

Routine Varicella Immunization And The Impact on Its Epidemiology, Medical Expenditure And Social Costs in Taiwan, 2000–2012

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Abstract

Varicella vaccine has been approved in Taiwan since 1997 and was introduced into routine immunization program to provide as a free, 1-dose vaccination for 1-year-old children throughout Taiwan since 2004. Information of varicella patients from 2000 to 2012 at National Health Insurance Database were retrieved including the epidemiological characteristics, medical expense and indirect costs from the societal perspective of varicella were analyzed. The implementation of routine varicella immunization has resulted an 87% decline in morbidity. The average age of varicella patients increased from 7.9 years to 16.3 years. The varicella-related hospital admissions decreased, but admission rate increased. Varicella patients with underlying diseases had higher admission rates and longer duration of hospital stay. The annual varicella-related medical expense declined after 2002 and the proportion of medical costs for admission has increased. The estimated indirect costs from the societal perspective of varicella were 8.3 times higher than varicella-related medical expense. The results will be a reference for revising the national immunization policy.

Keywords: varicella, varicella vaccine, epidemiology, medical expenditure, social costs

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

Case diagnosis year		Week 35★		Week 1–35			
Classification	Disease Diagnosed	2018	2017	2018		2017	
				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	1	0	52	0	22	0
	Acute Viral Hepatitis type A	1	2	66	27	326	39
	Amoebiasis	10	17	208	89	248	134
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	1	4	4	10	10
	Cholera	0	0	5	0	0	0
	Dengue Fever	33	8	236	167	216	213
	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	1	0
	Malaria	0	0	2	2	4	4
	Measles	2	0	33	13	5	5
	Meningococcal Meningitis	0	0	5	1	11	0
	Paratyphoid Fever	0	0	5	3	3	3
	Poliomyelitis	0	0	0	0	0	0
	Rubella	1	1	9	8	3	2
	Shigellosis	3	1	108	34	114	41
Typhoid fever	0	1	8	6	14	13	
West Nile Fever	0	0	0	0	0	0	
Category III	Acute Viral Hepatitis type B	2	3	90	8	111	4
	Acute Viral Hepatitis type C	9	4	317	3	202	1
	Acute Viral Hepatitis type D	0	0	0	0	1	0
	Acute Viral Hepatitis type E	0	0	5	0	13	3
	Acute Viral Hepatitis untype	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	1	1	32	0	8	0
	Haemophilus Influenza type b Infection	0	0	4	0	3	0
	Japanese Encephalitis	0	0	35	0	22	0
	Legionellosis	4	2	123	2	111	12
	Mumps	11	11	392	5	449	7
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	1	18	0	26	0
	Tetanus	0	1	5	0	7	0
	Category IV	Botulism	0	0	0	0	0
Brucellosis		0	0	0	0	0	0
Complicated Influenza		1	2	37	0	20	1
Complicated Varicella		0	1	19	0	29	1
Endemic Typhus Fever		0	0	0	0	0	0
Herpesvirus B Infection		9	8	337	0	333	2
Invasive Pneumococcal Disease		1	1	41	0	60	1
Leptospirosis		0	0	116	1	0	0
Lyme Disease		0	0	1	1	0	0
Melioidosis		1	2	12	1	18	0
Q Fever		1	0	10	1	12	0
Scrub Typhus		9	15	244	0	303	0
Toxoplasmosis		21	20	922	5	1193	6
Tularremia		0	3	12	1	13	0
Category V	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	0	0	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	1	1
	Yellow Fever	0	0	0	0	0	0
	Zika Virus Infection	0	0	0	0	0	0

- ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
- The following chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
- Numbers of mumps, neonatal tetanus and tetanus cases are summed up by the week of report.
- Since 2016/1/22, "Zika Virus Infection" was listed as a Notifiable Infectious Disease.
- Since 2018/1/1, "Listeriosis" was listed as a Notifiable Infectious Disease.

Suspected Clusters

- Twenty-one clusters were reported, including 9 tuberculosis clusters, 6 diarrhea clusters, and 6 upper respiratory tract infection clusters.

Imported Infectious Diseases

- There were 21 confirmed imported cases from 8 countries during week 35 of 2018.

Country Disease	Indonesia	Vietnam	Malaysia	Philippines	China	India	Thailand	Singapore	Total
Amoebiasis	6	2							8
DF		1	2	3		1		1	8
Acute Hepatitis B		1			1				2
Rubella					1				1
Measles							1		1
Acute Hepatitis A			1						1
Total	6	4	3	3	2	1	1	1	21

Note: The table summarized the number of imported cases that were either **confirmed** or **updated** in the given week.

- There are 379 confirmed imported cases from 25 different countries in 2018. The top 3 countries are Indonesia (116), Philippines (51), and Thailand (41).
- Top 3 imported diseases are Dengue Fever (169), Amoebiasis (89), and Shigellosis (34).

