

The Application of Laboratory Automated Reporting System on Listeria Infection Surveillance

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Abstract

Listeria infections are mainly caused by consuming foods contaminated with the bacterium *Listeria monocytogenes*. Infected individuals might experience fever, diarrhea or other gastrointestinal symptoms, and meningitis, miscarriage or even death in more severe cases. Taiwan had no national surveillance for Listeria infections until Laboratory Automated Reporting System (LARS) was established in September 2014. This study aimed to describe the demographic characteristics, medical treatment, invasive infections, and fatality in Listeria infection cases, using data from LARS. A total of 109 infected cases were reported from September 2014 to June 2016. Among these cases, 52 (48%) were aged over 65, and 7 (6%) were under 1 year old. More than 95 (87%) cases had invasive infections. The 30-day fatality rate was 19%. In addition, by integrating the surveillance of perspective outbreak trends, spatial distribution and logistics associations of case information, we could establish an automated analytical system to determine clusters more effectively. Further data, such as health insurance data, genomic sequences and drug resistance patterns of *Listeria monocytogenes*, are needed in order to follow cases' medical conditions, to formulate interventions, and to serve as the evidence to classify Listeria infection as one of the notifiable diseases.

Keywords: Laboratory Automated Reporting System, *Listeria monocytogenes*, Disease surveillance

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The Establishment, Maintenance and Operation of Communicable Disease Control Medical Network

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Abstract

The Communicable Disease Control Medical Network (CDCMN) was established in 2003 in response to the need for isolation and treatment of patients infected with the emerging, highly contagious and fatal disease, the Severe Acute Respiratory Syndrome (SARS). The operation of the network was reviewed and adjusted according to the response and experience of the 2009 H1N1 influenza pandemic and the avian influenza A (H7N9) epidemics to meet the challenges of prevention and control for emerging infectious diseases. This article introduced the concept of establishment, framework and operation of CDCMN, followed by the review and adjustment of its evolving role, as well as the comparison of medical networks in other countries, providing disease control personnel with a better understanding of the role, position and operation of CDCMN.

Keywords: Communicable Disease Control Medical Network, Response and Preparedness for Emerging Infectious Diseases

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

Case diagnosis year		Week 20★		Week 1-20			
Classification	Disease Diagnosed	2017	2016	2017		2016	
				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	15	0	13	0
	Acute Viral Hepatitis type A	9	24	245	25	300	27
	Amoebiasis	7	7	135	76	98	44
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	5	5	4	4
	Cholera	0	0	0	0	0	0
	Dengue Fever	7	6	90	90	543	108
	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	3	0
	Malaria	0	0	1	1	5	5
	Measles	0	0	5	5	4	3
	Meningococcal Meningitis	0	0	6	0	2	0
	Paratyphoid Fever	0	0	3	3	0	0
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	0	0	4	3
	Shigellosis	1	2	83	32	86	43
	Typhoid fever	0	0	9	8	2	1
West Nile Fever	0	0	0	0	0	0	
Category III	Acute Viral Hepatitis type B	1	5	61	3	37	1
	Acute Viral Hepatitis type C	2	1	84	0	76	1
	Acute Viral Hepatitis type D	0	0	1	0	1	0
	Acute Viral Hepatitis type E	0	1	7	2	8	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	0	2	0	4	0
	Haemophilus Influenza type b Infection	0	0	2	0	5	0
	Japanese Encephalitis	0	0	0	0	1	0
	Legionellosis	2	3	51	6	42	0
	Mumps	18	15	259	2	212	3
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	11	0	6	0
	Tetanus	0	0	3	0	3	0
	Category IV	Botulism	0	0	0	0	1
Brucellosis		0	0	0	0	0	0
Complicated Influenza		24	3	250	3	1827	2
Complicated Varicella		3	0	9	1	15	0
Endemic Typhus Fever		0	1	10	1	4	0
Herpesvirus B Infection		0	0	0	0	0	0
Invasive Pneumococcal Disease		8	5	224	2	297	0
Leptospirosis		0	3	24	0	19	2
Lyme Disease		0	0	0	0	0	0
Melioidosis		1	0	8	0	5	0
Q Fever		0	2	4	0	15	3
Scrub Typhus		6	14	111	0	104	0
Toxoplasmosis		0	0	6	0	5	0
Tularremia		0	0	0	0	0	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	1	1	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	0	0
	Yellow Fever	0	0	0	0	0	0
Zika Virus Infection	0	1	1	1	2	2	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
2. The following 8 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 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.

Suspected Clusters

- Thirty-four clusters were reported, including 6 tuberculosis clusters, 12 diarrhea clusters, 8 upper respiratory tract infection clusters and 8 influenza-like illness clusters.

