

Infection Control During Natural Disasters

Steven Bock and Mie Saijo

Broadcast live from APIC 2013 Conference


Infection Control During Disasters

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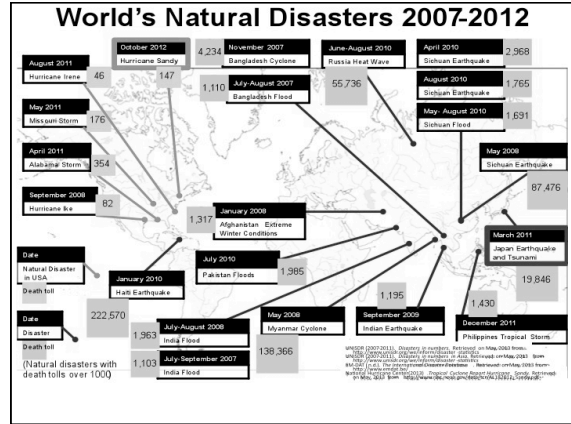
(1) NYU Langone Medical Center, US
(2) Japanese Red Cross Ishinomaki Hospital, Japan

Nothing to Disclose

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Learning Objectives

- Describe the role of the ICN/ICP during large-scale disasters, both in the hospital and beyond the hospital.
- Describe the importance of community partnership and collaboration in disaster preparedness.
- Describe specific tools the ICN/ICP should use to facilitate disaster recovery in a medical center.

NYU Langone Medical Center Historical Snapshot

- 1841 – NYULMC has its origins as the NYU Medical College
- 1948 – NYU Hospital was first created
- 1963 – the current NYU Tisch Hospital opened
- 2008 – Renamed NYU Langone Medical Center





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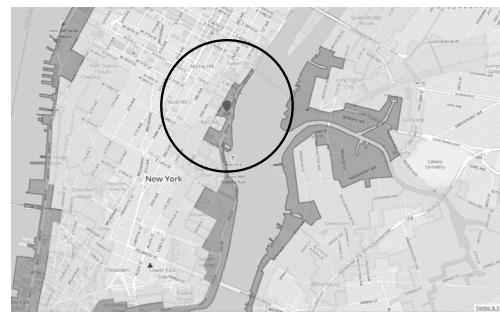
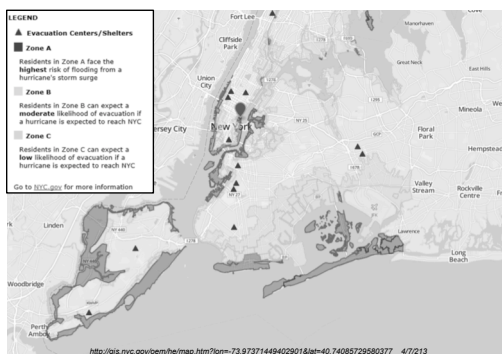
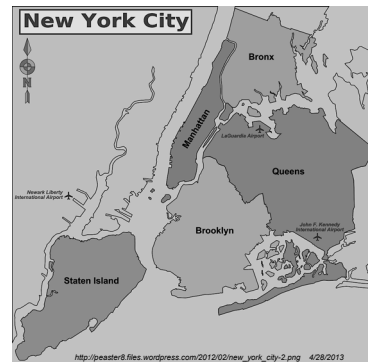
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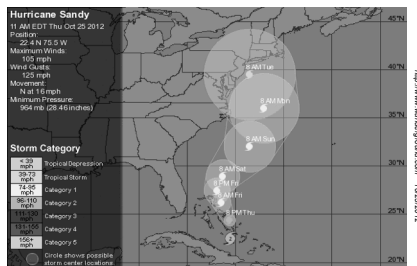
NYU Langone Medical Center Fast Facts

- Tisch Hospital / Schwartz HCC Pavilions = 705 Beds
- Hospital for Joint Disease = 190 Beds (Orthopedic Surgery & Rusk Rehabilitation Institute)
- 15,000 employees
- ~65 Operating Rooms, ~39,000 Admissions, ~4,600 Births, >650,000 Outpatient Visits
- IPC Department = 6 RNs, 1:150 ratio
1 Administrative Assistant, 3 Data Staff
MD Hospital Epidemiologist, Department Director
MD Associate Epidemiologist, Antibiotic Stewardship Dir.
MD Pediatric Epidemiologist



The Storm Approaches – Thursday, October 25

- Hurricane Sandy – Heading Where?



