Foodborne Infections Network in Taiwan CDC

- Laboratory diagnosis
- Surveillance and outbreak detection
- Outbreak investigation

Foodborne Disease Surveillance and Outbreak Detection in Taiwan

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Overview

• Introduction
• Intersectoral collaboration framework
• Foodborne disease and gastrointestinal illness outbreak detection systems in Taiwan
• Ongoing active surveillance programs
• Conclusion
Foodborne Disease Surveillance

- Foodborne diseases (FBD)
  - a growing public health concern

- Objectives of FBD surveillance
  - To monitor individual foodborne illness cases
  - To detect foodborne outbreaks
  - To estimate the burden of FBD

Intersectoral Collaboration (1)
### Intersectoral Collaboration (II)

<table>
<thead>
<tr>
<th>Organization</th>
<th>Responsibilities</th>
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<tbody>
<tr>
<td>Taiwan CDC (TCDC)</td>
<td>• Human FBD surveillance</td>
</tr>
<tr>
<td>Taiwan FDA (TFDA)</td>
<td>• Food poisoning event surveillance and food safety monitoring</td>
</tr>
<tr>
<td>Council of Agriculture (COA)</td>
<td>• FBD surveillance for animals, agriculture and livestock surveillance</td>
</tr>
<tr>
<td>Laboratory</td>
<td>• Laboratories of hospitals, TCDC, TFDA and COA</td>
</tr>
<tr>
<td>City/county public health bureaus</td>
<td>• Frontline for FBD outbreak or food poisoning event investigation</td>
</tr>
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### Major foodborne disease surveillance systems

- **Pathogen-Specific Surveillance**
  - National Notifiable Disease Surveillance System (NNDSS)
    - Notifiable Disease Questionnaire Investigation and Tracing System
- **International molecular subtyping network for foodborne disease Surveillance**
  - PulseNet Taiwan
- **Gastrointestinal illness Outbreak Surveillance**
  - Real-time Outbreak and Disease Surveillance System (RODS)
  - Symptom Surveillance System
  - School-based surveillance
  - Institution-based surveillance
### List of Notifiable Diseases in Taiwan

<table>
<thead>
<tr>
<th>Category</th>
<th>Disease</th>
<th>Reported Within</th>
<th>Mandatory Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Smallpox, Plague, SARS, Rabies, Anthrax, Rift Valley Fever, Marburg Hemorrhagic Fever, Yellow Fever, Ebola Virus Disease, Lassa Fever</td>
<td>24 hours</td>
<td>Isolation at designated institutions</td>
</tr>
<tr>
<td>V</td>
<td>MERS-CoV, Novel influenza A virus infections</td>
<td>24 hours</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Typhoid Fever, Paratyphoid Fever, Shigellosis, Amoebiais, EHEC, Hepatitis A, Cholera, Diphtheria, Dengue Fever, etc.</td>
<td>24 hours</td>
<td>When necessary, patients may be placed in designated institutions for isolation</td>
</tr>
<tr>
<td>III</td>
<td>Hepatitis E, Pertussis, Tetanus, Japanese Encephalitis, Tuberculosis, Congenital Rubella Syndrome, etc. Herpesvirus B Infection, Leptospirosis, Melioidosis, Botulism</td>
<td>1 week</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Brucellosis, Toxoplasmosis, Invasive Pneumococcal Disease, Q Fever, Lyme Disease, Tularemia, etc. Creutzfeldt-Jakob Disease</td>
<td>1 week</td>
<td></td>
</tr>
</tbody>
</table>

### Flow Chart of Notifiable Disease Reporting

1. **ill person**
2. **Clinicians**
3. **Conform with case definition?**
   - **No**
     - **Not reportable**
   - **Yes**
     - **Report case information and submit specimens**
     - **Epidemiological Investigation**
Public Accessible Infectious Disease Statistics Website

http://nidss.cdc.gov.tw/

Cases of notifiable foodborne disease in Taiwan, 2008-2011
Notifiable Disease Questionnaire Investigation and Tracing System

