



Managing Patients with Ebola Virus in the United States: Lessons Learned

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On behalf of the

Serious Communicable Diseases Unit

Emory University Hospital



Outline

- Background
- Operations
- Communications
- Lessons Learned

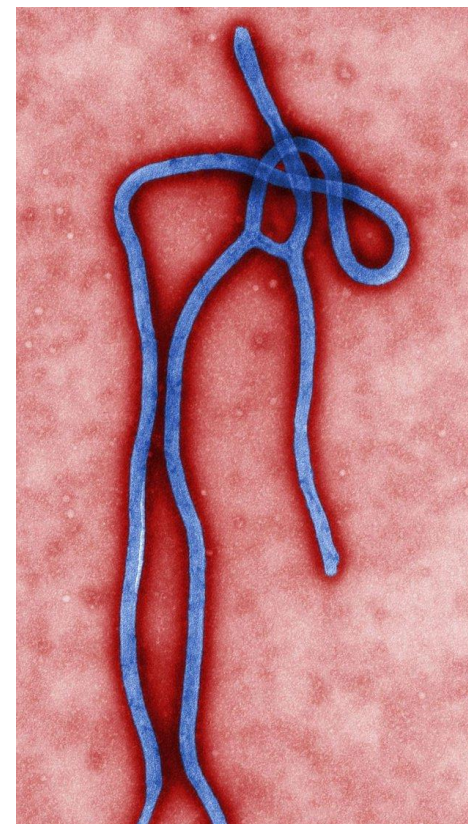


BACKGROUND



Background: Ebola Virus

- Family Filoviridae
 - Two genera: *marburgvirus* and *ebolavirus*
- Enveloped RNA virus
- Five subtypes of Ebola virus
 - **Zaire (EBOV)**
 - Sudan (SUDV)
 - Tai Forest (TAFV)
 - Bundibugyo (BDBV)
 - Reston (RESTV)
- No vaccines/treatments approved for humans
- Case-fatality rates of up to 90%



Cynthia Goldsmith/CDC



Background:

Clinical Characteristics of EVD

- Acute infection starts as a non-specific febrile illness
 - Fever, severe headache, muscle pain, malaise; progression to include GI symptoms (diarrhea and vomiting)
 - May appear 2-21 days after exposure (8-10 days most common)
- Small vessel involvement
 - Increased permeability due to cellular damage
- Multi-organ system failure
- Hemorrhage may develop in the second week
- Poor prognosis associated with
 - shock, encephalopathy, extensive hemorrhage



Background: Epidemiology

1976: Simultaneous outbreaks in Zaire (now DRC) & Sudan

- Zaire: 318 cases and 280 deaths (**88% mortality**)
- Sudan: 284 cases and 151 deaths (**53% mortality**)

1976 & 1979: Small-to-midsized outbreaks Central Africa

1995: Large outbreak in Kikwit (DRC)

- 315 cases (**81% mortality**)

Since 2000: Near-yearly outbreaks in Gabon, DRC or
Republic of Congo

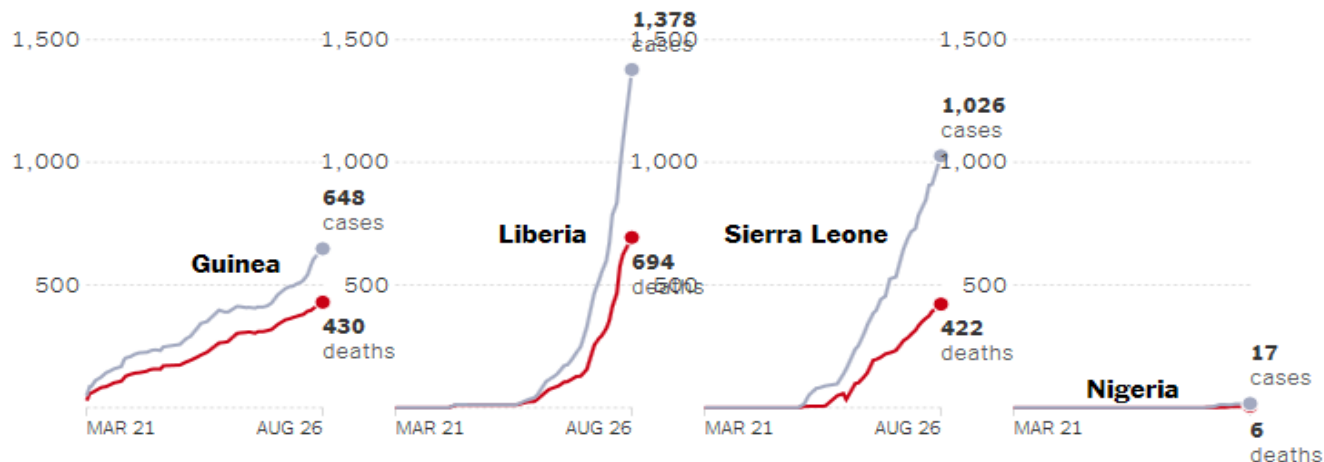
2000-2001: Largest outbreak on record (Sudan)

