Ebola virus disease (EVD) 2013-16

Lyn Gilbert
February 2016
Ebola virus disease (EVD) 2013-16

WHO, 20/1/16: 28,638 cases 11,316 deaths (40%)

http://www.pulitzer.org/works/2015-Feature-Photography
Ebola virus diseases 1976-2015

Previous EVD outbreaks 1976-2012

- ~25 outbreaks in Central/East Africa
- Largest 425 cases; total <2500 cases; ~1530 deaths

Guinea, Liberia, Sierra Leone (2013-16) 29,000 cases

60 x larger than any previous outbreak

Ebola Virus Species
- Ebola Zaire
- Ebola Sudan
- Ebola Côte d’Ivoire
- Ebola Bundibugyo

Cases of Ebola Fever in Africa 1979-2008
- 1-10
- 11-50
- 51-150
- 151-425

Nigerian (2014) - 20 cases

Dr Congo (2007, 2008)

Nzara (1976, 1979)

Uganda (2012)

Gulu (2000)

Yambio (2004)

Booue (1996)

Tandala (1977)


Libreville (2001)

Mayibout (1996)

Mekouka (1994)

Border ROC/Gabon (2001)

Kikwit (1995)

Yambuku (1976)

Luebo (2007, 2008)

Uganda (2012)

Nigeria (2014) - 20 cases
Emergence of EVD in West Africa

DECEMBER 2013

Meliandou village, Guéckedou Prefecture, Guinea

Index patient: 2 year old boy

Saez et al EMBO Molec Med 2015
Baize et al NEJM 2014
How the outbreak emerged

- 14/3/14 – Guinea - “mysterious disease” since December
- 21/3/14 – confirmed Ebola virus disease
- 31/3/14 – MSF: “unprecedented”
- mid-May – WHO deploy >100 technical experts

March 2014 already in 3 countries & capitals


May 20 2014 outbreak nearing its end ??
How the outbreak emerged

- 15/6/14 – more cases Sierra Leone, Liberia
  - MSF warning “alarmist”
- June-July – increasing alarm; meetings; WHO indecision
- Late July – spread to Lagos, Nigeria; rapidly contained

[Map showing the spread of the outbreak]

June 2014
MSF - outbreak “out of control”

Early August 2014
PHEIC declared

August - 1st cases outside Africa

Ebola-infected Americans to be evacuated from Liberia

• August 8th WHO:
  - “public health emergency of international concern”
• Spanish priest evacuated, died from EVD in Madrid
• More aid/health workers evacuated to Europe, North America
• American aid workers with EVD:
  – Treated at special isolation unit, built for CDC
    • greater security than required

– Given experimental drug Z-Mapp - recovered

• Nurse in Madrid infected after caring for priest
  – ?undermines CDC reassurance
International response

• August 11\textsuperscript{th} WHO convened ethics panel
  – Use of experimental drugs
  – Criticised for lack of action on the ground

• September 1\textsuperscript{st}: Dr Joanna Liu (MSF President):
  – “global coalition of inaction”
  – civilian or military medical teams needed

• September 19\textsuperscript{th} - UN Security Council
  – “threat to international peace and security”
  – Mission for Ebola Emergency Response (UNMEER);
  – 1\textsuperscript{st} ever for health emergency
1st EVD patient diagnosed in USA
1st EVD transmission in USA

• September 28th: Liberian-American man
  – admitted to Dallas Presbyterian Hospital
  – (previously seen & discharged)
  – fever, abdominal pain, diarrhoea - no strict isolation
  – EVD diagnosed 30th; died October 8th

• October 11-14th - 2 nurses became ill with EVD
  – Both recovered
Panic, blame, shame, politics, shock jocks

CDC suggest Dallas nurse breached protocol – not unreasonable

“Nurses union infuriated by suggestion of nurses’ Ebola protocol breach.”
“What protocols? There were no protocols”

CDC chief backtracks for blaming nurse who contracted deadly virus and stresses all hospitals should ‘think Ebola’

CDC appropriately changes infection control guidelines – enhanced personal protective equipment; greater care with removal
More panic. Blame, shame, politics, shock jocks

- New York doctor: MSF volunteer, Guinea
  - Well on return; developed fever 6d later - EVD
- Media, public outcry
- NY, NJ - 21 day **quarantine**
  - all travellers from west Africa
- Opposed by White House, MSF
  - problems with recruitment
- Australia, & most countries
  - Incr. border surveillance
  - No quarantine
    - except Queensland
    - 21-day quarantine
What We’re Afraid to Say About Ebola

By MICHAEL T. OSTERHOLM  SEP. 11, 2014

• “…two possible future chapters that should keep us up at night”:

• “The first …is that the Ebola virus spreads from West Africa to megacities in other regions of the developing world.” (yes, but….)

• “The second: Ebola virus could mutate to become transmissible through the air”….  

The current Ebola virus’s hyper-evolution is unprecedented” (is it?)

http://www.nytimes.com/2014/09/12/opinion/what-were-afraid-to-say-about-ebola.html
Why in west Africa? Why so widespread?

