

Lessons Learned from Epidemiological Investigations of the Enterohemorrhagic *Escherichia coli* O104:H4 Outbreak in Germany 2011

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Abstract

In recent years, nationwide and international foodborne outbreaks have become more commonly recognized. When foodborne illness happens, public health officials investigate outbreaks, ensure the scale of diagnostic capability in laboratories for foodborne microorganisms, control it and prevent similar outbreaks from happening in the future. A large outbreak of the hemolytic-uremic syndrome associated with enterohemorrhagic *Escherichia coli* O104:H4 occurred in Germany that ultimately involved more than 4,000 persons in 16 countries. We undertook a literature search refers to the epidemiological studies of this outbreak, and discussed the methods and results of the main investigations. Early in the epidemiological studies, the team of epidemiological specialists started with initial exploratory interviews and case-control studies which linked to consumption of raw tomato, cucumber, and salad in northern Germany. Additional recipe-based restaurant cohort studies, online questionnaires, trace-back and trace-forward investigations identified sprouts produced by an organic grower in Lower Saxony as vehicle of transmission. A thorough understanding of the advantages and limitations of epidemiological studies and typing methods during outbreak investigations is of crucial importance for selecting the appropriate approaches to explicitly define outbreak strains. Recall bias with regard to sprout consumption and potential selection bias in case-control studies also need to be taken into account to avoid impacts and losses from misidentification of incriminated food.

Keywords: Sprouts ; food poisoning ; Germany ; hemolytic uremic syndrome ; foodborne diseases

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Received : Mar.2, 2015

Accepted : Apr. 20, 2015

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DOI : 10.6525/TEB.20150609.31(11).001

Epidemiology of *Vibrio cholerae* Infection in Taiwan

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Abstract

From year 2004 to 2013, a total of 690 suspected cholera cases were reported in Taiwan. Among them, 323 cases were reported through “cholera” disease in notifiable disease surveillance system, the remaining 367 cases without stool or vomit specimens, were reported as “others” disease in the same system. Among 515 cases positive for *Vibrio cholerae*, only 28 cases were toxigenic cholera. The trends of *Vibrio cholerae* positive cases increased in recent years, particularly increased from May to October, more than half of cases occurred in summer season. The sex ratio of *Vibrio cholerae* positive cases is 1.7 times, majority of the cases were ≥ 50 years-old and raised yearly, and most of cases lived in the southern region. A large number of *Vibrio cholerae* positive cases (456) were either Non-O1 or Non-O139, of which 169 cases were reported through “cholera” disease; O1-Ogawa were 54 cases, of which only 2 cases were reported through “others” disease. Over the 10 years period, there were merely two toxigenic O139 cases detected in year of 2006 and 2010.

Currently, due to socio-economic development and public health improvement, cholera only happened sporadically in Taiwan. Taiwan is a subtropical island and surrounded by sea, aqua farming becomes more popular, plus the habit and easy access of seafood from the public, people might be infected with *Vibrio cholerae* and caused sepsis or even death. Therefore, public health authorities not only should strengthen on cholera surveillance, investigation and prevention measures, but also to explore the resistance and toxigenicity of Non-O1/Non-O139 *Vibrio cholerae* serotypes.

Keywords: *Vibrio cholerae* ; toxigenic O1 and O139 *Vibrio cholerae* serotypes ; Non-O1 ; Non-O139 *Vibrio cholerae* serotypes

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Received : Dec.15, 2014

Accepted : May 12, 2015

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DOI : 10.6525/TEB.20150609.31(11).002

A Suspect Cluster of Indigenous Shigellosis in Taipei, Taiwan, 2015

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Abstract

From January 1 to April 13, 2015, eight cases of *Shigella* infection were reported to the Taipei Regional Center of Taiwan Centers for Disease Control (TRC, TCDC). Seven persons were confirmed as *Shigella sonnei* (serogroup D) and the other one was confirmed as *S. flexneri* (serogroup B) from their stool samples by the Research, Diagnostics and Vaccine Development Center of TCDC. Epidemiologic investigation revealed that all eight cases were human immunodeficiency virus (HIV) infected males of active sexual-behavior age. The HIV case management profiles of these cases suggest that the route of transmission of this suspect cluster of shigellosis were likely to be person-to-person transmission especially unsafe sex including oral and anal sex. We suggest cross-departmental cooperation within health authorities is of necessity to timely mobilize both high risk groups case management experts and infectious disease control personnel to jointly implement preventive measures, health education of safe sex and establish good hygiene to reduce the risk of contracting infection and block further transmission in this country.