- 425 cases (**53% mortality**)



Background: Current Outbreak

- December 2013: Largest outbreak of Ebola virus disease (EVD) to date begins in Guinea
 - Mid-March 2014: 49 cases and 29 deaths
 - Late March: Liberia reported seven cases
 - End of May: the epidemic had spread to Sierra Leone
 - July 25th: first case reported from Nigeria





Background: Current Outbreak

- **4269 cases and 2288 deaths** (as of September 6, 2014)
- Guinea
 - 862 cases
 - 555 deaths
- Sierra Leone
 - 1361 cases
 - 509 deaths
- Liberia
 - 2046 cases
 - 1224 deaths
- Nigeria and Senegal: 24 cases and 8 deaths





Background:

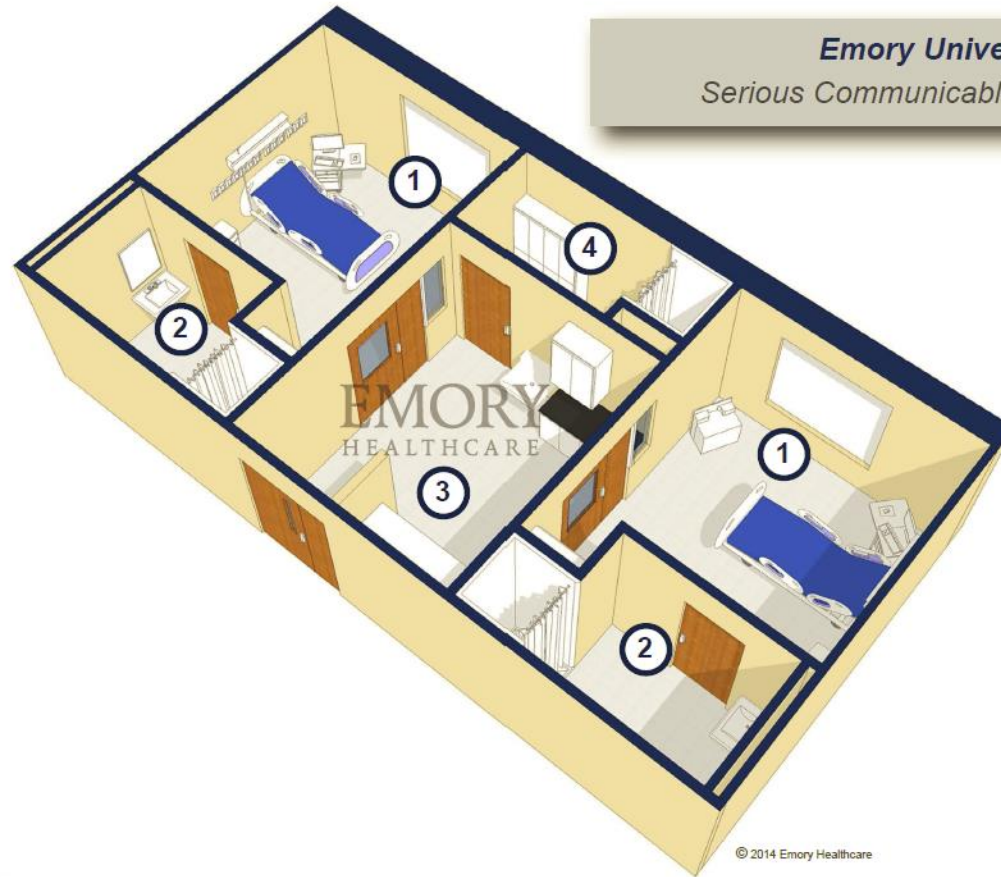
Emory University Hospital

- 579 beds (93 ICU beds)
- 25,000 admission per year
- “Magnet” hospital:
 - Recognized for nursing excellence by the American Nurses Credentialing Center
- 2012 and 2013: #2 in Quality
 - #2 of 110 U.S. Academic Medical Centers by the University HealthSystem Consortium (UHC)





Background: Serious Communicable Diseases Unit



*Emory University Hospital
Serious Communicable Disease Unit*



Background: Ebola and Emory

- **July 30, 2014:**
- ***Emory University Hospital asked to accept as a transfer the first patient with confirmed Ebola virus infection***
- **Expected arrival time unclear but need to be ready *within 72 hours.***
- **NEXT STEPS???**



OPERATIONS



Operations

- Clinical Care
- Laboratory Testing and Diagnostics
- Staff and Environmental Safety
- Waste Management



Operations: Clinical Care

- Formed by hospital administration 72 hours prior to arrival of 1st patient
 - Met 2x per day the first week
 - Team was comprised of key administrators, nursing leadership, physician leadership
- Careful coordination with involved organizations and groups
 - Within Emory, associated parties, state and federal government
- Formal review and approval process for key decisions



