>Performed with Some Challenges (S)</strong></td>
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<tr>
<td>The objectives and associated tasks were completed in a manner that achieved the objective(s) and did not negatively impact the performance of other activities. Performance of this activity did not contribute to additional health and/or safety risks for the public or for emergency workers, and it was conducted in accordance with applicable plans, policies, procedures, regulations, and laws. However, opportunities to enhance effectiveness and/or efficiency were identified.</td>
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<tr>
<td><strong>Performed with Major Challenges (M)</strong></td>
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<tr>
<td>The objectives and associated tasks completed in a manner that achieved the objective(s), but some or all of the following were observed: demonstrated performance had a negative impact on the performance of other activities; contributed to additional health and/or safety risks for the public or for emergency workers; and/or was not conducted in accordance with applicable plans, policies, procedures, regulations, and laws.</td>
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<tr>
<td><strong>Unable to be Performed (U)</strong></td>
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<tr>
<td>The objectives and associated tasks were not performed in a manner that achieved the objective(s).</td>
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<table>
<thead>
<tr>
<th>Ratings Key</th>
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<tbody>
<tr>
<td>P – Performed without Challenges</td>
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<tr>
<td>S – Performed with Some Challenges</td>
<td></td>
</tr>
<tr>
<td>M – Performed with Major Challenges</td>
<td></td>
</tr>
<tr>
<td>U – Unable to be Performed</td>
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</tbody>
</table>

[INSERT AGENCY LOGO HERE]
<table>
<thead>
<tr>
<th>Exercise Name: [Insert Exercise Name]</th>
<th>Organization/Jurisdiction: [Insert Agency Name]</th>
<th>Venue: [Insert Exercise Location]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
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</tr>
<tr>
<td>[Copy/Paste the list of objectives from the Situation Manual below. Delete these instructions upon completion of this document.]</td>
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</table>

**Objective 1**: [Insert Exercise Objective]

**Objective 2**: [Insert Exercise Objective]

**Objective 3**: [Insert Exercise Objective]

**Objective 4**: [Insert Exercise Objective]
<table>
<thead>
<tr>
<th>Objective 1</th>
<th>Associated Tasks</th>
<th>Observation Notes and Explanation of Rating</th>
<th>Target Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[Insert Objective 1 from Page 2]</strong></td>
<td>[Insert information regarding tasks that need to be completed to achieve Objective 1.]</td>
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<td>[Insert information regarding tasks that need to be completed to achieve Objective 1.]</td>
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<td>[Insert information regarding tasks that need to be completed to achieve Objective 1.]</td>
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<tr>
<td></td>
<td><strong>Final Rating for Objective 1</strong></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 2</th>
<th>Associated Tasks</th>
<th>Observation Notes and Explanation of Rating</th>
<th>Target Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[Insert Objective 2 from Page 2]</strong></td>
<td>[Insert information regarding tasks that need to be completed to achieve Objective 2.]</td>
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<td>[Insert information regarding tasks that need to be completed to achieve Objective 2.]</td>
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<td><strong>Final Rating for Objective 2</strong></td>
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<tr>
<td>Objective 3</td>
<td>Associated Tasks</td>
<td>Observation Notes and Explanation of Rating</td>
<td>Target Rating</td>
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<tr>
<td>[Insert Objective 3 from Page 2]</td>
<td>[Insert information regarding tasks that need to be completed to achieve Objective 3.]</td>
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<td><strong>Final Rating for Objective 3</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 4</th>
<th>Associated Tasks</th>
<th>Observation Notes and Explanation of Rating</th>
<th>Target Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Insert Objective 4 from Page 2]</td>
<td>[Insert information regarding tasks that need to be completed to achieve Objective 4.]</td>
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<td><strong>Final Rating for Objective 4</strong></td>
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PARTICIPANT FEEDBACK FORM

Participant Name: ________________________________________________________________

Exercise: ___________________________  Exercise Date: __________

1. Please rate, on a scale of 1 to 5, your overall assessment of the exercise relative to the statements provided below, with 1 indicating strong disagreement with the statement and 5 indicating strong agreement.

