

### Investigation on A Measles Outbreak Linked to An Imported Case, Northern Taiwan, 2019

Xiang-Ting Huang<sup>1\*</sup>, Pei-Hsuan Chang<sup>1</sup>, Chiang-Hsiao Hsuan<sup>2</sup>, Ming-Chu Tai<sup>2</sup>,  
Yu-Fang Tsai<sup>1</sup>, Meng-Yu Chen<sup>1</sup>, Hsin-Yi Wei<sup>1</sup>, Hsiao-Ping Tung<sup>1</sup>, Wen-Yueh Cheng<sup>3</sup>,  
Hsiao-Chi Wang<sup>3</sup>, Hui-Rong Liu<sup>1</sup>, Jui-Wei Hsieh<sup>1</sup>

#### Abstract

On April 3, 2019, a 29-year-old male was notified as a suspect case of measles (index case). Later he was confirmed as an imported measles case according to the laboratory results and travel history to Hong Kong. From April to May, additional 17 confirmed measles cases occurred in northern region of Taiwan, which all had direct or indirect epidemiological links to the index case, including common exposure in a restaurant (n=7), a hospital (n=4), a workplace (n=5), and in the household (n=1). Virus isolation from all 18 cases revealed identical genotype B3. All the cases were adult, with the mean age of 28 years (range: 19–38 years). Nine (50%) had received >1 dose of measles-mumps-rubella (MMR) vaccine. Fever (83.3%) and rash (94.4%) were the most common symptoms, and seven (39%) did not present cough, coryza, or conjunctivitis. This outbreak highlighted that young adults who were unvaccinated or with partial or waned immunity are susceptible to measles. Modified symptoms characterized with a milder rash or less intense symptoms may lead to challenges in early recognition.

**Keywords:** Adult measles, imported cases, contact tracing, MMR vaccine

<sup>1</sup>Taipei Regional Center, Centers for Disease Control, Ministry of Health and Welfare, Taiwan

<sup>2</sup>Northern Regional Center, Centers for Disease Control, Ministry of Health and Welfare, Taiwan

<sup>3</sup>Center for Diagnostics and Vaccine Development, Centers for Disease Control, Ministry of Health and Welfare, Taiwan

Corresponding author: Xiang-Ting Huang<sup>1\*</sup>

E-mail: xiang@cdc.gov.tw

Received: Sep. 03, 2019

Accepted: Oct. 25, 2019

DOI: 10.6525/TEB.202004\_36(8).0001

## Epidemiological And Clinical Characteristics of The First 18 Patients with COVID-19 in Taiwan

Wei-Ju Su\*, Tsung-Pei Tsou, Chia-Ping Su, Meng-Yu Chen, Hsin-Yi Wei, Pei-Yuan Wu, Kung-Ching Wang, Huai-Te Tsai, Hsin-Chun Lee

### Abstract

To understand the epidemiological and clinical characteristics of patients with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection in Taiwan, we analyzed data from the National Notifiable Disease Surveillance System and epidemiological case investigation reports. We included all real-time reverse-transcription polymerase chain reaction (real-time RT-PCR) confirmed cases of coronavirus disease-2019 (COVID-19) from Jan 21 to Feb 14, 2020, and followed up until Feb 27, 2020. Eighteen cases were confirmed and all survived. Median follow-up period was 24.5 days (range: 14–35). Of them, 16 (88.9%) were imported cases, and 2 (11.1%) were infected by imported cases within household. Their median age was 52 years (range: 21–74); 8 (44.4%) were men, and 9 (50%) had comorbidities. Symptoms included cough (72.2%), fever (66.7%), rhinorrhea (22.2%) and diarrhea (11.1%); one patient (5.5%) was asymptomatic. According to the WHO definition of clinical syndromes associated with SARS-CoV-2, there were 8 (44.4%), 9 (50.0%), and 1 (5.6%) categorized as mild, moderate, and severe illness, respectively. At the end of follow-up, 9 cases met the criteria of discontinuation of isolation and 8 of them were discharged. The median time from admission to discontinuation of isolation was 21 days (range: 13–31) and the median duration of persistent RT-PCR positivity was 14 days (range: 4–22) and 15 days (range: 4–24) for upper and lower respiratory samples, respectively. The first 18 cases of COVID-19 in Taiwan were all imported or importation related, which were related to the early phase of COVID-19 epidemic. Because viral clearance may take more than 2 weeks, management plans for patients with mild illness is necessary to ensure the best use of medical care capacities during the ongoing COVID-19 pandemic.