Operations: Clinical Care

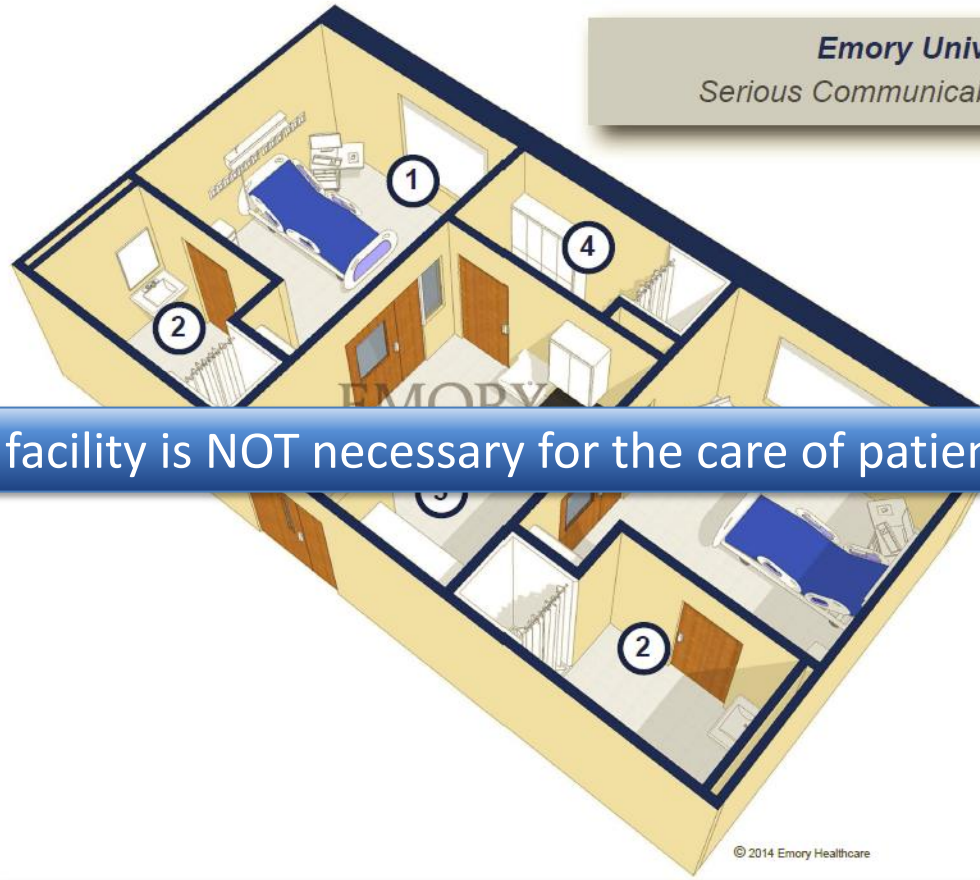
- Late July 2014: Two American humanitarians become infected with EBOV in Liberia
- During the first week of August, both were transferred by air ambulance to our hospital, 3 days apart
 - 33 yo male physician, day 11 of illness at arrival
 - 59 yo female missionary, day 15 of illness at arrival



Operations: Clinical Care

Activation of the SCD Unit

*Emory University Hospital
Serious Communicable Disease Unit*



This type of facility is NOT necessary for the care of patients with Ebola



Operations: Clinical Care

- No proven therapeutics
 - Unclear availability of any experimental agents
 - Limited safety or efficacy data in humans
 - BUT, we received SIGNIFICANT support and advice from CDC, FDA, and medical and scientific colleagues throughout the world
- With the help of the CDC, we monitored EBOV viral loads in blood by PCR
 - Progressive declines in viral loads that correlated with improvements in clinical condition
 - Had very low level of nucleic acid detection for several days despite resolution of symptoms



Operations: Clinical Care

The Critical Role of Nursing

- The ability to provide high-level nursing care and supportive care made a significant impact
 - 24/7 one-on-one nurses allowed for rapid response to changes and adjustment of care
 - Ability to support patients in nutrition, physical therapy, and self care
 - Emotional support
- Enabling safe interactions between family and patients was also beneficial
 - Glass window and intercom/phone system



Operations: Clinical Care

The Impact of Electrolytes

- Our patients had MARKED electrolyte abnormalities and nutritional deficiencies
 - Hypokalemia, hypocalcemia and hyponatremia
 - Required both intravenous and oral replacement
 - Both required **significant** potassium replacement
 - Laboratory testing for chemistries was **critical** to provide supportive care
 - Used oral nutritional supplements including nutritional drinks high in easily absorbed proteins, minerals and vitamins



