

Introduction to An Assessment Tool for Early Detection of Suspected Bioterrorism Attack

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Abstract

It is not easy to discriminate between deliberate and natural infectious disease outbreaks during the initial period of events; the formers generally cause serious damage and public panic. Thus, an early detection of a bioterrorism event is very significant, especially for those who are responsible for dealing with the bioterrorism events, in order to detect a suspected bioterrorism event earlier. This article is intended to systematically introduce a quantitative assessment tool developed by Grunow and Finke in 2002 to discriminate between deliberate and natural infectious disease outbreaks, which could be provided and utilized for the frontline medical staff and public health officers, as well as military, police, firefighter, and other staffs working in critical infrastructure which confronted by bioterror attacks.

Keywords: Biological warfare agents, Biological terrorist attack, Bioterrorism, Risk assessment, Epidemiology

Biological Disaster Prevention and Response System in Taiwan

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Abstract

In 2003, the outbreak of the SARS epidemic in Taiwan highlighted the problem of inter-departmental coordination. Therefore, Central Disaster Prevention and Response Council decided to set up an inter-ministerial command center and integrated biological disaster into the operation of Disaster Prevention Act. In addition, the Taiwan Center for Disease Control (Taiwan CDC) revised the Communicable Disease Control Act in 2004 in order to include the establishment of a Central Epidemic Command Center (CECC) based on the Act. During the 2009 H1N1 pandemic and 2013 H7N9 avian influenza epidemic, Taiwan CDC followed the Communicable Disease Control Act to set up CECC, and effectively integrated the resources from the ministries. This study reviewed the operation of CECC in 2009 and 2013 while investigating the difference between Disaster Prevention Act and Communicable Disease Control Act.

Keywords: Disaster Prevention Act, Communicable Disease Control Act, Biological disaster, Central Epidemic Command Center

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

Case diagnosis week		Week 2		Week 1 – 2	
Classification	Disease Diagnosed ¹	2016	2015	2016	2015
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	1	0
	Acute Viral Hepatitis type A	7	4	9	5
	Amoebiasis	4	5	10	20
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	1	0
	Cholera	0	0	0	0
	Dengue Fever	119	24	323	69
	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	0
	Malaria	2	0	2	1
	Measles	0	0	0	0
	Meningococcal Meningitis	0	0	0	0
	Paratyphoid Fever	0	0	0	3
	Poliomyelitis	0	0	0	0
	Rubella	0	0	0	0
	Shigellosis	4	4	6	11
Typhoid fever	0	2	0	3	
West Nile Fever	0	0	0	0	
Category III	Acute Viral Hepatitis type B	1	3	3	4
	Acute Viral Hepatitis type C ⁵	3	3	7	7
	Acute Viral Hepatitis type D	0	0	0	0
	Acute Viral Hepatitis type E	1	0	3	0
	Acute Viral Hepatitis untype	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	1	0
	Haemophilus Influenza type b Infection	0	1	0	1
	Japanese Encephalitis	0	0	0	0
	Legionellosis	3	9	3	14
	Mumps ²	12	7	30	23
	Neonatal Tetanus	0	0	0	0
	Pertussis	0	1	1	14
	Tetanus ²	0	0	0	0
Category IV	Botulism	0	0	0	0
	Brucellosis	0	0	0	0
	Complicated Influenza	23	11	39	14
	Complicated Varicella ⁴	0	0	0	1
	Endemic Typhus Fever	1	0	2	0
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	6	19	25	40
	Leptospirosis	0	3	1	6
	Lyme Disease	0	0	0	0
	Melioidosis	0	0	0	6
	Q Fever	0	0	0	3
	Scrub Typhus	12	24	24	36
	Toxoplasmosis	0	0	0	0
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, 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

- Nineteen clusters were reported, including 9 diarrhea clusters, 5 influenza-like illness, 3 tuberculosis clusters, 1 upper respiratory tract infection cluster, and 1 varicella cluster.

Imported Infectious Diseases

- 13 confirmed cases were imported from 6 countries during Week 2 of 2016.

Country Disease	Indonesia	Philippines	China	Malawi	Malaysia	Thailand	Total
Dengue Fever	2	3			1		6
Amoebiasis	1	1	1				3
Malaria				1		1	2
Leptospirosis			1				1
Shigellosis	1						1
Total	4	4	2	1	1	1	13

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

- A total of 26 confirmed cases were imported from 10 countries in 2016.
- Top 3 imported diseases : Dengue fever (11), Amoebiasis (6), Malaria (2).
- Top 3 countries responsible for most imported cases : Indonesia (7), Philippines (5), Vietnam (3).