Keywords: Shigellosis ; HIV infection ; sexually transmitted

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Received : Apr. 16, 2015

Accepted : May 12, 2015

DOI : 10.6525/TEB.20150609.31(11).003

week 20-21 (May. 17 - May. 30 , 2015) DOI: 10.6525/TEB.20150609.31(11).004

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

Classification	Disease Diagnosed ¹	Case diagnosis week		Week 20		Week 1 – 20	
		2015	2014	2015	2014	2015	2014
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	0	7	12		
	Acute Viral Hepatitis type A	3	2	31	56		
	Amoebiasis	10	2	135	93		
	Anthrax	0	0	0	0		
	Chikungunya Fever	0	0	3	5		
	Cholera	0	0	4	0		
	Dengue Fever	8	2	212	125		
	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	0	1		
	Malaria	0	1	4	7		
	Measles	3	0	6	12		
	Meningococcal Meningitis	1	0	2	2		
	Paratyphoid Fever	0	0	1	6		
	Poliomyelitis	0	0	0	0		
	Rubella	0	1	6	4		
	Shigellosis	2	3	77	62		
Typhoid fever	0	1	13	9			
West Nile Fever	0	0	0	0			
Category III	Acute Viral Hepatitis type B	2	3	43	36		
	Acute Viral Hepatitis type C ³	6	6	84	60		
	Acute Viral Hepatitis type D	0	0	1	0		
	Acute Viral Hepatitis type E	0	1	1	6		
	Acute Viral Hepatitis untype	0	0	1	3		
	Congenital Rubella Syndrome	0	0	0	0		
	Enteroviruses Infection with Severe Complications	0	0	1	2		
	Haemophilus Influenza type b Infection	0	0	1	2		
	Japanese Encephalitis	0	0	0	0		
	Legionellosis	2	4	52	43		
	Mumps ²	16	25	299	314		
	Neonatal Tetanus	0	0	0	0		
	Pertussis	0	2	40	13		
	Tetanus ²	1	0	3	1		
Category IV	Botulism	0	0	1	0		
	Brucellosis	0	0	0	0		
	Complicated Influenza	36	15	427	1518		
	Complicated Varicella ⁴	1	0	24	27		
	Endemic Typhus Fever	3	1	6	7		
	Herpesvirus B Infection	0	0	0	0		
	Invasive Pneumococcal Disease	10	4	256	315		
	Leptospirosis	1	0	17	14		
	Lyme Disease	0	0	0	0		
	Melioidosis	0	0	7	8		
	Q Fever	1	2	13	23		
	Scrub Typhus	7	4	78	78		
	Toxoplasmosis	2	0	5	5		
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 ⁶	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, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
2. Reported cases.
3. The epidemiological week calendar established by the World Health Organization is adopted for calculating each week's cumulative total.
4. Since 2014/1/1, "Varicella" was modified to "Complicated Varicella".
5. 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".
6. 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

- Twenty clusters were reported, including 8 diarrhea clusters, 6 upper respiratory tract infection clusters, 3 influenza-like illness clusters, 2 tuberculosis clusters, and 1 varicella cluster.

Imported Infectious Diseases

- 10 confirmed cases were imported from 4 countries during week 20 of 2015.

Disease \ Country	Country				Total
	Indonesia	China	Philippines	Malaysia	
Dengue Fever	3			1	4
Amoebiasis	2		1		3
Typhoid fever	1				1
Hepatitis A		1			1
Shigellosis	1				1
Total	7	1	1	1	10

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

- A total of 254 confirmed cases were imported from 25 countries in 2015.
- Top 3 imported diseases : Dengue fever (85), Amoebiasis (81), Shigellosis (43).
- Top 3 countries responsible for most imported cases : Indonesia (173), Vietnam (12), Philippines (12).

Summary of Epidemic

- **Dengue Fever** : The new cases were confirmed around the farmers market in Nanzih District, Kaohsiung City, indicating that affected area would be expanding. This summer's first indigenous family cluster of dengue cases has been confirmed in Liu-jia Village, North District, Tainan City. In some recently confirmed cases, the interval between the date of symptom onset and the date of reporting is comparatively longer. On top of that, recent plum rains have results in an increased number of water-filled containers and elevated the risk of an epidemic outbreak.
- **Enterovirus** : We are at the peak of the enterovirus season and the numbers of visits to outpatient services and ER for enterovirus infection have recently increased. In addition, coxsackie A virus is currently the dominant strain circulating in the community, accounting for approximately 66.7% of all cases. So far, one severe case of enterovirus infection has been confirmed.