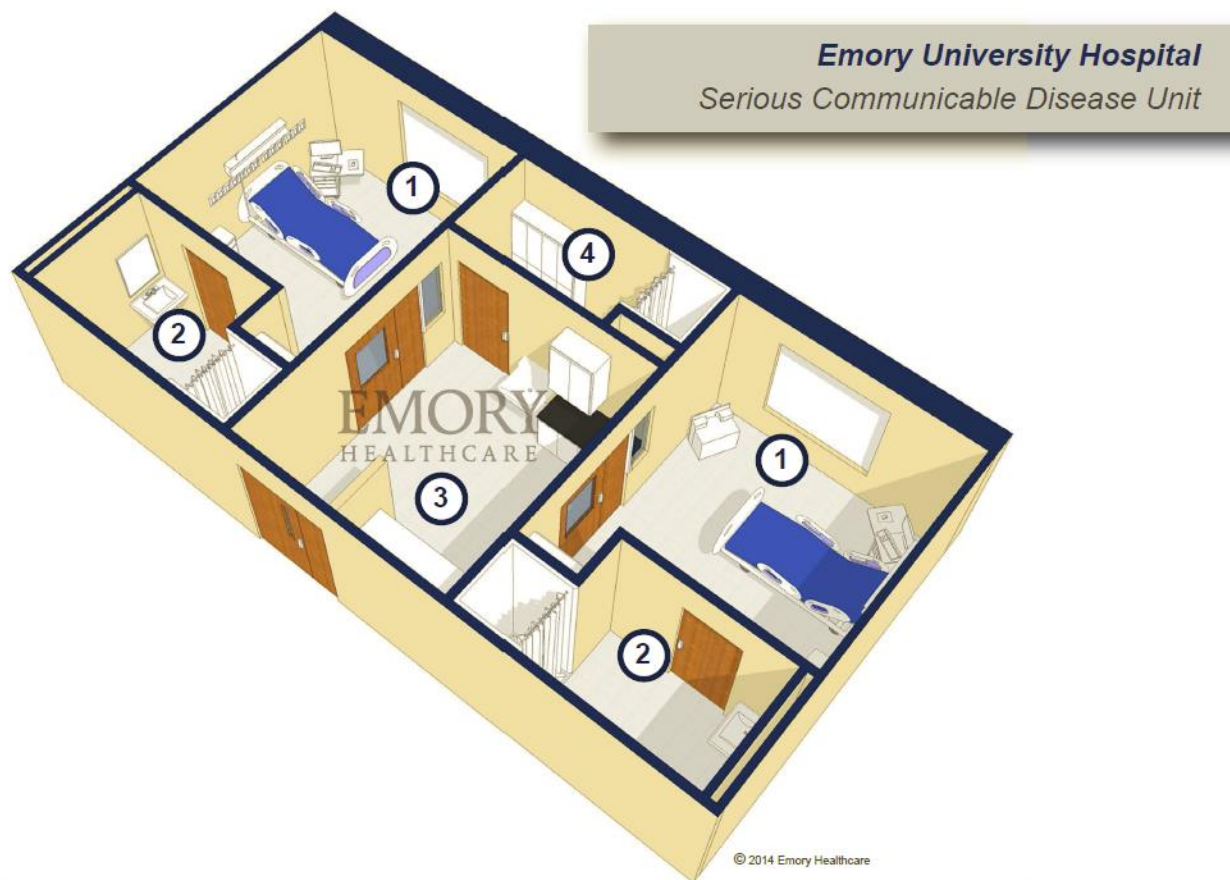
Operations:

Laboratory Testing and Diagnostics

- The SCD unit had previously established a small point of care lab within the anteroom
 - Dedicated lab equipment for our patients
 - Many lab technologists volunteered to run samples



Operations: Laboratory Testing and Diagnostics





Operations:

Laboratory Testing and Diagnostics

- The SCD unit had previously established a small point of care lab within the anteroom
- However after the unit was activated, we realized it would become too crowded
 - Commandeered an office adjacent to anteroom
 - Facilities and Engineering built a complete point of care lab facility in **less than 72 hours**
- **A dedicated lab in NOT required to work with blood from patients with Ebola**

Laboratory Test Support for Ebola Patients Within a High-Containment Facility

Charles E. Hill, MD, PhD,¹ Eileen M. Burd, PhD,¹ Colleen S. Kraft, MD,¹ Emily L. Ryan, PhD,¹ Alexander Duncan, MD,¹ Anne M. Winkler, MD,¹ John C. Cardella,² James C. Ritchie, PhD,¹ Tristram G. Parslow, MD, PhD^{1}*

