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Original Article

Fatal Cases in the 2014 Dengue Epidemic in Taiwan

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Abstract

Dengue is the most important vector-borne infectious disease in Taiwan and always inflicts a significant health burden mainly on the population in southern Taiwan. The 2014 dengue epidemic, larger than ever before, started as early as May 2014 when the first case was noted in Cianjhen District, Kaohsiung. Up to 15,211 dengue cases from this dengue epidemic, including 134 dengue hemorrhagic fever cases and 20 fatalities, were reported by February 2015. Specific therapeutic agents for dengue are currently not available. Effective medical management has been, however, proven to increase survival among dengue patients, and thereby cannot be overemphasized. After the first two fatal dengue cases being reported in August 2014, Taiwan CDC and the Department of Health, Kaohsiung City Government co-organized mortality conferences in hospitals where fatal cases happened. Physicians with expertise in dengue medical management were invited to participate in these mortality conferences. This report summarizes and highlights the pitfalls for clinical management of dengue found from reviews and detailed discussions of fatal cases, serving as a reminder of how to avoid such pitfalls and underscoring the importance of effective medical management for dengue.

Keywords：Dengue；Dengue hemorrhagic fever；Shock；Warning signs；Plasma leakage

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Laboratory Characteristics of Dengue Fever in Taiwan During 2009–2013

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Abstract

World Health Organization has declared dengue is the most rapidly spreading mosquito-borne disease in 2012. Located in subtropical region and frequently in contact with dengue high-risk Southeast Asian countries with dengue ranks as the most important acute infectious disease, Taiwan has spent innumerable resources and manpower in dengue prevention and control. Since huge dengue epidemic might occur in the future, laboratory analysis of dengue cases was taken for re-examining the benefits of laboratory diagnosis. The results showed in the followings: (1) On five-year average positive rate of medical institutions, the difference between imported dengue cases and indigenous cases is statistically significant; (2) 93% of dengue cases could be determined by first specimen result, and 40% of them were confirmed cases; 73% of dengue cases collected more than one specimen were confirmed cases; and (3) 75% of dengue confirmed cases were determined by PCR or NS1 in first specimen. The sensitivity of PCR or NS1 test in the first specimen was between 70.5% and 76.9%, and the sensitivity of IgM or IgG test in the second specimen was between 78.0% and 95.4%. These findings indicated that it is necessary to continually implement medical institutes visits and physicians education training before epidemic seasons to remind physicians about dengue symptoms in order to improve positive rate; if the diagnosis is uncertain with the first specimen but due to the necessity of urgent preventive measures for reducing the risk of disease spreading, with sufficient public health resources, a second specimen shall be recommended. Moreover, it will cut down laboratory expenses and avoid disease spreading by strengthening the public health education in seeking medical treatment and self-report with suspected symptoms in no time, since diagnosis can be determined by rapid PCR or NS1 test and reducing second specimen collection.

Keywords：Dengue fever；Positive rate；Laboratory results；Sensitivity

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An Imported Dengue Cluster in Taiwanese Businessmen from Indonesia

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Abstract

During the 2015 Chinese New Year holidays, three cases of dengue fever have been confirmed and reported to the Taipei Regional Center, Centers for Disease Control. The first case-patient is a Taiwanese businessman working in Indonesia who was returning to Yilan for the holidays. The following two case-patients, business partners of the index case, visited him in Indonesia and stayed in his factory to discuss business before returning to Taiwan. After detailed epidemiological investigation, these three patients were confirmed as an imported dengue cluster from Indonesia. In recent years, due to climate change, and frequent global business trading, we should be more alert about imported dengue fever and explore possible cases by detailed epidemiological investigation in order to prevent outbreak of domestic dengue fever.