**Keywords :** Novel coronavirus, SARS-CoV-2, COVID-19

Office of Preventive Medicine,  
Centers for Disease Control, Ministry  
of Health and Welfare, Taiwan  
DOI: 10.6525/TEB.202004\_36(8).0002

Corresponding author: Wei-Ju Su\*  
E-mail: wei-ju@cdc.gov.tw  
Received: Mar. 13, 2020  
Accepted: Mar. 27, 2020

week 15–16(Apr. 5–Apr. 18, 2020)

DOI: 10.6525/TEB.202004\_36(8).0003

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

Case diagnosis year		Week 15★		Week 1–15			
Classification	Disease Diagnosed	2020	2019	2020		2019	
				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	8	0	16	0
	Acute Viral Hepatitis type A	0	2	28	7	30	8
	Amoebiasis	2	6	73	38	91	47
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	2	2	0	0
	Cholera	0	0	0	0	0	0
	Dengue Fever	0	9	55	55	117	116
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	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	3	0	0	0
	Malaria	0	0	1	1	1	1
	Measles	0	13	2	2	57	28
	Meningococcal Meningitis	0	0	3	0	2	0
	Paratyphoid Fever	0	0	0	0	0	0
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	2	0	0	8	6
Shigellosis	4	1	52	19	36	12	
Typhoid fever	0	1	5	3	5	5	
West Nile Fever	0	0	0	0	0	0	
Zika virus infection	0	0	2	2	1	1	
Category III	Acute Viral Hepatitis type B	0	2	27	2	30	1
	Acute Viral Hepatitis type C	13	14	187	2	165	2
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	5	0	6	2
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	7	0	4	1
	Haemophilus Influenza type b Infection	0	0	1	0	0	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	5	6	69	3	76	6
	Mumps	3	16	134	3	176	0
	Neonatal Tetanus	0	0	0	0	0	0
Pertussis	0	5	8	0	19	0	
Tetanus	0	0	3	0	0	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	0	0	16	0	22	1
	Endemic Typhus Fever	1	0	3	0	2	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	35	546	6	708	2
	Invasive Pneumococcal Disease	2	11	129	0	163	2
	Leptospirosis	1	0	12	0	14	0
	Listeriosis	2	5	34	0	55	0
	Lyme Disease	0	0	0	0	1	1
	Melioidosis	0	0	3	1	1	0
	Q Fever	0	2	1	0	3	1
Scrub Typhus	1	0	60	1	73	0	
Toxoplasmosis	0	1	0	0	5	0	
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	0	0	0	0	0	0
	Coronavirus Infections	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
Severe Pneumonia with Novel Pathogens	30	-	385	331	-	-	
Yellow Fever	0	0	0	0	0	0	

- ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
- MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen's Disease and Creutzfeldt-Jakob Disease are excluded from the table.
- Numbers of mumps and tetanus cases are summed up by the week of report.
- Since 2020/1/15, "Severe Pneumonia with Novel Pathogens" was listed as a Notifiable Infectious Disease.

## Suspected Clusters

- Fourteen clusters were reported during week 15, including 8 tuberculosis clusters, 4 diarrhea clusters, 2 upper respiratory tract infection clusters.

## Imported Infectious Diseases

- There were 30 imported cases from 8 countries / areas during week 15 of 2020.