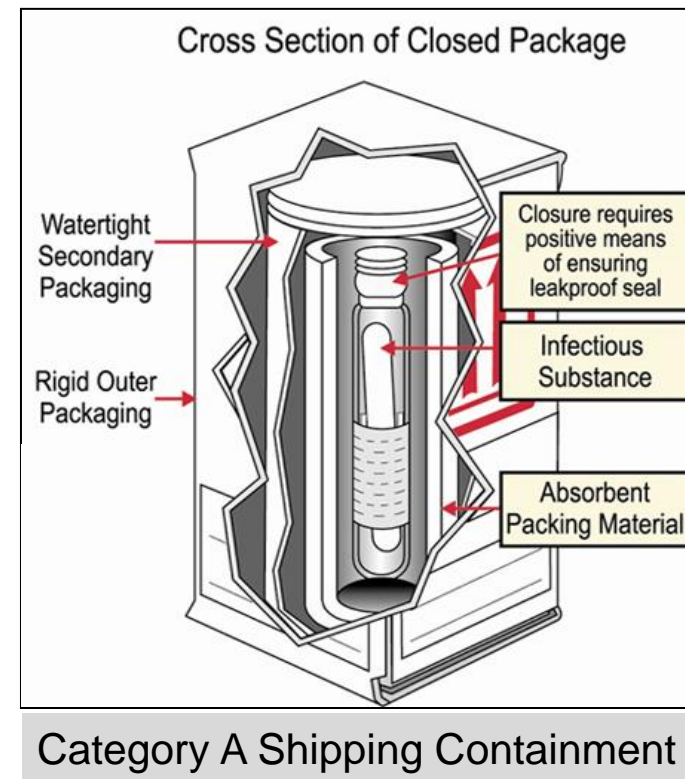
Lab Med Summer 2014 45:e109-e111

- Arterial blood-gas analyzer
- Automated urinalysis analyzer
- Coagulation analyzer
- Hematology analyzer
- Malaria POC device
- Less fear among hospital and lab staff
- Less impact on staffing and patient care
- Immediate results (really STAT)
- **Disadvantages**
 - Limited test panel
 - If machine goes down, no back up
 - Costs of maintaining equipment rarely used



Operations: Laboratory Testing and Diagnostics

- Limited staff trained in Category A shipping
 - Not part of the unit team
 - Reluctant to come to unit
 - Emory U. safety officers trained members of our team
- Commercial couriers, even those certified in Category A shipping, refused to pick up anything from Emory destined for CDC

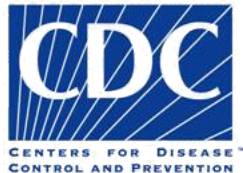




Operations: Staff & Environmental Safety



- OSHA Bloodborne Pathogens Standard (29 CFR 1910)
- CDC/NIH Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Ed.
- Department of Transportation (DOT) Hazardous Materials Regulations (Division 6.2 Biological Agents)
- National Science Foundation (NSF)/ American National Standards Institute (ANSI) 49 (Biosafety Cabinetry Certification)
- Georgia Environmental Protection Division (EPD)





Operations:

Staff & Environmental Safety

- Single patient room with a private bathroom
 - Maintain a log of persons entering the patient's room
- Dedicated medical equipment
 - Disposable, when possible
- Personal Protective Equipment (PPE)
 - All persons entering the patient room should wear at least:
 - Gloves
 - Gown (fluid resistant or impermeable)
 - Eye protection (goggles or face shield)
 - Facemask
 - Additional PPE might be required in certain situations depending on patient and environment, including but not limited to:
 - Double gloving
 - Disposable shoe covers
 - Leg coverings



Protecting Health Care Workers From Ebola: Personal Protective Equipment Is Critical but Is Not Enough

William A. Fischer II, MD; Noreen A. Hynes, MD, MPH; and Trish M. Perl, MD, MSc

- “Although PPE is effective at decreasing exposure to infected bodily fluids among health care workers, **its presence is simply not enough**”
- PPE itself can introduce risk
 - Proper training and competency in donning and doffing of PPE
 - Monitoring of activities by other team members
- Evaluate for and mitigate fatigue, exhaustion and complacency



Operations:

Staff & Environmental Safety

- We required **ALL** staff undergo refresher training from qualified instructors
 - Including all levels of possible PPE needed
 - Written SOPs were reviewed and approved by Safety, Nursing, and Infectious Control personnel
- All donning and doffing of PPE was observed by another team member
 - Placed visual clues to remind staff of proper protocols
 - Noticed some complacency after several days
- *Staff MUST be comfortable and assured with these procedures to ensure adequate patient care*



Operations: Staff & Environmental Safety

- Team meeting everyday to review plans and protocols
 - Open forum for questions and concerns from any team member
- Only approved personnel allowed in isolation area
 - Log of everyone who entered room
- All personnel required to enter twice daily temperature and symptom review into a online registry
 - 21 day after last shift in the unit

Direct Healthcare Provider (including Lab Personnel)

Symptom Questionnaire (Ebola Virus)

* Required

Employee Name: *

Employee ID #

Date: *

Month Day 2014

Time: *

Hr : Min AM

Cell Phone Number

Best Contact #

1) Temperature *

in degrees F

2) Nausea/Vomiting *

Yes

No

2.1) If yes, please explain:

3) Diarrhea: *

Yes

No

3.1) If yes, please explain:

