

### Investigation of A Norovirus Outbreak in A Training Institute—New Taipei City, 2016

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#### Abstract

On April 27, 2016, the Department of Health of New Taipei City (DHNTC) was notified of diarrhea clusters in a training institute since late March. On April 29, the Taipei regional center of Centers for Disease Control along with DHNTC conducted an investigation, including a cohort study among 250 trainees with semi-structural questionnaires. The laboratory results indicated norovirus was the etiological pathogen. Besides, the water specimens from well water (water source), tap water from one toilet/hand wash sink and warm water from one drinking fountain were positive for norovirus, the genotype was the same as those from ill trainees. After refining the case definition, we found the risk of illness was significantly associated with consuming warm water from unspecific drinking fountain (RR 3.12,  $p < 0.05$ ). On May 19, we conducted a second survey in order to find out the association between the specific drinking fountain and illness but none reached statistical significance. After all, we assumed contaminated well water most likely caused the outbreak, and norovirus might be transmitted by contacting or accidentally drinking the contaminated water. This investigation provides a reference to prevent diarrhea outbreak in similar institutions.

**Keywords:** Diarrhea, Outbreak, Norovirus, Water-borne

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## The First Diarrhea Outbreak on Cruise Ship in Taiwan, 2016

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### Abstract

A cruise ship reported that there were over hundred gastrointestinal (GI) illness cases on board on March 27, 2016, and would arrive at Port of Keelung on the next morning. The quarantine authority of Port of Keelung immediately communicated with the ship doctor to clarify the outbreak on board. Then, Taiwan Centers for Disease Control notified the related agencies, including the competent authorities of Custom, Immigration, Quarantine and Security (CIQS), who are responsible for passenger clearance service at Port of Keelung. While the cruise arrived, on-board quarantine was carried out by quarantine officers, all port staff were well-educated and with appropriate personal protective equipment. The frequency of disinfection at passenger terminal was increased.

This is the first large-scale diarrhea outbreak on cruise ship in Taiwan. Since cruise ships are considered as high-risk environment for the spread of communicable diseases, we suggest establishing quarantine policies for cruise ships. In addition, in order to identify pathogens early and assist ships to conduct proper control measures, we recommend equipping rapid test kits at quarantine authority for frequently encountered pathogens on board. Furthermore, in this event, we proved that Port of Keelung has definitely met the core capacity requirements of WHO IHR 2005.

**Keywords:** Cruise ship, Quarantine, Norovirus, Outbreak

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

Case diagnosis week		Week10		Week 1 – 10	
Classification	Disease Diagnosed <sup>1</sup>	2017	2016	2017	2016
Category I	Plague	0	0	0	0
	Rabies	0	0	0	0
	SARS	0	0	0	0
	Smallpox	0	0	0	0
Category II	Acute Flaccid Paralysis	1	0	6	7
	Acute Viral Hepatitis type A	8	10	144	83
	Amoebiasis	10	4	66	48
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	2	2
	Cholera	0	0	0	0
	Dengue Fever	3	4	59	493
	Diphtheria	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	1	1	1
	Malaria	0	0	0	3
	Measles	0	0	1	0
	Meningococcal Meningitis	1	0	2	1
	Paratyphoid Fever	0	0	3	0
	Poliomyelitis	0	0	0	0
	Rubella	0	1	0	3
	Shigellosis	7	6	43	35
Typhoid fever	0	0	4	1	
West Nile Fever	0	0	0	0	
Category III	Acute Viral Hepatitis type B	3	2	34	18
	Acute Viral Hepatitis type C <sup>5</sup>	7	6	47	29
	Acute Viral Hepatitis type D	0	0	1	1
	Acute Viral Hepatitis type E	0	0	5	4
	Acute Viral Hepatitis untype	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	0	1
	Haemophilus Influenza type b Infection	0	0	1	1
	Japanese Encephalitis	0	0	0	0
	Legionellosis	2	2	17	24
	Mumps <sup>2</sup>	11	13	117	100
	Neonatal Tetanus	0	0	0	0
	Pertussis	0	0	2	2
	Tetanus <sup>2</sup>	0	0	2	1
Category IV	Botulism	0	1	0	1
	Brucellosis	0	0	0	0
	Complicated Influenza	8	271	114	1477
	Complicated Varicella <sup>4</sup>	3	0	5	9
	Endemic Typhus Fever	0	0	0	3
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	9	20	125	184
	Leptospirosis	1	2	16	9
	Lyme Disease	0	0	0	0
	Melioidosis	1	0	6	2
	Q Fever	1	0	3	6
	Scrub Typhus	8	0	79	69
	Toxoplasmosis	1	0	2	1
Tularreemia	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0
	Ebola-Marburg Hemorrhagic Fever	0	0	0	0
	Novel Influenza A Virus Infections <sup>6</sup>	0	0	1	0
	Lassa Fever	0	0	0	0
	Rift Valley Fever	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0
Yellow Fever	0	0	0	0	

1. The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
2. Reported cases.
3. Since 2014/1/1, "Varicella" was modified to "Complicated Varicella".
4. Since 2014/3/6, the case definition for confirmed Acute hepatitis C was changed from "meet the clinical and laboratory conditions" to "meet the clinical or laboratory conditions".
5. Since 2014/7/1, various subtypes of human cases of avian influenza are reported as "novel influenza A virus infections", a Category V Notifiable Infectious Disease. The original "H5N1 flu" and "H7N9 flu", which were respectively listed as a Category I Notifiable Infectious Disease and a Category V Notifiable Infectious Disease were removed from the list on the same day.
6. Since 2016/1/22, "Zika Virus Infection" was listed as a Notifiable Infectious Disease.

