



Enfermedad por el virus del Ébola: epidemiología y desarrollo de la vacuna

Teresa González Galiana
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“But to families losing their loved ones, Ebola is a heartless killer. It demands what most people consider a ruthless response to suffering: distance. Its secret weapon is not the scientific mystery of its seven proteins. It’s love. It’s the human need to show compassion and care, and it’s killing Liberia’s women.”

Jina Moore

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El virus se detectó por vez primera en 1976 en dos brotes simultáneos ocurridos en Nzara (Sudán) y Yambuku (República Democrática del Congo). La aldea en que se produjo el segundo de ellos está situada cerca del río Ebola, que da nombre al virus.

El **género Ebolavirus** es, junto con los géneros Marburgvirus y Cuevavirus (virus Lloviu), uno de los tres miembros de la familia Filoviridae (filovirus). Comprende cinco especies:

- ebolavirus Bundibugyo (BDBV)
- ebolavirus Zaire (EBOV)
- ebolavirus Reston (RESTV)
- ebolavirus Sudan (SUDV)
- ebolavirus Tai Forest (TAFV)

Las especies BDBV, EBOV y SUDV se han asociado a grandes brotes de EVE en África, al contrario de las especies RESTV y TAFV. La especie RESTV, encontrada en Filipinas y China, puede infectar al ser humano, pero hasta ahora no se han comunicado casos de enfermedad humana ni de muerte debidos a ella.

Ebolavirus Ecology

Enzootic Cycle

New evidence strongly implicates bats as the reservoir hosts for ebolaviruses, though the means of local enzootic maintenance and transmission of the virus within bat populations remain unknown.

Ebolaviruses:

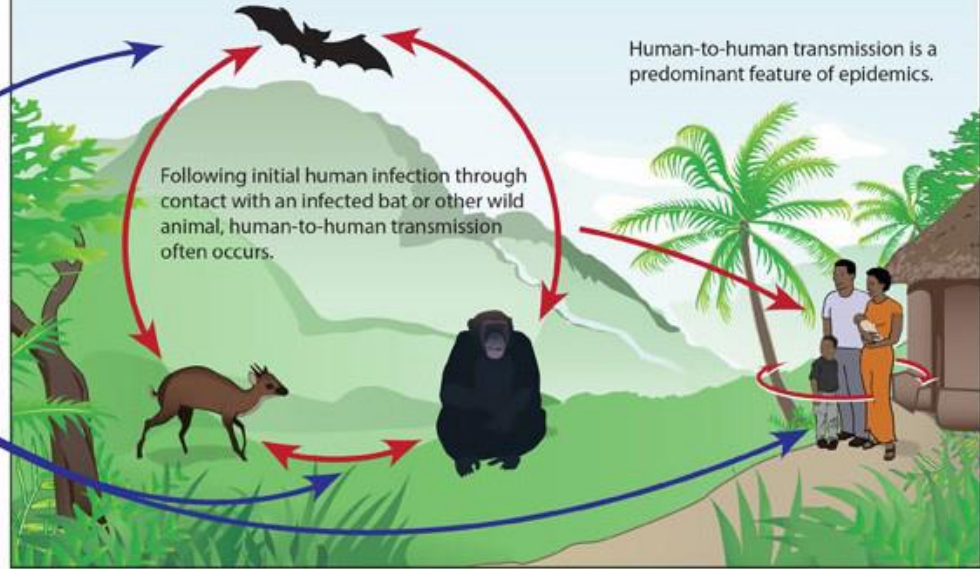
- Ebola virus (formerly Zaire virus)
- Sudan virus
- Tai Forest virus
- Bundibugyo virus
- Reston virus (non-human)



Epizootic Cycle

Epizootics caused by ebolaviruses appear sporadically, producing high mortality among non-human primates and duikers and may precede human outbreaks. Epidemics caused by ebolaviruses produce acute disease among

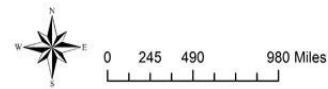
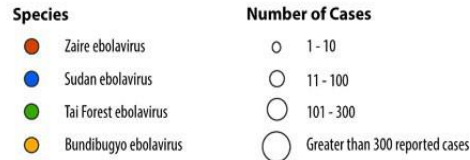
humans, with the exception of Reston virus which does not produce detectable disease in humans. Little is known about how the virus first passes to humans, triggering waves of human-to-human transmission, and an epidemic.



