When it comes to your doorstep: the Dallas experience with the Ebola virus

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Conflicts & Credits & Learning Objectives

• Credits: *Many are deserving of mention*
  – Foremost, the patients and their families involved
  – Each and every health care provider, public health worker, and hospital that provided care to these and other patients
  – Information sources: CNN, Dallas Morning News, Vanity Fair, CDC, AP, medical specialty societies, and many, many, more who reported and provided valuable information
  – Etc....

• Learning Objectives
  – Discuss the timeline and events of the first diagnosis and outbreak of Ebola Viral Disease (EVD) in the United States (U.S.)
  
  – Identify clinician and health facility areas important in the early diagnosis and clinical management of EVD
  
  – Review lessons in preparedness useful to every health system, city, and country readying for EVD
Disasters & Public Health Emergencies

• It only took one person
• To expose the vulnerability
• What can we all learn from this event?
Ebola Viral Disease (EVD)

- Family Filoviridae is EVD
  - Zaire – the West Africa epidemic (41-88% mortality)
  - Sudan (41-100% mortality)
  - Tai Forest (0 death)
  - Bundibugyo (34-40% mortality)
  - Reston (1990’s TX – monkey)
2014 West Africa EVD Outbreak

• First reported March 2014
• Widespread transmission
  – Guinea, Liberia, Sierra Leone
• Affected countries
  – Nigeria (Lagos, Port Harcourt)
  – Senegal (Dakar)
  – Spain (Madrid) Romas
  – United Kingdom (Scotland, England)
  – United States (Dallas, New York City)
  – Mali (Bamako)

EVD is a global disease - ONE person away from every country
EVD first to the US

- Dr. Kent Brantly and Nancy Witebol
  - Working in Monrovia
  - Experienced aid workers
  - Transferred from Liberia to Atlanta – Emory
    - Special jet
    - Special unit
    - Everybody well prepared
Time line – Exposure day (ED)

- ED 60 - US high media attention
- Sept 15 Exposure to 19 yo female (ED1)
- Sept 19 board plane: Liberia->Brussels->DC->DFW the next day on Sept 20.(ED2-3)
- Symptoms of viral illness begin (ED 9)
- Nausea/Fever/Headache (ED 10) – Hospital visit (LP/ABX/fever)
Time line – Exposure day (ED)

• Return via EMS – vomiting, fever diarrhea (ED 12)
  – Family told EMS – PPE in the ED – Health department notified – 3 EMS personnel exposed

• In emergency department (ED 12-13) then to the MICU (empty 24 bed unit)
  – Accusations fly
    • Nurse said she told provider that TED had told her travel on first visit
    • Epidemiologist says TED is scared and denies he had an exposure
    • Liberian officials will prosecute patient if he comes back
    • Local law will charge with endangering public.
Case History interject

- Hospital personnel notify county health officials
- Dallas county epidemiologist
  - Aware of travel – TED not discussing exposure risk
  - Thrombocytopenia was noted
- EVD testing requested
  - CDC reluctant “only a Liberian with a fever”
  - State finally agrees to collect specimen and travel to get it tested – transportation issues – screening test only.
On the “watch – list”

• EMS that took patient (issue with
• > 177 people infected

Family is sequestered with all of the soiled linens

2 days after the death

MICU nurse calls that she felt ill but not meet the threshold of 38.6°C. Texas changed to 38°C for

Epidemiologic Risk Assessment

• Must be linked to clinical outcomes, and not just case definition
• If early intervention improves clinical outcome, screen using the lowest marker thresholds that are manageable

threshold temp (deviates from CDC)
Nurses

• Nina Pham
  – 1 day after mild viral symptoms - + EVD
  – Had cared for TED in the MICU wearing PPE for 9 days

• Amber Joy Vinson
  – Was allowed by CDC to fly

• Both transferred (Emory in Atlanta, GA and NIH in Bethesda MD) – why?
Ebola Viral Disease

- EVD-2014 Contagious Status Report
- Reproduction Number “$R_0$” for EVD 2014 = $R_2$
  - The number likely to catch the disease from one disease positive person