## Suspected Clusters

- Forty-nine clusters were reported, including 4 tuberculosis clusters, 41 diarrhea clusters, 1 upper respiratory tract infection cluster, 1 influenza-like illness cluster, 1 fever of unknown origin cluster and 1 varicella cluster.

## Imported Infectious Diseases

- 13 confirmed cases were imported from 6 countries during Week 10 of 2017.

Country Disease	Indonesia	Japan	Philippines	Vietnam	Maldives	China	Total
Amoebiasis	3		1	1			5
Shigellosis	3						3
DF					2		2
Legionellosis						1	1
Complicated Varicella				1			1
IPD		1					1
<b>Total</b>	6	1	1	2	2	1	13

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

- A total of 140 confirmed cases were imported from 16 countries in 2017.
- Top 3 imported diseases : Dengue fever (59), Amoebiasis (37), Shigellosis (14).
- Top 3 countries responsible for most imported cases : Indonesia (56), Vietnam (19), Malaysia (14).

## Summary of Epidemic

- **Diarrhea** : As the viral gastroenteritis season is upon us, the risk of clustered cases remains.
- **Influenza** : As spring approaches, influenza activity is expected to decrease gradually. H3N2 is currently the dominant strain circulating in the community.
- **Scrub Typhus** : The number of cases reported and confirmed are expected to increase. The affected areas primarily include Hualien County and Taitung County.
- **Zika Virus Infection** : As the epidemic in affected areas has continued to persist, the risk of importing Zika virus into Taiwan from those countries remains.

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

Case diagnosis week		Week11		Week 1—11	
Classification	Disease Diagnosed <sup>1</sup>	2017	2016	2017	2016
<b>Category I</b>	Plague	0	0	0	0
	Rabies	0	0	0	0
	SARS	0	0	0	0
	Smallpox	0	0	0	0
<b>Category II</b>	Acute Flaccid Paralysis	1	0	7	7
	Acute Viral Hepatitis type A	16	23	160	106
	Amoebiasis	7	4	73	52
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	2	2
	Cholera	0	0	0	0
	Dengue Fever	2	1	61	494
	Diphtheria	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	1	1
	Malaria	0	0	0	3
	Measles	1	0	2	0
	Meningococcal Meningitis	0	0	2	1
	Paratyphoid Fever	0	0	3	0
	Poliomyelitis	0	0	0	0
	Rubella	0	0	0	3
	Shigellosis	1	4	44	39
	Typhoid fever	1	0	5	1
West Nile Fever	0	0	0	0	
<b>Category III</b>	Acute Viral Hepatitis type B	2	1	36	19
	Acute Viral Hepatitis type C <sup>5</sup>	3	5	50	34
	Acute Viral Hepatitis type D	0	0	1	1
	Acute Viral Hepatitis type E	0	0	5	4
	Acute Viral Hepatitis untype	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	1	0	1	1
	Haemophilus Influenza type b Infection	0	1	1	2
	Japanese Encephalitis	0	0	0	0
	Legionellosis	4	1	21	25
	Mumps <sup>2</sup>	13	9	130	109
	Neonatal Tetanus	0	0	0	0
	Pertussis	1	0	3	2
	Tetanus <sup>2</sup>	0	0	2	1
	<b>Category IV</b>	Botulism	0	0	0
Brucellosis		0	0	0	0
Complicated Influenza		12	110	126	1587
Complicated Varicella <sup>4</sup>		0	1	5	10
Endemic Typhus Fever		2	0	2	3
Herpesvirus B Infection		0	0	0	0
Invasive Pneumococcal Disease		10	9	135	193
Leptospirosis		1	2	17	11
Lyme Disease		0	0	0	0
Melioidosis		0	0	6	2
Q Fever		0	0	3	6
Scrub Typhus		3	0	82	69
Toxoplasmosis		1	1	3	2
Tularremia	0	0	0	0	
<b>Category V</b>	Ebola Virus Disease	0	0	0	0
	Ebola-Marburg Hemorrhagic Fever	0	0	0	0
	Novel Influenza A Virus Infections <sup>6</sup>	0	0	1	0
	Lassa Fever	0	0	0	0
	Rift Valley Fever	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0
Yellow Fever	0	0	0	0	

1. The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
2. Reported cases.
3. Since 2014/1/1, "Varicella" was modified to "Complicated Varicella".
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6. Since 2016/1/22, "Zika Virus Infection" was listed as a Notifiable Infectious Disease.

## Suspected Clusters

- Forty-eight clusters were reported, including 4 tuberculosis clusters, 33 diarrhea clusters, 8 upper respiratory tract infection clusters, 1 influenza-like illness cluster and 2 varicella clusters.

## Imported Infectious Diseases

- 8 confirmed cases were imported from 3 countries during Week 11 of 2017.

Disease \ Country	Indonesia	Malaysia	China	Total
DF		2		2
Hepatitis A		1		1
FluSC			1	1
Amoebiasis	1			1
Measles	1			1
Shigellosis	1			1
Typhoid fever	1			1
<b>Total</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>8</b>

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

- A total of 148 confirmed cases were imported from 16 countries in 2017.
- Top 3 imported diseases : Dengue fever (61), Amoebiasis (38), Shigellosis (15).
- Top 3 countries responsible for most imported cases : Indonesia (60), Vietnam (19), Malaysia (17).

## Summary of Epidemic

- **Diarrhea** : As the viral gastroenteritis season is upon us, the risk of clustered cases remains.
- **Influenza** : As large temperature fluctuations are expected this week, it is likely that influenza activity will remain similar to that last week. H3N2 is currently the dominant strain circulating in the community.
- **Scrub Typhus** : The number of cases reported and confirmed is expected to increase. The affected areas primarily include Hualien County and Taitung County.

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