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EBOLAVIRUS OUTBREAKS BY SPECIES AND SIZE, 1976 - 2014



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El abordaje de la enfermedad hasta 2014.

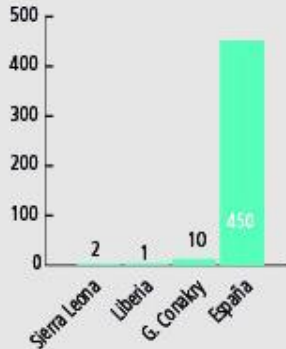
- Pequeños brotes localizados en comunidades rurales de países africanos
- Tarea atribuida a las ONGs, específicamente a Médicos sin Fronteras
- Aislar, contener. No tratar. Brotes autolimitados
- Prácticamente ninguna investigación excepto la operacional llevada a cabo por las propias ONGs y la realizada por las Fuerzas Armadas EEUU en el contexto de guerra biológica.
- En marzo de 2014 primeros casos en Guinea que se extienden en mancha de aceite hacia países cercanos

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El brote en África del Oeste

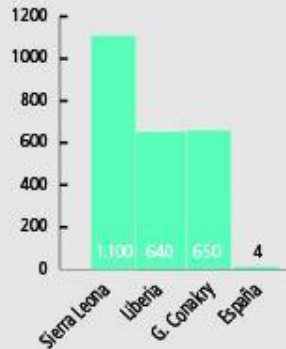
DESARROLLO Y SALUD

MÉDICOS POR CADA CIENTO MIL PERSONAS

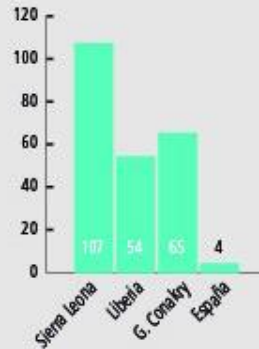


LA TASA DE MORTALIDAD MATERNA (2013)

Cantidad de mujeres que mueren en el embarazo y el parto por cada cien mil nacidos vivos.

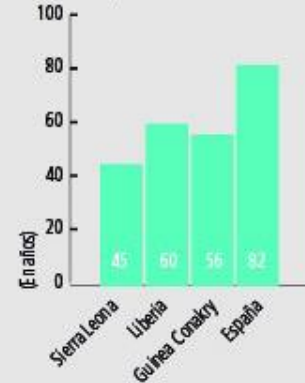


TASA DE MORTALIDAD INFANTIL (2013)

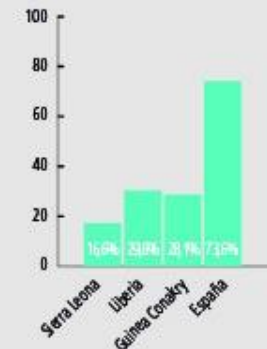


ESPERANZA DE VIDA AL NACER (2012)

Cantidad de años que viviría un recién nacido según los patrones de mortalidad vigentes.

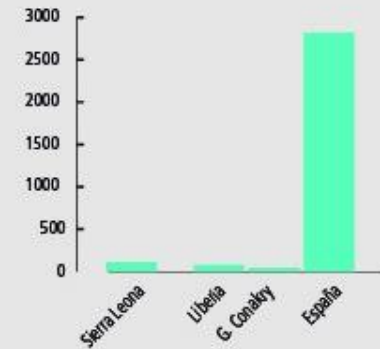


GASTO EN SALUD, SECTOR PÚBLICO (% DEL GASTO TOTAL EN SALUD) 2012



GASTO EN SALUD PER CÁPITA (DÓLARES, 2012)

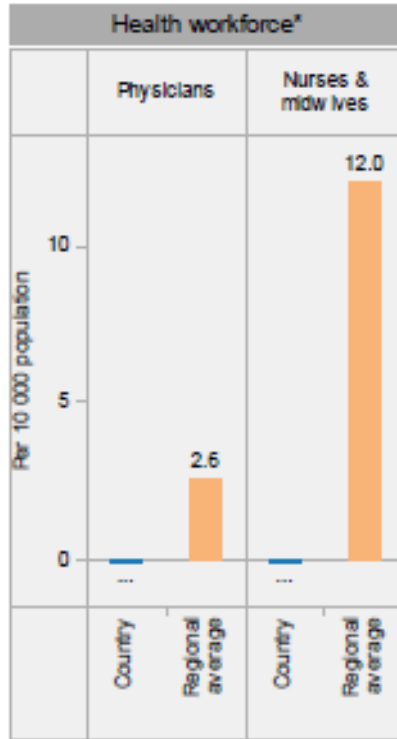
Suma de gastos en salud pública y privada, como proporción de la población total.



