

Progress and Refinement of Laboratory Biosafety Management in Taiwan

Wen-Chao Wu*, Wei-Shi Tsai, Pei-Ying Lu, Yi-Jhen Chen

Abstract

In early 2020, following the outbreak of COVID-19 in Wuhan, China, Taiwan Centers for Disease Control (Taiwan CDC) responded to the epidemic by establishing the Central Epidemic Command Center (CECC) for COVID-19 to initiate interdepartmental preparations and continue to build up epidemic prevention capacity. In terms of laboratory biosafety management, five major strategies had been implemented to ensure biosafety in laboratories engaged in novel coronavirus (SARS-CoV-2) related testing and research units, including "developing biosafety guidelines," "requiring institutional self-audit," "implementing external government inspection," "implementing pathogen transfer control" and "using information system management". Despite the accident of COVID-19 infection in a high-containment laboratory at the end of 2021, the CECC immediately activated the response mechanism, investigated the accident, and required the institution in question to complete the decontamination, correction and recovery plan. This showed that Taiwan has the ability to handle and respond quickly to major biosafety hazards. The cause of the accident was that the laboratory personnel did not follow the standard operating procedures related to personal protection equipment and laboratory operations, the laboratory supervisor had a misunderstanding of biosafety management, and the biosafety committee did not implement internal auditing and effective supervision. For this reason, Taiwan CDC had

Division of Infection Control and Biosafety,
Centers for Disease Control,
Ministry of Health and Welfare
DOI: 10.6525/TEB.202210_38(20).0001

Corresponding author: Wen-Chao Wu*
E-mail: wcwu@gate.sinica.edu.tw
Received: Jun. 30, 2022
Accepted: Jun. 30, 2022

accelerated the implementation of a biosafety officer supervision system and the introduction of a biorisk management system in high-containment laboratories to improve the biosafety management level of laboratories in Taiwan.

Keywords: laboratory biosafety, high-containment laboratory, laboratory-acquired infections, biosafety officer, biorisk management system

week 39–40 (Sep.25–Oct.8, 2022)

DOI: 10.6525/TEB.202210_38(20).0002

Weekly Data of Notifiable Inases (by week of diagnosis)

Case diagnosis year		Week 39★		Week 1–39			
Classification	Disease Diagnosed	2022	2021	2022		2021	
				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	1	2	20	0	25	0
	Acute Viral Hepatitis type A	0	0	114	1	52	0
	Amoebiasis	4	5	150	38	152	55
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	0	0	1	1
	Cholera	0	0	0	0	0	0
	Dengue Fever	2	0	58	39	9	9
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	2	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Hantavirus syndrome	0	0	3	0	0	0
	Malaria	0	0	2	2	1	1
	Measles	0	0	1	0	0	0
	Meningococcal Meningitis	0	0	1	0	3	0
	Paratyphoid Fever	0	0	0	0	2	0
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	0	0	0	0
	Shigellosis	1	1	56	3	97	0
	Typhoid fever	0	0	3	1	1	0
	West Nile Fever	0	0	0	0	0	0
Zika virus infection	0	0	0	0	0	0	
Monkeypox	0	-	3	3	-	-	
Category III	Acute Viral Hepatitis type B	1	3	73	0	100	2
	Acute Viral Hepatitis type C	10	8	340	1	408	0
	Acute Viral Hepatitis type D	0	1	0	0	1	0
	Acute Viral Hepatitis type E	1	0	10	0	5	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	0	0	1	0
	Haemophilus Influenza type b Infection	0	0	2	0	1	0
	Japanese Encephalitis	0	0	19	0	26	0
	Legionnaires' Disease	8	9	244	1	267	0
	Mumps	7	2	164	0	326	1
	Neonatal Tetanus	0	0	0	0	0	0
Pertussis	0	0	0	0	0	0	
Tetanus	0	0	4	0	3	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	0	5	23	0	42	0
	Endemic Typhus Fever	0	0	10	0	26	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	0	0	0	1	0
	Invasive Pneumococcal Disease	3	0	134	0	168	0
	Leptospirosis	0	7	42	0	54	0
	Listeriosis	0	2	110	0	132	0
	Lyme Disease	0	0	1	1	0	0
	Melioidosis	1	0	17	1	16	0
	Q Fever	0	0	3	0	8	0
	Scrub Typhus	3	8	211	0	200	0
Toxoplasmosis	0	0	19	0	11	0	
Tularemia	0	0	0	0	1	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	0	0	0	0	0	0
	Coronavirus Infections	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	0	0	1	0
	Rift Valley Fever	0	0	0	0	0	0
	Severe Pneumonia with Novel Pathogens	297749	61	6530587	32555	15442	917
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, Gonorrhea, HIV Infection, AIDS, Hansen's 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 2022/6/23, " Monkeypox " was listed as a Notifiable Infectious Disease.
 5. Hantavirus syndrome was no longer classify Hemorrhagic Fever with Renal Syndrome(HFRS) and Hantavirus Pulmonary Syndrome(HPS) since 2022.

Suspected Clusters

- Ten clusters related to diarrhea (6), tuberculosis (4) were reported during week 39.