<table>
<thead>
<tr>
<th>ASSESSMENT FACTOR</th>
<th>STRONGLY DISAGREE</th>
<th>STRONGLY AGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The exercise was well structured and organized.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The exercise scenario(s) was plausible and realistic.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The exercise documentation provided to assist in preparing for and participating in the exercise was useful.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The exercise allowed me to practice and improve priority capabilities.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The exercise helped my facility identify strengths and weaknesses in the execution of plans, protocols, and procedures.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>After this exercise, I believe my facility is better prepared to deal successfully with the scenario(s) that was exercised.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

2. Based on today’s exercise, list observed key strengths and/or areas that need improvement.

Strengths: ________________________________________________________________

________________________________________________________________________

Areas for improvement: ________________________________________________________

________________________________________________________________________

________________________________________________________________________

3. Please provide recommendations on how this exercise or future exercises could be improved or enhanced:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
MICHIGAN HEALTH ALERT NETWORK (MIHAN)
MICHIGAN HEALTH ALERT NETWORK (MIHAN)

OCHD encourages all healthcare facilities in Oakland County to establish a MIHAN account. MIHAN is a statewide web-based emergency alerting system that provides secure and rapid dissemination of important public health information. The key to a rapid and successful response to a pandemic or health emergency is early notification. MIHAN can transmit alert messages via e-mail, telephone, cell phone, fax, and e-mail enabled devices such as alpha-pagers.

The MIHAN allows for a two-way, 24/7 flow of information between key points of contact from the State of Michigan, local public health, hospitals, EMS agencies, health clinics, long term care facilities, and emergency management.

MIHAN is a password protected subscriber system -- a local or state administrator must grant users access to MIHAN. Each user controls their own MIHAN user account for how they want to receive alerts, specifying whether they receive an alert by phone, pager, fax, or e-mail or text.

MIHAN will be used by OCHD to disseminate important information to providers regarding a pandemic or other health emergency. If you are not enrolled or need technical help with your account please see the information below:

**To enroll in MIHAN contact the Oakland County Health Division Emergency Preparedness Unit at 248-858-5645.** You may also reference the MIHAN flyers included in the following pages.

Visit MIHAN at: [https://michiganhan.org/](https://michiganhan.org/)
What is the Michigan Health Alert Network?

The Michigan Health Alert Network (MIHAN) is a secure web-based notification system created by the State of Michigan to alert MIHAN participants of conditions that could adversely impact the health and safety of Michigan’s citizens. The system also provides situational awareness to key personnel about important but non-emergency health-related information. There is no cost to participate.

Who Participates in the MIHAN?

MIHAN participants include key points of contact from the State of Michigan, local public health, hospitals, EMS agencies, Federally Qualified and Rural Health Clinics, Long Term Care facilities, and emergency management.

Currently there are approximately 4000 MIHAN participants

MIHAN Alerts

Alerts are sent based on the roles, organizations, and geographic locations assigned to each user. Alerts will be sent according to the methods of contact you included in your profile and may include phone, fax, text messages and pagers. The person sending the alerts determines whether it goes out as an email, phone call or text message. The majority of MIHAN alerts will be sent to your email address.

How do I sign-up to receive MIHAN alerts?

Contact the MIHAN Administrator listed below to determine if you are eligible for a MIHAN account. If eligible, go to the MIHAN website https://michiganhan.org and click on the “Register Now” button at the bottom of the page. Once your account has been reviewed and approved, you will begin receiving alerts.

Registering for an account involves:

- Entering your user name, password and secret question
- Agreeing to the Terms of Service/ Privacy Policy & Information Pledge
- Entering in your related employer and title
- Adding direct points of contact you would like to be alerted
- Selecting your role and primary work organization

Questions and Support

For assistance with the MIHAN call: 517-335-8150

Craig Henry-Jones
MIHAN Project Coordinator
Email: henryc1@michigan.gov
Division of Emergency Preparedness and Response (DEPR)
Bureau of EMS, Trauma & Preparedness (BETP)
Michigan Department of Health & Human Services (MDHHS)
What is a MIHAN Alert?

An Alert is a message that notifies key first responders of conditions that could adversely impact the health of Michigan citizens. Some examples are natural disasters, terrorism, and disease outbreaks. The MIHAN is also utilized for drills and exercises. Alerts are sent to participants based on their Roles, Organizations or Groups.

Alerts can be sent via phone, E-mail, and text/alpha-numeric pagers.

Who Can Sign Up for MIHAN?

MIHAN participants include key points of contact charged with responding in the health-related incident. The system includes participants from the State of Michigan, local public health, hospitals, EMS agencies, Federally Qualified and Rural Health Clinics, Long Term Care facilities, and emergency management.

How Do I Sign Up for MIHAN Alerts?

1. Eligible individuals can self-register for the MIHAN at: https://michiganhan.org
2. Click the “Register Now” link and complete all required fields.
3. When creating a user name, develop one that incorporates your last name (i.e. jsmith1 or smithj1).
4. When choosing your Organization, select one that best represents your primary work location.