

Construction of a Mobile Surveillance System for Monitoring Infectious Disease Emergence in Disasters

Ken Ishikawa, Yasuhide Nakamura, Toyojiro Matuishi, Osuke Iwata, Hakuyo Ebara, Yoshitaka Miura, Toru Fuchimukai, Takeo Kasai, and Shoichi Chida

Earthquake and huge tsunami



On March 11, 2011, a powerful earthquake, huge tsunami, and nuclear accident struck north-central Japan. The earthquake had a magnitude 9.0 on the Richter scale. The subsequent five to six tsunamis, reached 38 m above sea level and flooded 561 km² of the coastal area, killing about 20,000 people.

Nuclear Meltdown Fukushima Daichi Plant



Because of complications from the nuclear plant accident, many residents were forced to evacuate their homes in Fukushima and remained in either temporary housing sites or in rented apartments.

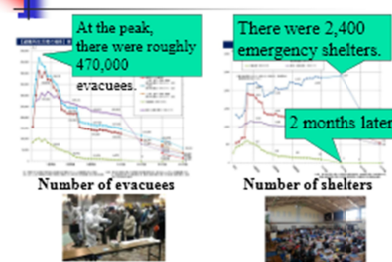
Damage caused by Great East Japan Earthquake

1. Damage caused by Great East Japan Earthquake

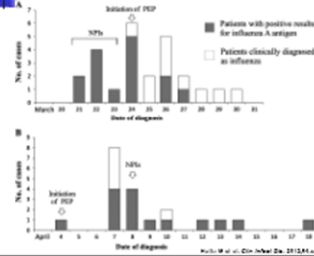
- On 11 March 2011, 2011 F_{9.0} Earthquake occurred off the coast of Japan.
- The largest state earthquake ever observed in the history of Japan and the 4th largest earthquake in the world (100 years).



Number of evacuees and shelters



Post-tsunami outbreaks of influenza in evacuation centers in Miyagi Prefecture, Japan



Tuberculosis infection in a shelter for Great East Japan Earthquake

We report a case of active pulmonary tuberculosis (TB) in a person who stayed at a shelter after the 2011 Great East Japan Earthquake, and results of an investigation into prevalence of latent tuberculosis infection (LTBI) among evacuees and others exposed to this patient.

Emerg. Infect. Dis., May 2013; 19(5):799–801.

Infection control

The occurrence and outbreaks of infectious diseases in shelters after the earthquake were of concern, because taking standard precautions was difficult and access to health care was poor. Infection control activities were required to support shelters in efforts to minimize infectious diseases.

Emerg. Infect. Dis., May 2013; 19(5):799–801.

Damage of hospitals and clinics in the area

Damage situation No. 1: The status of damage at hospitals and clinics in the affected areas

300 / 380 (79%) of hospitals were destroyed. 2,159 / 6,633 (33%) of clinics were destroyed.


Category	Number of facilities		Number of facilities destroyed		Percentage of destroyed facilities	
	Total	Destroyed	Total	Destroyed	Hospitals (%)	Clinics (%)
Hospitals	380	300	380	300	79	-
Clinics	6,633	2,159	6,633	2,159	-	33
Total	7,013	2,459	7,013	2,459	-	-

Loss of residential medical records in Great East Japan Earthquake

The following records kept in city halls or health care centers were lost


1. Residential registration books
2. Residential medical examinations
3. Individual immunization histories
4. Medical information of patients receiving home health care
5. Information on drugs that patients were taking

Fortunately, medical records of expectant mothers were kept on the server of a perinatal medical information system that was operational in Iwate prefecture.



Disaster area in Iwate

Infection surveillance after the Great East Japan Earthquake



Osake Iwata et al., *Bulletin of the WHO, Lessons from the Field*, Article ID: BLT.12.117945

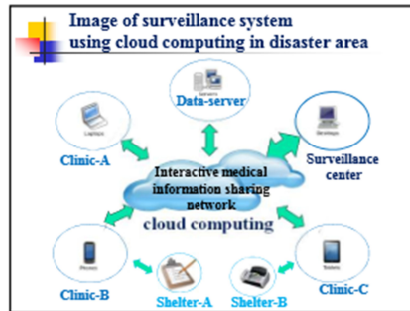
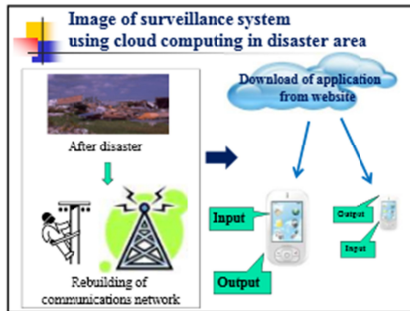
Infection surveillance after a natural disaster

Modern health-care systems are highly vulnerable to the loss of advanced technological tools. The initiation or reestablishment of disease surveillance following a natural disaster can therefore prove challenging, even in a developed country.

Surveillance should be promptly initiated after a disaster by:

- (i) Developing a surveillance system that is tailored to the local setting.
- (ii) Establishing a support team network
- (iii) Integrating resources that remain or soon become locally available.

Osake Iwata et al., *Bulletin of the World Health Organization, Lessons from the Field*, Article ID: BLT.12.117945



- ### Aim of this study group
- To establish a mobile surveillance system for monitoring infectious disease emergence during disasters
 - To improve the system, which can be used during future disasters worldwide

Input items for the application

Natural Disaster Morbidity Surveillance Tally Sheet

Monitoring Infectious Disease Emergence

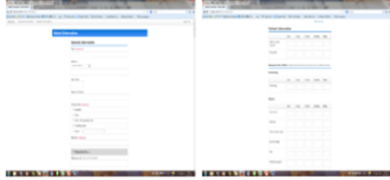
(Centers for Disease Control and Prevention (CDC) in USA)

- ### Security system for this application
- Encryption of data
 - Issuing ID/password to restrict access
 - Restriction on input information

Application of surveillance system to monitoring infectious disease emergence during disasters

Security system Patient information
Refer to patient count

Application of surveillance system to monitoring infectious disease emergence during disasters



The screenshot displays a web-based surveillance system interface. It features a header with the title "Application of surveillance system to monitoring infectious disease emergence during disasters". Below the header, there are two main panels. The left panel contains a form with several input fields, including "Patient Name", "Age", "Sex", "Address", and "Date of Onset". The right panel shows a table with columns for "Patient ID", "Date of Onset", "Location", and "Status". The table contains several rows of data, including patient IDs like "001", "002", and "003", and dates like "2008-08-01".

Input of patient information

Demonstration of the application