Ebola Virusu Hastalığı

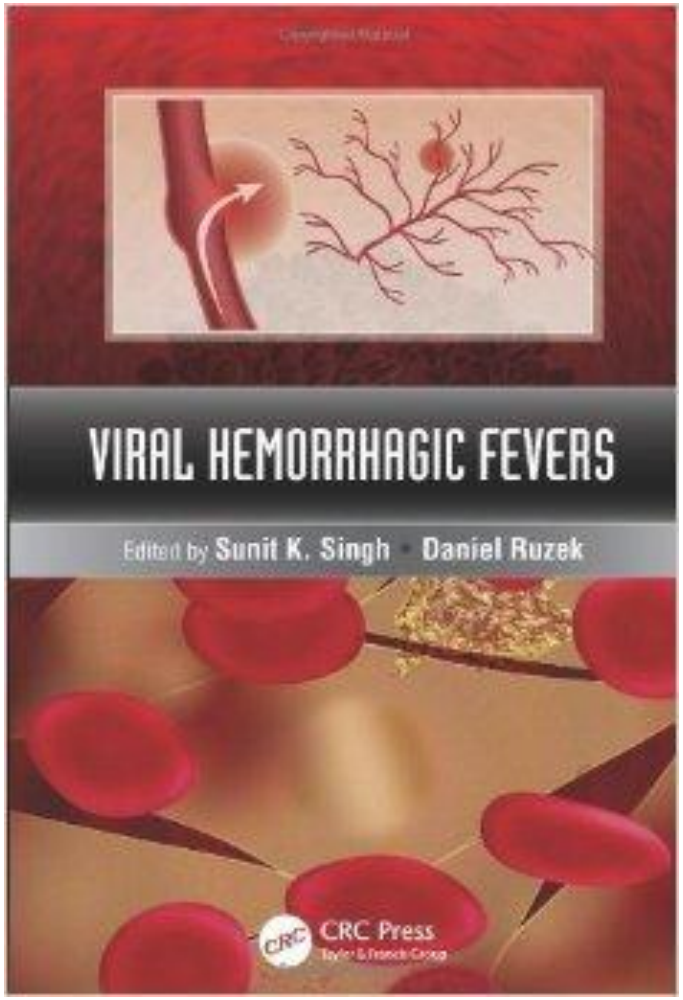
Dr. Önder Ergönül
Koç Üniversitesi Tıp Fakültesi

22 Ekim, İstanbul

Viral Kanamalı Ateşler
4 Genus, 12 Viruses

Filoviridae	Arenaviridae	Bunyaviridae	Flaviviridae
Ebola	Lassa	Hanta	Yellow F.
Marburg	S.America	Rift Valley	Dengue
		CCHF	Omsk
			Kyasanur
			Alkhumra

Ortak Özellikler



- Tek iplikli RNA viruslarıdır
- Acil infeksiyonlardır
- Küresel tehdit oluştururlar
- Yerel isimler alırlar
- Patogenezleri yakındır
- Aşıları yoktur
- Tedavileri zayıftır
- Kontrolü güçtür

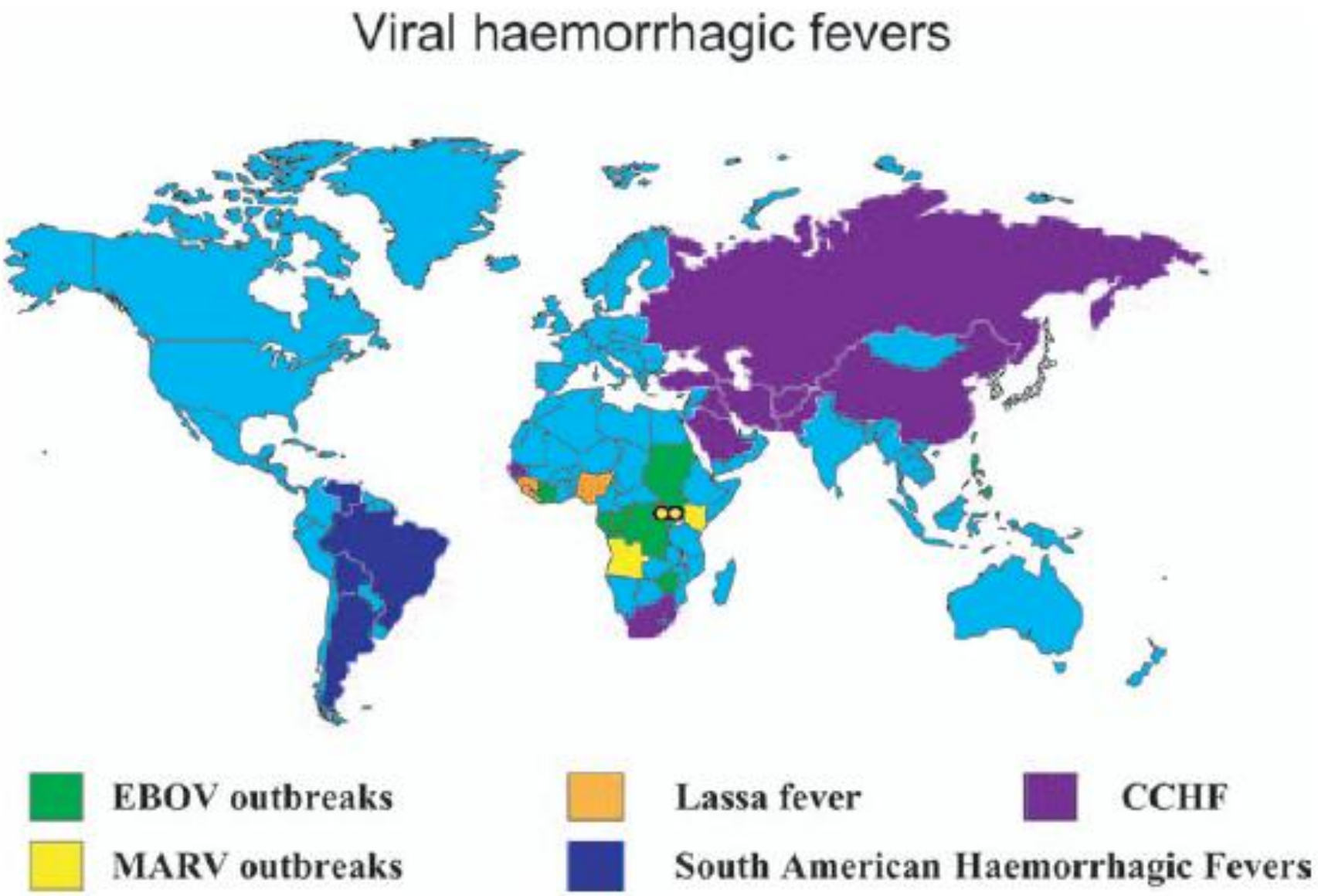


Fig. 1 Map of the world showing those countries known in 2005 to be affected by viral haemorrhagic fever (VHF) viruses. All those marked produce nosocomial outbreaks, with the exception of the South American haemorrhagic fever viruses. CCHF, Crimean–Congo haemorrhagic fever; EBOV, Ebola virus; MARV, Marburg virus.

Developments in Emerging and Existing Infectious Diseases 1
Series Editors: Önder Ergönül and Füsun Can

EMERGING INFECTIOUS DISEASES

Clinical Case Studies

Edited by

**Önder Ergönül, Füsun Can,
Lawrence Madoff, and Murat Akova**

Chapter 9

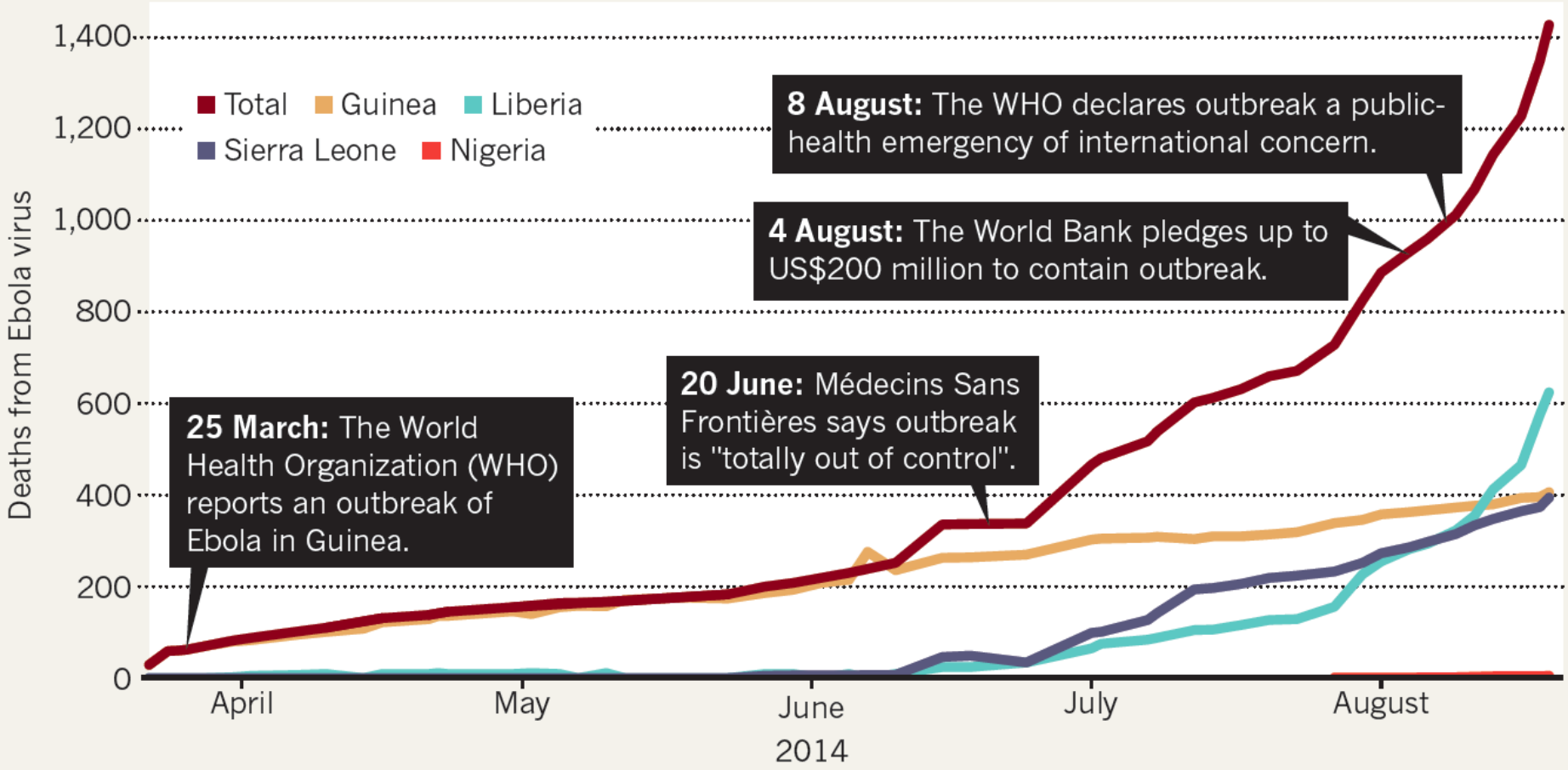
Ebola Virus Disease

Pierre Formenty
Emerging and Epidemic Zoonotic Diseases Team (CED/EZD), World Health Organization

CASE PRESENTATION

OUT OF CONTROL

The death toll from Ebola virus in West Africa continues to rise. Infectious-disease experts say that more health-care workers are needed to contain the outbreak.