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

Case diagnosis week		Week 21		Week 1—21	
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	7	12
	Acute Viral Hepatitis type A	4	3	35	59
	Amoebiasis	6	2	141	95
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	3	5
	Cholera	0	0	4	0
	Dengue Fever	7	0	219	125
	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	0	1
	Malaria	0	0	4	7
	Measles	7	0	13	12
	Meningococcal Meningitis	0	0	2	2
	Paratyphoid Fever	0	0	1	6
	Poliomyelitis	0	0	0	0
	Rubella	0	0	6	4
	Shigellosis	1	3	78	65
Typhoid fever	1	0	14	9	
West Nile Fever	0	0	0	0	
Category III	Acute Viral Hepatitis type B	5	0	48	36
	Acute Viral Hepatitis type C ³	6	5	90	65
	Acute Viral Hepatitis type D	0	0	1	0
	Acute Viral Hepatitis type E	0	0	1	6
	Acute Viral Hepatitis untype	0	0	1	3
	Congenital Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	1	1	3
	Haemophilus Influenza type b Infection	0	0	1	2
	Japanese Encephalitis	0	0	0	0
	Legionellosis	2	2	54	45
	Mumps ²	14	28	313	342
	Neonatal Tetanus	0	0	0	0
	Pertussis	1	0	41	13
	Tetanus ²	1	0	4	1
Category IV	Botulism	0	0	1	0
	Brucellosis	0	0	0	0
	Complicated Influenza	27	20	454	1538
	Complicated Varicella ⁴	2	4	26	31
	Endemic Typhus Fever	1	3	7	10
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	10	6	266	321
	Leptospirosis	0	0	17	14
	Lyme Disease	0	0	0	0
	Melioidosis	0	0	7	8
	Q Fever	0	1	13	24
	Scrub Typhus	6	3	84	81
	Toxoplasmosis	0	1	5	6
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, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.

2. Reported cases.

3. The epidemiological week calendar established by the World Health Organization is adopted for calculating each week's cumulative total.

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6. 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

- Twenty-four clusters were reported, including 7 upper respiratory tract infection clusters, 6 diarrhea clusters, 5 influenza-like illness clusters, 4 tuberculosis clusters, and 2 varicella clusters.

Imported Infectious Diseases

- 9 confirmed cases were imported from 2 countries during week 21 of 2015.

Disease	Country		Total
	Indonesia	Philippines	
Amoebiasis	5		5
Dengue Fever	3	1	4
Total	8	1	9

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

- A total of 263 confirmed cases were imported from 25 countries in 2015.
- Top 3 imported diseases : Dengue fever (89), Amoebiasis (86), Shigellosis (43).
- Top 3 countries responsible for most imported cases : Indonesia (181), Philippines (13), Vietnam (12).

Summary of Epidemic

- **Dengue Fever** : No new case was confirmed during Week 21. Nevertheless, the recent plum rains in KaoPing area have resulted in an increased number of water-filled containers and elevated the risk of an epidemic outbreak.
- **Enterovirus** : The enterovirus activity remained at a peak. During Week 21, the ER consultation rate for enterovirus infection is 5.98‰, and the numbers of visits to outpatient services and ER for enterovirus infection have not fluctuated. In addition, coxsackie A virus is currently the dominant strain circulating in the community, accounting for approximately 65.2% of all cases. So far, one severe case of enterovirus infection has been confirmed.
- **MERS-CoV** : As tertiary (third-generation) illnesses have occurred in South Korea, healthcare facilities of all levels in Seoul have begun to implement fever screening, indicating that the epidemic is expanding. Currently, Taiwan CDC has

issued a travel notice of Level 2: Alert for MERS-CoV to Seoul, South Korea, and a travel notice of Level 1: Watch for MERS-CoV to other areas in South Korea. The public is urged to practice good personal hygiene, and avoid visiting healthcare facilities and hospitals in South Korea when unnecessary.

The Taiwan Epidemiology Bulletin series of publications is published by Centers for Disease Control, Ministry of Health and Welfare, Taiwan (R.O.C.) since Dec 15, 1984.

Address : No.6, Linshen S. Road, Taipei, Taiwan 100 (R.O.C.) **Telephone No :** (02) 2395-9825

Publisher : Hsu-Sung Kuo

Editor-in-Chief : Tsuey-Fong Lee

Executive Editor : Chien-Chun Chen, Hsiu-Lan Liu

Website : <http://www.cdc.gov.tw/>

Suggested Citation :

[Author].[Article title].Taiwan Epidemiol Bull 2015;31:[inclusive page numbers]. [DOI]