

Overview of The Diagnostics, Treatments And Vaccines for Ebola Virus Infection

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Abstract

In recent years the Ebola virus disease has continued to reoccur in Africa, especially in West Africa. From 2013 to 2016, this devastating epidemic became the most widespread outbreak in history. The World Health Organization (WHO) therefore declared a public health emergency of international concern (PHEIC) on this particular outbreak. The Ebola outbreak not only affected West Africa, but also spread across borders to other countries, infecting many people including health care personnel. To effectively prevent and control the epidemic, many international organizations have been devoting to the research of diagnosis and treatments, developing medicines and vaccines against Ebola virus; some progress has successfully been made. In Taiwan, no case had been detected to date. Nevertheless, in order to prepare for the possible spread of the outbreak in the future, collecting all the information relating to this disease is critical. We overviewed the most updated international research regarding to the disease features, laboratory diagnostics, therapies and vaccines, serving not only as a reference for public health policy-making but also as a guideline for health care personnel to follow when coping with the challenge of the epidemic.

Keywords: Ebola Virus Diseases, Ebola treatments, Ebola diagnostics, Ebola drugs, Ebola vaccines

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Weekly Data of Notifiable Infectious Diseases (by week of diagnosis)

Case diagnosis year		Week 27★		Week 1–27			
Classification	Disease Diagnosed	2019	2018	2019		2018	
				Total cases★	Imported cases	Total cases★	Imported cases
Category I	Plague	0	0	0	0	0	0
	Rabies	0	0	0	0	0	0
	SARS	0	0	0	0	0	0
	Smallpox	0	0	0	0	0	0
	Acute Flaccid Paralysis	1	0	32	0	45	0
Category II	Acute Viral Hepatitis type A	0	1	46	13	48	21
	Amoebiasis	11	2	180	84	152	67
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	7	7	2	2
	Cholera	0	0	0	0	0	0
	Dengue Fever	23	7	247	205	101	100
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	1	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	0	0	1	0
	Malaria	0	1	1	1	1	1
	Measles	2	0	104	38	30	7
	Meningococcal Meningitis	0	0	2	0	5	1
	Paratyphoid Fever	0	0	2	1	2	1
	Poliomyelitis	0	0	0	0	0	0
	Rubella	1	0	18	15	5	4
	Shigellosis	2	4	74	26	84	24
	Typhoid fever	1	0	13	12	7	5
	West Nile Fever	0	0	0	0	0	0
Zika virus infection	0	0	1	1	0	0	
Category III	Acute Viral Hepatitis type B	2	2	56	0	61	4
	Acute Viral Hepatitis type C	7	9	318	2	234	3
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	7	1	4	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	3	1	16	1	23	0
	Haemophilus Influenza type b Infection	0	0	0	0	4	0
	Japanese Encephalitis	0	4	11	0	22	0
	Legionellosis	3	9	135	9	85	2
	Mumps	10	14	316	1	310	3
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	22	0	13	0
Tetanus	0	0	0	0	4	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	2	0	31	1	24	0
	Endemic Typhus Fever	1	1	5	0	15	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Invasive Pneumococcal Disease	6	4	241	2	277	0
	Leptospirosis	2	2	32	0	23	0
	Listeriosis	4	5	103	1	88	0
	Lyme Disease	0	0	1	1	0	0
	Melioidosis	1	0	5	0	6	0
	Q Fever	0	0	11	2	8	1
	Scrub Typhus	22	8	214	3	155	0
	Severe Complicated Influenza	38	11	1088	6	731	5
Toxoplasmosis	0	1	7	0	11	1	
Tularemia	0	0	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0	0	0
	Lassa Fever	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	0	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0	

1. The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
2. MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease are excluded from the table.
3. Numbers of mumps and tetanus cases are summed up by the week of report.
4. Since 2018/1/1, "Listeriosis" was listed as a Notifiable Infectious Disease.

Suspected Clusters

- Thirty-six clusters were reported during week 27, including 5 tuberculosis clusters, 14 diarrhea clusters, 2 upper respiratory tract infection clusters, 12 influenza-like illness clusters, 3 enterovirus clusters, and 1 unknown of fever origin.

Imported Infectious Diseases

- There were 16 imported cases from 8 countries during week 27 of 2019.

Countries Diseases	Vietnam	Indonesia	Cambodia	Thailand	India	China	Philippines	Sri Lanka	Total
DF	3		3		1		1	1	9
Amoebiasis		3							3
Measles				1		1			2
Scrub Typhus				1					1
Rubella	1								1
Total	4	3	3	2	1	1	1	1	16

Note: The table summarized the number of imported cases that were either **confirmed** or **updated** in the given week.

