Insights and Lessons Learned from the 2011 Tohoku Earthquake and Tsunami Tragedy

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At 3 months after the disaster

- Magnitude 9.0 earthquake, followed by 12 meter high Tsunami on March 11
  - 25,000 casualties, 90,000 in refugee stations
- Fukushima nuclear plant not cooled down, yet
  - Evacuation zone: 20km+ diameter
- Tokyo is 250km away: slight short of electricity
- We sincerely appreciate all the helps from 135 countries, 15 int’l organizations
  - From search dog to aircraft carrier Ronald Reagan
Electricity failure by day

Source: Report of Japan Soc. of Civil Eng.
Failed stations of 3 Cell-phone companies by day

Source: Report of Japan Soc. of Civil Eng.
Healthcare provider operation at Iwate Prefecture by week


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Recovery

- Each element recovery saturates in a week
  - Electricity, Network, Restoration, Staffs
  - Severely broken facilities takes much longer
- Healthcare provider operation is based on all of them
  - saturates in a month
What was needed?

We suffer from earthquake + something
  + fire, house crash: Kobe 1994: Surgical help
  + tsunami: Tohoku 2011: Chronic, Psychiatric

Most doctors went into the area said: “Past prescription history would have helped to keep the continuity of care”

Atropine for chemical disaster, after atropine?

Double-sheet copy paper could be the best solution

One for record, one in patients’ hand, only with which continuity of care can be kept in refugee station.

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Priority of medical record contents for dispatch team

- **High:**
  - Severity of injury/disease, Prescription history, Type of injury/disease

- **Middle:**
  - Images of the patient (visible or X-ray), Past disease history (incl. examination results), Past progress notes

- **Low:**
  - Past health checkup record.

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Does internet/SNS help?

z Telephone: requires both party at the same time (push-type)
  y Congestion rate: 1 to 10-20
  y Satellite cell-phone was reliable, and has RJ45 net port (384kb/s)

z Internet: pull for readers
  y E-mail: one-to-one
  y SNS: Easy to broadcast
    x However, mountain of aide material arrived to few refugee stations which was on “broadcast” while neighboring station had nothing.
Disaster network, N-STAR, Inmarsat

z How to get power?

y Hybrid car?
Does EHR help?

- Medical records at each provider
  - Scattered in many meanings
    - Have to have back up archive
  - Ishinomaki municipal hospital and Yamagata general medical center (82km from Ishinomaki) mutually stored their reimbursement claim data
    - Ishinomaki restored patient demographics in a month.
  - All other information would be useful, only if they had time to download and read
    - When?
Can we use reimbursement claim for recovery?

- Reimbursement claim data
  - Fee for service contents in Japan
  - are at insurer (J-Energy insurance organization to Ishinomaki fishermen mutual)
  - are collected at Ministry, but unlinkablely anonymized
  - JAMI advised Ministry to relax the inquiry process to each insurer
    - Ministry took action to relax process.

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JAMI had made recommendation in 2000, but...

- Double layer copy paper for on-site record
  - Some team had them (Japan red cross)

- Satellite phone
  - Few installed
  - Defense force had them, without PC

- Disaster preparedness public interest
  - Half life: 2 years

- Should be combined with more frequent, advocate “disaster”
  - System down, network trouble.

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Lessons learned (again)

- Initial one week
  - Prescription history
    - by easy operation for dispatch team
    - but, could be with no electricity nor network
- Medical record restoration after then
  - HIS SE is a precious resource to share
- To keep concern
  - Network failure, system replace, can be disastrous.
Solution: HL7 based SS-MIX storage

- Ministry project
- Imports prescription, lab results, diagnosis in HL7 v2.5 from HIS
- No DB engine needed
- 1059 hospitals can export HL7
- 140 hospitals has SS-MIX storage
Ministry of Health Project: SS-MIX: HL7 standardized clinical information storage
Wide variety of applications

- We have patient demographics, prescriptions & injections, lab results, diagnosis classifications in HL7 v2.5
  - PHR, repository for EHR
  - Making documents, including case cards
  - Clinical database
  - Interoperability with peripheral departmental systems
  - Backup for disaster, including replacing & upgrading HIS.

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SS-MIX
Storage

- **Patient ID**
  - y birth date
  - x contents

- **Filesystem directory service only**

- **No DB engine needed**
  - y but, quick retrieval

```
<table>
<thead>
<tr>
<th>Storage root folder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient ID, first 3 digits</td>
</tr>
<tr>
<td>Patient ID, remaining digits</td>
</tr>
<tr>
<td>Full patient ID</td>
</tr>
<tr>
<td>Transaction date, YYYYMMDD</td>
</tr>
<tr>
<td>HL7 event message identifier, i.e. OML-01</td>
</tr>
<tr>
<td>HL7 v2.5 message files, (lab results, Px, )</td>
</tr>
</tbody>
</table>

Another miscellaneous storage directory for files other than HL7 v2.5

Same structure, and

| Transaction date, YYYYMMDD |
| Contents identifier (Metadata) |
| Contents, (JPEG files, CDA's, ) |
```
20 SS-MIX storage in PC can provide Px, lab, Dx without power, network

At Hamamatsu Univ. Hosp.

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Thank you for your attention and helping hands