Ebola and the Industrial Hygienist
Annual Joint Meeting NY AIHA/ASSE/SENY
Carrie Sadovnik, CIH, LEED GA, NYC Health and Mental Hygiene
February 24, 2015
Overview

- Current status of EVD
- Role of the IH in public health
- EVD planning & controls
- EVD worker safety innovations
- Future considerations
• NYC Health: Facts About Ebola
DOHMH EVD
Preparedness Focus as of 2/24/15

• Healthcare System Readiness
  – Focus on Acute Care hospitals
• Quarantine & Active Monitoring
  – Direct for Some Risk
  – Active for Low but Not Zero Risk
## Cumulative EVD Cases and Deaths
(as of 2/20/15)*

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Cases (Suspected, Probable, and Confirmed)</th>
<th>Laboratory-Confirmed Cases</th>
<th>Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guinea</td>
<td>3120</td>
<td>2734</td>
<td>2072</td>
</tr>
<tr>
<td>Liberia</td>
<td>9096</td>
<td>3152</td>
<td>3947</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>11155</td>
<td>8223</td>
<td>3423</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23371</strong></td>
<td><strong>14109</strong></td>
<td><strong>9442</strong></td>
</tr>
</tbody>
</table>

*Data Source: most recent WHO Ministry of Health Situation Report
U.S. Aid to West Africa
THE HOSPITAL AND INDUSTRIAL HYGIENE.

Wade Wright, M.D.,
Industrial Clinic, Massachusetts General Hospital, Boston, Mass.

The first relation of the hospital to industrial hygiene is in the obligation of the hospital to provide for the study of industrial disease. This obligation is the more imperative because of the preventive aspect of medical treatment, and the fact that much of the ignorance among physicians concerning the hazards of various occupations and trade processes and of the dependence upon such hazards for the failure of American industry, is due to the fact that adequate standards of industrial hygiene have been due in great part to the medical profession’s complete neglect of the problems of industrial hygiene. It is obvious that no sound hygienic measures can be introduced into the industry unless they be worked out on an honest and scientific basis. The prevention of the effect on workers of occupational health hazards. Studies of the conditions of work have been made in but few factories and by few persons. We must borrow from the experiences of other nations, notably England, Germany, but there are many

OHN and ICN: Significant steps

HISTORY OF OCCUPATIONAL HEALTH NURSING

The first nurse recognized as functioning as a specialist in worker health was Betty Moulton. In 1888 she was employed by a group of coal mining companies in Pennsylvania. In 1897 Ada Mayo Stewart was hired by the president of the Vermont Marble Company to visit employees in their homes and to tend to the health of the family as well. The early twentieth century saw the blooming of “industrial nurses.”
Industrial Hygiene & Infection Control (Fuller, 2007)

- IH misunderstood and underutilized
- IH activities are performed by non-EHS staff with little knowledge of IH
- Hierarchy of Controls not easily accepted in healthcare
- Lack of partnering with IC teams, professional organizations

G. Ayliffe (2000)
Industrial Hygiene & Infection Control

‘We need better collaboration among all of the experts - occupational health and safety professionals and their federal and state agencies and infection control specialists and public health professionals, to assure the right controls are in place and the right decisions are made to protect both health care workers AND patients.’

IH / EHS Professional in Healthcare

- Responsible for Common EHS Program Areas
- TJC Environment of Care Standards
- ICRA
- JCAHO and NFPA 99 ICS
Environment of Care

- Fire safety
- Utility systems
- Medical equipment
- Emergency mgmt
- Safety
- Security
- Hazardous materials
IH / EHS Professional in Healthcare

- Responsible for Common EHS Program Areas
- TJC Environment of Care Standards
- ICRA
- JCAHO and NFPA 99 ICS
Infection Control Risk Assessment

• Identify Activity/Project Risk Level
• Identify Patient Risk Group
• Determine Class of Precautions
Step 1. Identify the **Type of Construction Project**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Description</th>
</tr>
</thead>
</table>
| **TYPE A** | **Inspection and Non-Dust Generating Activities.**  
includes, but is not limited to:  
- removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet  
- painting (but not sanding)  
- wall covering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection |
| **TYPE B** | **Small Scale, Short Duration Activities which Create Minimal Dust**  
includes, but is not limited to:  
- installation of telephone and computer cabling  
- access to chase spaces  
- cutting of walls or ceiling where dust migration can be controlled |
| **TYPE C** | **Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies**  
includes, but is not limited to:  
- sanding of walls for painting or wall covering  
- removal of floor coverings, ceiling tiles and casework  
- new wall construction  
- minor duct work or electrical work above ceilings  
- major cabling activities  
- any activity which cannot be completed within a single work shift |
| **TYPE D** | **Major demolition and construction projects**  
includes, but is not limited to:  
- activities which require consecutive work shifts  
- requires heavy demolition or removal of a complete cabling system  
- new construction |
Step 2. Identify the **Patient Risk Groups** that will be affected. *(If more than one risk group will be affected, select the higher risk group).*

