

### Laboratory and Clinical Diagnosis of Patients Reporting Multiple Notifiable Diseases

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#### Abstract

In Taiwan, clinicians frequently report multiple notifiable diseases for a single case to have each of the diseases tested. The clinical and public health implications and the optimal laboratory diagnostic algorithm for these cases are not known.

Cases reporting more than three notifiable diseases through National Notifiable Diseases Surveillance System (NNDSS) during January–June, 2009 were included. Their characteristics were collected from NNDSS and medical chart review. Diagnostic algorithms were designed. Cost-savings and diagnostic yield were calculated.

During the study period, 623 cases have reported more than three notifiable diseases. The most commonly reported diseases were scrub typhus (92.3%), Q fever (88.6%), endemic typhus (77.8%), leptospirosis (47.6%) and dengue fever (15.6%). The most common combination of diseases were scrub typhus, Q fever, and endemic typhus (34.5%). Of the 551 cases with medical chart review, 111 (20.1%) were diagnosed with a notifiable disease; while 118 (21.4%) had a definite clinical diagnosis other than notifiable disease. The most common clinical syndromes were fever and rash (18.1%), abnormal liver function and jaundice (14.3%) and pneumonia/acute respiratory distress syndrome (12.5%). Cost-saving diagnostic algorithms based on patient characteristics, test positive rate or diagnostic method showed limited effect.

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Because of the similarity in clinical presentation and the lack of diagnostic capability in most hospitals, it is expected that clinicians will continue to report multiple notifiable diseases. Public health authorities should re-evaluate the purpose and means of surveillance.

**Keywords:** Notifiable diseases, Disease notification, Laboratory diagnosis, Surveillance, Diagnosis

# The Analysis of International Medical-related Stockpile Systems

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## Abstract

In response to the surge capacity caused by accidental or unexpected emergencies and disasters, many countries have established medical-related stockpile systems to lower down the impact on epidemic prevention and medical systems, protect public's health and maintain confidence in the government. We reviewed the purposes and contents of the medical related stockpile systems in the United States, Canada, Australia, Singapore and Taiwan. The study showed that most countries had endeavored to develop sustainable management models such as risk assessment and stockpile replacement to utilize the budget more efficiently. We also found that the management of medical related stockpile system of personal protective equipment (PPE), operated by the Taiwan Centers for Disease Control (Taiwan CDC), was compatible with the international standards, including risk assessment based procurements, the three-tier stockpiling framework and the stockpile replacement model, which saved large amount of government expenditure. Besides, the stockpile system in Taiwan CDC was characteristic of maintaining minimum stockpile of PPE, comprehensive delivery network and the establishment of Management Information System. In the future, we could improve the effectiveness of national medical related stockpile system by upgrading the delivery time according to the capability of the logistics in Taiwan and exchange the stockpile information among different government departments.

**Keywords:** Medical-related stockpile, Three-tier stockpiling framework, Minimum stockpile, Personal protective equipment (PPE), Stockpile replacement model