4) Headache: *

Yes

No



Operations: Waste Management

- Local civil authorities requested no untreated EBOV patient waste enter standard waste stream
 - All patients' liquid wastes were disinfected with bleach or quaternary disinfecting detergents for > 5 minutes prior to flushing
- All room wastes were double bagged and sent to unit's autoclave
 - Up to 40 bags a day!!!
 - Our small, old autoclave was inadequate
 - Took over larger device and brought to unit
 - Took **6** days to form agreement with our waste disposal company to pick up bags for incineration



Operations: Waste Management

- Patient 1: Admitted for 19 days
- Patient 2: Admitted for 14 days

- Autoclaved **350** bags of regulated medical waste
 - ***Total weight: 3,058 lbs***

- Packaged **218** boxes of regulated medical waste

- 6 shipments of regulated medical waste were transported for incineration



COMMUNICATIONS



Communications

- Primary goal: to educate and allay fears
- Key messages
 - **We have the expertise in serious infectious diseases**
 - **We are trained and prepared for these patients**
 - **We will protect our patients, our staff and our communities**
- Patient confidentiality and respect is paramount
 - **“To act in the best interests of our patients”**



Internal Communications

- On 7/31/2014, prior to patient arrival, near-simultaneous notification via email blast to following groups:
 1. All Emory Healthcare staff
 2. All Emory physicians
 3. All Emory University
- All inpatients and new admissions at Emory University Hospital received a letter from the CMO and CNO
- Key messages:
 - EUH is prepared, ready and safe
 - The SCD is a unique facility
 - The SCD staff are trained and prepared



Internal Communications

- Open forums for all physicians and staff
 - Twice a day for 3 consecutive days
 - Every other day for 1st week
- Hospital administration, nursing administration and hospital epidemiology leaders available for Q & A.
- Key leaders rounded on the floors to answer questions from staff AND patients
- Patient education video



Internal Communications

- Understanding the concerns of our hospital staff was critical
 - Ongoing Email updates to all staff
 - Intranet with updated Q & A
- Maintaining confidence and honesty with our other patients
 - Letter given to each inpatient and all new admission explaining the situation and our key messages
 - Key leaders rounded on the floors to answer questions

**POWERFULLY CLEANS
YOUR BLOCKED NOSE**
& RELIEVES OTHER ALLERGY SYMPTOMS*



*Provides 12 hour relief of nasal congestion, sneezing, runny nose, itchy, watery eyes, & itchy nose & throat.

Use only as directed



Ann Coulter

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EBOLA DOC'S CONDITION DOWNGRADED TO 'IDIOTIC'

August 6, 2014



I wonder how the Ebola doctor feels now that his humanitarian trip has cost a Christian charity much more than any services he rendered.

What was the point?

Whatever good Dr. Kent Brantly did in Liberia has now been overwhelmed by the more than \$2 million already paid by the Christian charities Samaritan's Purse and SIM USA just to fly him and his nurse home in separate Gulfstream jets, specially equipped with medical tents, and to care for them at one of America's premier hospitals. (This trip may be the first real-world demonstration of the economics of Obamacare.)

There's little danger of an Ebola plague breaking loose from the treatment of these two Americans at the Emory University Hospital. But why do we have to deal with this at all?

**FUNDING FATHERS:
The Unsung
Heroes of the
Conservative
Movement**

by Ron Robinson
& Nicole Hoplin

FUNDING FATHERS

The Unsung Heroes of the
Conservative Movement

Wash. Post and New York Times



**"Comprehensive
and well-written"**

— JOHN FUND

Wall Street Journal
Columnist



External Communications: Before Media Frenzy





External Communications: During Media Frenzy





External Communications: The Challenge of a Media Frenzy





External Communications: The Challenge of a Media Frenzy





External Communications: The Press Conference 8/1/2014





External Communications: The Press Conference 8/1/2014





External Communications: Media Availability 8/1/2014



Dr. Sanjay Gupta @drsanjaygupta · Aug 1

Dr Bruce Ribner is doc who will treat pts with #Ebola. In addition to protective gear, he will take his temp 2x/day
pic.twitter.com/k4TMRAMAn7

↩ Reply ↻ Retweeted ★ Favorited

Flag media



External Communications: Media Availability 8/2/2014





External Communications: Media Availability 8/4/2014





External Communications: Washington Post Editorial 8/6/2014

I'm the head nurse at Emory. This is why we wanted to bring the Ebola patients to the U.S.

These patients will benefit – not threaten – the country.



By Susan M. Grant August 6

Susan Mitchell Grant, RN, is chief nurse for Emory Healthcare.