<table>
<thead>
<tr>
<th>Disease</th>
<th>Transmission</th>
<th>$R_0$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles</td>
<td>Airborne</td>
<td>12–18</td>
</tr>
<tr>
<td>Pertussis</td>
<td>Airborne droplet</td>
<td>12–17</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Saliva</td>
<td>6–7</td>
</tr>
<tr>
<td>Smallpox</td>
<td>Airborne droplet</td>
<td>5–7</td>
</tr>
<tr>
<td>Polio</td>
<td>Fecal-oral route</td>
<td>5–7</td>
</tr>
<tr>
<td>Rubella</td>
<td>Airborne droplet</td>
<td>5–7</td>
</tr>
<tr>
<td>Mumps</td>
<td>Airborne droplet</td>
<td>4–7</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>Sexual contact</td>
<td>2–5</td>
</tr>
<tr>
<td>SARS</td>
<td>Airborne droplet</td>
<td>2–5[^2]</td>
</tr>
<tr>
<td>Influenza (1918 pandemic strain)</td>
<td>Airborne droplet</td>
<td>2–3[^3]</td>
</tr>
<tr>
<td>Ebola (2014 Ebola outbreak)</td>
<td>Bodily fluids</td>
<td>1.5–2.5[^4]</td>
</tr>
</tbody>
</table>
Continuing story

• Now 112 being monitored including the dog for 21 days
• Increased airport screening
• Self monitoring kit for all travelers from Liberia, Sierra Leone and Guinea
• Craig Spencer – NYC tested positive had been in Guinea
Dallas Protests

• Why did Mr. Duncan die?
  – Was he black? Was he poor?
  – Treatment
    • Not a match for convalescent serum of a survivor
    • TKM – Ebola not given thought to might worsen
    • Zmapp – non available in the US
    • Brincidofovir
      – FDA
      – IRB
      – Pharmaceutical
Whoops

• Hospital blamed nurses
• Federal government (CDC) couldn’t step in
• Then came the nurse from Maine
  – Had tested negative
  – Mandate to quarantine for 21 days
Since the death of Thomas Duncan

- Ebola outbreak in Dallas officially ends!

“... We feel very comfortable that everyone who could have been exposed to Ebola has been monitored and found to be asymptomatic,” Dr. David Lakey, Commissioner Texas Department of State Health Services 17 November 2017

CDC Definition of Ebola:
- When 42 days (does not include incubation period) have elapsed since last laboratory negative

17 November 2017
Died in the bio-containment unit in Nebraska, Oregon
Over?

<table>
<thead>
<tr>
<th>Date</th>
<th>December 2013 – June 2016[1][2]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Casualties</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: current estimates suggest that between 17 percent and 70 percent of Ebola cases were unreported.[3]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
<th>Last update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberia</td>
<td>10,666</td>
<td>4,806</td>
<td>outbreak ended 9 June 2016[2]</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>14,122</td>
<td>3,955</td>
<td>outbreak ended 17 March 2016[4]</td>
</tr>
<tr>
<td>Guinea</td>
<td>3,804</td>
<td>2,536</td>
<td>outbreak ended 1 June 2016[5]</td>
</tr>
<tr>
<td>Nigeria</td>
<td>20</td>
<td>8</td>
<td>outbreak ended 19 October 2014[6]</td>
</tr>
<tr>
<td>Mali</td>
<td>8</td>
<td>6</td>
<td>outbreak ended 18 January 2015[7]</td>
</tr>
<tr>
<td>United States</td>
<td>4</td>
<td>1</td>
<td>outbreak ended 21 December 2014[8]</td>
</tr>
<tr>
<td>Italy</td>
<td>1</td>
<td>0</td>
<td>outbreak ended 20 July 2015[9]</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1</td>
<td>0</td>
<td>outbreak ended 10 March 2015[10]</td>
</tr>
<tr>
<td>Senegal</td>
<td>1</td>
<td>0</td>
<td>outbreak ended 17 October 2014[6]</td>
</tr>
<tr>
<td>Spain</td>
<td>1</td>
<td>0</td>
<td>outbreak ended 2 December 2014[11]</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>28,616</td>
<td>11,310</td>
<td>as of 8 May 2016</td>
</tr>
</tbody>
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What did we all do?

- Ebola screening areas in hospital
- Create treatment teams
- Inform patients
- Drills and training
Thank You!

Any Questions?