Imported Infectious Diseases

- There were 1212 imported cases from 32 countries during week 39.
 - Severe Pneumonia with Novel Pathogens:** 1206 cases from Vietnam (110), USA(62), Germany(26), Thailand(22), Korea(17), Indonesia(15), Singapore(16), UK(16), the Philippines(14), Japan(13), France(13), Turkey(11), Malaysia(11), and the remaining 19 countries have less than 10 cases, 799 unknowns.
 - Amoebiasis:** 3 cases from Indonesia (1), unknowns (2).
 - Dengue Fever:** 2 cases from Vietnam (1), Myanmar (1).
 - Shigellosis:** 1 case from unknown.
- During week 1–39, there were 32646 imported cases from 128 countries. The top three countries are Vietnam (4011), USA (2399), Indonesia (1287).
- During week 1–39, the notifiable diseases with the highest number of imported cases is Severe Pneumonia with Novel Pathogens (32555).

Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens :** The COVID-19 epidemic in Taiwan reach a plateau, the risk for local transmission is persistence.
- **Dengue Fever:** The local cluster in Qianzhen District of Kaohsiung City is under observation. Taiwan is in the midst of Dengue Fever season, the risk of Dengue Fever infection continues.

Weekly Data of Notifiable Inases (by week of diagnosis)

Case diagnosis year		Week 40★		Week 1–40			
Classification	Disease Diagnosed	2022	2021	2022		2021	
				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	1	1	21	0	26	0
	Acute Viral Hepatitis type A	1	1	115	1	53	0
	Amoebiasis	10	4	160	41	156	57
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	1	0	1	1	1	1
	Cholera	0	0	0	0	0	0
	Dengue Fever	3	0	61	41	9	9
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	2	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Hantavirus syndrome	0	0	3	0	0	0
	Malaria	0	0	2	2	1	1
	Measles	0	0	1	0	0	0
	Meningococcal Meningitis	0	0	1	0	3	0
	Paratyphoid Fever	0	0	0	0	2	0
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	0	0	0	0
	Shigellosis	3	1	59	4	98	0
	Typhoid fever	0	0	3	1	1	0
	West Nile Fever	0	0	0	0	0	0
Zika virus infection	0	0	0	0	0	0	
Monkeypox	0	-	3	3	-	-	
Category III	Acute Viral Hepatitis type B	2	0	75	0	100	2
	Acute Viral Hepatitis type C	22	3	362	1	411	0
	Acute Viral Hepatitis type D	0	0	0	0	1	0
	Acute Viral Hepatitis type E	0	0	10	0	5	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	0	0	1	0
	Haemophilus Influenza type b Infection	0	0	2	0	1	0
	Japanese Encephalitis	0	0	19	0	26	0
	Legionnaires' Disease	8	16	252	1	283	0
	Mumps	7	7	171	0	333	1
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	0	0	0	0
Tetanus	1	0	5	0	3	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	3	1	26	0	43	0
	Endemic Typhus Fever	0	1	10	0	27	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	0	0	0	1	0
	Invasive Pneumococcal Disease	6	1	140	0	169	0
	Leptospirosis	2	10	44	0	64	0
	Listeriosis	3	5	113	0	137	0
	Lyme Disease	0	0	1	1	0	0
	Melioidosis	1	0	18	1	16	0
	Q Fever	0	0	3	0	8	0
	Scrub Typhus	11	16	222	0	216	0
Toxoplasmosis	0	0	19	0	11	0	
Tularemia	0	0	0	0	1	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	0	0	0	0	0	0
	Coronavirus Infections	0	0	0	0	1	0
	Novel Influenza A Virus Infections	0	0	0	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Severe Pneumonia with Novel Pathogens	323861	44	6854389	32981	15486	960	
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’s 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 2022/6/23, " Monkeypox " was listed as a Notifiable Infectious Disease.
5. Hantavirus syndrome was no longer classify Hemorrhagic Fever with Renal Syndrome (HFRS) and Hantavirus Pulmonary Syndrome (HPS) since 2022.

Suspected Clusters

- Twelve clusters related to diarrhea (5), tuberculosis (7) were reported during week 40.

Imported Infectious Diseases

- There were 432 imported cases from 22 countries during week 40.
 - Severe Pneumonia with Novel Pathogens:** 426 cases from USA (19), Vietnam (15), Singapore (14), China (14), Thailand (10), and the remaining 17 countries have less than 10 cases, 303 unknowns.
 - Amoebiasis:** 2 cases from Indonesia (2).
 - Dengue Fever:** 2 cases from Philippines (1), Vietnam (1).
 - Shigellosis:** 1 case from unknown.
 - Chikungunya Fever:** 1 case from Cambodia.
- During week 1–40, there were 33079 imported cases from 128 countries. The top three countries are Vietnam (4030), USA (2418), Indonesia (1291).
- During week 1–40, the notifiable diseases with the highest number of imported cases is Severe Pneumonia with Novel Pathogens (32981).

Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens :** The COVID-19 epidemic in Taiwan reach a plateau, the risk for local transmission is persistence.
- **Dengue Fever:** The local cluster in Qianzhen District of Kaohsiung City is under observation. The temperature in southern Taiwan is still suitable for dengue vector activity, the risk of Dengue Fever infection continues.

The Taiwan Epidemiology Bulletin series of publications is published by Centers for Disease Control, Ministry of Health and Welfare, Taiwan (R.O.C.) since Dec. 15, 1984.

Publisher: Jih-Haw Chou

Editor-in-Chief: Yung-Ching Lin

Executive Editor: Hsueh-Ju Chen, Hsin-Lun Lee

Address: No.6, Linsen S. Rd, Jhongjheng District, Taipei City 10050, Taiwan (R.O.C.)

Telephone No: +886-2-2395-9825

Website: <https://www.cdc.gov.tw/En>

Suggested Citation:

[Author].[Article title].Taiwan Epidemiol Bull 2022;38:[inclusive page numbers]. [DOI]