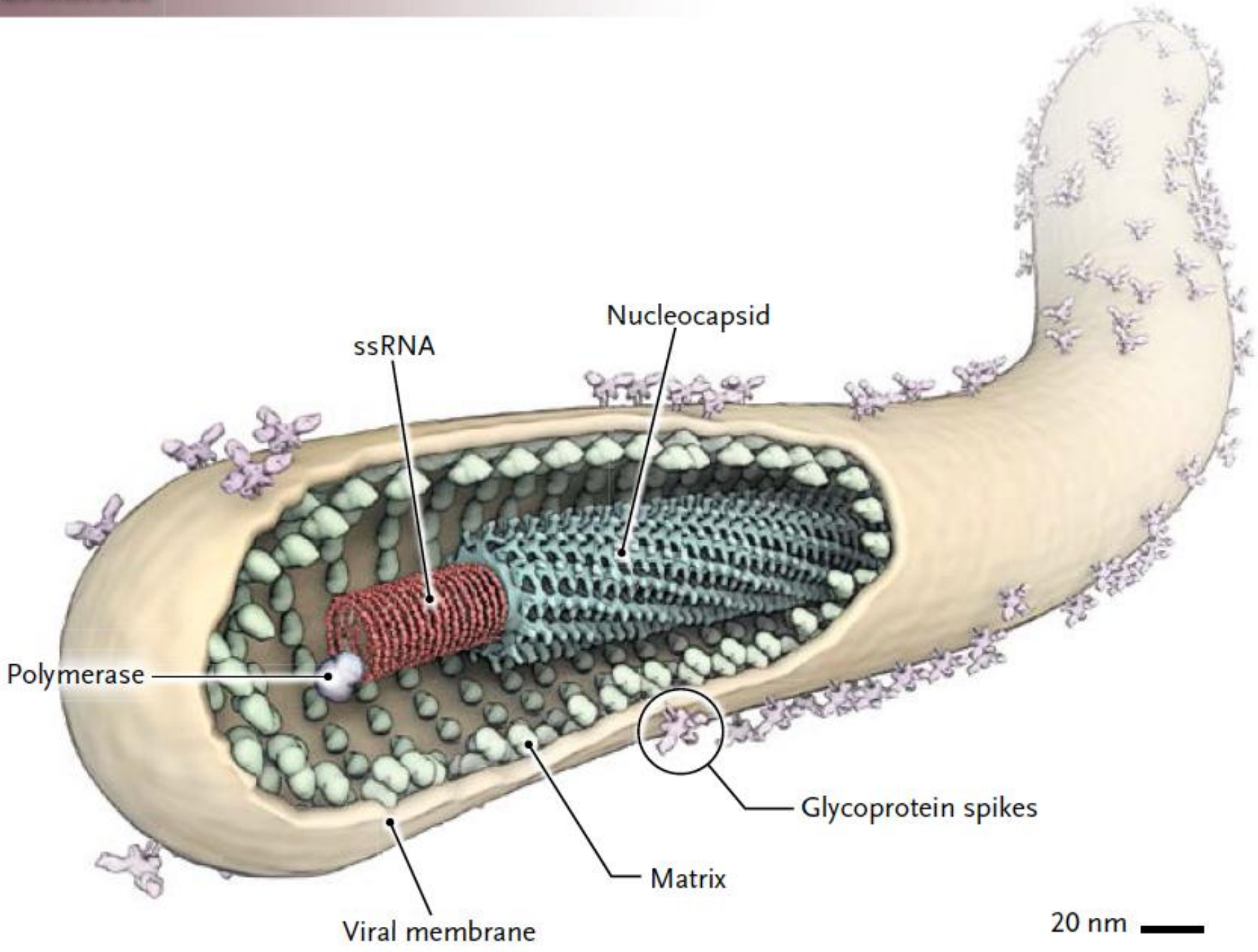


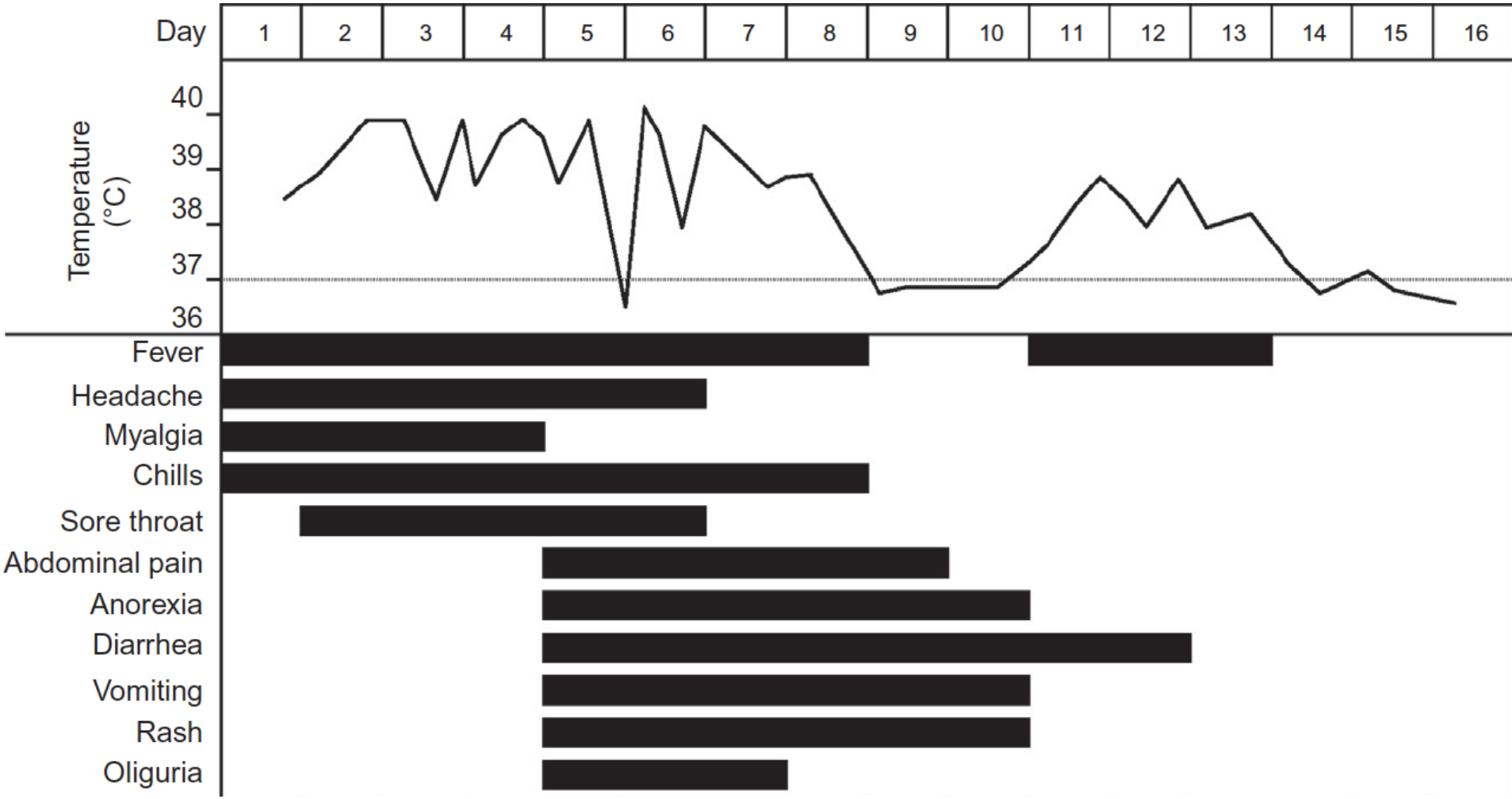
Nature, 28 August 2014

'In 1976 I discovered Ebola, now I fear an unimaginable tragedy'

Peter Piot was a researcher at a lab in Antwerp when a pilot brought him a blood sample from a Belgian nun who had fallen mysteriously ill in Zaire

Ebolavirus


Nucleocapsid
ssRNA
Polymerase
Glycoprotein spikes
Matrix
Viral membrane
20 nm



Formenty P. Ebola. In: Ergonul, Can, Akova, Madoff, 2014, Elsevier

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Ebola Virus Disease in West Africa — The First 9 Months of the Epidemic and Forward Projections

WHO Ebola Response Team*

NEJM, 7 Ekim 2014

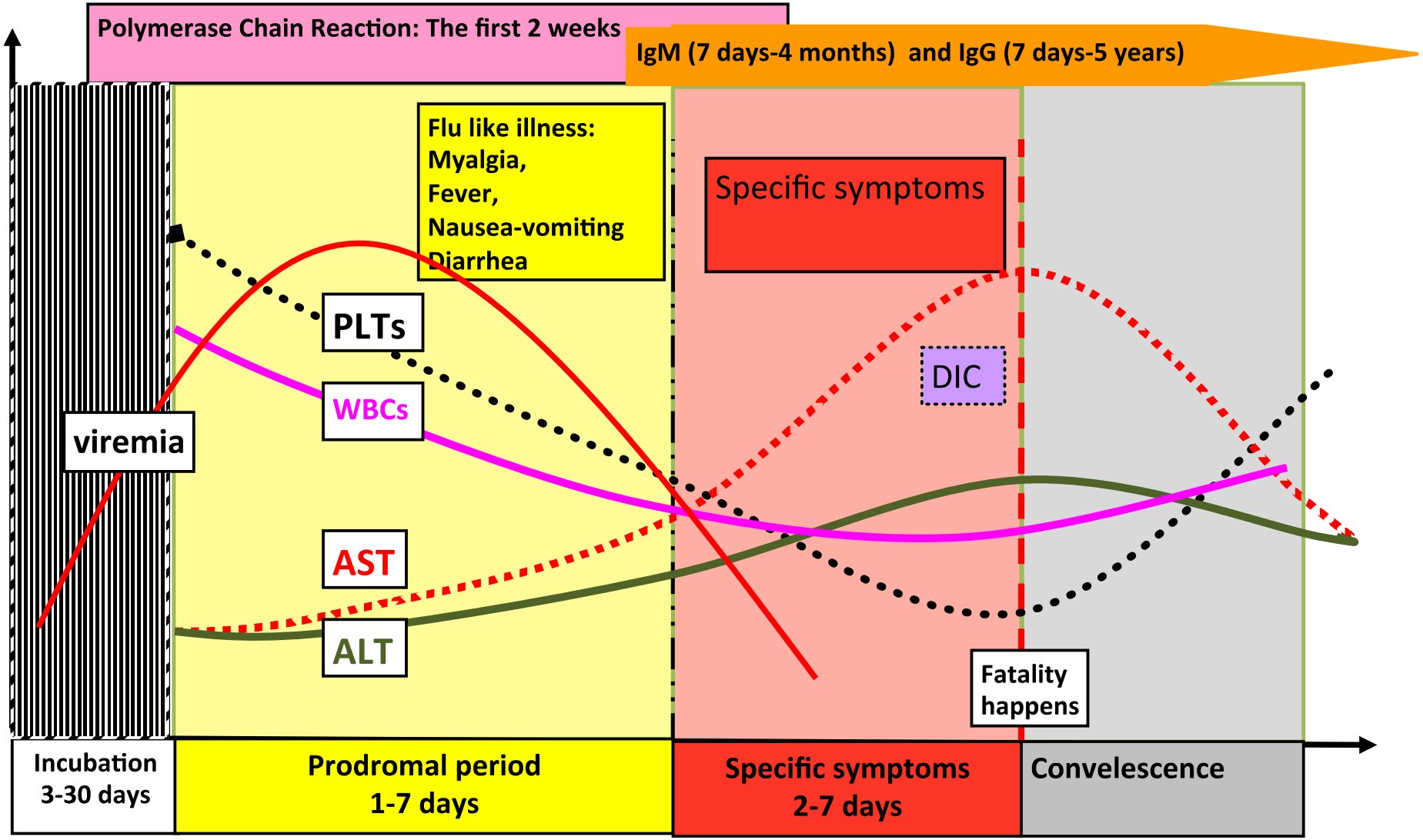
Table 1. Demographic Characteristics and Signs and Symptoms in Confirmed and Probable Ebola Case Patients with a Definitive Clinical Outcome in Guinea, Liberia, Nigeria, and Sierra Leone.*