Diseases \ Countries / Areas	USA	Indonesia	UK	Austria	Iceland	France	Morocco	Spain	Total
Severe Pneumonia with Novel Pathogens	10	3	5	3	2	2	1	1	27
Acute Hepatitis A		2							2
Amoebiasis		1							1
Total	10	6	5	3	2	2	1	1	30

- As of week 15 in 2020, there were 475 imported cases from 41 different countries. The top 3 countries are USA (85), Indonesia (78), UK (70).
- The three notifiable diseases with the highest number of imported cases are Severe Pneumonia with Novel Pathogens (331), Dengue Fever (55), Amoebiasis (38).

## Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens** : The risk of locally-acquired infection cases might increase due to more frequent contact and movement in the period of college/university admission through screening and recommendation program.

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

Case diagnosis year		Week 16★		Week 1-16			
Classification	Disease Diagnosed	2020	2019	2020		2019	
				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	3	0	11	0	16	0
	Acute Viral Hepatitis type A	0	1	28	7	31	8
	Amoebiasis	5	5	78	42	96	49
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	2	2	0	0
	Cholera	0	0	0	0	0	0
	Dengue Fever	0	5	55	55	122	121
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	1	0	0	1	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	3	0	0	0
	Malaria	0	0	1	1	1	1
	Measles	0	15	2	2	72	29
	Meningococcal Meningitis	0	0	3	0	2	0
	Paratyphoid Fever	0	2	0	0	2	1
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	2	0	0	10	8
	Shigellosis	3	5	55	20	41	14
Typhoid fever	0	1	5	3	6	6	
West Nile Fever	0	0	0	0	0	0	
Zika virus infection	0	0	2	2	1	1	
Category III	Acute Viral Hepatitis type B	1	3	28	2	33	1
	Acute Viral Hepatitis type C	17	12	203	2	177	2
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	5	0	6	2
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	2	7	0	6	1
	Haemophilus Influenza type b Infection	1	0	2	0	0	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	7	5	76	5	81	6
	Mumps	4	14	138	6	190	0
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	8	0	19	0
Tetanus	1	0	4	0	0	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	0	0	16	0	22	1
	Endemic Typhus Fever	0	0	3	0	2	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	22	546	6	730	2
	Invasive Pneumococcal Disease	1	13	130	0	176	2
	Leptospirosis	1	0	13	0	14	0
	Listeriosis	0	0	34	0	55	0
	Lyme Disease	0	0	0	0	1	1
	Melioidosis	1	0	4	1	1	0
	Q Fever	0	2	1	0	5	1
	Scrub Typhus	0	2	60	1	75	0
Toxoplasmosis	0	0	0	0	5	0	
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	0	0	0	0	0	0
	Coronavirus Infections	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
Severe Pneumonia with Novel Pathogens	13	-	398	343	-	-	
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 2020/1/15, "Severe Pneumonia with Novel Pathogens" was listed as a Notifiable Infectious Disease.

### Suspected Clusters

- Fifteen clusters were reported during week 16, including 8 tuberculosis clusters, 3 diarrhea clusters, 2 varicella clusters, 2 fever of unknown origin clusters.

### Imported Infectious Diseases

- There were 19 imported cases from 5 countries, Coral Princess Cruises, Navy Dunmu Fleet during week 16 of 2020.

Diseases \ Countries / Areas	Indonesia	Coral Princess Cruises	USA	Navy Dunmu Fleet	Malaysia	China	UK	Total
Severe Pneumonia with Novel Pathogens		4	4	3			1	12
Amoebiasis	4							4
Legionnaires' Disease					1	1		2
Shigellosis	1							1
Total	5	4	4	3	1	1	1	19

- As of week 16 in 2020, there were 494 imported cases from 43 different countries / areas. The top 3 countries are USA (89), Indonesia (83), UK (71).
- The three notifiable diseases with the highest number of imported cases are Severe Pneumonia with Novel Pathogens (343), Dengue Fever (55), Amoebiasis (42).

### Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens** : The risk of locally-acquired infection cases might increase due to the clusters of Navy Dunmu Fleet.

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, Zhongjheng 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 2020;36:[inclusive page numbers]. [DOI]