Tohoku University
and
the Great East Japan Earthquake

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Thank you for supporting!

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* Outline of the disaster
* Role of Tohoku University and IRIDeS
* HFA-2 in Sendai World Conference

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Hazards

NATURAL	SOCIETAL	TECHNOLOGICAL	BIOLOGICAL
Typhoon Earthquake Flood Landslide Volcanic Activity Tornado Tsunami El Niño Heat island Snow storm	Explosion Mass Gathering Armed Conflict Stampede Ambush Hostage taking War Terrorist Attack	Fire Transportation -Accident (Land, Sea, Air) Chemical Spill /Leak Nuclear, Radiological Infrastructure -Accidents	Food Poisoning Disease Outbreak Insects Red Tide

- Know your risk
- Reduce your risk
- Prepared to act

$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Capacities}}$$

Know your risk
Reduce your risk
Prepared to act

Preparedness before the disaster

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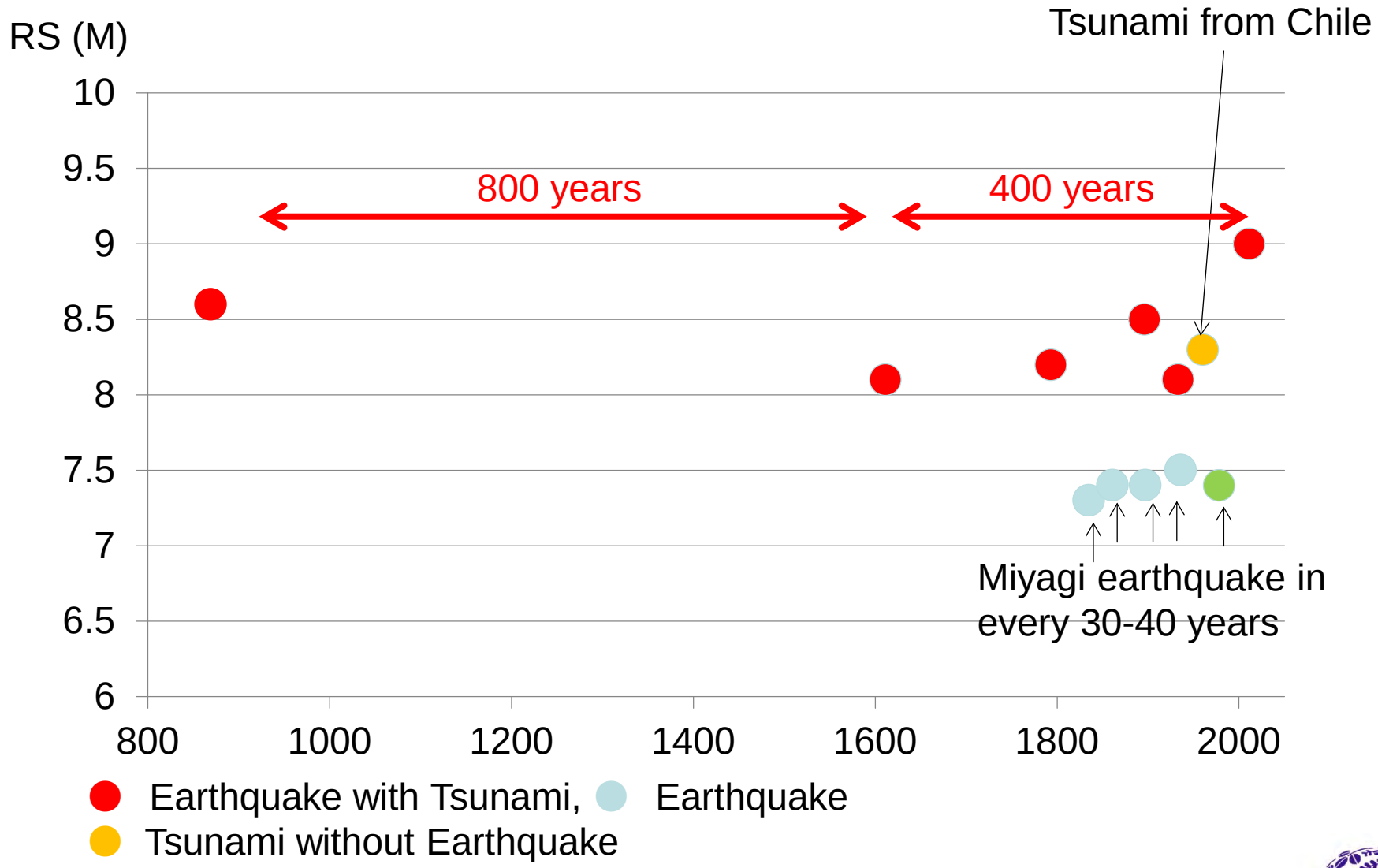
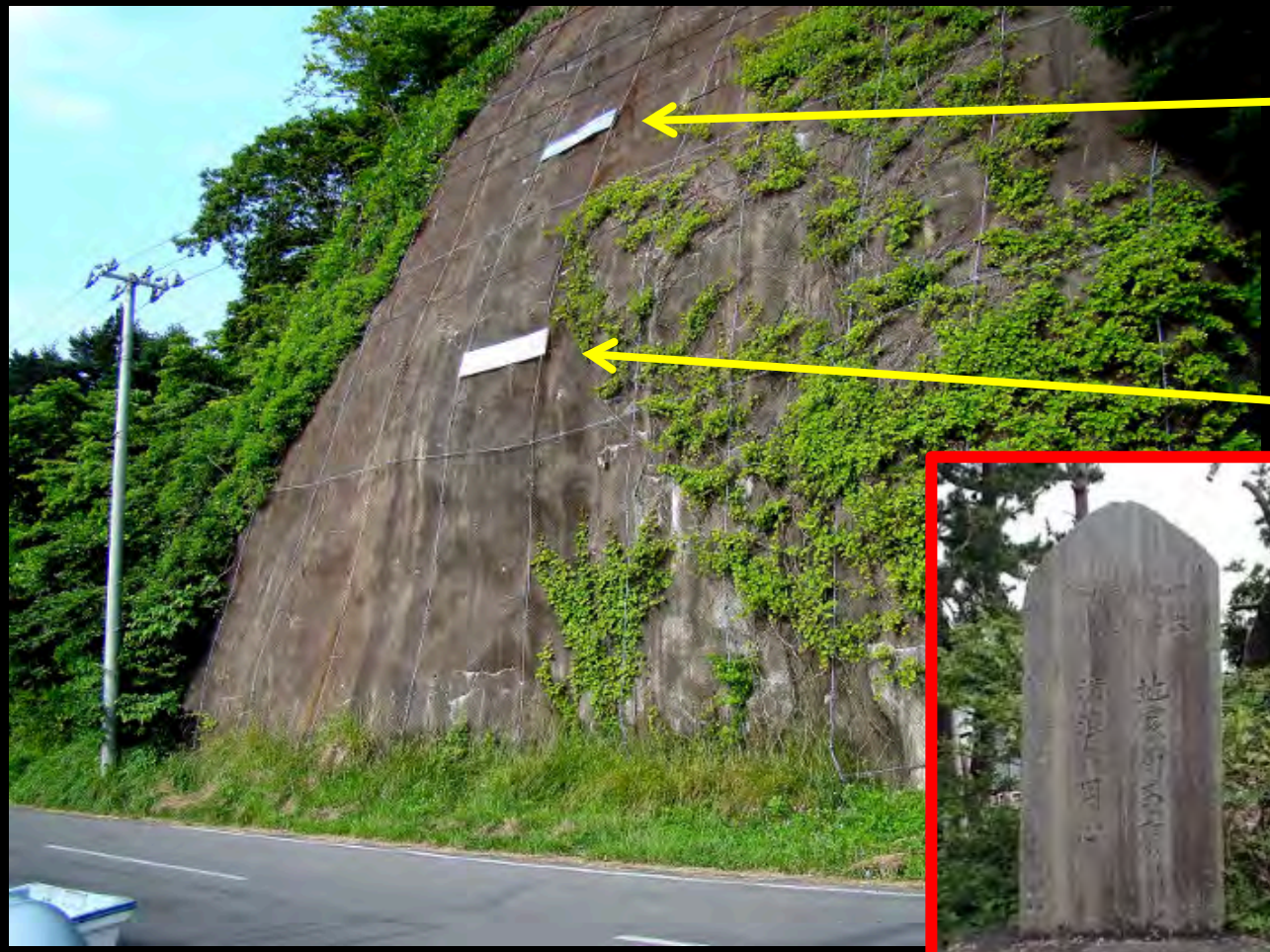
Earthquake and Tsunami in Tohoku area



Lessons: Sea Walls

Established in 1958
Total length 2,433 m (Guinness record)
Base Width 25 m
Height above sea level 10 m
Effectively prevented the town from damage in 1960 Tsunami from Chile