External Communications: Did the Tide Turn? YES

- “Emory has been transparent and timely.”
- “Emory has been proactive.”
- “Emory has coordinated its message.”
- “Emory has dismissed scare tactics in an indirect way—and educated the public.”
- “Emory’s overarching message is clear: We’re prepared, we’re capable, and we’re composed.”
- “What could have been a PR nightmare for the hospital has been handled with poise, transparency and accessibility.”
- http://www.prdaily.com/Main/Articles/Emory_and_Ebola_Handling_the_global_spotlight_in_a_17050.aspx
- <http://solomonmccown.com/Blog/ebola-pr-how-emory-university-hospital-got-it-right>



The Bigger Picture – much more than 2 patients at Emory

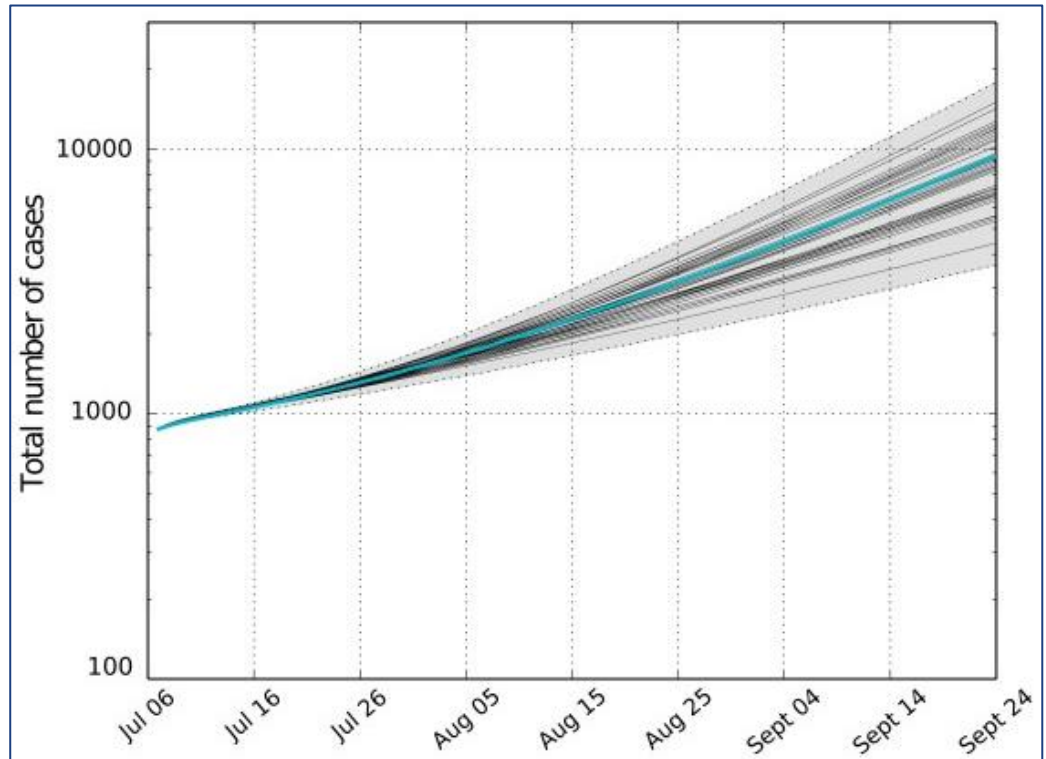
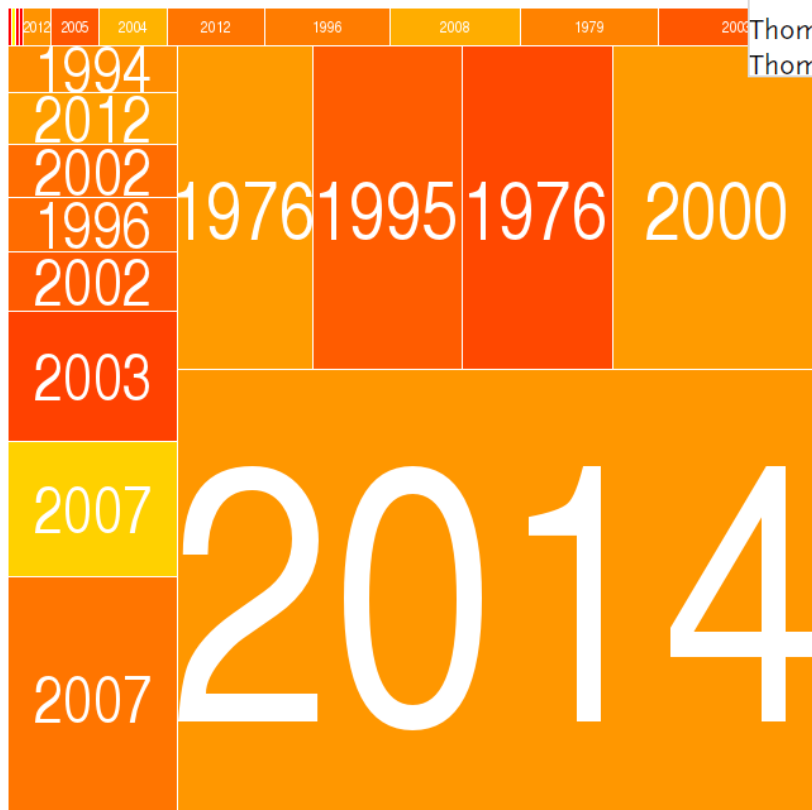
Ebola Virus Disease in West Africa —

No Early End to the Outbreak

Margaret Chan, M.D.