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

Case diagnosis year		Week 44★		Week 1-44				
Classification	Disease Diagnosed	2017	2016	2017		2016		
				Total cases★	Imported cases	Total cases★	Imported cases	
<b>Category I</b>	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	
<b>Category II</b>	Acute Flaccid Paralysis	1	0	29	0	35	0	
	Acute Viral Hepatitis type A	1	24	348	47	959	74	
	Amoebiasis	5	4	300	164	269	139	
	Anthrax	0	0	0	0	0	0	
	Chikungunya Fever	0	0	11	11	8	8	
	Cholera	1	0	2	1	8	0	
	Dengue Fever	12	10	303	293	757	317	
	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	1	0	3	0	
	Malaria	0	0	7	7	13	13	
	Measles	0	0	5	5	13	7	
	Meningococcal Meningitis	0	0	11	0	6	0	
	Paratyphoid Fever	0	0	5	4	5	2	
	Poliomyelitis	0	0	0	0	0	0	
	Rubella	0	0	3	2	4	3	
	Shigellosis	2	5	140	50	189	91	
Typhoid fever	0	0	17	14	7	3		
West Nile Fever	0	0	0	0	0	0		
<b>Category III</b>	Acute Viral Hepatitis type B	2	2	131	7	91	4	
	Acute Viral Hepatitis type C	3	0	259	2	172	2	
	Acute Viral Hepatitis type D	0	0	1	0	1	0	
	Acute Viral Hepatitis type E	0	0	14	3	15	5	
	Acute Viral Hepatitis untype	0	0	0	0	0	0	
	Congenital Rubella Syndrome	0	0	1	1	0	0	
	Enteroviruses Infection with Severe Complications	0	0	10	0	27	0	
	Haemophilus Influenza type b Infection	0	0	5	0	14	0	
	Japanese Encephalitis	0	0	25	0	23	0	
	Legionellosis	7	3	143	12	94	3	
	Mumps	12	12	559	9	530	7	
	Neonatal Tetanus	0	0	0	0	0	0	
	Pertussis	2	0	33	0	17	0	
	Tetanus	0	0	9	0	10	0	
	<b>Category IV</b>	Botulism	0	0	0	0	5	0
		Brucellosis	0	0	0	0	0	0
Complicated Influenza		8	20	1279	6	1927	2	
Complicated Varicella		2	2	26	1	37	0	
Endemic Typhus Fever		0	0	33	1	13	0	
Herpesvirus B Infection		0	0	0	0	0	0	
Invasive Pneumococcal Disease		10	16	391	4	491	0	
Leptospirosis		5	4	82	1	104	2	
Lyme Disease		0	0	1	1	2	2	
Melioidosis		0	2	22	0	39	1	
Q Fever		0	0	16	0	41	3	
Scrub Typhus		9	14	381	0	405	3	
Toxoplasmosis		0	0	17	0	8	0	
Tularremia		0	0	0	0	0	0	
<b>Category V</b>	Ebola Virus Disease	0	0	0	0	0	0	
	Marburg Hemorrhagic Fever	0	0	0	0	0	0	
	Novel Influenza A Virus Infections	0	0	1	1	0	0	
	Lassa Fever	0	0	0	0	0	0	
	Rift Valley Fever	0	0	0	0	0	0	
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0	0	0	
	Yellow Fever	0	0	0	0	0	0	
Zika Virus Infection	0	0	4	4	13	13		

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
2. The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
3. Numbers of mumps and tetanus cases are summed up by the week of report.
4. Since 2016/1/22, "Zika Virus Infection" was listed as a Notifiable Infectious Disease.

## Suspected Clusters

- Fourteen clusters were reported, including 8 tuberculosis clusters, 4 diarrhea clusters, 1 influenza-like illness cluster and 1 varicella cluster.

## Imported Infectious Diseases

- 20 confirmed cases were imported from 7 countries during Week 44 of 2017.

Country Disease	Vietnam	Indonesia	Philippines	India	Myanmar	Thailand	USA	Total
DF	5		3	2	1	1		12
Amoebiasis		2	1					3
Hepatitis A							1	1
Cholera			1					1
Hepatitis C	1							1
Shigellosis		1						1
Paratyphoid Fever		1						1
Total	6	4	5	2	1	1	1	20

Note: The statistics listed in this table include imported cases that were either **confirmed** or **updated** in the previous week.

- A total of 642 confirmed cases were imported from 36 countries in 2017.
- Top 3 imported diseases : Dengue fever (293), Amoebiasis (164), Shigellosis (50).
- Top 3 countries responsible for most imported cases : Indonesia (206), Vietnam (104), Philippines (80).

## Summary of Epidemic

- **Enterovirus** : The enterovirus epidemic season has begun. Most reported cases experience mild symptoms. EV71 virus is still circulating in the community.
- **Dengue Fever** : The epidemic activity remains at its peak in Southeast Asian countries and imported cases have continued to be reported. In addition, as the mosquito activity remains high, the risk of imported and indigenous epidemics still remains.