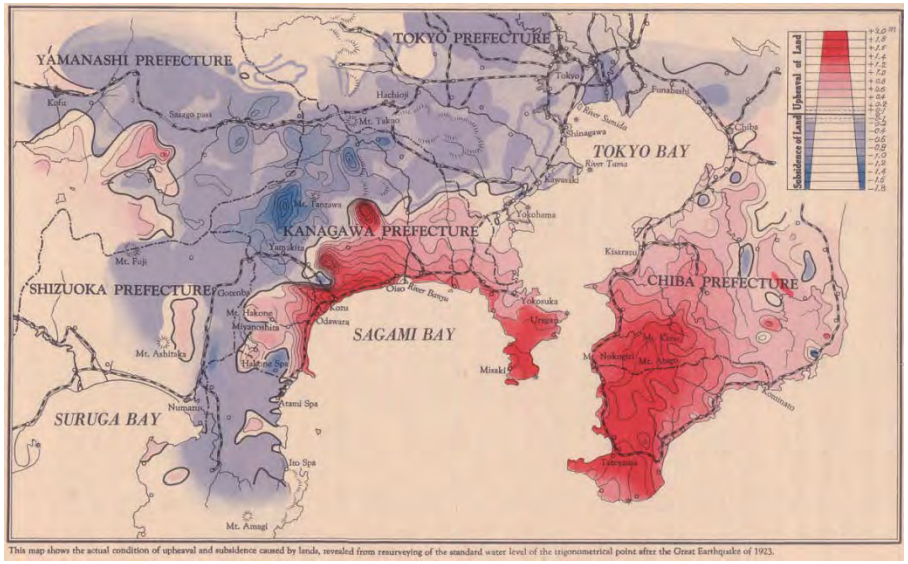
Lessons: Memorials



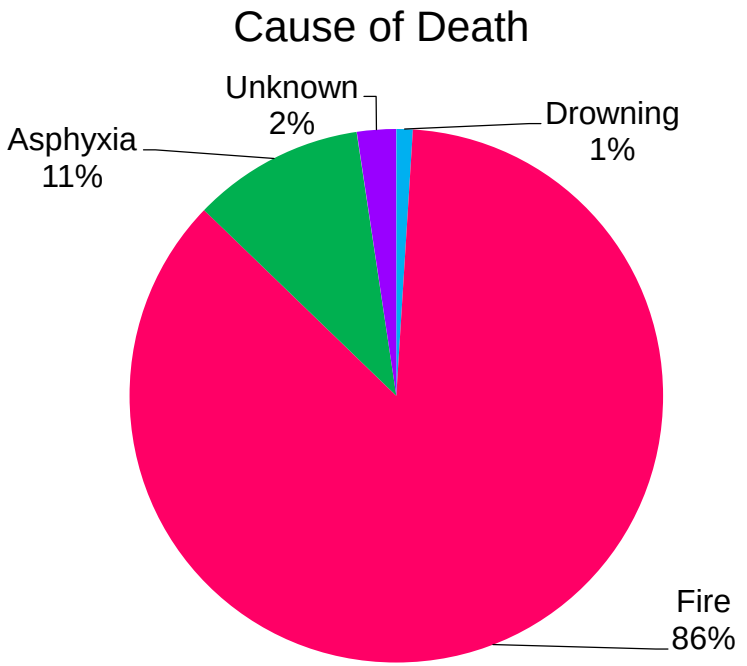
Stone monument warning Tsunami after earthquake (built 1933)

http://blog.goo.ne.jp/hi-sann_001/e/5c9b7c39919be7249499068bf186839e

Lessons from 1921 Great Kanto Earthquake



September 1, 1923
11:58:32
M7.9
Approx. 105,000.



The buildings should be fire-resistant
Every Sept. 1 is the Disaster Drill Day

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Lessons from 1978 Miyagi Earthquake

M7.4
28

The buildings should be earthquake proof

Past Lessons: Hazard map and warning system

Indication of estimated inundation area.

Warning within 4 min.