Imported Infectious Diseases

- 15 confirmed cases were imported from 8 countries during Week 20 of 2017.

Country Disease	Philippines	Indonesia	Malaysia	Maldives	Vietnam	China	Japan	Thailand	Total
DF			3	2				1	6
Amoebiasis	2	3			1				6
Hepatitis A							1		1
Legionellosis						1			1
Shigellosis	1								1
Total	4	3	2	2	1	1	1	1	15

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

- A total of 264 confirmed cases were imported from 18 countries in 2017.
- Top 3 imported diseases : Dengue fever (90), Amoebiasis (76), Shigellosis (32).
- Top 3 countries responsible for most imported cases : Indonesia (111), Philippines (29), Vietnam (25).

Summary of Epidemic

- **Influenza** : Mild influenza activity in the community is expected to continue to persist. The number of severe cases may increase slightly.
- **Scrub Typhus** : The scrub typhus epidemic season has begun. The affected areas primarily include Hualien County and Taitung County.
- **Enterovirus** : Currently, mild enterovirus activity has been increasing continuously. EV71 is still circulating in the community.
- **Dengue Fever** : International epidemics are increasing gradually. As the temperature has increased and the rain has continued to occur, the risk of imported and indigenous epidemic are elevated.

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

Case diagnosis year		Week 21★		Week 1-21				
Classification	Disease Diagnosed	2017	2016	2017		2016		
				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	0	15	0	13	0	
	Acute Viral Hepatitis type A	9	29	254	25	329	27	
	Amoebiasis	11	6	145	80	104	47	
	Anthrax	0	0	0	0	0	0	
	Chikungunya Fever	0	0	5	5	4	4	
	Cholera	0	0	0	0	0	0	
	Dengue Fever	1	5	91	91	548	113	
	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	3	0	
	Malaria	0	0	1	1	5	5	
	Measles	0	0	5	5	4	3	
	Meningococcal Meningitis	0	0	6	0	2	0	
	Paratyphoid Fever	1	0	3	3	0	0	
	Poliomyelitis	0	0	0	0	0	0	
	Rubella	0	0	0	0	4	3	
	Shigellosis	2	4	85	33	90	45	
	Typhoid fever	2	0	10	9	2	1	
West Nile Fever	0	0	0	0	0	0		
Category III	Acute Viral Hepatitis type B	3	3	64	3	40	1	
	Acute Viral Hepatitis type C	11	10	95	1	86	1	
	Acute Viral Hepatitis type D	0	0	1	0	1	0	
	Acute Viral Hepatitis type E	0	0	7	2	8	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	0	2	0	4	0	
	Haemophilus Influenza type b Infection	0	0	2	0	5	0	
	Japanese Encephalitis	1	0	1	0	1	0	
	Legionellosis	4	1	55	7	43	0	
	Mumps	19	7	279	2	219	3	
	Neonatal Tetanus	0	0	0	0	0	0	
	Pertussis	0	0	11	0	6	0	
	Tetanus	0	0	3	0	3	0	
	Category IV	Botulism	0	0	0	0	1	0
		Brucellosis	0	0	0	0	0	0
Complicated Influenza		35	3	285	3	1830	2	
Complicated Varicella		0	0	9	1	15	0	
Endemic Typhus Fever		0	0	10	1	4	0	
Herpesvirus B Infection		0	0	0	0	0	0	
Invasive Pneumococcal Disease		1	11	225	2	308	0	
Leptospirosis		2	1	26	0	20	2	
Lyme Disease		0	0	0	0	0	0	
Melioidosis		0	0	8	0	5	0	
Q Fever		0	3	4	0	18	3	
Scrub Typhus		7	27	118	0	131	1	
Toxoplasmosis		0	0	6	0	5	0	
Tularremia		0	0	0	0	0	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	1	1	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	0	0	
	Yellow Fever	0	0	0	0	0	0	
Zika Virus Infection	0	0	1	1	2	2		

- ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
- The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
- Numbers of mumps 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.

Suspected Clusters

- Forty-four clusters were reported, including 6 tuberculosis clusters, 15 diarrhea clusters, 13 upper respiratory tract infection clusters, 8 influenza-like illness clusters and 2 varicella clusters.

Imported Infectious Diseases

- 11 confirmed cases were imported from 6 countries during Week 21 of 2017.

