Mobilizing to Respond to an Infectious Disease Emergency

John Lynch, MD, MPH
Harborview Medical Center
University of Washington

Steven Mitchell, MD
Harborview Medical Center
University of Washington
Objectives:
1. Understand the complexity of safe and effective care
2. Understand the unique impacts on staff when caring for these patients
3. Understand the fundamental shift in institutional approach necessary for effective care
HMC was ready for....

• Trauma ✓
• Burns ✓
• Shock/sepsis ✓
• Tuberculosis ✓
• HIV ✓
• Influenza (including HPAI) ✓
• Hantavirus ✓
• And many other diseases, we thought...
1st Ebola outbreak in West Africa
Multiple countries:
- Guinea
- Liberia
- Nigeria
- Senegal
- Sierra Leone

1 in 2 people who get Ebola in this outbreak have died.

Likely host = bats
Modeling Ebola in West Africa: Cumulative Cases by Date of Reporting

Modeling Method: IDEA (Fisman et al. 2013) | Generation Time: 18 days | Interpolation Method: Exponential | Data Source: WHO
Comparison with Past Epidemics

Ebola cases and deaths by year, and countries affected

- **2nd-worst year**
  Sudan, Democratic Republic of Congo
  - 602 cases
  - 431 deaths
  - Source: World Health Organization

- **5th**
  Democratic Republic of Congo
  - 315 cases
  - 254 deaths

- **3rd**
  Uganda
  - 425 cases
  - 224 deaths

- **4th**
  Uganda, Democratic Republic of Congo
  - 413 cases
  - 224 deaths

- **1st**
  Guinea, Liberia, Nigeria, Senegal and Sierra Leone
  - 13,042 cases
  - 4,818 deaths as of Nov. 5

Supplements
September 26, 2014 / 63(03);1-14
EVD in the United States
Levels of protective gear

Mask or respirator

Goggles, safety glasses or face shield

Hood that covers the neck

A thicker outer glove

Sealed hood

One layer of gloves

Two layers of gloves

Fluid-resistant leg and shoe coverings

Impermeable gown that fully covers arms and the body from neck to mid-thigh

Impermeable body suit made of material that is difficult to tear

Breathing pack filters air to protect workers from airborne viruses

Seams taped
HIGHLY INFECTIOUS DISEASE CARE

• 9/30/14 Diagnosis of Thomas Duncan

• 10/6/14 Harborview Announcement

• 10/10/14 Nina Pham Diagnosed
HIGHLY INFECTIOUS DISEASE CARE
From CBS’ 60 Minutes Transcript 10/26/14:

On September 28, Duncan was rushed by ambulance to Texas Health Presbyterian Hospital. He was isolated in a separate section of the ER and nurse Sidia Rose, starting the night shift, was briefed on the special precautions required for what they now suspected was a case of Ebola.

Sidia Rose:” I went over and met with a nurse who gave me a report. She also went over the protective gear that we would be wearing that night. She gave, you know, finished briefing me on what was going to happen, and I literally burst out in tears.”
HIGHLY INFECTIOUS DISEASE CARE

• Risks Abound With Highly Infectious Diseases
  – Transmission of EVD to staff
  – Staff and Resource Impact of Single Patient
    • Single staff member illness > substantial institutional risk
  – Financial consequences
HIGHERLY INFECTIOUS DISEASE CARE

• Can’t Underestimate Fear Factor
  – Medical Staff
  – Support Staff
  – Patient and Families
EVD in Healthcare Workers

<table>
<thead>
<tr>
<th></th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guinea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liberia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sierra Leone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>800</td>
<td>450</td>
</tr>
</tbody>
</table>
HIGHLY INFECTIOUS DISEASE CARE

• From CBS’ 60 Minutes Transcript 10/26/14:

  • **Sidia Rose:** The first time when I went in and he vomited, I was standing in front of him, he was sitting on the commode, and there was just so much it went over the bag, it was on the walls, on the floors. I had two pairs of gloves on and shoe covers. And I had my face shield on. I didn't have two masks on at the time, I had just one. No, we didn't have any head covers. But I wiped down the walls, wiped down the floor with some bleach wipes.

  • **Richard Townsend:** He was having so much diarrhea and vomiting that he, you know, she was constantly having to give him the little bags that we have for people to vomit into.
• From CBS’ 60 Minutes Transcript 10/26/14:

• “Then the hospital moved out all of the patients in medical intensive care and reconfigured the 24-bed unit for just one patient. It was a strange scene for ICU nurse John Mulligan.”
Revenue drops 25 percent at Presbyterian Dallas, ER visits decline 50 percent after Ebola case
Reality check:

if a lab specimen spills in the main lab we would have to close the lab down for hours to decontaminate

if a lab specimen from a patient with EVD comes to the main lab, few technologists would process it
Unexpected Adventures in Waste Management

- **CDC**: Sanitary sewers may be used for the safe disposal of patient waste.
- **County Watershed Department**: If ebola virus is placed in the sanitary sewers they would disconnect our service.
- **Result**: All patients’ liquid wastes were disinfected with bleach or quaternary disinfecting detergents for > 5 minutes prior to flushing.
Unexpected Adventures in Waste Management (2)

- **CDC**: disposable materials and linens should be placed in leak-proof containment and discarded as regulated medical waste.
- **Our contractor**: all waste needed to be certified as free of ebola virus before they would transport to their incinerator.
- **Result**: we autoclaved all regulated medical waste before contractor picked it up.
HIGHLY INFECTIOUS DISEASE CARE

Proportion of ED Medical Directors Who Perceived Specific EVD Preparations as “Very Challenging” on a 7-Point Likert Scale (≥5).