During the Storm, October 29-30, 2012

- Hospital was damaged by superstorm Sandy
- Sudden water incursion into facility, all power lost,
- Key hospital systems not operating
- Some parts of buildings inaccessible due to damage
- Cell phone service was rather limited throughout NYC region
- Hospital evacuated overnight October 29-30, 2012



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City and Surrounding Area Also Battered by Storm



IPC Role in Disaster Planning – Within the Hospital

- Plan around loss of key systems – Careful Risk Assessment
- Computers – Electronic Medical Records
- Phone system
- Heating, Ventilation, Air Conditioning (HVAC)
- Plumbing/potable water
- Loss of main power, temporary loss of emergency power
- Loss of “control” of facility with regard to census



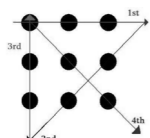
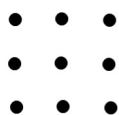
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IPC Role in Disaster Planning – Beyond the Hospital



- Risk Assessment, Risk Stratify Your Plans - Bioterrorism event, community-wide (epidemic) communicable disease outbreak, natural disaster, or mass casualty event
- Employee Health Services – Close partnership
- Public Health – May require special cooperation

IP Role in Community Partnership and Collaboration

- Partnership with the surrounding communities was not a component of the IPC role during superstorm Sandy
- Surge capacity may affect IP roles/staffing
- Work with government and/or non-governmental agencies
- Work with IPs at area hospitals, LTCFs, adult day care, schools
- Work with public relations – interviews with media

IP Disaster Recovery Tools

- Tool: *Noun* - A device or implement, especially one held in the hand, used to carry out a particular function
- Remember that disaster preparations should be based on risk assessment
- IPs work roles may change after a disaster (not business as usual)
- Superstorm Sandy showed us we were not fully prepared for all elements of a substantial disaster response

Hospital Recovery – Tools for the Job

- CDC guide – *Remediation and Infection Control Considerations for Reopening Healthcare Facilities Closed Due to Extensive Water and Wind Damage (2005)*
http://emergency.cdc.gov/disasters/reopen_healthfacilities.asp
- CDCs first point – keep workers safe
- De-water the facility, remove mold risks
- Develop a **risk stratified** approach to recovery
- Coordinate the planning – work with:
Facilities leadership
Plumbing leadership
HVAC leadership



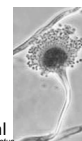
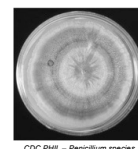
HVAC Recovery for Patient, Visitor, and Staff Safety

- Conduct HVAC Risk Assessment – Damage, Disuse, Fans, Filters, and Ducts
- Replace flooded ducts, Consider cleaning other ductwork
- Follow ICRA-like controls for all work



Assessment of HVAC, Air Quality After Duct Cleaning

- Visual inspection of ductwork
- Environmental sampling:
Active Air Impactor Sampling – Cultures
Duct surface testing:
Tape Lift Specimens
Gravimetric Vacuum Cassettes
Surface Cultures by Rodac Plates
- Where to sample? Use Risk Stratified Approach! (High Risk, High Volume, Problem Prone)
- Challenge of interpreting results! No national consensus on testing after duct cleaning in a hospital



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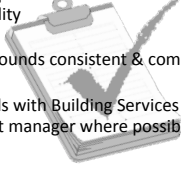
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Equipment and Supplies

- What to do with all the stuff inside the hospital? Yard Sale? Landfill? **ebay**? Quick wipe and ready to use? Remember – use risk stratified approach
- Use a systematic process to evaluate all supplies & equipment throughout facility
- Checklists make rounds consistent & comprehensive
- Coordinate rounds with Building Services supervisory staff and department manager where possible

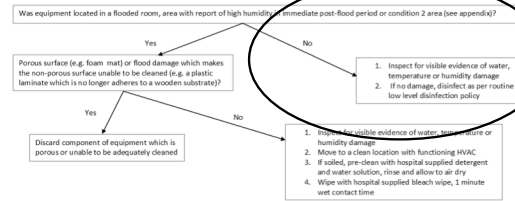


Flowchart for Evaluation of Equipment

Infection prevention and control guidelines for assessment, cleaning and disinfection of medical equipment, supplies and HVAC systems in medical center buildings which flooded during Hurricane Sandy.