Variable	All Patients	Patients Who Died	Patients Who Recovered	Odds Ratio (95% CI)†
		no./total no. (%)		
Demographic characteristics				
Male sex	685/1415 (48.4)	515/1056 (48.8)	170/359 (47.4)	0.93 (0.73–1.19)
Age group				
<15 yr	190/1378 (13.8)	145/1021 (14.2)	45/357 (12.6)	1.18 (0.83–1.71)
15–44 yr	838/1378 (60.8)	577/1021 (56.5)	261/357 (73.1)	0.48 (0.36–0.62)
≥45 yr	350/1378 (25.4)	299/1021 (29.3)	51/357 (14.3)	2.47 (1.79–3.46)
Health care worker	158/1429 (11.1)	112/1067 (10.5)	46/362 (12.7)	0.86 (0.60–1.27)
Signs and symptoms				
General symptoms				
Fever‡	1002/1151 (87.1)	746/846 (88.2)	256/305 (83.9)	1.34 (0.92–1.95)
Fatigue	866/1133 (76.4)	633/829 (76.4)	233/304 (76.6)	0.94 (0.68–1.28)
Loss of appetite	681/1055 (64.5)	498/778 (64.0)	183/277 (66.1)	0.92 (0.69–1.23)
Vomiting	753/1114 (67.6)	566/816 (69.4)	187/298 (62.8)	1.19 (0.89–1.59)
Diarrhea	721/1099 (65.6)	555/813 (68.3)	166/286 (58.0)	1.42 (1.06–1.89)
Headache	553/1035 (53.4)	407/757 (53.8)	146/278 (52.5)	1.03 (0.78–1.36)
Abdominal pain	439/992 (44.3)	311/715 (43.5)	128/277 (46.2)	0.85 (0.64–1.13)
Muscle pain	385/990 (38.9)	293/728 (40.2)	92/262 (35.1)	1.24 (0.92–1.67)
Joint pain	374/950 (39.4)	283/695 (40.7)	91/255 (35.7)	1.32 (0.98–1.80)
Chest pain	254/686 (37.0)	196/488 (40.2)	58/198 (29.3)	1.53 (1.07–2.20)
Cough	194/655 (29.6)	150/462 (32.5)	44/193 (22.8)	1.74 (1.18–2.61)
Difficulty breathing	155/665 (23.3)	123/472 (26.1)	32/193 (16.6)	1.68 (1.10–2.63)
Difficulty swallowing	169/514 (32.9)	138/375 (36.8)	31/139 (22.3)	2.22 (1.41–3.59)
Conjunctivitis	137/658 (20.8)	109/465 (23.4)	28/193 (14.5)	2.03 (1.29–3.29)
Sore throat	102/467 (21.8)	82/339 (24.2)	20/128 (15.6)	1.94 (1.13–3.46)
Confusion	84/631 (13.3)	68/446 (15.2)	16/185 (8.6)	2.00 (1.14–3.71)
Hiccups	108/947 (11.4)	91/699 (13.0)	17/248 (6.9)	2.15 (1.27–3.82)
Jaundice	65/627 (10.4)	52/443 (11.7)	13/184 (7.1)	1.83 (0.99–3.63)
Eye pain	48/622 (7.7)	39/438 (8.9)	9/184 (4.9)	1.95 (0.95–4.40)
Rash	37/642 (5.8)	30/453 (6.6)	7/189 (3.7)	1.90 (0.86–4.83)
Coma or unconsciousness	37/627 (5.9)	34/445 (7.6)	3/182 (1.6)	4.59 (1.61–19.34)

Kanamalar

Variable	All Patients	Patients Who Died	Patients Who Recovered	Odds Ratio (95% CI)†
		no./total no. (%)		
Unexplained bleeding	168/932 (18.0)	140/693 (20.2)	28/239 (11.7)	1.83 (1.20–2.90)
Hematemesis	26/670 (3.9)	20/503 (4.0)	6/167 (3.6)	1.07 (0.44–3.01)
Blood in stool	48/843 (5.7)	35/614 (5.7)	13/229 (5.7)	0.98 (0.52–1.96)
Bleeding gums	19/837 (2.3)	18/608 (3.0)	1/229 (0.4)	6.69 (1.35–121.32)
Bloody nose	16/836 (1.9)	15/610 (2.5)	1/226 (0.4)	8.02 (1.54–148.62)
Bloody cough	20/831 (2.4)	16/605 (2.6)	4/226 (1.8)	1.63 (0.58–5.82)
Other bleeding	8/657 (1.2)	5/493 (1.0)	3/164 (1.8)	0.45 (0.11–2.23)
Bleeding at injection site	20/833 (2.4)	19/605 (3.1)	1/228 (0.4)	6.51 (1.32–118.04)
Blood from vagina§	14/431 (3.2)	13/290 (4.5)	1/126 (0.8)	6.0 (1.11–112.4)
Blood in urine	10/827 (1.2)	9/601 (1.5)	1/226 (0.4)	5.14 (0.90–98.73)
Bleeding under skin	5/827 (0.6)	5/604 (0.8)	0/223	NA

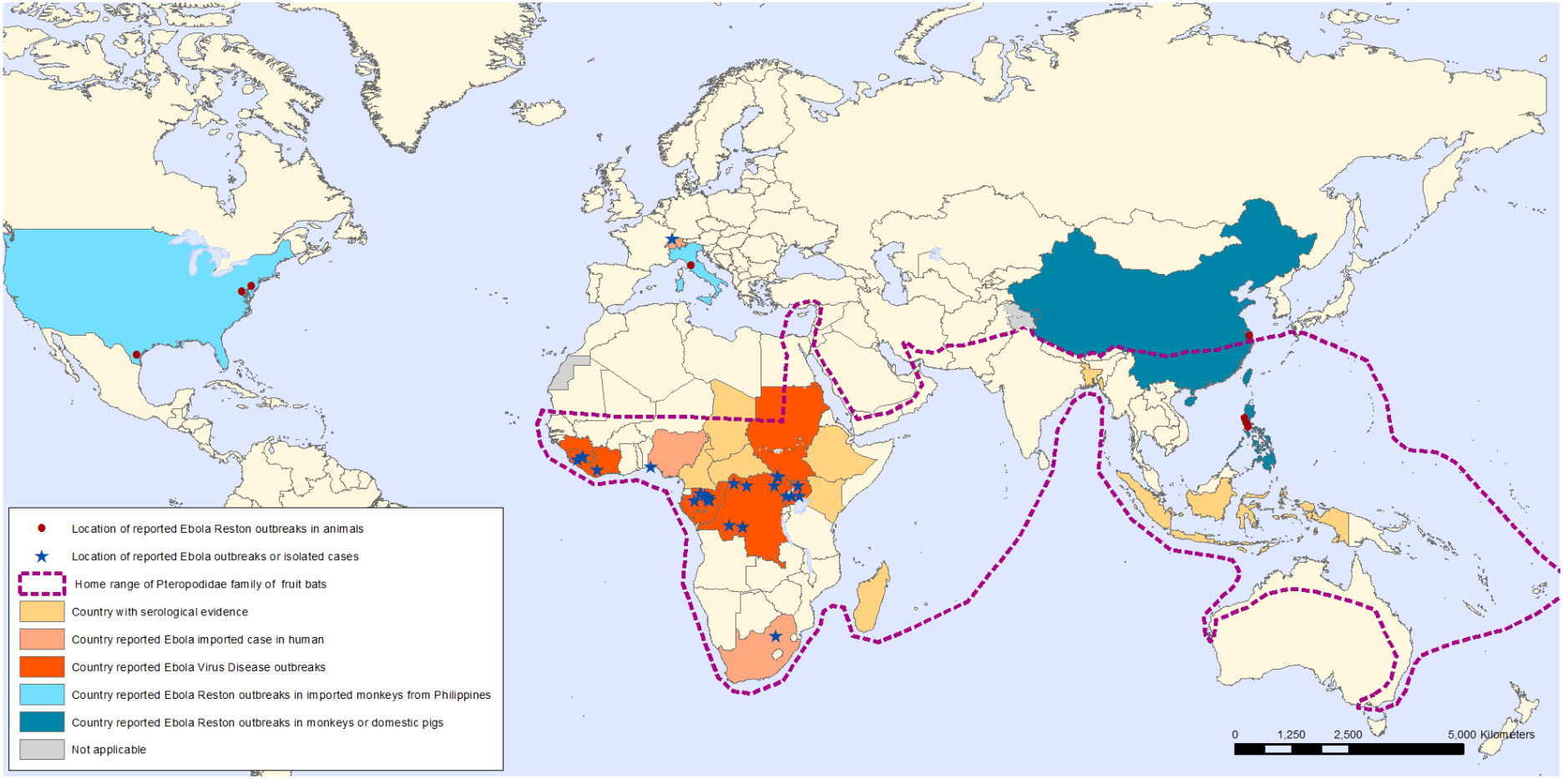
Clinical and Laboratory Course



Ergonul O. *Lancet ID* 2006; 6: 203-214

MSF Staff Members Lead a Young Patient with Suspected Ebola into the Case-Management Center.

Geographic distribution of Ebola virus disease outbreaks in humans and animals



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization

World Health Organization

EBOLA OUTBREAK RESPONSE: REGIONAL CONFIRMED AND PROBABLE CASES

World Health Organization

MAP DATE: 03 October 2014

Recent Cases (21 Days Prior)