Ebola 2014 — New Challenges, New Global Response and Responsibility

Thomas R. Frieden, M.D., M.P.H., Inger Damon, M.D., Ph.D., Beth P. Bell, M.D., M.P.H., Thomas Kenyon, M.D., M.P.H., and Stuart Nichol, Ph.D.



<http://onforb.es/Y3YjoG>

A. Vespignani et al. Modeling projection of cases if spread continues at current rates. <http://news.sciencemag.org/health/2014/08/disease-modelers-project-rapidly-rising-toll-ebola>



Our Team

• Emory Nursing

- Toni Ash
- Chris Barnes
- Jason Calhoun
- Lauren Chapman
- Tracey Daye
- Haley Durr
- Shunasee Evans
- Janice Gentry
- Jan Ginnane
- Susan Grant
- Chris Haynes
- Carolyn Hill
- Dustin Hillis
- Crystal Johnson
- Jessica Loomis
- Josia Mamora
- Laura Mitchell
- Susan Mitchell
- Jill Morgan
- Nancy Osakwe
- Jacqueline Owen
- Sarah Piazza
- Kristina Shirley
- Jodi Siddens
- Carrie Silas
- Jason Slabach
- Elaina Tirador
- Donnette Todd
- Sharon Vanairsdale

• Pharmacy

- Amir Emamifar
- Susan Rogers

• Health & Safety

- George Golston
- Sean Kaufman
- Patricia Olinger
- Sean Olinger
- Kalpana Rengarajan
- Scott Thomaston

• Infection Control

- Connie Bryant
- Betsy Hackman
- Regina Howard
- Marolyn Jones

• Environmental Services

- Jeff Broughton
- Brian Frisle
- Robert Jackson
- Jerry Lewis

• Emory Medical Labs

- Nicole Brammer
- Juli Buchanan
- Eileen Burd, PhD
- John Cardella
- Brenda Eaves
- Crystal Evans
- Charles Hill, MD
- Krista Hostetler
- Karen Jenkins
- Maureen Lindsey
- Jordan Magee
- Randall Powers
- Emily Ryan, PhD

• Occupational Health

- Emily Beck
- Paula Desroches



Our Team

• Administration

- Robert Bachman
- Bill Bornstein
- John Fox
- Bryce Gartland
- Anne Adams
- Dee Cantrell
- Mary Beth Allen
- Nancye Feistritz
- Jen Goodman
- Ira Horowitz
- Chad Ritenour

• Media Relations

- Vince Dollard
- Nancy Seideman
- Holly Korschun
- Janet Christenbury

• Pastoral Care

- Robin Brown-Haithco
- Miranda Lynn Gartin
- Erica Gerald-Washington
- Rhonda James-Jones
- Donald Miller
- Dan Stark

• Supplies/Logistics

- Gentrice McGee
- Porcia Jones

• EUH Security

- Linda Scott-Harris
- James Cain
- Roderick Davis
- Tyrone Johnson
- Tyrone Pickett
- Anthony Shaw
- Tenina Truesdale

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- Jim Blum
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- Ricky Matkins
- Kathy Schwock
- Francis Wolf
- Kathy Stack
- Joel Zivot
- Laureen Hill
- Cathy Meechan
- Paul Meechan
- Jon Sevranski
- Seth Walker

• Emergency Medicine

- Alex Isakov
- Sam Shartar

• Emory Infectious Diseases

- **Bruce Ribner**
- **Sonia Bell**
- G Marshall Lyon
- Aneesh Mehta
- Colleen Kraft
- Jay Varkey
- Mark Mulligan
- Carlos Del Rio
- Phyllis Kozarsky
- Rachel Friedman
- Monica Farley
- David Stephens



Thank You to Our Colleagues

- Centers for Disease Control and Prevention (CDC)
 - **Timothy Uyeki**
 - **Anita McElroy**
 - **David Kuhar**
 - Ute Stroehler
 - Christina Spiropoulou
 - Jonathan Towner
 - Stuart Nichol
 - Shelley Campbell
 - Aridh Gibbons
 - Deborah Cannon
 - Paul Meechan
 - Viral Special Pathogens Branch
- National Microbiology Laboratory of the Public Health Agency of Canada
 - Dr. Gary Kobinger
- Food & Drug Administration (FDA)
 - Dr. Debra Birnkrant
 - Dr. Robert Kosko
 - Division of Antiviral Products
- SIM and Samaritan's Purse
 - Dr. Lance Plyler
 - Dr. John Fankhauser
 - Dr. Deborah Eisenhut
 - Medical team at the ELWA hospital Liberia
- CBR International Corp
 - Dr. Miles Brennan
 - Dr. Jeanne Novak



Our Patients and Their Families



Their message: Help is needed in West Africa