Keywords：Dengue fever；Imported infectious disease；Taiwanese businessman

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

Case diagnosis week		Week 33		Week 1—33	
Classification	**Disease Diagnosed**[1]	**2015**	**2014**	**2015**	**2014**
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	0	0	10	26
	Acute Viral Hepatitis type A	1	1	64	73
	Amoebiasis	8	7	228	162
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	4	6
	Cholera	1	0	5	3
	Dengue Fever	919	151	2195	874
	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	7	11
	Measles	0	0	27	17
	Meningococcal Meningitis	0	0	2	3
	Paratyphoid Fever	0	0	1	6
	Poliomyelitis	0	0	0	0
	Rubella	0	0	6	5
	Shigellosis	6	1	115	92
	Typhoid fever	0	0	21	14
	West Nile Fever	0	0	0	0
Category III	Acute Viral Hepatitis type B	2	3	78	73
	Acute Viral Hepatitis type C[4]	3	3	131	107
	Acute Viral Hepatitis type D	0	0	1	1
	Acute Viral Hepatitis type E	1	0	2	8
	Acute Viral Hepatitis untype	0	0	2	3
	Congential Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	4	6
	Haemophilus Influenza type b Infection	0	0	1	2
	Japanese Encephalitis	1	0	27	13
	Legionellosis	5	1	108	79
	Mumps[2]	14	19	521	561
	Neonatal Tetanus	0	0	0	0
	Pertussis	0	1	56	35
	Tetanus[2]	1	0	7	3
Category IV	Botulism	0	0	2	0
	Brucellosis	1	0	1	0
	Complicated Influenza	3	2	761	1715
	Complicated Varicella[3]	2	0	38	37
	Endemic Typhus Fever	1	0	22	16
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	7	7	352	409
	Leptospirosis	6	5	40	39
	Lyme Disease	0	1	2	1
	Melioidosis	3	2	20	15
	Q Fever	0	3	27	39
	Scrub Typhus	7	23	232	283
	Toxoplasmosis	2	0	8	8
	Tularremia	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[5]	0	0	0	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.

Suspected Clusters

●Six clusters were reported, including 3 upper respiratory tract infection clusters, 1 diarrhea cluster, 1 enterovirus infection cluster, and 1 influenza-like illness cluster.

Imported Infectious Diseases

●21 confirmed cases were imported from 10 countries during Week 33 of 2015.

Country / Disease	Indonesia	Cambodia	Vietnam	Myanmar	India	China	Philippines	Singapore	Malaysia	Thailand	Total
Dengue Fever	1	3	3	2	2		1	1	1	1	15
Amoebiasis	2										2
Brucellosis	1										1
Hepatitis B	1										1
Scrub Typhus						1					1
Hepatitis E						1					1
Total	5	3	3	2	2	2	1	1	1	1	21

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

●A total of 430 confirmed cases were imported from 28 countries in 2015.

●Top 3 imported diseases：Dengue fever (164), Amoebiasis (134), Shigellosis (56).

●Top 3 countries responsible for most imported cases：Indonesia (248), Philippines (34), Vietnam (24).

Summary of Epidemic

●**Dengue Fever**：Dengue activity has continued to increase, and we are about to enter the peak of the epidemic season. The number of new indigenous cases confirmed in Week 33 is 2.3 times higher than that reported in Week 32. 87% of the indigenous dengue cases reported thus far this summer were confirmed in Tainan City. The speed at which the number of cases grows in Tainan City this summer is the highest compared to the same period in the previous years. The outbreaks in North District, Annan District, West Central District, Yongkang District, South District and East District, Tainan City have increased. On the other hand, in Kaohsiung City, the number of new cases reported in Week 33 is 2.2 times higher than that reported in Week 32. Notably, the outbreak in Sanmin District, Kaohsiung City has increased rapidly. The number of indigenous cases has continued to be reported in Pingtung County. New indigenous cases in Taoyuan City and Chiayi City have also been reported. The public is urged to clean up vector breeding site in schools to reduce the risk of an epidemic outbreak for the upcoming semester.

●Enterovirus：The enterovirus activity has not fluctuated. During the past two weeks, the ER consultation rate for enterovirus infection was almost the same as the epidemic threshold. Coxsackie A16 virus is currently the dominant strain circulating in the community. Taiwan CDC will continue to closely monitor the outbreak, and the epidemic is expected to gradually increase for the upcoming semester.

