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Strategies for Supplying Personal Protective Equipment to Hospitals in Taiwan during The Early COVID-19 Pandemic

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Abstract

Personal protective equipment (PPE) provides proper protection for first-line medical and outbreak prevention personnel to ensure their safety. After the outbreak of COVID-19 in 2019, the demand for PPE had increased rapidly, but the international supply was shrinking, causing the panic procuring in the world. After the outbreak of SARS (severe acute respiratory syndrome) in 2003, Taiwan revised the relevant regulations on the prevention and control of infectious diseases, established the PPE three-level (the central government, local governments and hospitals) reserve and dispatch mechanism including the Management Information System (MIS) for outbreak prevention, which requires that the central/local and hospitals should estimate the 30-day PPE safety reserves in case of outbreaks of infectious diseases. During this COVID-19 outbreak, the contingency strategies for outbreak prevention materials include closely monitoring the consumption and reserve situation of PPE in hospitals through MIS, emergency requisition of PPE to expand the central reserve, formulating PPE allocation and replenishment principles to replenish hospitals, and inviting hospitals to assess the actual needs and improvement of safety reserves, etc. We found that the consumption of protective clothing, N95 masks and isolation gowns in the hospitals from January to July 2020 had increased by at least 10 times compared with those during the same period in 2019. The original 30-day PPE safety reserve in the hospitals gradually increased. As of July 2020, the actual inventory of N95 masks in

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hospitals was 2.3 times of the safety reserve, 10.6 times higher for surgical masks, and 1.7 times higher for protective clothing. Comparing the safety reserves in hospitals and medical centers, the adjusted PPE amount in medical centers had increased the most, and the amount of PPE allocated to each medical staff in medical centers had also increased the most. Obviously, the response strategy fulfilled the needs for medical and outbreak prevention in the early COVID-19 outbreak.

Keywords: COVID-19, personal protective equipment, Management Information System

week 7–8 (Feb. 13–Feb. 26, 2022)

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Weekly Data of Notifiable Inases (by week of diagnosis)

Case diagnosis year		Week 7★		Week 1-7			
				2022		2021	
Classification	Disease Diagnosed	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	0	0	4	0	4	0
	Acute Viral Hepatitis type A	17	0	44	0	11	0
	Amoebiasis	7	2	32	2	23	12
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	0	0	0	0
	Cholera	0	0	0	0	0	0
	Dengue Fever	0	0	0	0	2	2
	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 syndrome	0	1	0	0	3	0
	Malaria	0	0	0	0	1	1
	Measles	0	0	0	0	0	0
	Meningococcal Meningitis	0	0	0	0	0	0
	Paratyphoid Fever	0	0	0	0	0	0
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	0	0	0	0
	Shigellosis	6	2	14	0	22	0
	Typhoid fever	0	0	0	0	0	0
	West Nile Fever	0	0	0	0	0	0
	Zika virus infection	0	0	0	0	0	0
Category III	Acute Viral Hepatitis type B	2	0	17	0	15	0
	Acute Viral Hepatitis type C	7	3	50	0	84	0
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	1	1	2	0	1	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	0	0	0	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	4	5	50	0	56	0
	Mumps	4	12	29	0	67	1
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	0	0	0	0
	Tetanus	0	0	1	0	1	0
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	2	0	4	0	9	0
	Endemic Typhus Fever	0	1	0	0	3	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	0	0	0	0	0
	Invasive Pneumococcal Disease	4	6	21	0	47	0
	Leptospirosis	2	0	4	0	6	0
	Listeriosis	3	0	13	0	15	0
	Lyme Disease	0	0	1	1	0	0
	Melioidosis	0	2	0	0	4	0
	Q Fever	0	0	2	0	0	0
	Scrub Typhus	3	3	17	0	46	0
	Toxoplasmosis	0	0	3	0	2	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 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	447	5	2928	2149	134	113
	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

●Thirty-one clusters related to diarrhea (29), upper respiratory tract infection (1) and varicella (1) were reported during week 7.