- 1 - 10
- 11 - 100
- 101 - 200
- 201 - 300
- 301 - 400

All cases

- 1 - 10
- 11 - 100
- 101 - 200
- 201 - 400
- 401 - 800

NOT ACTIVE - No cases in previous 21 days

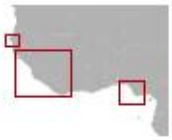
ACTIVE - New cases in previous 21 days

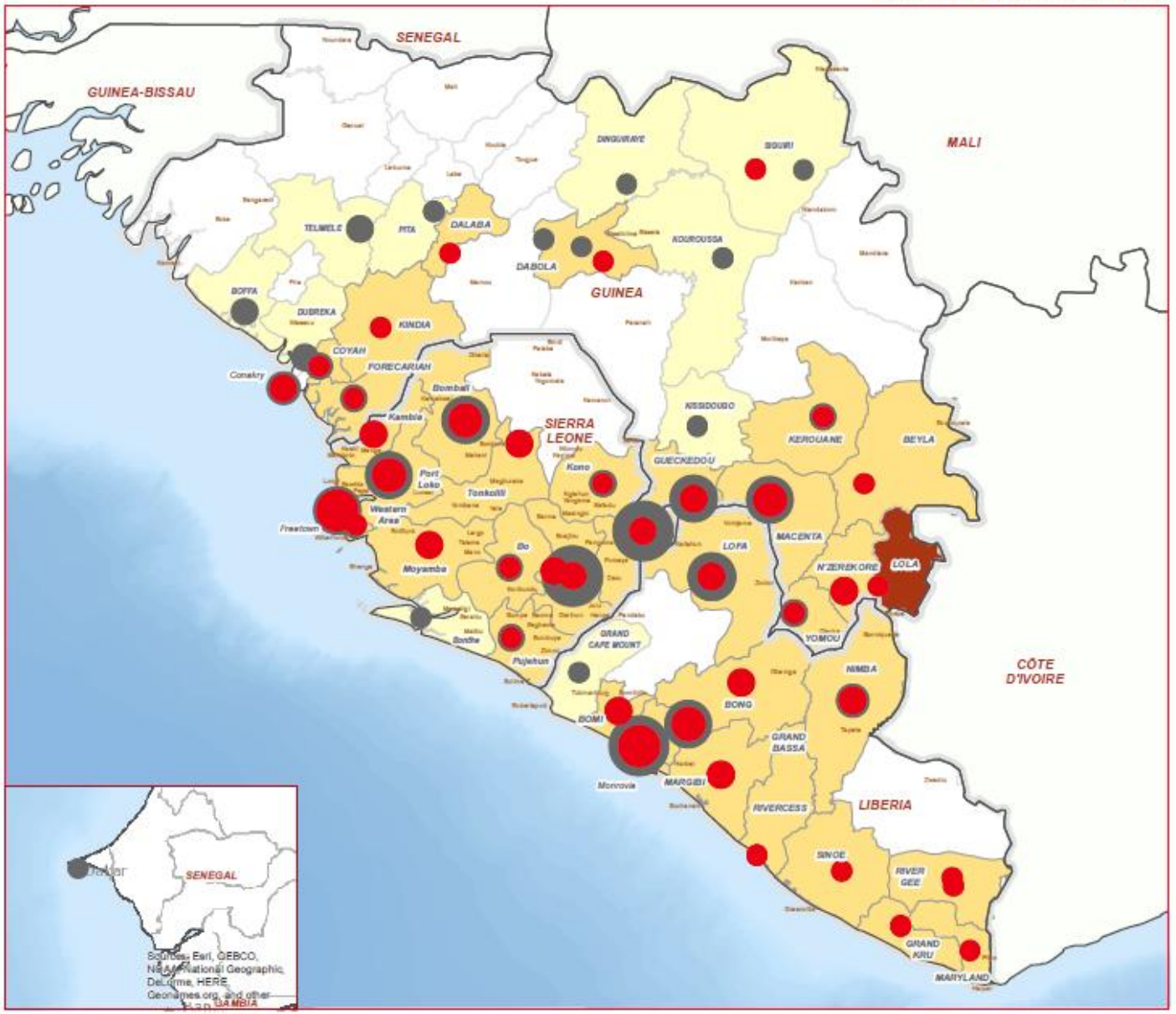
NEWLY INFECTED - New cases in previous 7 days (in previously uninfected areas)

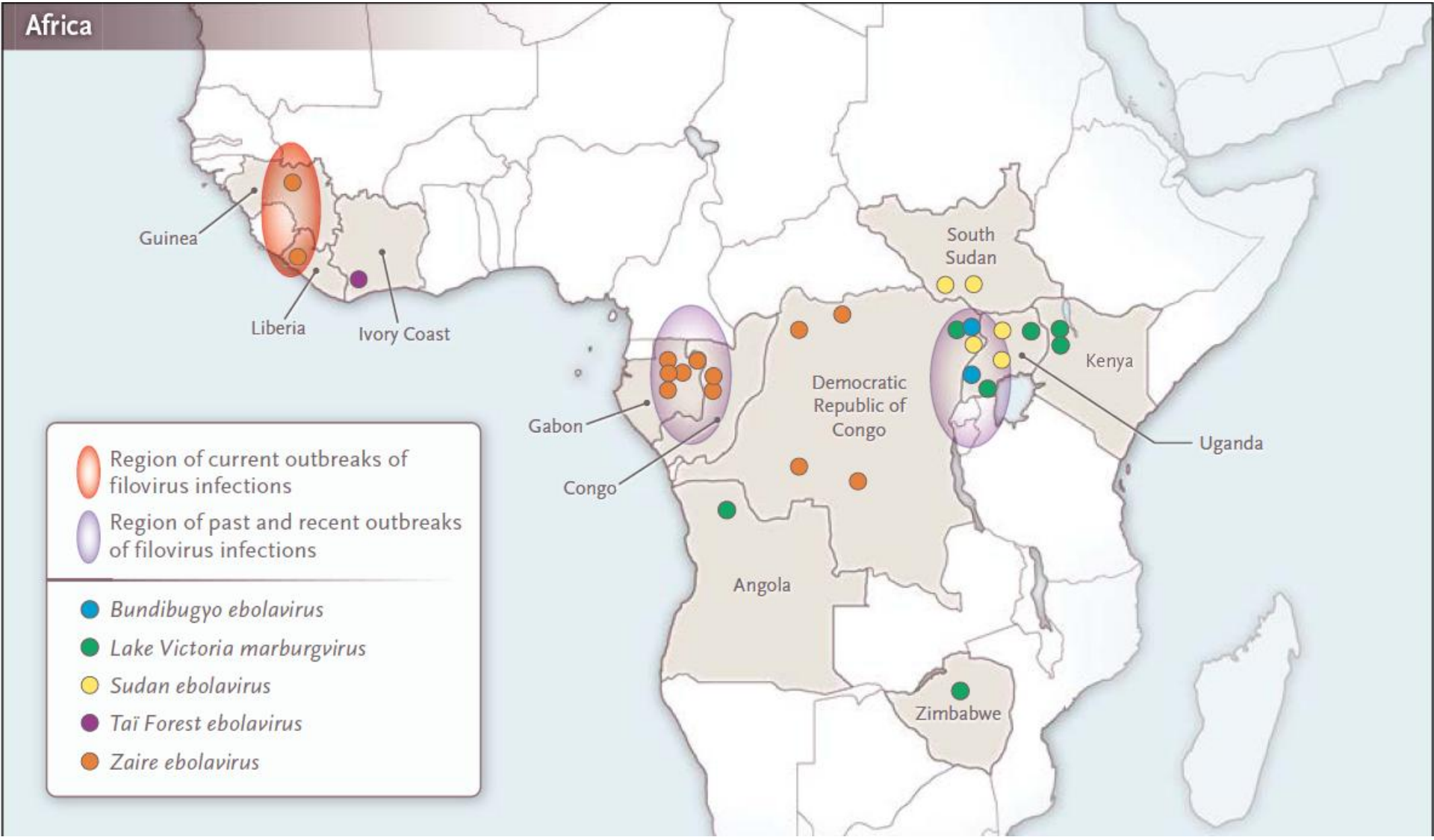
Map Scale (A3): 1:3,700,000

1 cm = 37 km

0 40 80 160 km






Africa
Guinea
Liberia
Ivory Coast
Gabon
Congo
South Sudan
Democratic Republic of Congo
Kenya
Uganda
Angola
Zimbabwe
Region of current outbreaks of filovirus infections
Region of past and recent outbreaks of filovirus infections
Bundibugyo ebolavirus
Lake Victoria marburgvirus
Sudan ebolavirus
Taï Forest ebolavirus
Zaire ebolavirus

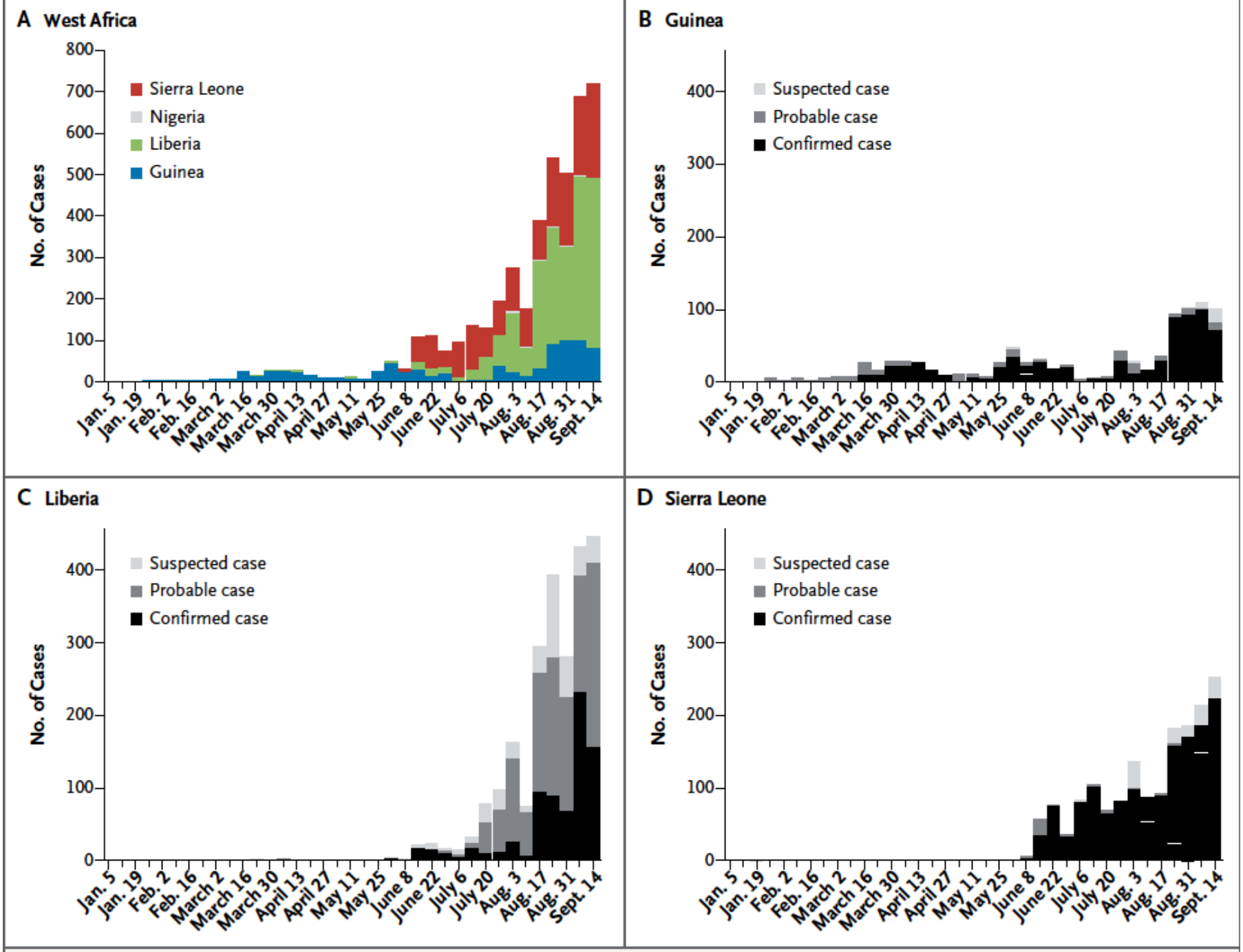
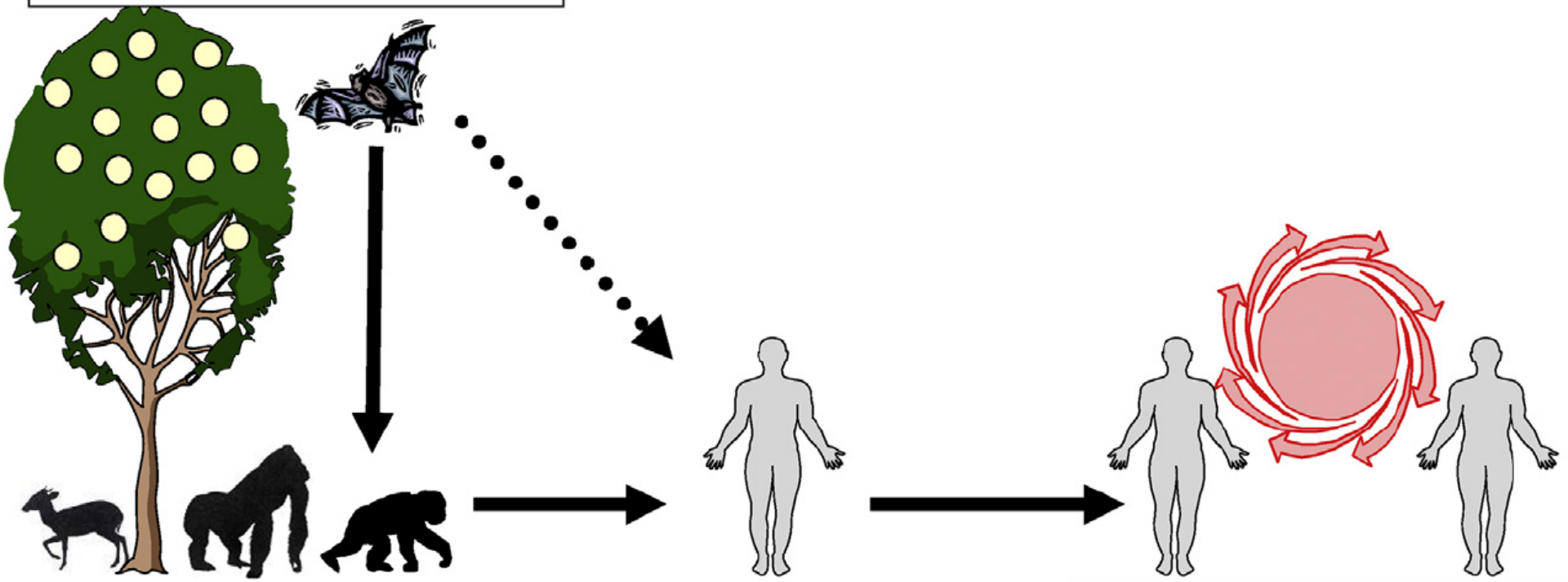


Figure 2. Weekly Incidence of Confirmed, Probable, and Suspected Ebola Virus Disease Cases.