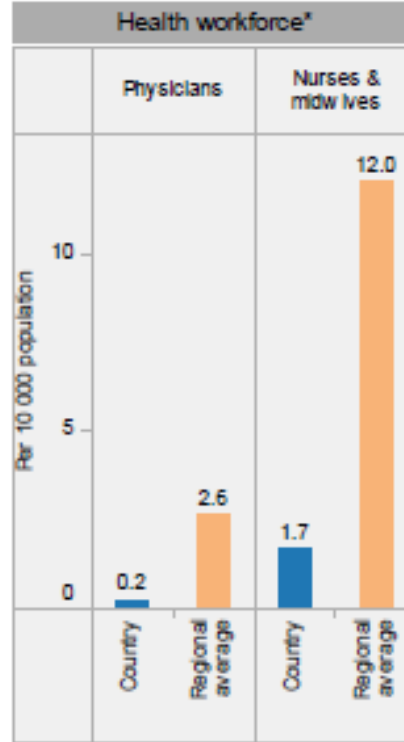
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El brote en África del Oeste

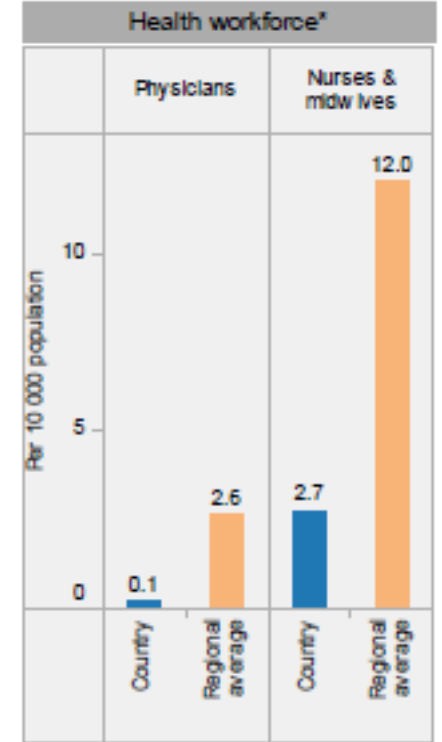
Sierra Leona



Liberia



Guinea

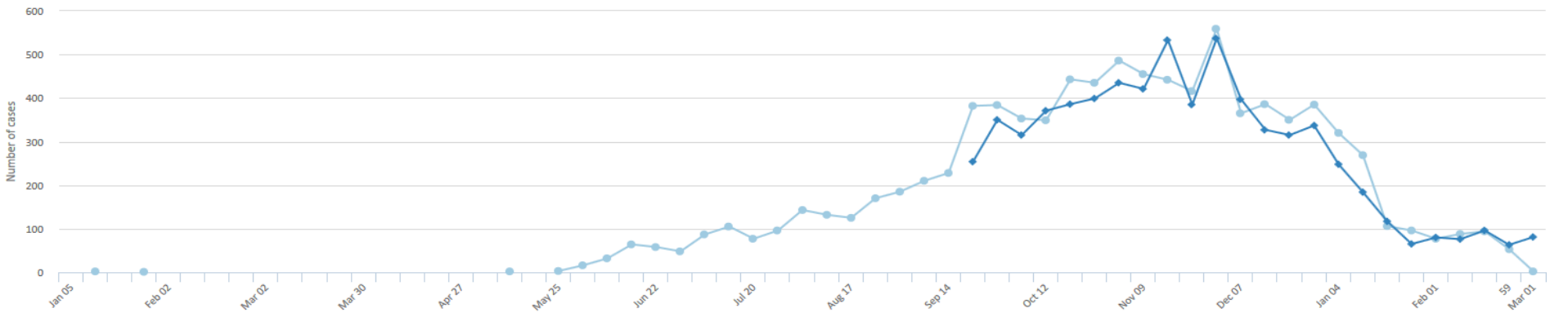


Número de trabajadores sanitarios antes de la crisis

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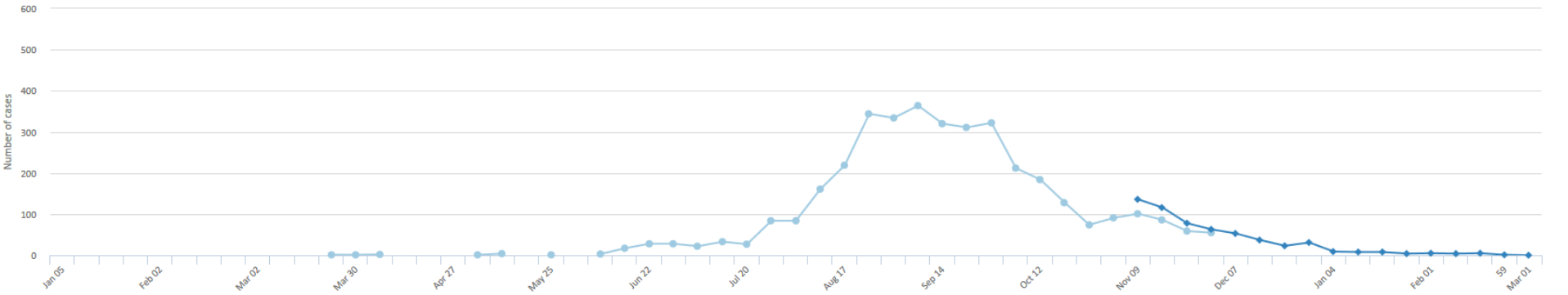
Sierra Leone

Patient database Situation report



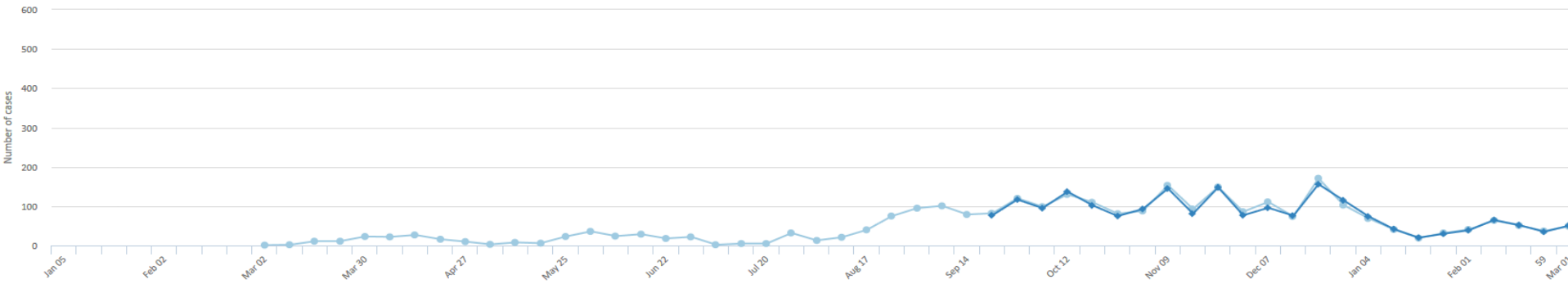
Liberia

Patient database Situation report



Guinea

Patient database Situation report



Los casos en los países del norte.

El impacto en la opinión pública.

- 8 agosto 2014. Declaración de Emergencia de Salud Pública
- MSF se declara incapaz de atender a todos los casos
- Octubre 2014: primeros casos de contagio en países del Norte. Movilización de la comunidad internacional. Llegada de fondos
- Extraña reacción de los sistemas sanitarios en los países del Norte.
- La locura...el miedo...

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Y, mientras tanto, en el Sur...

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Los “nuevos acercamientos” OMS-CDC

- Los Community Care Centers
- Los nuevos protocolos de IPC

Pero lo que seguía funcionando era el lavado de manos, la lejía y la vigilancia estrecha inter pares...