- Generate web-based questionnaire for cases notified
- Identify shared risk factors and spatial-temporal relationships
- Establish a reference database for future FBD investigation

PulseNet Taiwan

- Introduction of the PulseNet standardized PFGE protocols in 2002 and formally inaugurated in 2006
- Facilitate early recognition of FBD clusters that require further epidemiological investigation.
**Gastrointestinal illness Outbreak Detection (I)**

- **Goals**
  - To detect increases in gastrointestinal illness in the community
  - To monitor the impact on healthcare systems
- **Gastrointestinal disease in ER, OPD and hospitalizations**
  - Real-time Outbreak and Disease Surveillance (RODS)
    - 170+ ERs send visit data with ICD-9-CM codes electronically in real time
  - Syndromic surveillance using national health insurance claim data (OPD and hospitalizations)
    - Coverage: 99% of population

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**Weekly Proportion ER visits for acute diarrhea, Taiwan, 2007–2014**
Weekly proportion of ER visits for acute diarrhea by region, Taiwan, 2013–2014

Proportion of ER visits for acute diarrhea by age group, Taiwan, 2011–2014
Symptom Surveillance System

• Reporting suspected gastrointestinal illness clusters
  – From hospitals, quarantine units or city-county public health bureau
• Case definition
  – Exclusion: suspected cases of notifiable FBD or food poisoning
  – Inclusion: cases with gastrointestinal symptoms and their epidemiologic relevance

School- and institution-based surveillance

• Reporting suspected gastrointestinal illness clusters
  – From daycare providers, schools, and long-term care facilities
• Case definition
  – Cases with gastrointestinal symptoms and their epidemiologic relevance
Virological surveillance for diarrheal outbreaks, 2011–2014

No. of diarrheal outbreaks

- Pending
- Negative
- Rotavirus
- Norovirus + Rotavirus
- Norovirus

Gastrointestinal illness Outbreak Detection (IV)

Complaint-based surveillance
- Media surveillance
- Communicable Disease Reporting Hotline

1922
Gastrointestinal illness Outbreak Detection (V)

International epidemic surveillance & IHR

Data sources for international epidemic surveillance

Surveillance

Laboratory Survey

Physician Survey

Population Survey

Case is reported

Organism is isolated

Laboratory receives & processes specimens

Physician requests & obtains stool specimen from patient

Individual seeks medical attention

Individual develops diarrheal illness

Individual is exposed to foodborne pathogen

Foodborne Diseases Active Surveillance (I)

Taiwan CDC
http://www.cdc.gov.tw
**Foodborne Diseases Active Surveillance (II)—Automated Laboratory Reporting System**

- **Objectives**
  - Active surveillance for the prevalence of foodborne pathogens in the community
  - Early detection of possible FBD outbreaks
- The test results of foodborne pathogens from the hospitals are automatically exchanged to TCDC.
Foodborne Diseases Active Surveillance(III)—Ongoing surveys

- Survey of clinical laboratory practices and physicians
  - To understand knowledge, attitudes and practices of physicians.
    - Which pathogens to be included in routine bacterial stool cultures
    - Which tests will be specifically requested by the physician
    - Specific techniques used to isolate the pathogens.
  - Implemented in January-December 2014 by interview or Internet questionnaire

Foodborne Diseases Active Surveillance(IV)—Ongoing surveys

- Survey of the population (June 2014—)
  - To estimate the burden of acute diarrheal illness
  - To describe the frequency of important food exposures
**Conclusion**

- Multifaceted approaches to improve foodborne disease surveillance in TCDC
- Ongoing programs
  - TCDC, TFDA and COA expanded intersectoral collaboration on assessment of foodborne outbreak
  - Automated Laboratory Reporting System to be implemented

**Acknowledgement**

- Epidemic Intelligence Center
  - Wei-Sheng Hung
  - Chia-Lin Lee
  - Ding-Ping Liu