Imported Infectious Diseases

●There were 375 imported cases from 53 countries during week 7.

Severe Pneumonia with Novel Pathogens : 375 cases from USA 83, Indonesia 35, Japan 21, Vietnam 21, India 19, UK 17, Canada 15, the Philippines 12, Germany 11, Malaysia 10, Australia 10, and the remaining 42 countries have less than 10 cases.

●During week 1–7, there were 2152 imported cases from 96 countries. The top three countries are USA (829), the Philippines (99), and India (97).

●During week 1–7, the notifiable diseases with the highest number of imported cases are Severe Pneumonia with Novel Pathogens (2149).

Summary of Epidemic

●**Severe Pneumonia with Novel Pathogens**：The COVID-19 pandemic remaining serious globally and the risk of imported cases exists. New clusters in Kaohsiung City and New Taipei City have been reported, and the cases spread to the other counties. In addition, in some cases, sources of infection are under investigation, the risk of locally-acquired infection in Taiwan continues.

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

Case diagnosis year		Week 8★		Week 1-8			
				2022		2021	
Classification	Disease Diagnosed	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	0	0	4	0	4	0
	Acute Viral Hepatitis type A	14	1	58	0	12	0
	Amoebiasis	3	5	35	3	28	13
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	0	0	0	0
	Cholera	0	0	0	0	0	0
	Dengue Fever	0	1	0	0	3	3
	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 syndrome	0	0	0	0	3	0
	Malaria	0	0	0	0	1	1
	Measles	0	0	0	0	0	0
	Meningococcal Meningitis	0	0	0	0	0	0
	Paratyphoid Fever	0	0	0	0	0	0
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	0	0	0	0
	Shigellosis	2	3	16	0	25	0
	Typhoid fever	0	0	0	0	0	0
	West Nile Fever	0	0	0	0	0	0
	Zika virus infection	0	0	0	0	0	0
Category III	Acute Viral Hepatitis type B	3	0	20	0	15	0
	Acute Viral Hepatitis type C	4	13	54	0	97	0
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	2	0	1	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	0	0	0	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	5	4	55	0	60	0
	Mumps	5	13	34	0	80	1
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	0	0	0	0
	Tetanus	0	0	1	0	1	0
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	0	1	4	0	10	0
	Endemic Typhus Fever	0	1	0	0	4	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	0	0	0	0	0
	Invasive Pneumococcal Disease	3	9	24	0	56	0
	Leptospirosis	1	2	5	0	8	0
	Listeriosis	4	9	17	0	24	0
	Lyme Disease	0	0	1	1	0	0
	Melioidosis	0	1	0	0	5	0
	Q Fever	0	0	2	0	0	0
	Scrub Typhus	4	0	21	0	46	0
	Toxoplasmosis	1	0	4	0	2	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 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	411	12	3339	2531	146	125
	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

●Thirty-two clusters related to diarrhea (28), tuberculosis (3) and upper respiratory tract infection (1) were reported during week 8.

Imported Infectious Diseases

●There were 383 imported cases from 55 countries during week 8.

Severe Pneumonia with Novel Pathogens : 382 cases from USA 59, Indonesia 56, the Philippines 39, Vietnam 35, Hong Kong 17, India 17, Thailand 13, France 10, Australia 10, Malaysia 10, and the remaining 45 countries have less than 10 cases.

Amoebiasis : 1 Indonesia.

●During week 1–8, there were 2535 imported cases from 99 countries. The top three countries are USA (888), the Philippines (138), and India (136).

●During week 1–8, the notifiable diseases with the highest number of imported cases are Severe Pneumonia with Novel Pathogens (2531).

Summary of Epidemic

●**Severe Pneumonia with Novel Pathogens**：The COVID-19 pandemic remaining serious globally and the risk of imported cases exists. New clusters in New Taipei City and Taoyuan city have been reported. In addition, some cases without known sources are under investigation, the risk of locally-acquired infection in Taiwan continues.

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