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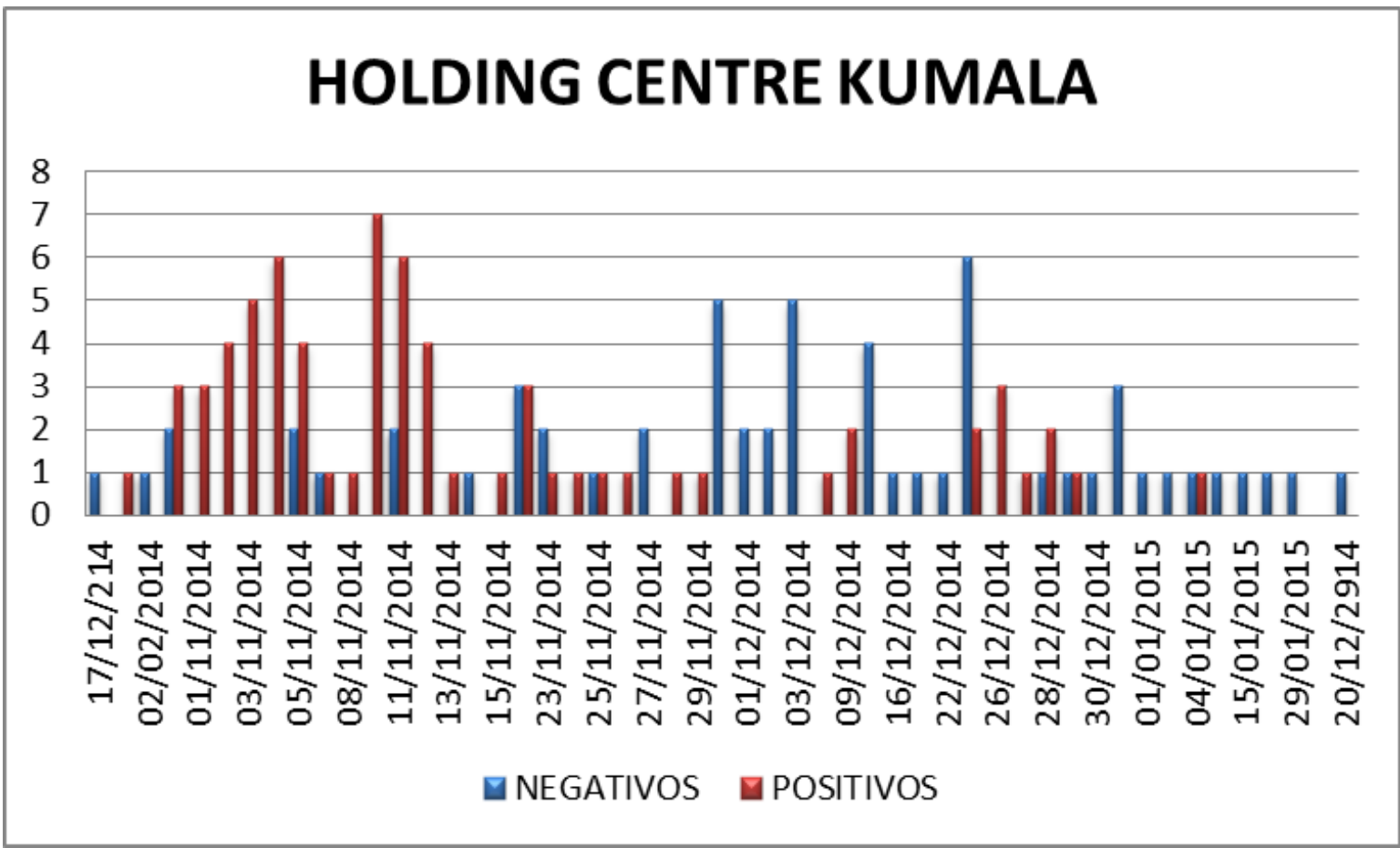


Centro de Tratamiento de Moyamba (en construcción)

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HOLDING CENTRE KUMALA



128 casos hasta ahora, 69 de los cuales, positivos

Los nuevos desafíos

- El aumento en investigación de tratamientos: Favipiravir, Brincidovir
- Los ensayos con derivados sanguíneos
- El desarrollo de nuevos tests.
- El desarrollo acelerado de vacunas. La competencia. Los costes. La población diana...

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The Independent 7 september

"The problem with that is, even if you've got a way of making a vaccine, unless there's a big market, it's not worth the while of a mega-company **There was no business case to make an Ebola vaccine for the people who needed it most:** first because of the nature of the outbreak; second, the number of people likely to be affected was, until now, thought to be very small; and third, the fact that the people affected are in some of the poorest countries in the world and can't afford to pay for a new vaccine. It's a market failure."