1. Virus reservoir : Fruit bats

The virus maintains itself in fruit bats. The bats spread the virus during migration.



2. Epizootic in primates

Infected fruit bats enter in direct or indirect contact with other animals and pass on the infection, sometimes causing large-scale epidemics in gorillas, chimpanzees and other monkeys or mammals (e.g. forest antelopes).

3. Primary human infection

Humans are infected either through direct contact with infected bats (rare event), or through handling infected dead or sick animals found in the forest (more frequent)

4. Secondary transmission

Secondary human-to-human transmission occurs through direct contact with the blood, secretions, organs or other body fluids of infected persons. High transmission risk when providing direct patient care or handling dead bodies (funerals).

Formenty P. Ebola. In: Ergonul, Can, Akova, Madoff, 2014, Elsevier

Bushmeat: yabani hayvan eti

The term **bushmeat**, also called **wildmeat** and **game meat**, refers to meat from non-domesticated mammals, reptiles, amphibians and birds hunted for food in tropical forests

Basic reproduction number, *R*o (Çoğalma sayısı)

- 1.71 (95% CI, 1.44 to 2.01), Guinea
- 1.83 (95% CI, 1.72 to 1.94), Liberia
- 1.20 (95% CI, 0.67 to 1.96), Nigeria
- 2.02 (95% CI, 1.79 to 2.26), Sierra Leone

- Ro <1 : sönümlenme
- Ro=1 : endemik
- Ro>1 : salgın

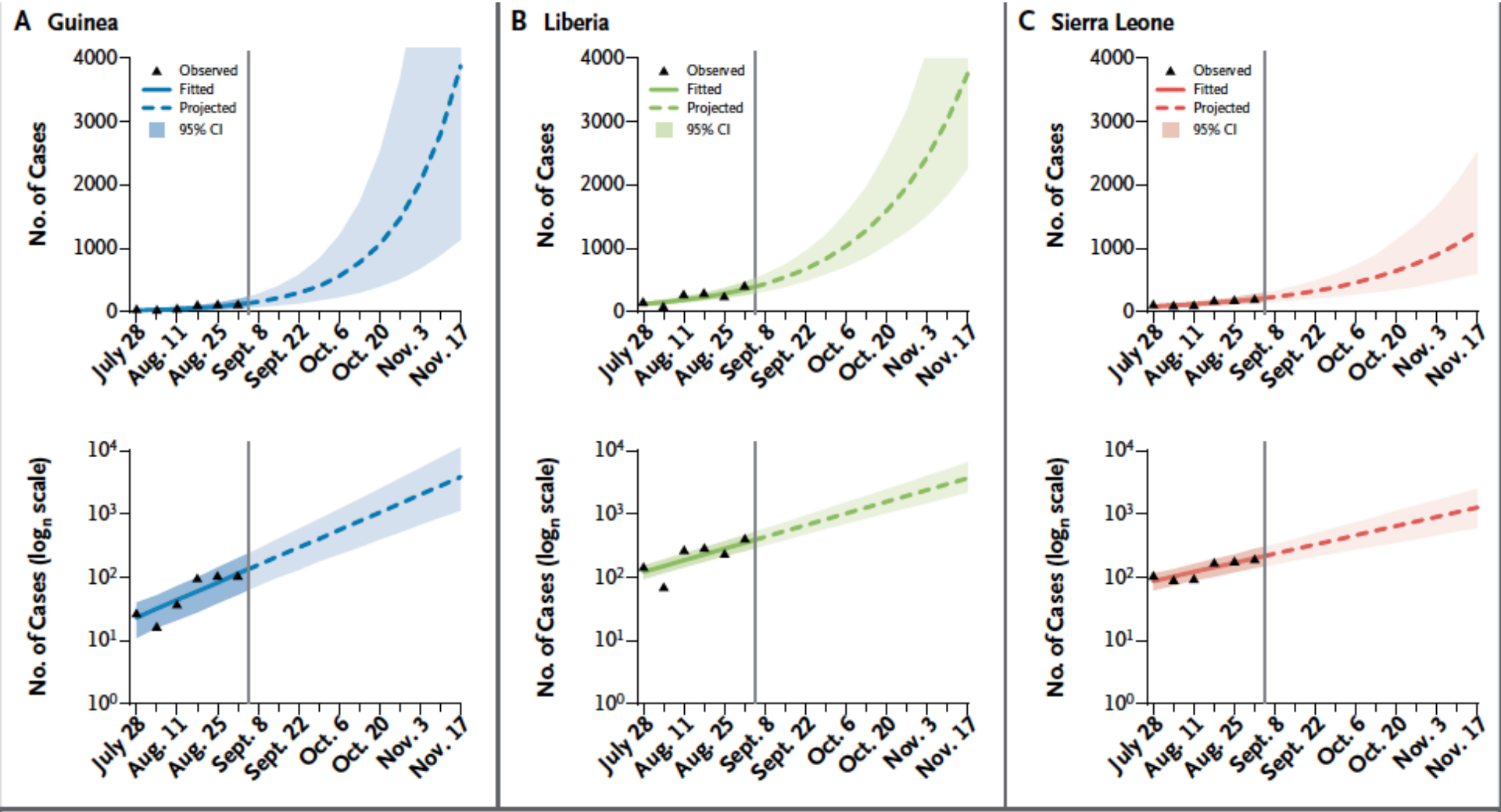
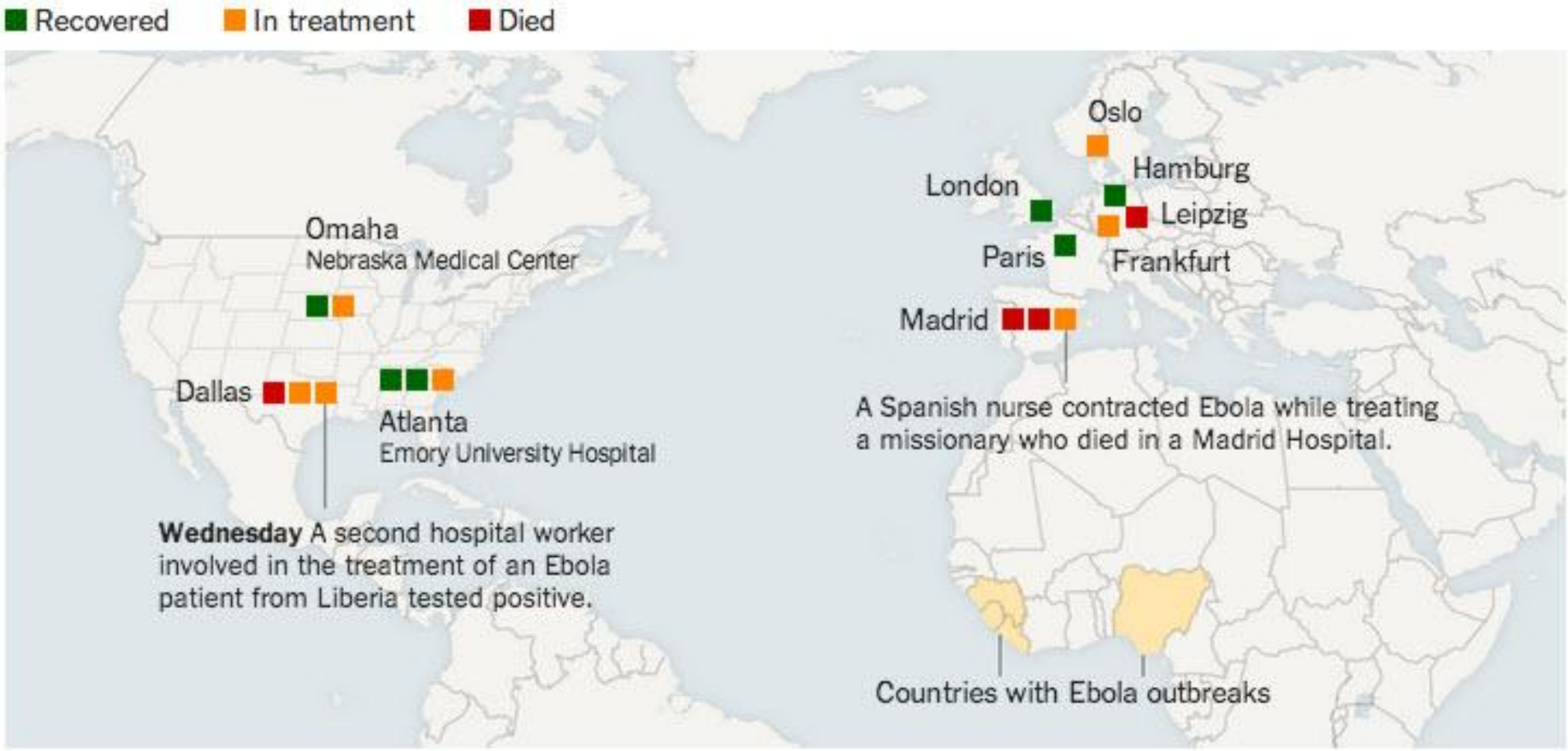


Figure 4. Observed and Projected Case Incidence.

NEJM, 23 Eylül 2014


Recovered
In treatment
Died
Omaha
Nebraska Medical Center
Dallas
Atlanta
Emory University Hospital
Wednesday A second hospital worker involved in the treatment of an Ebola patient from Liberia tested positive.
Oslo
Hamburg
London
Leipzig
Paris
Frankfurt
Madrid
A Spanish nurse contracted Ebola while treating a missionary who died in a Madrid Hospital.
Countries with Ebola outbreaks

Ebola outbreak: Nurse infected in Spain

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Media Statement

For Immediate Release: Sunday, October 12, 2014
Contact: Media Relations
(404) 639-3286

CDC Confirms Healthcare Worker Who Provided Care for First Patient Positive for Ebola

Patient isolated and public health investigation ongoing

Today, the Centers for Disease Control and Prevention (CDC) confirmed test results reported late last night by the Texas Department of State Health Services' public health laboratory showing that a healthcare worker at Texas Presbyterian Hospital is positive for Ebola. The healthcare worker, who provided care for the Dallas index patient, was isolated soon after symptoms started and remains so now.