<table>
<thead>
<tr>
<th>Low Risk</th>
<th>Medium Risk</th>
<th>High Risk</th>
<th>Highest Risk</th>
</tr>
</thead>
</table>
| Most outpatient areas | • Cardiology  
• Echocardiography  
• Endoscopy  
• Nuclear Medicine  
• Physical Therapy  
• Radiology/MRI  
• Respiratory Therapy | • Special procedure  
• Surgery recovery  
• Newborns  
• Bed-ridden patients | • Immune-suppressed  
• Open wound  
• Transplant units  
• Intensive care units |
| • Office areas  
• Clinics | • Emergency Room  
• Labor & Delivery  
• Laboratories (specimen)  
• Newborn Nursery  
• Outpatient Surgery  
• Pediatrics  
• Pharmacy  
• Post Anesthesia Care Unit  
• Surgical Units | • Any area caring for immunocompromised patients  
• Burn Unit  
• Cardiac Cath Lab  
• Central Sterile Supply  
• Intensive Care Units  
• Medical Units  
• Negative pressure isolation rooms  
• Oncology  
• Operating rooms |
Step 3. Use the matrix below to match the Patient Risk Group and Type of Construction and determine the Class of Precautions required during construction.

<table>
<thead>
<tr>
<th>Patient Risk Group</th>
<th>TYPE A</th>
<th>TYPE B</th>
<th>TYPE C</th>
<th>TYPE D</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW Risk Group</td>
<td>I</td>
<td>II</td>
<td>II</td>
<td>III / IV</td>
</tr>
<tr>
<td>MEDIUM Risk Group</td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
</tr>
<tr>
<td>HIGH Risk Group</td>
<td>I</td>
<td>II</td>
<td>III / IV</td>
<td>IV</td>
</tr>
<tr>
<td>HIGHEST Risk Group</td>
<td>II</td>
<td>III / IV</td>
<td>III / IV</td>
<td>IV</td>
</tr>
</tbody>
</table>

Class of Precautions
IH / EHS Professional in Healthcare

- Responsible for Common EHS Program Areas
- TJC Environment of Care Standards
- ICRA
- JCAHO and NFPA 99 ICS
NYC Health – ICS Safety Officer

• Planning
• Hazard Identification & Assessment
• Control Recommendation and Implementation
• Communication & Coordination Tasks
Planning

- VIDEO: CDC Training – Preparedness Considerations for Managing Ebola in Emergency Departments
NYC DOHMH Incident Command System

Numbers correspond to a description found on the back of this page

1. Incident Commander
   - Commissioner of Health
   - Liaison Officer 2
   - Legal Advisor 3
   - Safety Officer 4
   - Principal Scientific Advisor 5
   - Public Information Officer 6

7. Planning Section
8. Finance Section
9. Logistics Section
10. Information Technology Section
11. Clinical Operations Section
18. Environmental Operations Section
August 2014 - Stockpiling & Kitting

Case Investigation:
- Impermeable coverall w/integrated booty & hood
- Short/long cuff nitrile
- PAPR w/integrated filter & air hose
- Disposable scrubs
ABSA - Risk Group Classification for Infectious Agents

- BSL-1: Low Risk Microbes
- BSL-2: Intermediate Risk Microbes
- BSL-3: High Risk Microbes
- BSL-4: Maximum Risk Microbes
HOW EBOLA SPREADS

NOT VIA

AIR

WATER

FOOD

EBOLA SPREADS BY DIRECT CONTACT WITH BODILY FLUIDS OR CONTAMINATED NEEDLES
Internal DOHMH Job Risk Assessment

• Case Investigations
  – Laboratory Specimen Handling
  – Case Investigations, Screenings, Contact Tracing, Active Monitoring
  – Environmental

• Public Health Medical Services
  – Health Clinics
  – Correctional Health
  – School Health