- Civil war, political instability, infrastructure collapse
  - deforestation (bats – Ebola reservoir); poverty (bush meat)
- Old disease – new location; “mimics” (malaria, cholera etc.)
  - delayed recognition; fear; porous borders/mobile population
- Health system; rapidly overwhelmed
  - inadequate isolation, equipment; healthcare worker deaths
- Cultural /behavioural “amplifiers”
  - burial practices, traditional healers, mistrust
- Extension from rural to urban areas
- Systemic failings....national/international
Healthcare worker density (doctors, nurses, midwives per 10,000 population)

Millennium Development Goal target = 23/10,000

Liberia = 3/10,000
Sierra Leone = 2/10,000
Guinea = 1/10,000
Ebola 2014 – facts & fears

• Spread to other countries - yes
  – Nigeria (20 cases, 8 deaths), Senegal (1 case), Mali (8, 6 deaths)
  – Western countries 26 cases; 3 transmissions

• High toll among HCWs - yes
  – Early cases not recognised; inadequate/no precautions
  – Many HCWs infected in the community

• High morbidity & mortality
  – no specific treatment
  – inadequate diagnostics, medications, staff
  – mortality reduced (++) by early supportive care
Mutation rate and genotype variation of Ebola virus from Mali case sequences

T Hoeman et al Science April 2015;348:117-9

• Mutation rate “is consistent with rates observed in (previous) Central African outbreaks. ...”

• “our data indicate that EBOV is not undergoing rapid evolution in humans during the current outbreak”...

• “.. should alleviate several previously raised concerns.”
Ebola outside West Africa:
26 cases; 3 transmissions

Source: Reuters, WHO
Current status (January 2016)

Ebola outbreaks
To January 14th 2016
Number of people:
- infected
- of whom: dead

3,804
2,536
14,122
3,955
10,675
4,809
6649
208
8

SIERRA LEONE
LIBERIA
CONGO
MALI
NIGERIA

Number of people infected
Per 100,000 population

Sources: WHO; UN; The Economist
*Includes cases in Italy, Spain, Britain and the United States. Excludes Congo

Economist.com
Current status (January 2016)

New cases* of Ebola infection per week
To January 14th 2016

Guinea

Liberia†

Sierra Leone‡

DECLARED EBOLA FREE

DECLARED EBOLA FREE

DECLARED EBOLA FREE

Source: WHO

*Confirmed

†March 30th 2015

‡August 24th 2015

Guinea: declared Ebola-“free” 29/12/15

Liberia: 1st Ebola-“free” 9/5/15
6 cases June 3/9/15
3 cases November 14/1/16

Sierra Leone: Ebola-“free” 7/11/15
1 new case Jan 14 2016
Healthcare worker deaths
The gap widens

<table>
<thead>
<tr>
<th>Doctors, nurses, and midwives</th>
<th>Stock pre-Ebola</th>
<th>Stock post-Ebola</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guinea</td>
<td>5395</td>
<td>5317</td>
<td>-1%</td>
</tr>
<tr>
<td>Liberia</td>
<td>1029</td>
<td>946</td>
<td>-8%</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>1153</td>
<td>1074</td>
<td>-7%</td>
</tr>
</tbody>
</table>

May 2015 = 240 HCW deaths
Total January 2016 = 551 HCW deaths

“Collateral damage”

<table>
<thead>
<tr>
<th>Maternal mortality ratio (per 100,000 livebirths)</th>
<th>Infant mortality rate (per 1000 livebirths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Ebola (2013)</td>
<td>May 2015</td>
</tr>
<tr>
<td>Guinea</td>
<td>Liberia</td>
</tr>
<tr>
<td>650</td>
<td>640</td>
</tr>
<tr>
<td>897</td>
<td>1347</td>
</tr>
<tr>
<td>38% (26 to 50)</td>
<td>111% (76 to 145)</td>
</tr>
</tbody>
</table>

Estimates based on “co-efficients of HCW mortality”
Also increased mortality from malaria, cholera etc.

What have we learnt; what should we do?

• Poor countries, dysfunctional governments at risk
  – Global support to “build resilient health systems”

• Ebola can be/could have been controlled
  – but needs “staff, stuff, space, systems”


• Vaccine, drugs trials delayed; inconclusive
  – Need generic protocols with ethical approval in advance
  – “rVSV-ZEBOV might be highly efficacious and safe in preventing Ebola virus disease…..”

  Henao Restrepo et al  Lancet Online  July 2015
What have we learnt; what should we do?

- “Routine” hospital infection prevention & control inadequate
  - Needs improvement (NB: MERS in South Korea)
    - for patient protection – imperfectly implemented
    - fear/self-protection – dangerous over-reaction

- Restructure & adequate funding of WHO
  - 68th World Health Assembly: May 18th 2015
    - Margaret Chan: “I have heard what the world expects from WHO. And we will deliver.”
    - Global health emergency workforce
    - Strengthen core & surge capacity for emergency response

- Will the international community support it?
Residents call attention to a man lying dead on a busy street in Monrovia, Liberia, who had died three days earlier. When no burial team came, people wearing rubber gloves dragged him into the street, stopping traffic and demanding he be taken away.

Daniel Berehulak  http://www.nytimes.com/slideshow/2015/04/20/blogs/20150420-lens-