On Friday, October 10, the healthcare worker reported a low-grade fever overnight and was referred for testing. The healthcare worker had been self-monitoring for fever and symptoms. As a precaution, after identification of fever, the healthcare worker was isolated and CDC staff interviewed the patient to determine additional contacts or potential exposures. At this time, one close contact has been identified and is being monitored.

İspanyol Hemşirenin Köpeği Öldürüldü

Ebola Virus Antibody Prevalence in Dogs and Human Risk

Loïs Allela,*[1] Olivier Bourry,*[1] Ré… …ilippe Yaba,* Brice Kumulungui,*
Pierre Rouqu… …ric M. Leroy*‡

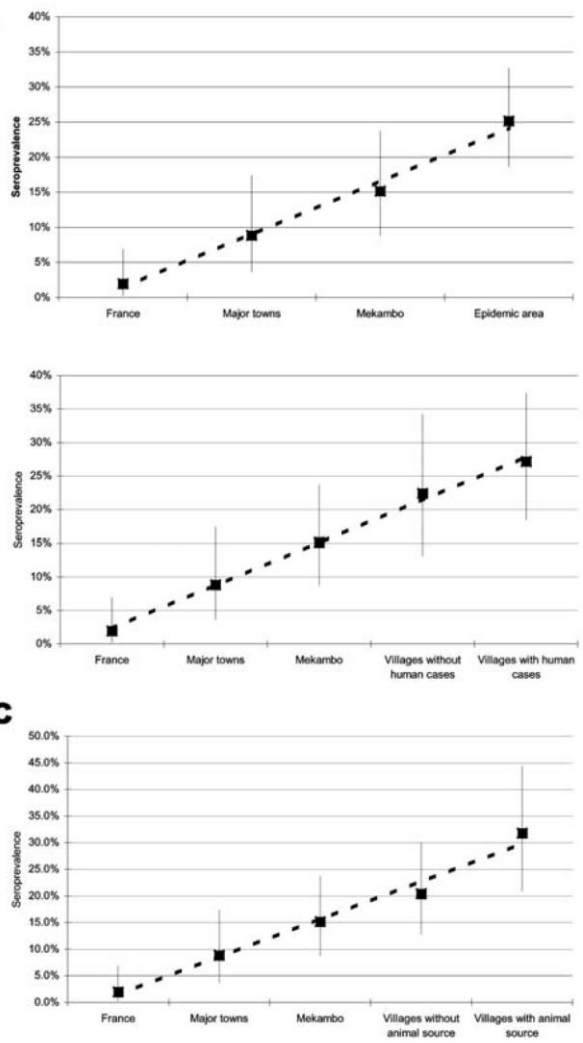
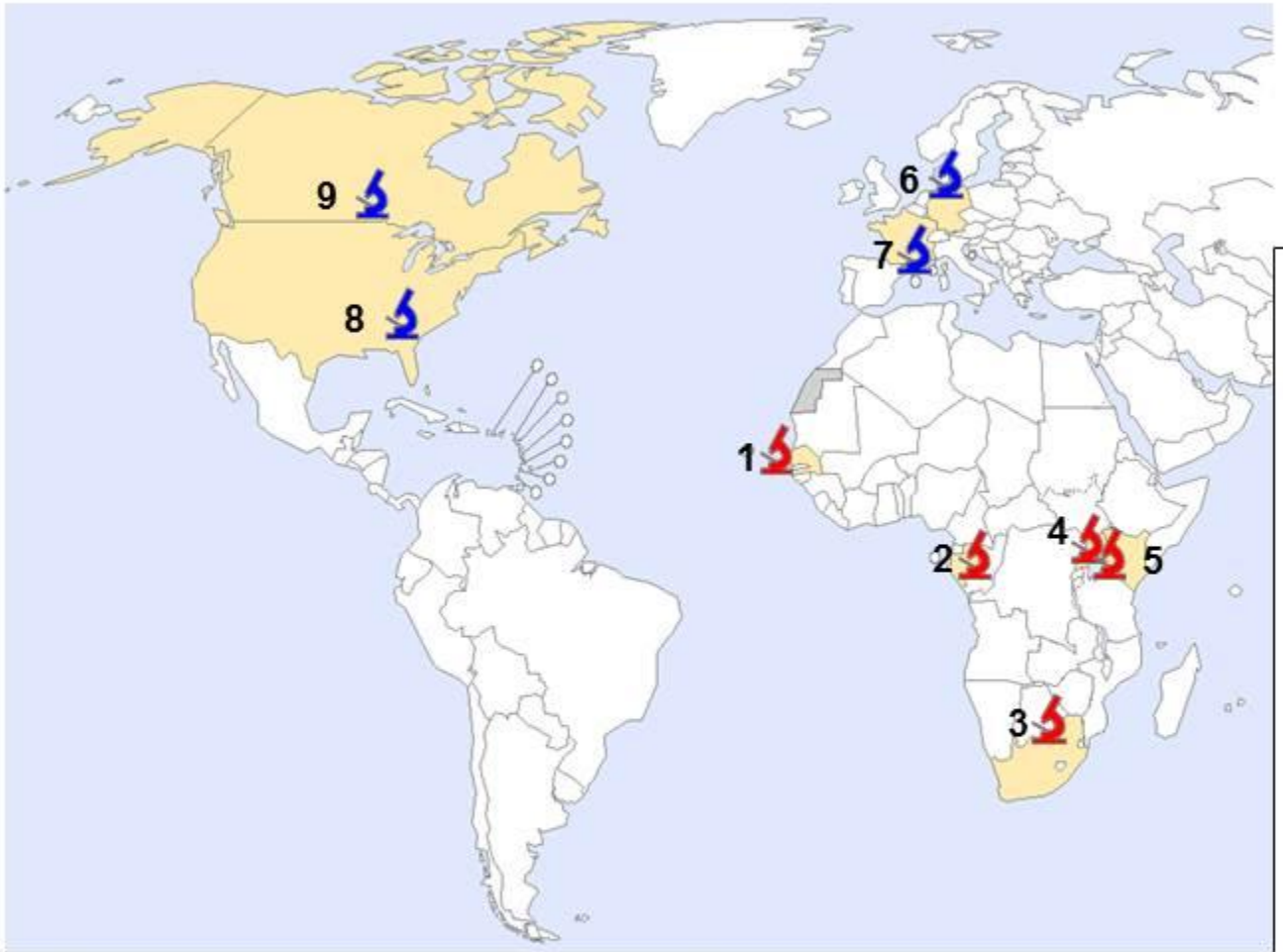


Table 2. Prevalence rates of Ebola-specific i… …n different areas and villages

Area/village characteristic	…evalence* (%)	95% confidence interval (%)
France	2	0.2–6.9
Major towns (Libreville and Port Gentil)	8.9	3.6–17.4
Mekambo	15.2	8.7–23.8
Ebola virus–epidemic area (villages)	25.2	18.6–32.6
Villages with human cases	27.2	18.4–37.4
Villages without human cases	22.4	13.1–34.2
Villages with human cases and animal sourc…	31.8	20.9–44.4
Villages with human cases, without animal s…	15.4	4.4–34.9

EID, 2005

Ebola Virus Disease in West Africa
EDPLN laboratories for Ebola or Marburg virus diagnostic



EDPLN : Emerging and Dangerous pathogens Laboratory Network

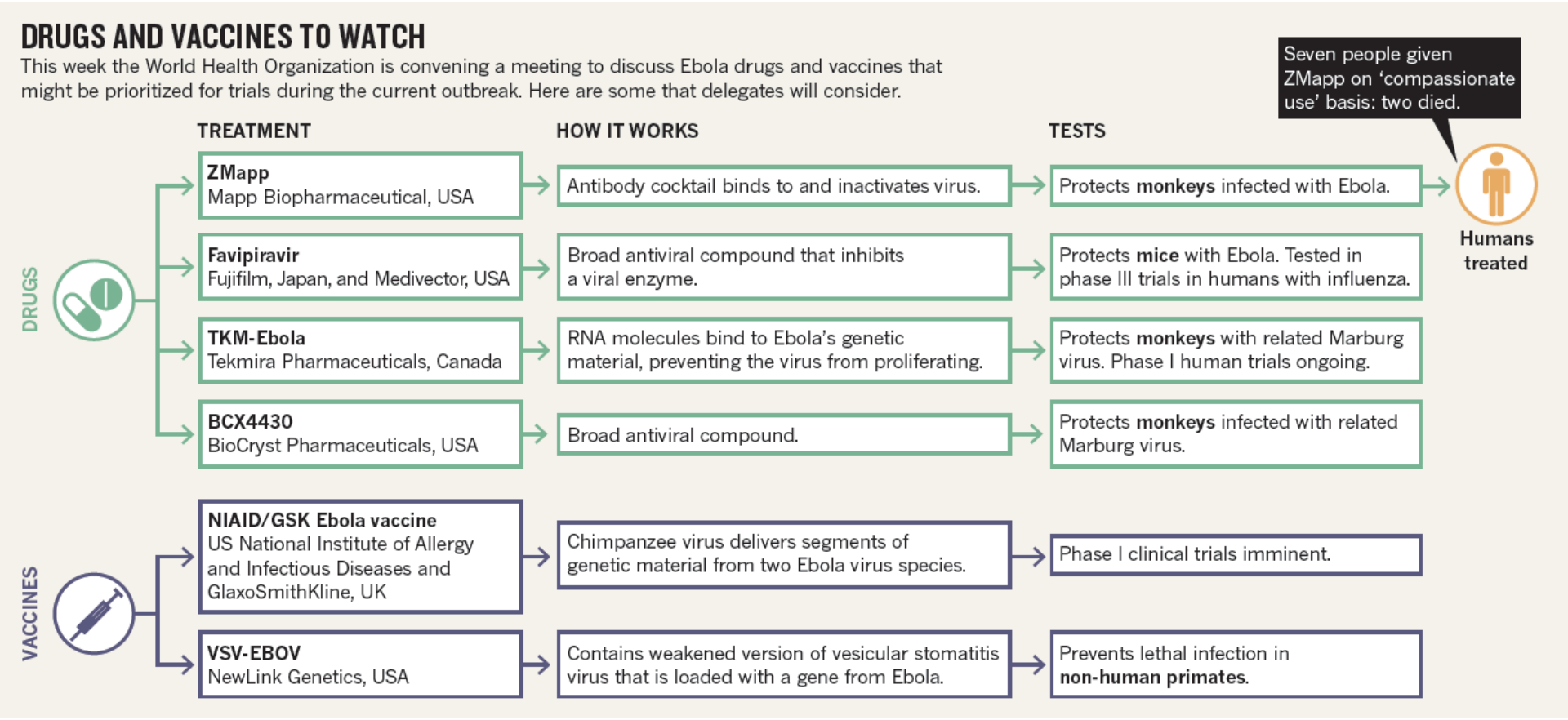
1. **Senegal**
   Institut Pasteur de Dakar
2. **Gabon**
   Centre International de Recherches Médicales de Franceville
3. **South Africa**
   National Institute for Communicable Diseases
4. **Uganda**
   Uganda Virology Research Institute
5. **Kenya**
   Kenya Medical Research Institute (KEMRI)
6. **Germany**
   Bernhard-Nocht-Institut für Tropenmedizin (BNI)
7. **France**
   Institut Pasteur Lyon et Paris
8. **United States of America**
   Centers for Disease Control and Infection
9. **Canada**
   National Microbiology Laboratory
   Public Health Agency of Canada