Summary of Epidemic

- **Dengue Fever** : Dengue activity has slowed down. The public is urged to clean up and remove any vector breeding sites. The epidemic has decreased in Kaohsiung City and the number of new cases reported during Week 2 is 40% less than that reported during Week 1. Clusters of cases have continued to be reported in Kaohsiung City and Pingtung County. Since May 1, 2015, 224 deaths have been confirmed to be caused by dengue infection, while 8 deaths are waiting to be reviewed.
- **Enterovirus** : Enterovirus season has continued and enterovirus activity is slightly higher than the epidemic threshold. The ER consultation rate for enterovirus infection during Week 2 in 2016 has not fluctuated. The epidemic season will soon be over. Coxsackie A virus is currently the dominant strain circulating in the community. The specimens tested positive for Enterovirus 71 have been identified in the community. The majority of the cases were reported in Yilan County and Yunlin County.

- **Influenza** : Influenza activity has increased significantly. H1N1 is currently the dominant strain circulating in the community. In terms of viral surveillance, some H1N1 isolates tested are considered as low reactors to the currently used influenza vaccine virus. Thus far, none of the viruses identified has shown drug resistance.
- **Zika virus** : The first imported case of Zika virus infection has been confirmed.

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

Classification	Case diagnosis week Disease Diagnosed ¹	Week 3		Week 1–3	
		2016	2015	2016	2015
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	1	1
	Acute Viral Hepatitis type A	5	1	14	6
	Amoebiasis	4	3	14	23
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	1	0
	Cholera	0	0	0	0
	Dengue Fever	74	22	395	91
	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	0
	Malaria	0	1	2	2
	Measles	0	0	0	0
	Meningococcal Meningitis	0	0	0	0
	Paratyphoid Fever	0	0	0	3
	Poliomyelitis	0	0	0	0
	Rubella	0	0	0	0
	Shigellosis	2	4	8	15
Typhoid fever	1	0	1	3	
West Nile Fever	0	0	0	0	
Category III	Acute Viral Hepatitis type B	1	1	4	5
	Acute Viral Hepatitis type C ⁵	1	5	8	12
	Acute Viral Hepatitis type D	0	0	0	0
	Acute Viral Hepatitis type E	0	0	3	0
	Acute Viral Hepatitis untype	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	1	0
	Haemophilus Influenza type b Infection	0	0	0	1
	Japanese Encephalitis	0	0	0	0
	Legionellosis	6	5	8	19
	Mumps ²	12	16	42	39
	Neonatal Tetanus	0	0	0	0
	Pertussis	0	5	1	19
Tetanus ²	0	0	0	0	
Category IV	Botulism	0	0	0	0
	Brucellosis	0	0	0	0
	Complicated Influenza	34	5	73	19
	Complicated Varicella ⁴	5	3	5	4
	Endemic Typhus Fever	0	0	2	0
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	20	21	45	61
	Leptospirosis	0	3	1	9
	Lyme Disease	0	0	0	0
	Melioidosis	0	1	0	7
	Q Fever	0	0	0	3
	Scrub Typhus	14	21	38	57
	Toxoplasmosis	1	0	1	0
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, 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

- Fifteen clusters were reported, including 5 diarrhea clusters, 4 upper respiratory tract infection cluster, 3 influenza-like illness, and 3 tuberculosis clusters.

Imported Infectious Diseases

- 6 confirmed cases were imported from 5 countries during Week 3 of 2016.

Disease \ Country	Indonesia	Vietnam	Thailand	Japan	Cambodia	Total
	Dengue Fever	1	1	1		
Shigellosis					1	1
Amoebiasis	1					1
Hepatitis A				1		1
Total	2	1	1	1	1	6

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

- A total of 32 confirmed cases were imported from 12 countries in 2016.
- Top 3 imported diseases : Dengue fever (14), Amoebiasis (7), Malaria (2).
- Top 3 countries responsible for most imported cases : Indonesia (9), Philippines (5), Vietnam (4).

Summary of Epidemic

- **Dengue Fever** : Dengue activity has slowed down. The public is urged to clean up and remove any vector breeding sites. The epidemic has decreased in Kaohsiung City and the number of new cases reported during Week 3 is 40% less than that reported during Week 2. Since May 1, 2015, 225 deaths have been confirmed to be caused by dengue infection, while 7 deaths are waiting to be reviewed. As of now, 13 dengue cases are still being treated in the intensive care unit (ICU).
- **Enterovirus** : The ER consultation rate for enterovirus infection during Week 3 in 2016 has decreased slightly. The epidemic season is over. Coxsackie A virus is currently the dominant strain circulating in the community. Since January 1, 2016, the specimens tested positive for Enterovirus 71 have been identified in the community. The majority of the cases were reported in Taoyuan City.

● **Influenza** : Influenza activity has increased significantly. Since July 1, 2015, a cumulative total of 253 cases of severe complicated influenza have been confirmed. Among these cases, 41 died. H1N1 is currently the dominant strain circulating in the community. In terms of viral surveillance, some H1N1 isolates tested are considered as low reactors to the currently used influenza vaccine virus. Thus far, none of the viruses identified has shown drug resistance.

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