

Epidemiology of Invasive Group A Streptococcal Infections and Associated Toxic Shock Syndrome in Taiwan, 2011–2015

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Abstract

Invasive Group A *Streptococcus* infections and associated toxic shock syndrome are important infectious diseases worldwide, in the view of mortality, severe sequelae or medical burden. In 2011, the number of scarlet fever cases due to Group A streptococcal infections tripled in Hong Kong, including several children having invasive infection and toxic shock syndrome. Therefore, the Taiwan Centers for Disease Control set up a surveillance system to monitor the situation of invasive Group A *Streptococcus* infections and associated toxic shock syndrome in Taiwan in July, 2011. The surveillance ended in June, 2015.

In this research we analyzed the surveillance data from July, 2011 to June, 2015. A total of 876 cases were reported. The average annual incidence was 0.9 per 100,000 populations, with the highest incidence of 1.2 per 100,000 populations from July 2011 to June 2012. The number of cases and incidences increased with age. The elderly over 75 years old had the highest incidence of 4.5 to 6.5 per 100,000 populations. Male cases were more than female ones, with a ratio of 1.4 to 4.2. The case fatality rate was 3.1%.

The research revealed the current situation of the disease in Taiwan, and provided a valuable baseline data for future studies and policy formulation.

Keywords: invasive Group A Streptococcal infections, toxic shock syndrome, Scarlet fever

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

Case diagnosis year		Week 3★		Week 1–3			
Classification	Disease Diagnosed	2021	2020	2021		2020	
				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	4	0	1	0
	Acute Viral Hepatitis type A	3	1	6	0	5	1
	Amoebiasis	3	2	12	5	15	5
	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	4	1	1	20	20
	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	2	1	0	2	0
	Malaria	0	0	0	0	0	0
	Measles	0	0	0	0	2	2
	Meningococcal Meningitis	0	1	0	0	2	0
	Paratyphoid Fever	0	0	0	0	0	0
	Poliomyelitis	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	
Shigellosis	5	1	13	0	11	4	
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	1	5	0	6	1
	Acute Viral Hepatitis type C	10	14	38	0	42	0
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	0	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	1	2	1	0	2	0
	Haemophilus Influenza type b Infection	0	0	0	0	0	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	5	7	35	0	22	3
	Mumps	9	7	28	0	28	1
	Neonatal Tetanus	0	0	0	0	0	0
Pertussis	0	0	0	0	4	0	
Tetanus	0	0	1	0	0	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	0	2	5	0	6	0
	Endemic Typhus Fever	2	0	2	0	0	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	92	0	0	289	4
	Invasive Pneumococcal Disease	6	14	22	0	48	0
	Leptospirosis	0	2	4	0	2	0
	Listeriosis	0	1	7	0	2	0
	Lyme Disease	0	0	0	0	0	0
	Melioidosis	0	0	1	0	0	0
	Q Fever	0	0	0	0	0	0
	Scrub Typhus	8	9	25	0	22	1
Toxoplasmosis	0	0	1	0	0	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	33	0	76	63	0	0	
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

- Eighteen clusters related to diarrhea (9), tuberculosis (6), enterovirus (2), and upper respiratory tract infection (1) were reported during week 3.

Imported Infectious Diseases

- There were 25 imported cases from 8 countries during week 3.

Diseases	Countries								Total
	Indonesia	USA	Philippines	UK	Denmark	Cameroon	Spain	Myanmar	
Severe Pneumonia with Novel Pathogens	8	5	4	2	1	1	1	1	23
Amoebiasis	2								2
Total	10	5	4	2	1	1	1	1	25

- As of week 3, there were 69 imported cases from 18 countries. The top three countries are Indonesia (22), Philippines (13), and USA (13).
- The three notifiable diseases with the highest number of imported cases are Severe Pneumonia with Novel Pathogens (63), Amoebiasis (5), and Dengue Fever (1).

Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens** : There have been new cases linked to the hospital COVID-19 cluster. It is worrisome that the new cases have visited public spaces while they were infectious. The situation of global COVID-19 pandemic continues to be critical. The risk of further locally-acquired and imported cases is rising.
- **Influenza-like illness** : The epidemic status increase gradually.

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

Case diagnosis year		Week 4★		Week 1-4			
Classification	Disease Diagnosed	2021	2020	2021		2020	
				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	4	0	2	0
	Acute Viral Hepatitis type A	2	4	8	0	9	1
	Amoebiasis	3	4	15	6	19	8
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	0	0	0	0
	Cholera	0	0	0	0	0	0
	Dengue Fever	1	6	2	2	26	26
	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	1	0	2	0	2	0
	Malaria	1	1	1	1	1	1
	Measles	0	0	0	0	2	2
	Meningococcal Meningitis	0	0	0	0	2	0
	Paratyphoid Fever	0	0	0	0	0	0
	Poliomyelitis	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	
Shigellosis	4	2	17	0	13	4	
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	2	8	0	8	1
	Acute Viral Hepatitis type C	16	10	54	0	52	0
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	0	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	1	0	2	0
	Haemophilus Influenza type b Infection	0	0	0	0	0	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	7	2	42	0	24	3
	Mumps	10	11	38	0	39	2
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	0	0	4	0
Tetanus	0	0	1	0	0	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	1	0	6	0	6	0
	Endemic Typhus Fever	0	0	2	0	0	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	62	0	0	351	6
	Invasive Pneumococcal Disease	7	13	29	0	61	0
	Leptospirosis	2	0	6	0	2	0
	Listeriosis	3	4	10	0	6	0
	Lyme Disease	0	0	0	0	0	0
	Melioidosis	1	1	2	0	1	1
	Q Fever	0	0	0	0	0	0
	Scrub Typhus	5	1	30	0	23	1
Toxoplasmosis	0	0	1	0	0	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	25	3	101	82	3	3	
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 2020/1/15, "Severe Pneumonia with Novel Pathogens" was listed as a Notifiable Infectious Disease.

Suspected Clusters

- Twenty clusters related to diarrhea (12), tuberculosis (5), upper respiratory tract infection (2) and varicella (1) were reported during week 4.

Imported Infectious Diseases

- There were 22 imported cases from 10 countries during week 4.

Diseases \ Countries	Philippines	Brazil	USA	South Africa	Indonesia	Mexico	Czech Republic	Germany	Myanmar	Cambodia	Total
Severe Pneumonia with Novel Pathogens	4	4	4	2	1	1	1	1	1		19
Amoebiasis					1						1
Dengue Fever	1										1
Malaria										1	1
Total	5	4	4	2	2	1	1	1	1	1	22

- As of week 4, there were 91 imported cases from 21 countries. The top three countries are Indonesia (24), Philippines (18), and USA (17).
- The three notifiable diseases with the highest number of imported cases are Severe Pneumonia with Novel Pathogens (82), Amoebiasis (6), and Dengue Fever (2).

Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens** : There have been new cases linked to the hospital COVID-19 cluster. It is worrisome that the new cases have visited public spaces while they were infectious. The situation of global COVID-19 pandemic continues to be critical. The risk of further locally-acquired and imported cases is rising.
- **Influenza-like illness** : The epidemic status is similar to previous weeks.

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