AFR-EDPLN laboratories with capacity for Ebola or Marburg virus diagnostic

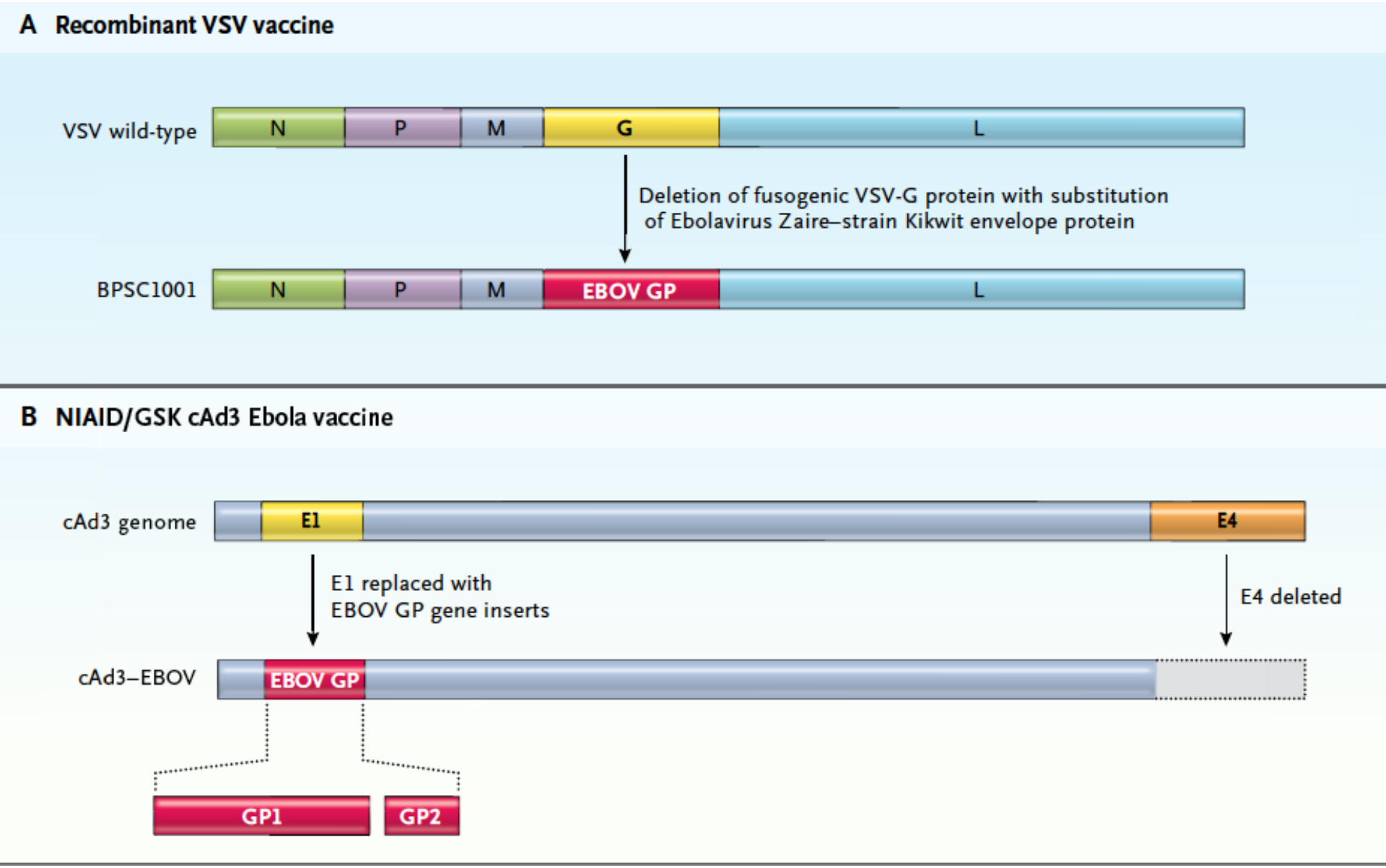
Global EDPLN laboratories supporting the Guinea Ebola outbreak response

Source: WHO, 10 April 2014

İlaçlar ve Aşılar



Ebola Aşı Adayları



NEJM, 7 Ekim 2014

HEALTH EBOLA

Ebola Healthcare Workers Are Dying Faster Than Their Patients

Jack Linshi @jacklinshi | Oct. 3, 2014

The bulk of healthcare workers are locals who don't have enough resources or training to treat not only their patients, but also each other

ŞİRE'NİN TEDAVİSİ SÜRÜYOR / SİERRA NORVEÇLİ EBOLA'YA YAKALANDI

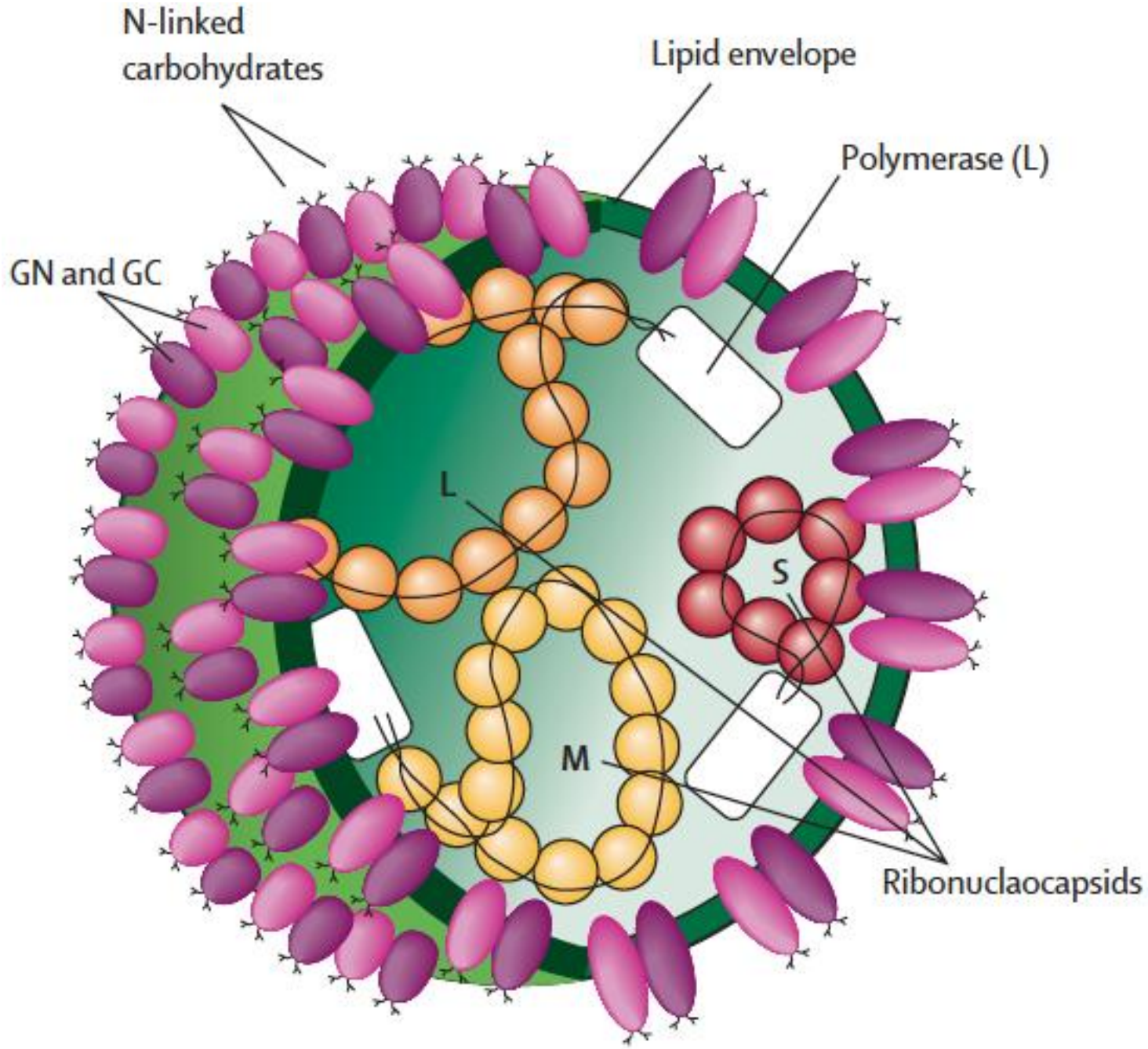
İspanyol Hemşire'nin Tedavisi Sürüyor / Sierra Leone'de Bir Norveçli Ebola'ya Yakalandı

Spain ramps up Ebola response; Norwegian tests positive in Sierra Leone

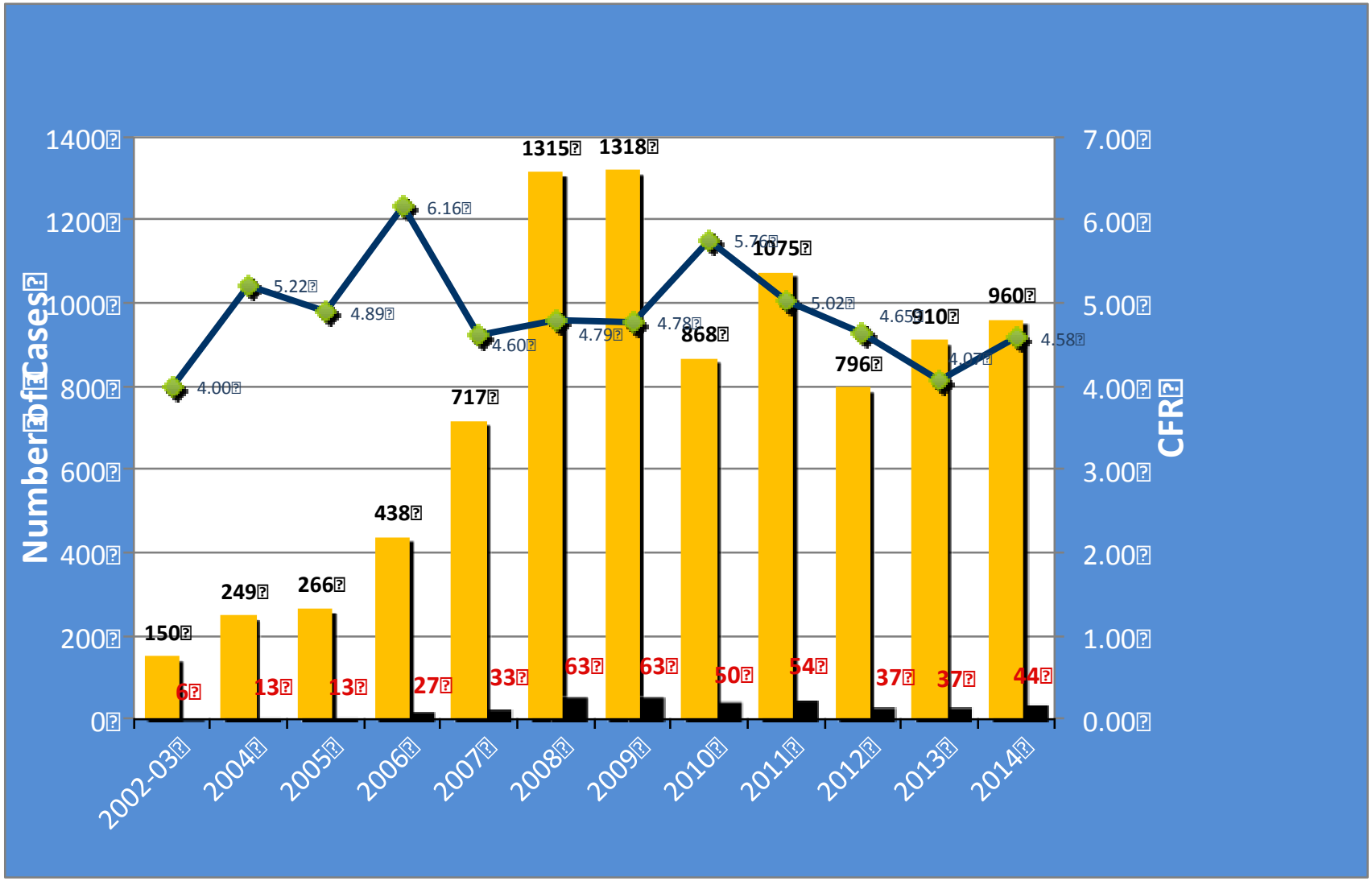
HABERLER »