- There are 432 imported cases from 23 different countries in 2019. The top 3 countries are Indonesia (158), Vietnam (61), and Philippines (54).
- Top 3 imported diseases are Dengue Fever (205), Amoebiasis (84), and Measles (38).

Summary of Epidemic

- **Enterovirus:** Taiwan is in the midst of enterovirus season. The growth of the epidemic is expected to gradually slow down.
- **Dengue Fever:** The dengue epidemic in Southeast Asia is increasing. As the continuous rainfall, the risk of indigenous dengue fever is expected to raise.
- **Japanese Encephalitis:** Taiwan is in the midst of Japanese encephalitis season. New cases are expected to primarily in southern Taiwan.

Weekly Data of Notifiable Infectious Diseases (by week of diagnosis)

Case diagnosis year		Week 28★		Week 1–28			
Classification	Disease Diagnosed	2019		2018			
		2019	2018	Total cases★	Imported cases	Total cases★	Imported cases
Category I	Plague	0	0	0	0	0	0
	Rabies	0	0	0	0	0	0
	SARS	0	0	0	0	0	0
	Smallpox	0	0	0	0	0	0
Category II	Acute Flaccid Paralysis	0	1	32	0	46	0
	Acute Viral Hepatitis type A	4	2	50	13	50	21
	Amoebiasis	5	8	185	89	160	71
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	3	0	10	10	2	2
	Cholera	0	0	0	0	0	0
	Dengue Fever	22	8	269	221	109	107
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	1	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	0	0	1	0
	Malaria	0	0	1	1	1	1
	Measles	2	0	106	40	30	7
	Meningococcal Meningitis	0	0	2	0	5	1
	Paratyphoid Fever	0	0	2	1	2	1
	Poliomyelitis	0	0	0	0	0	0
	Rubella	1	0	19	16	5	4
Shigellosis	2	3	76	28	87	25	
Typhoid fever	4	0	17	13	7	5	
West Nile Fever	0	0	0	0	0	0	
Zika virus infection	0	0	1	1	0	0	
Category III	Acute Viral Hepatitis type B	1	3	57	0	64	4
	Acute Viral Hepatitis type C	12	10	330	2	244	3
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	7	1	4	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	2	0	18	1	23	0
	Haemophilus Influenza type b Infection	0	0	0	0	4	0
	Japanese Encephalitis	1	4	12	0	26	0
	Legionellosis	12	4	147	10	89	2
	Mumps	11	6	327	1	316	3
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	22	0	13	0
Tetanus	1	0	1	0	4	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	2	1	33	1	25	0
	Endemic Typhus Fever	2	1	7	1	16	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Invasive Pneumococcal Disease	3	10	244	2	287	0
	Leptospirosis	2	2	34	0	25	0
	Listeriosis	5	4	108	1	92	0
	Lyme Disease	0	0	1	1	0	0
	Melioidosis	1	2	6	0	8	1
	Q Fever	1	0	12	2	8	1
	Scrub Typhus	15	6	229	3	161	0
	Severe Complicated Influenza	41	24	1129	6	755	5
Toxoplasmosis	1	0	8	0	11	1	
Tularemia	0	0	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0	0	0
	Lassa Fever	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	0	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
2. MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease are excluded from the table.
3. Numbers of mumps and tetanus cases are summed up by the week of report.
4. Since 2018/1/1, "Listeriosis" was listed as a Notifiable Infectious Disease.

Suspected Clusters

- Twenty-six clusters were reported during week 28, including 5 tuberculosis clusters, 10 diarrhea clusters, 3 upper respiratory tract infection clusters, 7 influenza-like illness clusters, and 1 enterovirus cluster.

Imported Infectious Diseases

- There were 33 imported cases from 9 countries during week 28 of 2019.

Diseases	Countries									Total
	Indonesia	Vietnam	Cambodia	Myanmar	Malaysia	Singapore	Thailand	China	Philippines	
DF	2	4	4		3	2	1		1	17
Amoebiasis	5									5
Chikungunya Fever				3						3
Measles		2								2
Shigellosis	2									2
Endemic Typhus Fever	1									1
Legionellosis							1			1
Rubella								1		1
Typhoid fever	1									1
Total	11	6	4	3	3	2	2	1	1	33

Note: The table summarized the number of imported cases that were either **confirmed** or **updated** in the given week.

- There are 465 imported cases from 23 different countries in 2019. The top 3 countries are Indonesia (169), Vietnam (67), and Philippines (55).
- Top 3 imported diseases are Dengue Fever (222), Amoebiasis (89), and Measles (40).

Summary of Epidemic

- **Dengue Fever:** The dengue epidemic in Southeast Asia is increasing. As the continuous rainfall, the risk of indigenous dengue fever is expected to raise.
- **Enterovirus:** Taiwan is in the midst of enterovirus season. The growth of the epidemic has slowed down gradually.

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