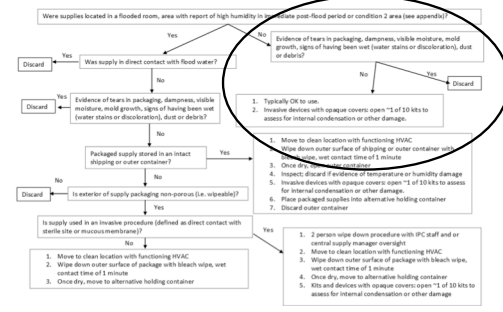
Questions should be directed to Infection Prevention and Control (212-263-5454) and/or Environmental Health and Safety (212-263-5155).

Assessment, cleaning and disinfection of durable medical equipment



Flowchart for Evaluation of Supplies

Assessment, cleaning and disinfection of supplies



Pre-Opening Checklist

IPC CHECKLIST FOR RE-OPENING INSPECTIONS

Building/Unit/Room #:	YES	NO	DATE	Initial
1) Location in building flooded and/or experienced fluctuations in humidity?				
2) Room or location flooded?				
3) Assessment, Cleaning and Disinfection of:	YES	NO	DATE	Initial
a) Visibly Inspected Rooms (Walls, Ceilings, Floors, Windows, etc.) for presence of mold?				
COMMENTS:				
b) Durable medical equipment completed per protocol?				
COMMENTS:				
c) Supplies completed per protocol?				
COMMENTS:				
4) Terminal / Discharge Cleaning performed per protocol?				
COMPLETED/TO BE COMPLETED ON:				

Post-Recovery Surveillance – Now What?

- What you conduct surveillance for will depend on the type of disaster you experience
- Determine ahead of time how you will watch for sentinel infections
- Have a response plan and share with IPC Committee
- Seek help to develop plan – Hospital Epidemiologist, Microbiology, ID physicians, possibly DOH staff

NYULMC Infection Prevention & Control Department

Hospital Epidemiologist & Director of Infection Prevention & Control	Michael Phillips MD
Associate Hospital Epidemiologist & Director of Antibiotic Stewardship	Donald Chen MD
Pediatric Hospital Epidemiologist	Jennifer Lighter Fisher MD
Data Analyst	Anna Stachel MPH CIC
Data Assistant	Gabriela Pinto
Project Assistant	Alycia Foti
Administrative Assistant	Delia Valentin
Practitioners	Steven Bock RN CIC Ranekka Dean RN MPA Alex Rowan-Hazlerigg RN CIC
	Tania Bubb RN MSN CIC Sandra Hardy RN MS Faith Skeete RN MSN CIC

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**The Great East Japan Earthquake
Activities of the ICN**

Mie Saijo, RN, BSM, CNIC
Nothing to Disclose

 Japanese Red Cross Society

Japanese Red Cross Ishinomaki Hospital
(As of March 1, 2011)

- 402 beds
- Medical Zone population: 220,000
- One of 14 designated disaster base hospitals in Miyagi Prefecture
- Prefectural governor-certified emergency hospital
 - 44,003 emergency patients, 7,234 patients transported (2010)
- 790 employees (100 physicians, 424 nurses)
- 14 Infection Control Team Staff
 - 4 MDs acting concurrently as ICDs
 - 1 full-time ICN (Japanese Nursing Association-certified ICN)
 - 9 other health professionals (pharmacists, lab technicians, and clinical engineers) holding concurrent IC positions





March 11, 2011 (Fri)
14:46
x

The Great East Japan Earthquake strikes



MAGNITUDE 9.0

MAX WAVE HEIGHT 20M (67FT)

OF COMPLETELY OR HALF-DESTROYED HOUSES IN ISHINOMAKI CITY
33,071 / ~60,000¹⁾

KILLED OR MISSING IN ISHINOMAKI CITY
3,959¹⁾

KILLED OR MISSING TOTAL
18,559²⁾



1) Miyagi Prefecture Disaster Countermeasures Headquarters (2013). Damage situation report (as of April 26, 2013). Retrieved on May 13, 2013 from http://www.miyagi.go.jp/keiki/saisei/ishinomaki_higashiyuuyama

2) National Police Agency of Japan Disaster Countermeasures Headquarters (2013). Damage situation and police countermeasures (as of May 10, 2013). Retrieved on May 13, 2013 from http://www.npa.go.jp/keiki/saisei/ishinomaki_2.htm

2011.3.11 Japanese Red Cross Ishinomaki Hospital
Record of the Initial Response to the "Great East Japan Earthquake"

(Video Removed)

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Characteristics of Patients during the Acute Phase of the Disaster