Country \ Disease	Indonesia	Malaysia	China	Palau	Myanmar	Philippines	Total
Amoebiasis	3					1	4
DF				1			1
Typhoid fever		1			1		2
Hepatitis C			1				1
Legionellosis			1				1
Shigellosis	1						1
Paratyphoid Fever	1						1
Total	5	1	2	1	1	1	11

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

- A total of 274 confirmed cases were imported from 19 countries in 2017.
- Top 3 imported diseases : Dengue fever (91), Amoebiasis (80), Shigellosis (33).
- Top 3 countries responsible for most imported cases : Indonesia (115), Philippines (29), Vietnam (25), Malaysia (25).

Summary of Epidemic

- **Influenza** : Mild influenza activity in the community is expected to continue to persist. The number of severe cases may increase.
- **Scrub Typhus** : The scrub typhus epidemic season has begun. The affected areas primarily include Hualien County and Taitung County.
- **Enterovirus** : Currently, mild enterovirus activity has been increasing continuously. EV71 is still circulating in the community.
- **Dengue Fever** : International epidemics are increasing gradually. As the temperature has increased and the rain has continued to occur, the risk of imported and indigenous epidemic are elevated.

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

Case diagnosis year		Week 22★		Week 1-22			
Classification	Disease Diagnosed	2017	2016	2017		2016	
				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	1	16	0	14	0
	Acute Viral Hepatitis type A	9	41	263	26	370	31
	Amoebiasis	5	14	149	85	118	57
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	5	5	4	4
	Cholera	0	0	0	0	0	0
	Dengue Fever	1	4	92	92	552	117
	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	3	0
	Malaria	0	0	1	1	5	5
	Measles	0	0	5	5	4	3
	Meningococcal Meningitis	0	0	6	0	2	0
	Paratyphoid Fever	0	1	3	3	1	1
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	0	0	4	3
Shigellosis	2	3	87	33	93	46	
Typhoid fever	1	0	11	10	2	1	
West Nile Fever	0	0	0	0	0	0	
Category III	Acute Viral Hepatitis type B	0	1	64	3	41	1
	Acute Viral Hepatitis type C	7	3	101	1	89	2
	Acute Viral Hepatitis type D	0	0	1	0	1	0
	Acute Viral Hepatitis type E	2	0	9	2	8	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	0	2	0	4	0
	Haemophilus Influenza type b Infection	0	0	2	0	5	0
	Japanese Encephalitis	0	0	1	0	1	0
	Legionellosis	3	0	58	7	43	0
	Mumps	14	22	293	3	241	3
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	1	1	12	0	7	0
	Tetanus	1	1	4	0	4	0
Category IV	Botulism	0	0	0	0	1	0
	Brucellosis	0	0	0	0	0	0
	Complicated Influenza	29	1	314	3	1831	2
	Complicated Varicella	0	4	9	1	19	0
	Endemic Typhus Fever	2	0	12	1	4	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Invasive Pneumococcal Disease	8	10	233	2	318	0
	Leptospirosis	1	5	27	0	25	2
	Lyme Disease	0	0	0	0	0	0
	Melioidosis	0	0	8	0	5	0
	Q Fever	4	0	8	0	18	3
	Scrub Typhus	4	19	122	0	150	1
	Toxoplasmosis	0	0	6	0	5	0
Tularremia	0	0	0	0	0	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	1	1	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	0	0
	Yellow Fever	0	0	0	0	0	0
	Zika Virus Infection	0	0	1	1	2	2

- ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
- The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
- Numbers of mumps 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.

Suspected Clusters

- Thirty-seven clusters were reported, including 7 tuberculosis clusters, 8 diarrhea clusters, 16 upper respiratory tract infection clusters and 8 influenza-like illness clusters.

Imported Infectious Diseases

- 8 confirmed cases were imported from 4 countries during Week 22 of 2017.

Country Disease	Indonesia	Philippines	Vietnam	Malaysia	Total
Amoebiasis	5				5
DF			1		1
Hepatitis A				1	1
Typhoid fever		1			1
Total	5	1	1	1	8

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

- A total of 282 confirmed cases were imported from 19 countries in 2017.
- Top 3 imported diseases : Dengue fever (92), Amoebiasis (85), Shigellosis (33).
- Top 3 countries responsible for most imported cases : Indonesia (120), Philippines (30), Vietnam (26), Malaysia (26).

Summary of Epidemic

- **Influenza** : Mild influenza activity in the community is expected to continue to persist. The number of severe cases may increase.
- **Scrub Typhus** : The scrub typhus epidemic season has begun. The affected areas primarily include Hualien County and Taitung County.
- **Enterovirus** : Currently, mild enterovirus activity has been increasing continuously. EV71 is still circulating in the community.
- **Dengue Fever** : International epidemics are increasing gradually. As the temperature has increased and the rain has continued to occur, the risk of imported and indigenous epidemic are elevated.

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