Adrian Hill. Director of Jenner Institute. Oxford



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Dos líneas prometedoras en vacunas

- chAd3-ZEBOV, GlaxoSmithKline (GSK) - Instituto Nacional de Alergias y Enfermedades Infecciosas de Estados Unidos (NIAID)
- rVSV-ZEBOV, Agencia de Salud Pública de Canadá, la licencia de comercialización es propiedad de NewLink Genetics, de Iowa.

En diciembre 2014 el GAVI aprueba 300 millones de USD para financiar vacunas y 90 mas para el desarrollo de las mismas

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Ebola vaccines, therapies, and diagnostics Questions and Answers 21 January 2015

Two vaccine candidates currently being tested in humans are the ChAd3-ZEBOV vaccine, being developed by GlaxoSmithKline, in collaboration with the United States National Institute of Allergy and Infectious Diseases, and the rVSV-ZEBOV vaccine, being developed by NewLink Genetics and Merck Vaccines USA, in collaboration with the Public Health Agency of Canada. Both vaccines have shown to be safe and efficacious in animals.

Johnson & Johnson, in association with Bavarian Nordic, are developing 2-dose vaccination approaches for Ebola using different vaccines for the first and second doses. This approach is known as heterologous prime-boost. The two vaccine candidates are known as Ad26-EBOV and MVA-EBOV.

Novavax, a biotech company, is developing a recombinant protein Ebola vaccine candidate based on the Guinea 2014 Ebola virus strain.

The Russian Federal Ministry of Health is developing a recombinant influenza candidate Ebola vaccine, as well as other approaches. The recombinant influenza candidate is scheduled to start Phase I trials in the second half of 2015. Other products in development include an oral adenovirus platform (Vaxart), an alternative vesicular stomatitis virus candidate (Profectus Biosciences), an alternative recombinant protein (Protein Sciences), a DNA vaccine (Inovia) and a recombinant rabies vaccine (Jefferson University).



World Health
Organization

Ebola vaccine efficacy trial ready to launch in Guinea

5 March 2015 -- Based on promising data from initial clinical trials in late 2014, WHO, with the Health Ministry of Guinea, Médecins Sans Frontières, Epicentre and The Norwegian Institute of Public Health, will launch a Phase III trial in Guinea on 7 March to test the VSV-EBOV vaccine for efficacy and effectiveness to prevent Ebola. The vaccine was developed by the Public Health Agency of Canada. A second vaccine will be tested in a sequential study, as supply becomes available.

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Ebola vaccine efficacy trial ready to launch in Guinea

VACCINE SELECTION

Which vaccine/s will be used and why?

The plan is to test both the VSV-EBOV (Canada) and Chad3 (GSK) vaccines, which are the two most advanced in development. These will be tested sequentially in two consecutive trials and in different geographic areas. The choice of which vaccine will be tested first is based on an evidence-based algorithm that was developed by independent experts to aid in the decision of which vaccine should be tested first.

The first vaccine to be tested will be the VSV-EBOV vaccine, in part due to availability of enough doses before the start of the trial in Guinea.



World Health
Organization

Ebola vaccine efficacy trial ready to launch in Guinea

Como lo van a hacer?

Vacunando primero a todos los “trabajadores de primera línea”

Vacunando luego (voluntariamente) a los contactos identificados de cada uno de los nuevos casos. Al azar vacunarán inmediatamente después del contacto o tres semanas mas tarde.

No incluirán a menores ni a embarazadas.

Calculan que tardaran unas seis semanas en tener los 180 anillos que se han propuesto analizar.

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LARGE SCALE ACCESS TO VACCINE(S)

If the vaccines work and the epidemic is still ongoing how will WHO and its partners ensure that everyone who needs to be vaccinated will receive the vaccine?

Access to a safe and effective vaccine today and in the future is among the trial partners' primary concerns. In addition, WHO, UNICEF, US CDC, BMGF and Gavi are collaborating with the affected countries to develop plans and strategies for large-scale introduction, should this be needed.

The vaccines' manufacturers have assured that enough vaccine will be available in the coming months.

Who will fund the vaccines if large vaccination is recommended?