- **Hypothermia from exposure to tsunami waters and extreme cold**
 - Many communities were flooded.
 - It was snowing, and the temperature was below freezing.
 - Blocked roads hampered rescue efforts.
- **Tsunami-related Aspiration Pneumonia (Tsunami Lung)**
 - Many were engulfed by the tsunami.
 - Many aspirated water contaminated with oil, mud, etc.
- **Exacerbation of chronic illnesses in the elderly population**
- **Few severely injured trauma patients**

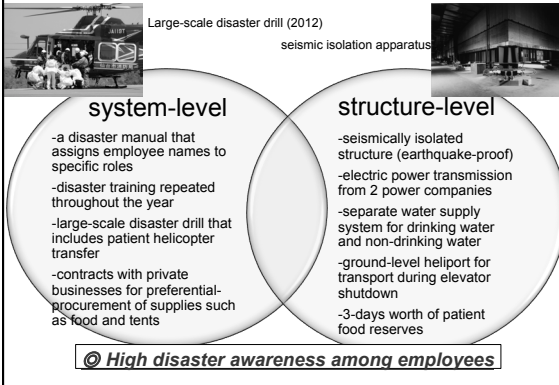


Numerous patients crowd the hospital

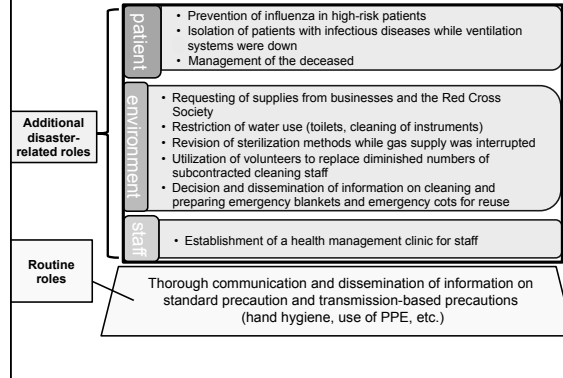


March 13th, The "Green" Triage Area in the Hospital Lobby (provided by Kyodo News)

Hospital Preparedness for Major Earthquake Disasters



ICN's Roles in the Hospital



ICN's Roles outside of the Hospital

Emergency shelters overflowing with evacuees



Emergency Shelter Conditions

- 50,000 evacuees, 300 emergency shelters
- Half of the designated emergency shelters were damaged
- Life in the emergency shelter continues while essential utilities are lost

elementary school



community hall



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Ishinomaki Zone Joint Relief Team Response

ICN Contribution
3/17~3/19
Conducted a survey of 300 emergency shelters

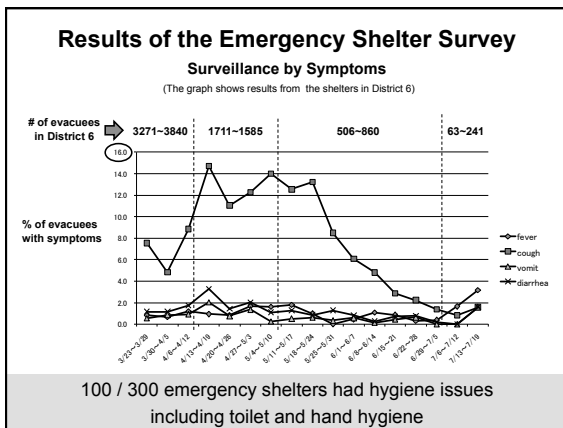
- developed the Emergency Shelter Survey
- developed and distributed educational leaflets for disaster relief supporters at the emergency shelters
- provided instructions and consultations for the relief team staff
- developed a nursing manual on patient isolation space
- conducted rounds of the emergency shelters:
 - *provided instructions on hand washing and toilet cleaning
 - *requested information and reports on infected persons
 - *provided instructions on isolation of evacuees with suspected infections
 - *conducted countermeasures for food-poisoning
 - *managed wastes, etc.

The joint team was composed of multiple groups such as the Japanese Red Cross Relief Team, Physicians Association Team, University Medical Team, etc.