• Community Outreach
### Internal DOHMH JRA Tool

#### Hierarchy of Controls

<table>
<thead>
<tr>
<th>Likelihood of Close or Direct Contact with EVD</th>
<th>Examples of NYC Employees Worker Category</th>
<th>Recommended Control Measures</th>
<th>Recommended Personal Protective Equipment (PPE)</th>
</tr>
</thead>
</table>
| **None/Negligible** | Overwhelming majority of city employees:  
  - Workers with no reasonably anticipated interaction with suspected EVD persons  
  - Workers with high volume contact with the public  
  - Office, clerical, and reception staff  
  - Staff that visit homes of NYC residents  
  - Workers with reasonably anticipated potential for exposure to blood or body fluids from an unknown source (negligible EVD risk)  
    - Staff e.g. life guards, designated to provide first aid  
    - Custodial staff authorized to clean up blood or bodily fluids  
    - Waste water workers  
    - Sanitation workers | None needed, but can consider the following:  
  - Re-evaluate Health and Safety programs, including Bloodborne Pathogens’ Exposure Control Plan (ECP) to include potential exposure to body fluids, including vomit. Other programs to review for needed amendments include PPE, Respiratory Protection, and Right to Know/Hazard Communication.  
  - Regular hand hygiene  
  - Ebola awareness training | No additional or special PPE is recommended. |
| **Some** | Limited to:  
  - Workers escorting or aiding suspected EVD person not exhibiting bleeding/vomiting/diarrhea  
  - Workers guarding, driving, or otherwise assisting with suspected EVD specimen or waste transport/shipping | As above, AND  
  - As practical, maintain distance (3 feet)  
  - Regular hand hygiene  
  - Isolate suspected EVD person  
  - Notify NYC DOHMH | Gloves, during close or direct contact. |
| **Medium** | Limited to:  
  - Workers interacting with suspected EVD person exhibiting bleeding/vomiting/diarrhea and where a distance of 3 feet is unavoidable:  
    - Police on aided response or transport where physical restraint is needed | As above, AND  
  - PPE program including training, practice, competence, and observation of PPE  
  - Designated areas for donning and doffing PPE  
  - Use trained observer (or buddy) to help guide donning/doffing process | Gloves  
  - Fluid-resistant gown or coverall  
  - Boot or shoe covers  
  - Mask  
  - Face shield |
| **High** | Limited to:  
  - Workers interacting with blood and/or body fluids from confirmed EVD patient (contaminated):  
    - Bioremediation workers cleaning contaminated surfaces  
    - Waste management workers removing associated waste | As above, AND  
  - Use safe work practices to avoid contact with blood or body fluids, including isolation of contamination and disinfectant  
  - Avoid methods that could generate aerosols  
  - As necessary, monitor for heat stress  
  - Medical monitoring | Waterproof gloves  
  - Face mask that covers nose and mouth  
  - Face shield (and goggles if chemical splashes expected)  
  - Fluid-resistant or impervious coveralls  
  - Closed-toe shoes and shoe covers  
  - If large amounts of blood or body fluids are present and/or aerosols may be generated, use:  
    - Double-gloves  
    - Waterproof boots  
    - Coveralls that have integral hoods |
PPE

Engineering Controls

Administrative Controls

Elimination of Potential Exposures

Protects only the wearer

Protects most people
Controls: Elimination/Engineering

“Laboratories should consult with an industrial hygienist…” regarding specimen management and equipment.  

*CDC Medical Officer Nancy Cornish, MD (AACC webinar, 10/7/14)*
Controls: Elimination/Engineering

- Can consultation be provided over the phone?
- Is face-to-face interview with patient required?
- Can you use remote communication methods?
- Can info about degree of contamination of environment be ascertained prior to entry?
Controls: Elimination/Engineering

Ebola patient Dr. Richard Sacra speaks with his wife via Vidyo from the Biocontainment Unit. Photo provided by The Nebraska Medical Center. http://www.vidyo.com/

Case investigation protocol requires remote communication methods
Controls: Administrative Controls

DOHMH actively monitored temp/symptoms

• 114 health care workers
• 1429 travelers (13 current)
Training Topics

Audience: ~450 healthcare staff; 200 community outreach, quarantine and monitoring

- Ebola 101
- Infection Control & Prevention
- PPE – Gloves, “Dry” vs “Wet” ensembles
- DOT/IATA Hazwaste Transport
- Field Safety
Specialized Training Methods

- Video analysis
  - to model skill execution
  - to facilitate improved performance

Specialized Training Methods

- Training aids
  - Fluorescent glow germ as visual cue
  - Fluorescent tracer used to assess contamination/exposure

Specialized Training Methods

- Competency-based training

### Preparation

<table>
<thead>
<tr>
<th>Step</th>
<th>Trial 1 Date</th>
<th>Trial 2 Date</th>
<th>Trial 3 Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>✓ or ✗</td>
<td>✓ or ✗</td>
<td>✓ or ✗</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Steps for Putting on PPE

<table>
<thead>
<tr>
<th>Step</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Outside room, remove all jewelry. Put on disposable scrubs.</td>
</tr>
<tr>
<td>6.</td>
<td>Inspect gloves, gowns, masks for rips, tears, or soiling.</td>
</tr>
<tr>
<td>7.</td>
<td>Perform hand hygiene with sanitizer.</td>
</tr>
<tr>
<td>8.</td>
<td>Put on inner gloves.</td>
</tr>
<tr>
<td>9.</td>
<td>Don impervious coverall and zip up</td>
</tr>
<tr>
<td>10.</td>
<td>Put on boot covers or shoe covers.</td>
</tr>
<tr>
<td>11.</td>
<td>Put on N-95 respirator and perform seal checks.</td>
</tr>
</tbody>
</table>
# PPE Practice Drills