Financial resources are in place to procure and make vaccines available to the Ebola affected countries. Millions of doses will be funded by Gavi (the Global Vaccine Alliance), whose Executive Board approved a US\$ 300 million funding envelope in December 2014. There are also U\$ 90 million earmarked to support the deployment of the vaccine(s)

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CÓMO SE CONTAGIA EL ÉBOLA COMPARADO CON OTRAS ENFERMEDADES

TABLA R₀ DE ENFERMEDADES CONTAGIOSAS

EL R₀ ES EL NÚMERO DE INFECCIONES SECUNDARIAS ESPERADAS RESULTANTES DE UN SOLO CASO INFECCIOSO



* UNA PERSONA INFECTADA CON EL ÉBOLA PUEDE CONTAGIAR A ENTRE 1,4/1,9 PERSONAS DE MEDIA

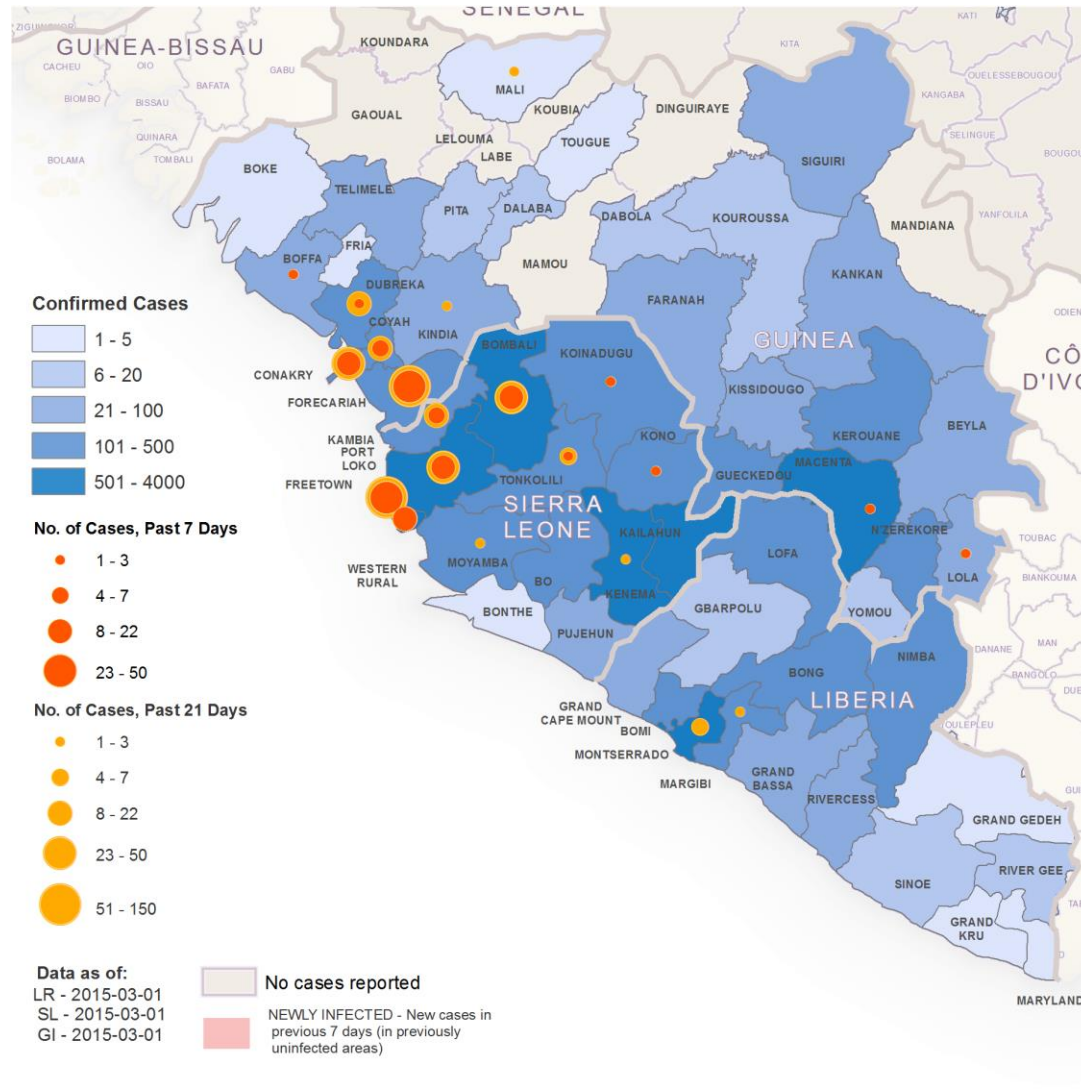
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Situación de la enfermedad a 1 de marzo de 2015

África del oeste (Fuente: WHO-Roadmap)



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Muchas gracias