-1 ICN from Ishinomaki Red Cross Hospital, and 1 ICN from Ishinomaki Municipal Hospital

Content of the Emergency Shelter Survey

- 1. Physical conditions of the evacuees**
 - Number of evacuees at the shelters
 - Number of evacuees with the following symptoms: fever, cough, vomiting, diarrhea
- 2. Daily living needs**
 - water, food, electricity, blankets, heating, sanitation of toilet facilities
- 3. Medical needs**
 - Pregnant women
 - Pediatric, Psychiatric, OB-GYN, Dental needs



Toilets

Issues

- **Structural**
 - Indoor Toilets
 - Wastes cannot be flushed, backflows due to damages
 - Temporary Toilets
 - Inadequate emptying, dark, steps, Japanese-style (squatting)
- **Management**
 - People unaware of toilet rules

Interventions

- **Clarified Toilet Rules**
 - clean high touched surfaces
 - secure separate toilets for people with diarrhea / vomiting
- **Installed wrap-type toilets with solidifying powder** (90 toilets for Ishinomaki City)

Hand Hygiene

Issues

With water and sewage functions lost, people were using plastic water bottles for hand-washing

- Fingers touching the nozzle
- Hand towels being shared

Risk of Cross-Infection

communal hand towel

A system designed to enable hand-washing with both hands.

Interventions

- Promoted the use of hand sanitizers and hand wipes
- Provided hand hygiene instructions before eating and after using the toilet
- Installed a simple water-supply system

Isolation Space

Issues

- people with suspected infections living in crowded shelters
- difficulty securing space for isolation

Interventions

- secured isolation rooms by converting a closed hospital ward into a short-term stay clinical shelter

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Maintenance of the Living Environment

Issues


- Mold growth and mite infestation on futons (mattresses) placed directly on the floor



Mold on futons

Interventions

- Cleaned the shelters
- Dried or replaced futons
- Collaborated with volunteer groups that specialized in mite extermination
- Installed cardboard beds



An elderly woman sitting on a cardboard bed

Photos retrieved from the Ishinomaki Disaster Recovery Support Committee website

Educating Disaster Relief Supporters

Issues


- Relief Team
 - Lack of knowledge on how to properly deal with infected individuals at emergency shelters (e.g. handling of vomitus)
- Volunteers
 - Inadequate hygiene management during outdoor meal preparation

Food-poisoning outbreak among supporters

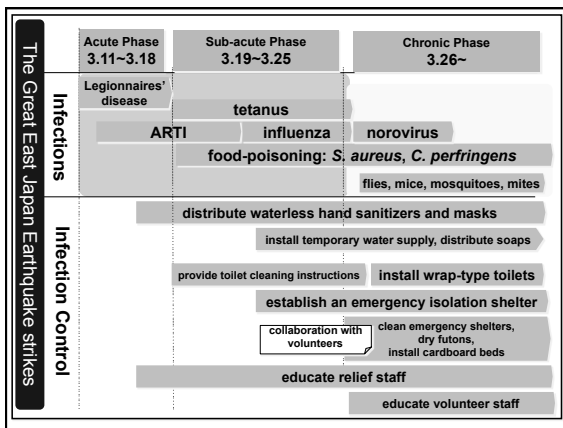
- *Norovirus*: 9 cases
- *S. aureus*: 15 cases

Interventions

- Developed and distributed educational leaflets with information on infection control, infectious diseases and updates/announcements
- Held meetings with the Relief Team members to identify problems and provided instructions for each case
- Visited volunteer group headquarters to give lectures on infection control



Providing education on infection prevention at the Ishinomaki Disaster Recovery Support Committee




Recommendations on Infection Control at Emergency Shelters

Written by 26 Japanese Nursing Association-certified ICNs in Miyagi Prefecture

We published a book hoping to share what we have learned from our Great East Japan Earthquake experience.

Main Topics

1. Methods for Hand Hygiene
2. Hygiene Management of Toilets
3. Isolation for Infectious Diseases
4. Cleaning and Ventilating the Living Environment
5. Education on Infection Control
6. Conducting Syndromic Surveillance



Summary of ICN Activities during the Great East Japan Earthquake

- 1. In the Hospital**
The following were effective in avoiding confusion and continuing safe healthcare in the hospital during the disaster:
 - Seismically isolated structure of the hospital
 - Preparations through well-planned disaster drills and trainings involving the entire hospital staff
 - Daily routine infection control and management activities carried out by the ICN
- 2. At the Emergency Shelters**
We were able to collaborate with many disaster relief supporters to promote infection control at the emergency shelters.

The most important role and contributions of the ICN were: Hand hygiene, toilet hygiene, isolation, maintenance of the living environment, education on infection control.
- 3. Future Considerations**
It is important for infection control practitioners to actively participate in disaster preparedness projects, in both the hospital and the community.



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