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

Case diagnosis week		Week 34		Week 1—34	
Classification	**Disease Diagnosed**[1]	**2015**	**2014**	**2015**	**2014**
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	0	1	10	27
	Acute Viral Hepatitis type A	3	1	67	74
	Amoebiasis	4	7	232	169
	Anthrax	0	0	0	0
	Chikungunya Fever	0	1	4	7
	Cholera	1	0	6	3
	Dengue Fever	1387	256	3577	1130
	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	7	11
	Measles	0	1	27	18
	Meningococcal Meningitis	0	0	2	3
	Paratyphoid Fever	1	0	2	6
	Poliomyelitis	0	0	0	0
	Rubella	0	0	6	5
	Shigellosis	4	3	119	95
	Typhoid fever	0	2	21	16
	West Nile Fever	0	0	0	0
Category III	Acute Viral Hepatitis type B	3	0	81	73
	Acute Viral Hepatitis type C[4]	5	5	136	112
	Acute Viral Hepatitis type D	0	0	1	1
	Acute Viral Hepatitis type E	0	0	2	8
	Acute Viral Hepatitis untype	0	0	2	3
	Congential Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	4	6
	Haemophilus Influenza type b Infection	0	0	1	2
	Japanese Encephalitis	0	1	27	14
	Legionellosis	2	4	110	83
	Mumps[2]	13	15	534	576
	Neonatal Tetanus	0	0	0	0
	Pertussis	1	2	57	37
	Tetanus[2]	0	0	7	3
Category IV	Botulism	0	0	2	0
	Brucellosis	1	0	2	0
	Complicated Influenza	11	6	772	1721
	Complicated Varicella[3]	0	0	38	37
	Endemic Typhus Fever	0	0	22	16
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	7	8	359	417
	Leptospirosis	1	2	41	41
	Lyme Disease	0	0	2	1
	Melioidosis	1	2	21	17
	Q Fever	0	1	27	40
	Scrub Typhus	4	10	236	293
	Toxoplasmosis	0	0	8	8
	Tularremia	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[5]	0	0	0	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".
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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.

Suspected Clusters

●Ten clusters were reported, including 5 diarrhea clusters, 3 tuberculosis clusters, and 2 upper respiratory tract infection clusters.

Imported Infectious Diseases

●25 confirmed cases were imported from 9 countries during Week 34 of 2015.

Country / Disease	Indonesia	Vietnam	China	Myanmar	Philippines	Cambodia	Australia	India	Thailand	Total
Dengue Fever		3	1	2	2	1		1	1	11
Amoebiasis	3		2							5
Shigellosis	3	1				1				5
Hepatitis A	1	1					1			3
Brucellosis			1							1
Total	7	5	4	2	2	2	1	1	1	25

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

●A total of 455 confirmed cases were imported from 29 countries in 2015.

●Top 3 imported diseases：Dengue fever (175), Amoebiasis (139), Shigellosis (61).

●Top 3 countries responsible for most imported cases：Indonesia (255), Philippines (36), Vietnam (28).

Summary of Epidemic

●**Dengue Fever**：Dengue activity has continued to increase, and the peak of the epidemic season is fast approaching. The number of new indigenous cases confirmed during Week 34 is 1.3 times higher than that reported during Week 33. Approximately 200 new cases have been confirmed per day. Furthermore, heavy downpours has elevated the risk of an outbreak in southern Taiwan. 88% of the indigenous dengue cases reported thus far this summer were confirmed in Tainan City, the number of new cases reported during Week 34 is 1.3 times higher than that reported during Week 33. 90% of the districts in Tainan City have reported dengue cases. Among them, North District, is the hardest hit. On the other hand, in Kaohsiung City, the number of new cases reported during Week 34 is 1.1 times higher than that reported during Week 33. Notably, the clusters have been reported in Zuoying District, Lingya District and Fongshan District, Kaohsiung City. The number of indigenous cases and clusters have continued to be reported in Pingtung County. Furthermore, sporadic cases have been reported in the other 14 cities and counties in the nation. New indigenous cases in Taoyuan City and Chiayi City have also been reported.

●**Enterovirus**：Enterovirus activity has peaked. During Week 34, the numbers of visits to outpatient services for enterovirus infection have not fluctuated, and the ER consultation rate for enterovirus infection was slightly higher than the epidemic threshold. Coxsackie A16 virus is currently the dominant strain circulating in the community. Taiwan CDC will continue to closely monitor the outbreak, and the epidemic is expected to gradually increase as the new semester starts this week.

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