EBOLA'NIN AVRUPA'DA YAYILMA OLASILIĞI DÜŞÜK / ANCAK YENİ OLGULARLA KARŞILAŞILMASI "KAÇINILMAZ"

Risk of Ebola spreading in Europe is very low: statement by Zsuzsanna Jakab, WHO Regional Director for Europe

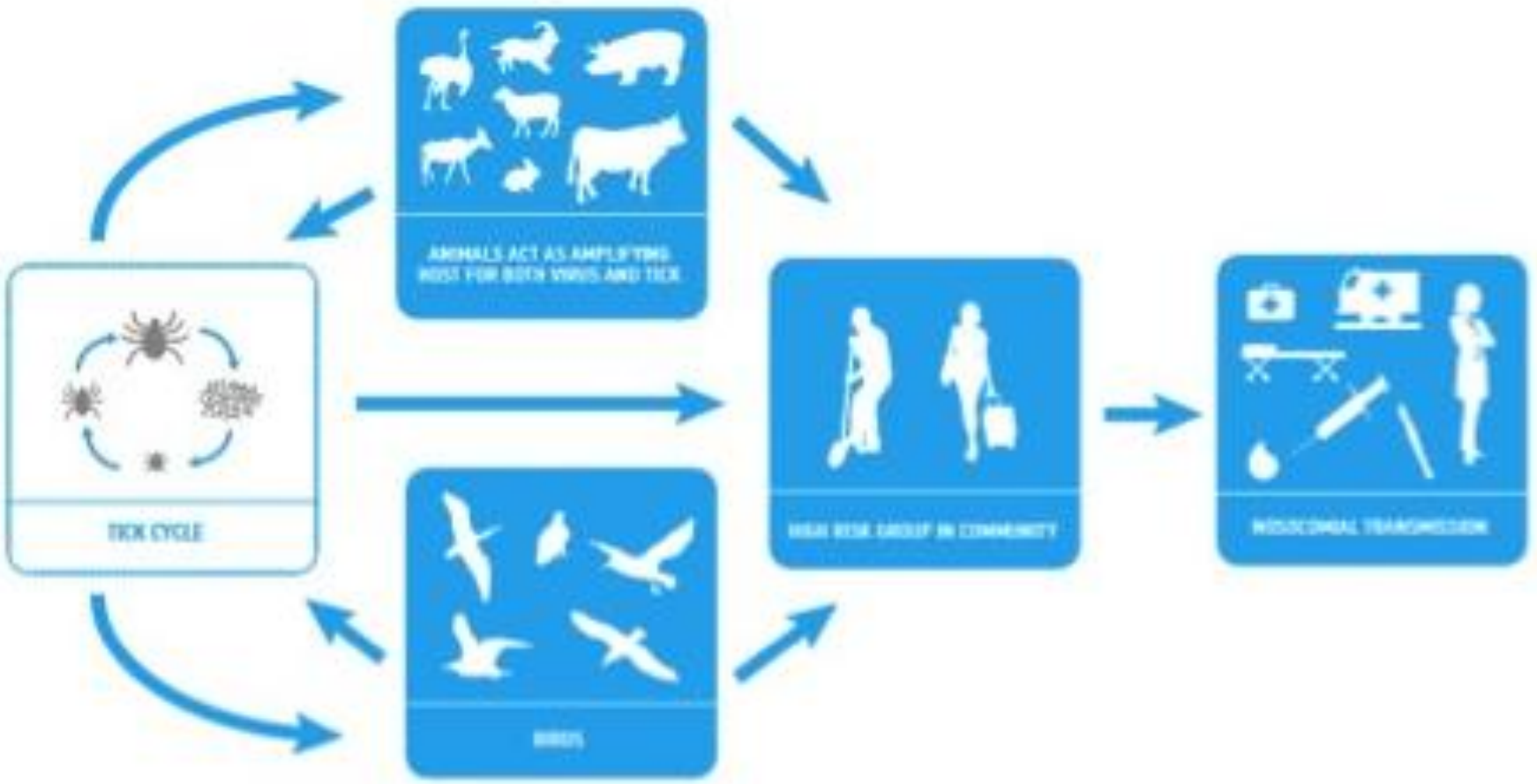

N-linked
carbohydrates
Lipid envelope
Polymerase (L)
GN and GC
L
S
M
Ribonuclaocapsids

Cases and Case Fatality Rate: 2002-2014



MoH, Public Health Institute, Turkey

Crimean-Congo Hemorrhagic Fever



Ergonul O, In Emerging Infections, 2014, Elsevier

İğneyi yanlışlıkla kendine batıran doktor öldü

Ondokuz Mayıs Üniversitesi (OMÜ) Sağlık Araştırma ve Uygulama Merkezi acil servisine başvuran Kırım Kongo Kanamalı Ateşi (KKKA) hastasında kullanılan iğneyi yanlışlıkla kendine batıran doktor Mustafa Bilgiç, tedavi gördüğü yoğun bakım servisinde müdahalelere rağmen kurtarılamadı.

AA | 22 EYLÜL 2012, 11:42

GÜNDEM

GÜNDEM

Sarayda Hanedan'ın muhteşem düğünü

Crimean-Congo Hemorrhagic Fever among Health Care Workers, Turkey

Aysel Kocagul Celikbas, Başak Dokuzoğuz, Nurcam Baykam, Sebnem Eren Gok, Mustafa Necati Eroğlu, Kenan Midilli, Herve Zeller, and Onder Ergonul

Table 1. Clinical and laboratory findings of HCWs in whom Crimean-Congo hemorrhagic fever developed after occupational exposure, Turkey, 2004–2011*†

HCW, outcome	Body temperature, °C	Bleeding	Leukocytes/ mm^3	Platelets/ mm^3	AST	ALT	APTT	Fibrinogen	SSI
1, survived	38.5	No	800	42,000	425	346	44	225	Moderate
2, survived	37.2	No	1100	53,000	145	81	43	270	Mild
3, died	40.5	Ecchymosis, hematemesis, melena, hematuria	11,100	40,000	251	277	90	171	Severe
4, survived	40.5	No	2,900	78,000	150	110	37.4	250	Mild
5, survived	39	Epistaxis	1,800	58,000	167	129	64	218	Moderate
6, survived	40.5	No	1,800	44,000	123	216	40.5	165	Moderate
7, survived	39.1	No	3,100	13,000	418	132	40.9	170	Moderate

*HCW, health care worker; AST, aspartate aminotransferase; ALT, alanine aminotransferase; APTT, activated partial thromboplastin time ; SSI, severity score index.
†Reference values: leukocytes, 4,000–11,000/mm^3; platelets, 150,000–450,000/mm^3; AST, <50 IU/L; ALT, <50 IU/L; APTT, 24–36 sec; fibrinogen, 200–400 mg/dL.

Emerg Infect Dis 2014

Table 2. Demographic features of HCWs with occupational exposure to Crimean-Conger hemorrhagic fever virus, Turkey, 2004–2011*

Episode, outcome†	HCW age, y/sex/profession	Procedure	Transmission route	Ribavirin for postexposure prophylaxis	Ribavirin for therapy (no. d after symptom onset)	Fatal
Episode 1; survived, her baby died	36/M/nurse	Wound care	Contact with surgical wound without protective equipment	No	Yes (0)	No
	31/F/nurse	Intubation, aspiration	Aerosol and droplet and contact without protective equipment	No	No	No
Episode 2; died	28/F/nurse	Phlebotomy	Needlestick	No	Yes (3)	Yes
Episode 3; died	41/M/physician	Resuscitation	Aerosol and droplet	–	Yes (0)	No
	26/M/physician	Nasal tamponade	Indirect contact	–	Yes (0)	No
	29/M/physician	Nasal tamponade	Indirect contact	–	Yes (0)	No
Episode 4; survived	30/M/nurse	Phlebotomy	Needlestick	No	Yes (1)	No
Episode 5; survived	30/F/nurse	Phlebotomy	Needlestick	Yes	–	No
Episode 6; survived	24/F/physician	Phlebotomy	Needlestick	Yes	–	No

*HCW, health care worker; –, ribavirin not necessary.
†Outcome for the index case-patient in each episode.

Emerg Infect Dis 2014

Sağlık Çalışanları Nasıl Giyinmeli?

http://www.mkk.de/cms/media/bilder/presse/2002/50/Lassa.jpg


Рекомендуемый порядок снятия СИЗ
Помните о тех участках, где возможно загрязнение СИЗ, и не допускайте самозаражения при их снятии!
Пример: оказание помощи пациенту с птичьим гриппом
Снимите перчатки вместе с халатом (если халат одноразовый), выбросьте их.
Обработайте руки спиртосодержащим препаратом или водой.
Снимите защитные очки, НЕ прикасаясь к передней части.
Снимите респиратор, НЕ прикасаясь к передней части.
Обработайте руки спиртосодержащим препаратом или водой.
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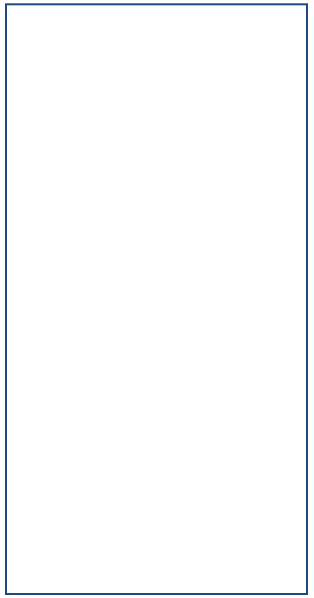
How to put on PPE (when all PPE items are needed)
Step 1
- Identify hazards & manage risk. Gather the necessary PPE.
- Plan where to put on & take off PPE.
- Do you have a friend? Mirror?
- Do you know how you will deal with waste?
Step 2
- Put on a gown.
Step 3a
- Put on face shield.
OR
Step 3b
- Put on medical mask and eye protection (e.g. eye visor/goggles).
+
Note: If performing an aerosol-generating procedure (e.g. aspiration of respiratory tract, intubation, resuscitation, bronchoscopy, autopsy), a particulate respirator (e.g. US NIOSH-certified N95, EU FFP2, or equivalent respirator) should be used in combination with a face shield or an eye protection. Do user seal check if using a particulate respirator.
Step 4
- Put on gloves (over cuff).
How to take off PPE
Step 1
- Avoid contamination of self, others & the environment.
- Remove the most heavily contaminated items first.
Remove gloves & gown
- Peel off gown & gloves and roll inside out.
- Dispose of gloves and gown safely.
Step 2
- Perform hand hygiene.
Step 3a
If wearing face shield:
- Remove face shield from behind.
- Dispose of face shield safely.
Step 3b
If wearing eye protection and mask:
- Remove goggles from behind.
- Put goggles in a separate container for reprocessing.
- Remove mask from behind and dispose of safely.
Step 4
- Perform hand hygiene.

Standard Precautions

- hand hygiene
- **gloves** ➔ based on risk assessment
- **gown** ➔ based on risk assessment
- **facial protection (eyes, nose, mouth)** ➔ based on risk assessment
- respiratory hygiene and cough etiquette
- environmental cleaning and disinfection
- cleaning and disinfection of patient care equipment
- waste disposal
- prevention of needlestick injuries.



Not SP, not for clinical use!

Hand hygiene and use of PPE based on risk assessment

- Always before and after patient contact, and after contact with contaminated environmental surfaces or equipment
- If direct contact with patient's blood and body fluids, secretions, excretions, mucous membranes or non-intact skin
- If there is a risk of spills onto the health-care worker's face