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

Case diagnosis year		Week 45★		Week 1-45			
Classification	Disease Diagnosed	2017	2016	2017		2016	
				Total cases★	Imported cases	Total cases★	Imported cases
<b>Category I</b>	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
<b>Category II</b>	Acute Flaccid Paralysis	1	1	30	0	36	0
	Acute Viral Hepatitis type A	2	24	350	47	983	74
	Amoebiasis	4	5	304	165	274	142
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	1	11	11	9	9
	Cholera	0	1	2	1	9	0
	Dengue Fever	6	2	309	299	759	319
	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	1	0	3	0
	Malaria	0	1	7	7	14	14
	Measles	0	0	5	5	13	7
	Meningococcal Meningitis	0	0	11	0	6	0
	Paratyphoid Fever	0	0	5	4	5	2
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	3	2	4	3
Shigellosis	4	3	144	50	192	93	
Typhoid fever	0	0	17	14	7	3	
West Nile Fever	0	0	0	0	0	0	
<b>Category III</b>	Acute Viral Hepatitis type B	3	4	134	7	95	4
	Acute Viral Hepatitis type C	8	2	267	2	174	2
	Acute Viral Hepatitis type D	0	0	1	0	1	0
	Acute Viral Hepatitis type E	0	0	14	3	15	5
	Acute Viral Hepatitis untype	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	1	1	0	0
	Enteroviruses Infection with Severe Complications	1	0	11	0	27	0
	Haemophilus Influenza type b Infection	0	0	5	0	14	0
	Japanese Encephalitis	0	0	25	0	23	0
	Legionellosis	5	3	148	12	97	3
	Mumps	7	10	566	9	540	7
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	1	1	34	0	18	0
	Tetanus	0	0	9	0	10	0
<b>Category IV</b>	Botulism	0	0	0	0	5	0
	Brucellosis	0	0	0	0	0	0
	Complicated Influenza	8	28	1287	6	1955	2
	Complicated Varicella	0	0	26	1	37	0
	Endemic Typhus Fever	1	0	34	1	13	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Invasive Pneumococcal Disease	9	11	400	4	502	0
	Leptospirosis	3	3	85	1	107	2
	Lyme Disease	0	0	1	1	2	2
	Melioidosis	1	4	23	0	43	1
	Q Fever	1	1	17	0	42	3
	Scrub Typhus	7	21	388	0	426	3
	Toxoplasmosis	0	0	17	0	8	0
	Tularremia	0	0	0	0	0	0
<b>Category V</b>	Ebola Virus Disease	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	1	1	0	0
	Lassa Fever	0	0	0	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0	0	0
	Yellow Fever	0	0	0	0	0	0
Zika Virus Infection	0	0	4	4	13	13	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.  
2. The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.  
3. Numbers of mumps and tetanus cases are summed up by the week of report.  
4. Since 2016/1/22, "Zika Virus Infection" was listed as a Notifiable Infectious Disease.

## Suspected Clusters

- Twenty-three clusters were reported, including 11 tuberculosis clusters, 5 diarrhea clusters, 1 upper respiratory tract infection cluster, 1 influenza-like illness cluster and 5 varicella clusters.

## Imported Infectious Diseases

- 7 confirmed cases were imported from 4 countries during Week 45 of 2017.

Disease \ Country	Vietnam	Indonesia	Cambodia	Thailand	Total
DF	3	1	1	1	6
Amoebiasis		1			1
Total	3	2	1	1	7

Note: The statistics listed in this table include imported cases that were either **confirmed** or **updated** in the previous week.

- A total of 649 confirmed cases were imported from 36 countries in 2017.
- Top 3 imported diseases : Dengue fever (299), Amoebiasis (165), Shigellosis (50).
- Top 3 countries responsible for most imported cases : Indonesia (208), Vietnam (107), Philippines (80).

## Summary of Epidemic

- **Enterovirus** : The epidemic activity has continued to slow down and the epidemic peak might be over soon. EV71 virus is still circulating in the community.
- **Dengue Fever** : The epidemic activity remains at its peak in some countries in Southeast Asia and imported cases have continued to be reported. Although the risk of indigenous epidemics has decreased gradually, the mosquito activity remains high in southern Taiwan. Hence, sporadic cases are expected to occur.

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