<table>
<thead>
<tr>
<th>Evaluation of Stable Patient</th>
<th>Bedside Care and Treatment of EVD Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard, contact &amp; droplet precautions</td>
<td>Enhanced droplet precautions</td>
</tr>
<tr>
<td></td>
<td>Double gloves with, at a minimum, outer gloves with extended cuffs.</td>
</tr>
</tbody>
</table>
February 11, 2015

Guidelines for the Medical Clearance of Designated Ebola Caregivers in US Hospitals American College of Occupational and ...
SPECIFIC EBOLA CHALLENGES: WASTE CREATION

Environmental Remediation & Waste Management
Legal Challenges

- Onsite inactivation or incineration
- Off-site transport of Category A requires special DOT permit Transport – temperature controlled & emergency spill plan
- Security to prevent bioweapon use
- Triple, watertight containment
- Post-transport decon
WAYS HOSPITALS DISPOSE OF BIOHAZARD WASTE

AUTOCLAVING: steam sterilization within a pressurized chamber

- Accounts for 90–91% of biohazard disposal
- 2013: 34 incinerators in U.S.
- Purpose: Reduce waste's mass, volume, danger of spreading infection
- Mobile units (e.g., MediBurn or MedClean) used especially for pharmaceutical and pathological waste
- Stationary units for high volume: San-I-Pak (compactor included), Mark-Costello (vacuum + shredder), Redbag Solutions (filter for liquids vs solids)
- Issues: Possibility of airborne pathogens [mercury + dioxin], pollution, smoke, financial cost
- Combined with: shredding (to reduce mass of sterilized waste up to 85%), tumbling (maximum exposure of pathogens), compacting, and ozone sterilization (reduces need for hazardous chemicals)
Non-Healthcare Environmental Cleaning & Disinfection

• Dry – no special cleanup
• Wet –
  – Clean hard, porous surface items with EPA disinfectant or 10% bleach for non-enveloped virus
  – Dispose as hazardous waste all visibly contaminated soft, porous items
  – No baseline or clearance sampling
DOHMH Environmental Protocols

- Contact building manager & DSNY
- Conduct visual assessment
- Oversee cleanup, in coordination w/EPA
- Avoid aerosol-generating cleaning methods
- Vacuum must employ HEPA filtration
- Clean surfaces and remove EVD body fluids
- Disinfect surfaces, reusable equipment, PPE
EVD Waste Management

- Inspect & clear for re-occupancy
- Oversee waste disposal w/EPA/DEC/OEM
  - Current process
    - Non-healthcare waste in overpack and transloaded to hospital vendor
    - 10 companies have DOT permit for Cat A
    - 2 incinerators sites accept Cat A
  - Long term solution
    - DEC/EPA approval for regional autoclaving?
    - More approved haulers to pick up from site
Communication/Coordination

http://www.reuters.com/article/2014/11/12/us-usa-nurses-ebola-idUSKCN0IW14S20141112
Communications/Coordination

DOHMH Safety on Interagency Team

- Drafted employee informational materials
- Drafted Mayor’s Letter to Employees
- Led Citywide response to unions
- Participated on Municipal Labor Council special committee
Training and Information

Ebola

Ebola FAQs  Provider Info  Workplace Resources  Education Materials

▶ General Information about Ebola

Ebola Workplace Resources

Learn More About Ebola (YouTube)
FAQs for Workplace Settings (PDF)
Guidance for Directors and Administrative Staff at Child Care Centers: West Africa Ebola Outbreak (PDF)
Ebola Guidance for Private Schools (PDF)
FAQs for Custodians and Other Professionals Who Clean Body Fluids (PDF)
FAQs for New York City Employees (PDF)

For more information, call 311.
Future Activities?

• Continue training efforts with DOHMH healthcare staff
• Develop infection prevention training courses for high- and low-risk NYC employees
• Explore utility of ICRA outside of hospital
• Discuss implementation options for medical screening
Concluding Thoughts

• IH/EHS expertise has been critical to the EVD outbreak public health response
• Need deeper understanding & expertise in infection control & prevention
• Collaboration between IH & IC should be ongoing
  – Internal to organization
  – Professional/standard-setting groups (JCHO, APIC, ABSA)
Thank You!

- Alexis Daniels
- Catherine Dentinger
- Courtney Drayer
- Divine Adika
- Errol Robinson
- Ingrid Ramlakhan
- Ken Peskowitz
- Laurie VanVynck