Summary of Epidemic

- **Enterovirus:** As schools start, the epidemic could increase by close contacts between individuals.
- **Dengue Fever:** The epidemic has been increasing in the nearby Asian countries; therefore, the imported cases are continuously potential risks in Taiwan. Several indigenous dengue fever clusters have occurred in Taiwan. Accumulation of water containers after the heavy rain increases vector breeding. Therefore, the risk of indigenous epidemics remain elevated.
- **Scrub Typhus:** Taiwan is in the midst of scrub typhus season. The current primarily affected areas include Hualien County and Taitung County.

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

Case diagnosis year		Week 36★		Week 1-36			
Classification	Disease Diagnosed	2018	2017	2018		2017	
				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	52	0	23	0
	Acute Viral Hepatitis type A	1	2	67	27	328	40
	Amoebiasis	6	4	214	93	252	136
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	4	4	10	10
	Cholera	0	0	5	0	0	0
	Dengue Fever	52	11	288	186	227	224
	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	1	0
	Malaria	1	0	3	3	4	4
	Measles	0	0	33	13	5	5
	Meningococcal Meningitis	0	0	5	1	11	0
	Paratyphoid Fever	1	0	6	4	3	3
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	9	8	3	2
	Shigellosis	3	3	111	34	117	43
	Typhoid fever	3	0	11	9	14	13
West Nile Fever	0	0	0	0	0	0	
Category III	Acute Viral Hepatitis type B	4	1	94	8	112	4
	Acute Viral Hepatitis type C	7	1	323	3	203	1
	Acute Viral Hepatitis type D	0	0	0	0	1	0
	Acute Viral Hepatitis type E	0	0	5	0	13	3
	Acute Viral Hepatitis untype	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	1	32	0	9	0
	Haemophilus Influenza type b Infection	1	0	5	0	3	0
	Japanese Encephalitis	0	0	35	0	22	0
	Legionellosis	11	3	134	3	114	12
	Mumps	16	11	408	5	460	7
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	5	0	23	2	26	0
	Tetanus	0	0	5	0	7	0
	Category IV	Botulism	0	0	0	0	0
Brucellosis		0	0	0	0	0	0
Complicated Influenza		0	0	37	0	20	1
Complicated Varicella		0	2	19	0	31	1
Endemic Typhus Fever		0	0	0	0	0	0
Herpesvirus B Infection		5	4	342	0	337	2
Invasive Pneumococcal Disease		3	2	44	0	62	1
Leptospirosis		6	0	122	1	0	0
Lyme Disease		0	0	1	1	0	0
Melioidosis		2	2	14	1	20	0
Q Fever		2	0	12	1	12	0
Scrub Typhus		12	4	256	0	307	0
Toxoplasmosis		19	11	941	5	1204	6
Tularremia		0	0	12	1	13	0
Category V	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	0	0	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	1	1
	Yellow Fever	0	0	0	0	0	0
Zika Virus Infection	0	0	0	0	0	0	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
2. The following 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, neonatal tetanus 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.
5. Since 2018/1/1, "Listeriosis" was listed as a Notifiable Infectious Disease.

Suspected Clusters

- Twenty-one clusters were reported, including 10 tuberculosis clusters, 3 diarrhea clusters, 4 upper respiratory tract infection clusters, 2 influenza-like illness clusters, and 2 varicella clusters.

Imported Infectious Diseases

- There were 29 confirmed imported cases from 10 countries during week 36 of 2018.

Disease \ Country	Indonesia	Cambodia	Philippines	Malaysia	China	Myanmar	Bangladesh	Thailand	Solomon Islands	Laos	Total
DF	3	3	4	3		2		1		1	17
Amoebiasis	3										3
Typhoid fever	2					1					3
Pertussis					2						2
Malaria									1		1
Legionellosis					1						1
Paratyphoid Fever							1				1
Acute Hepatitis A		1									1
Total	8	4	4	3	3	3	1	1	1	1	29

Note: The table summarized the number of imported cases that were either **confirmed** or **updated** in the given week.

- There are 408 confirmed imported cases from 28 different countries in 2018. The top 3 countries are Indonesia (124), Philippines (55), and Thailand (42).
- Top 3 imported diseases are Dengue Fever (186), Amoebiasis (92), and Shigellosis (34).

Summary of Epidemic

- **Enterovirus:** Schools have started, the epidemic could increase by close contacts between individuals.
- **Dengue Fever:** The epidemic has been increasing in the nearby Asian countries; therefore, the potential risks of imported cases are still high in Taiwan. There have been dengue fever epidemic in several counties in Taiwan. In addition, accumulation of water after the heavy rain could create possible breeding sites for mosquitoes. The risk of indigenous epidemics remain elevated.

- **Scrub Typhus:** Taiwan is in the midst of scrub typhus season. The current primarily affected areas include Hualien County and Taitung County.

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