- Hospital Administrative Support: 38%
- Securing Financial Resource Allocation: 24%
- Securing Adequate Supplies (eg PPE*): 34%
- Spatial Modifications**: 46%
- Staff Buy-in & Participation: 23%
- Staff Education & Training: 35%
- Waste Management Planning: 37%

Abbreviations: ED, emergency department; EVD, Ebola virus disease; *PPE, personal protective equipment. **For example, building an anteroom for donning and doffing PPE.

ORIGINAL RESEARCH

Survey of Ebola Preparedness in Washington State Emergency Departments

C. Hayes Wong, MD; Susan Stern, MD; Steven H. Mitchell, MD

Disaster Medicine and Public Health Preparedness
Attitudes of ED Medical Directors Toward EVD Preparedness on a 7-Point Likert Scale.

The care of a single suspected EVD patient will severely impact my ED’s ability to care for other patients.

3% 79%
0% 20% 40% 60% 80% 100%
- Moderately and Strongly Agree (6-7)
- Moderately and Strongly Disagree (1-2)

ORIGINAL RESEARCH
Survey of Ebola Preparedness in Washington State Emergency Departments
C. Hayes Wong, MD; Susan Stern, MD; Steven H. Mitchell, MD

Disaster Medicine and Public Health Preparedness
HIGHLY INFECTIOUS DISEASE CARE

• Fundamental Shift In Organizational Approach is Required

10/15/14 Harborview Implements “Incident Command System”

• Implement command structure for rapid decision making and multi-disciplinary planning
SHIFT IN ORGANIZATIONAL APPROACH
Where?
Who?
**NOTES:**

A. ED WARM ROOM CONTAINMENT TO BE MINIMUM 1” AWAY FROM ACCESS PANEL.

B. ED WARM ROOM ENTRY ZIP DOOR TO BE 72”.

C. ALL OTHER ZIP DOORS TO BE 58” MIN.

D. ED & 2WH WARM ROOM BARRIERS TO HAVE CLEAR WINDOW FOR VISIBILITY.

**CAUTION:**

- **INDICATES RED BIOHAZARD CONTAINER**

**MAP A**
HOT: Patient Room

PT. RM 278
2WH-72

Warm Room #1:
Decontamination

Warm Room #2:
Doffing

COLD: Ante Room

COLD: Hallway/ Barrier

COLD: Shower

EQUIP/SUP
2WH-73

CONS
2WH-COR-64
HOT: Patient Room

COLD: Breezeway

COLD: Ante Room

COLD: Shower

Warm Room #1: Decontamination

Warm Room #2: Doffing

COLD: Exit to Hallway

 ISO: Patient Room

EQUIP/SUP: 2WH-83

ELEVATOR: 2WH-ELV-11

ELEVATOR: 2WH-ELV-9

ELEVATOR: 2WH-ELV-12

1. BREEZEWAY (1WH-COR-006) THROUGH GARDENVIEW HALLWAY (1WH-COR-007> 1WH-COR-009> 1WH-COR-10) TO 1WH STAFF ELEVATORS.

2. UP TO 2WH.

3. LEFT INTO CORRIDOR (2WH-COR-02), RIGHT AT FOLLOWING CORRIDOR (2WH-COR-64) TO 2WH ISO ROOM (2WH-72, PAT RM 278).

ROUTE KEY:

DIRECT ADMIT TO 2WH PRIMARY ROUTE:

1. BREEZEWAY (1WH-COR-006) THROUGH GARDENVIEW HALLWAY (1WH-COR-007> 1WH-COR-009> 1WH-COR-10) TO 1WH STAFF ELEVATORS.

2. UP TO 2WH.

3. LEFT INTO CORRIDOR (2WH-COR-02), RIGHT AT FOLLOWING CORRIDOR (2WH-COR-64) TO 2WH ISO ROOM (2WH-72, PAT RM 278).

DIRECT ADMIT PRIMARY ROUTE:

1. BREEZEWAY (1WH-COR-006) THROUGH GARDENVIEW HALLWAY (1WH-COR-007> 1WH-COR-009> 1WH-COR-10) TO 1WH STAFF ELEVATORS.

2. UP TO 2WH.

3. LEFT INTO CORRIDOR (2WH-COR-02), RIGHT AT FOLLOWING CORRIDOR (2WH-COR-64) TO 2WH ISO ROOM (2WH-72, PAT RM 278).

HMC EBOLA DIRECT ADMIT TO 2WH PATIENT TRAVEL PATH

MAP E

2WH- ICU

1WH

1EH-/ 1WH ED DEPT
And more work....

• Dialysis
• Handling of dead bodies
• Monitoring of laboratory workers
• Standardization of PPE
• Maintenance of training
CDC/State Designations

• CDC arrived the next day to evaluate HMC’s response readiness

• Response tiers (November 2014):
  – Ebola treatment
  – Ebola assessment
  – Frontline facilities
Key actions

• Rapid development of safe, effective protocols
• Communication/education corrects misinformation
• Training normalizes the work
• Be ready to modify all of the above on a daily basis
• Preparing for the long-haul...and the next epidemic