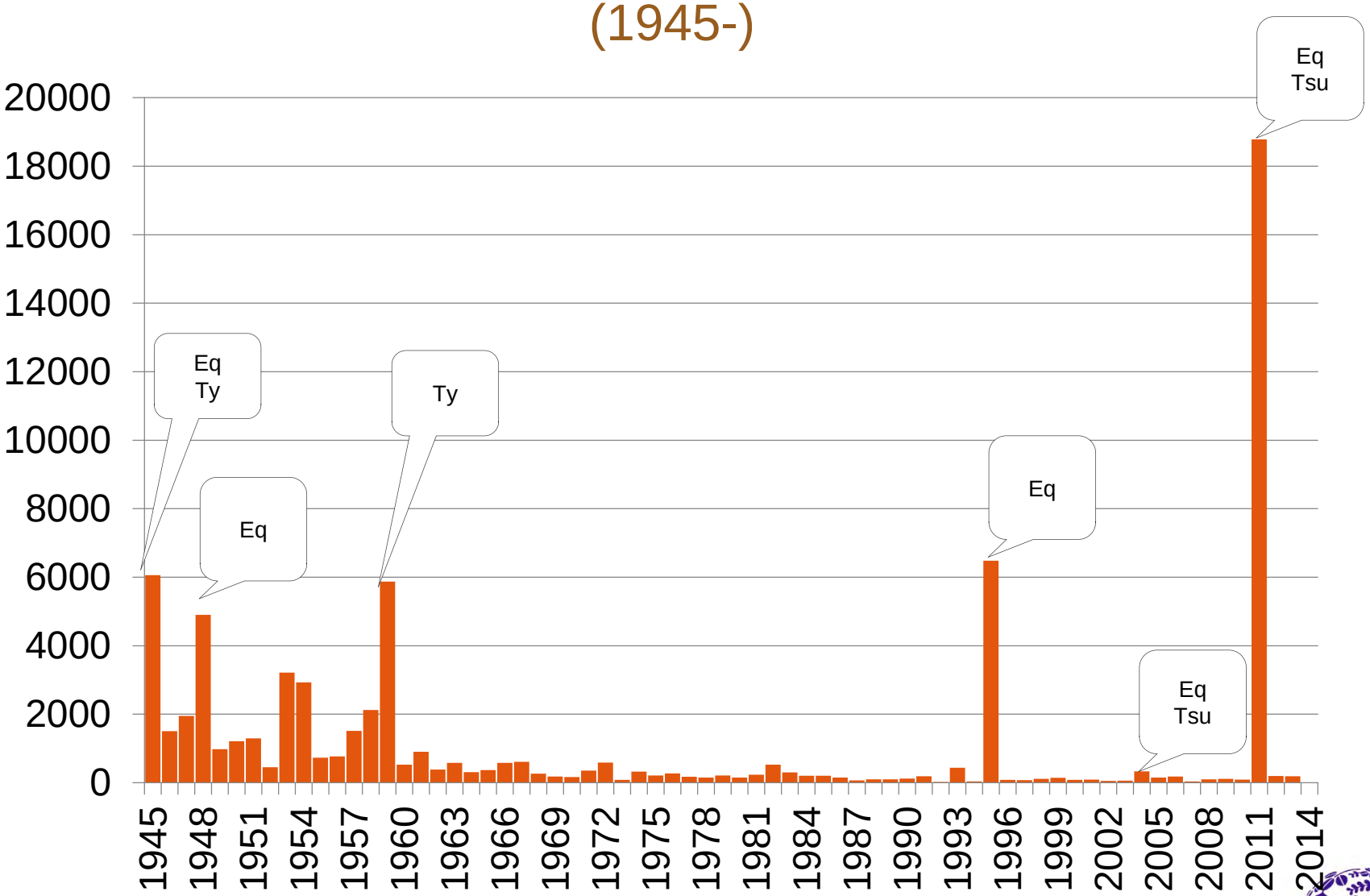
Hazard Map

Past lesson: Evacuation Training

- 1923 Sep 1st: Great Kanto Earthquake
  - Disaster Drill Day

- Tsunami Tendenko
  - Children are taught to evacuate by themselves

Direct deaths and missing from disaster in Japan (1945-)



Know your risk
Reduce your risk
Prepared to act

Medical Preparedness before the disaster

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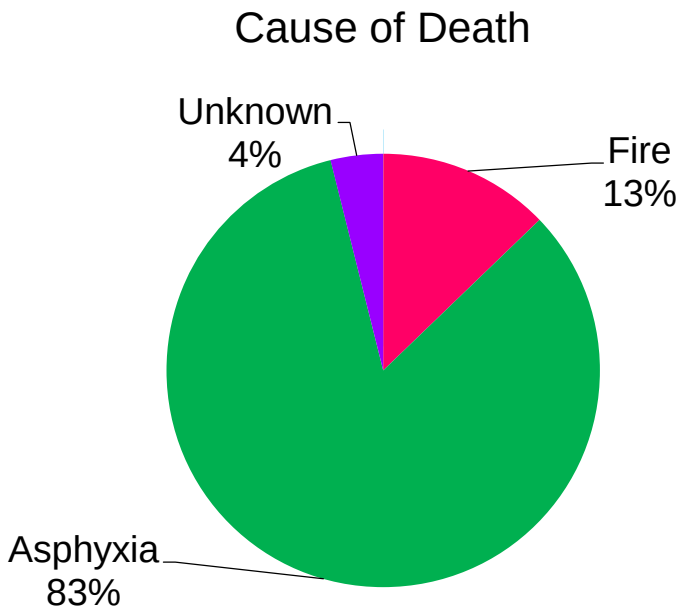
The role of health professionals

$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Capacities}}$$

- Know your risk
- Reduce your risk
- Prepared to act

Lessons from 1995 Great Hanshin Awaji Earthquake

January 17, 1995
05:46
M7.3



Japanese Association for Disaster Medicine was established

Lessons from Great Hanshin Awaji Earthquake in Medial Management in Japan

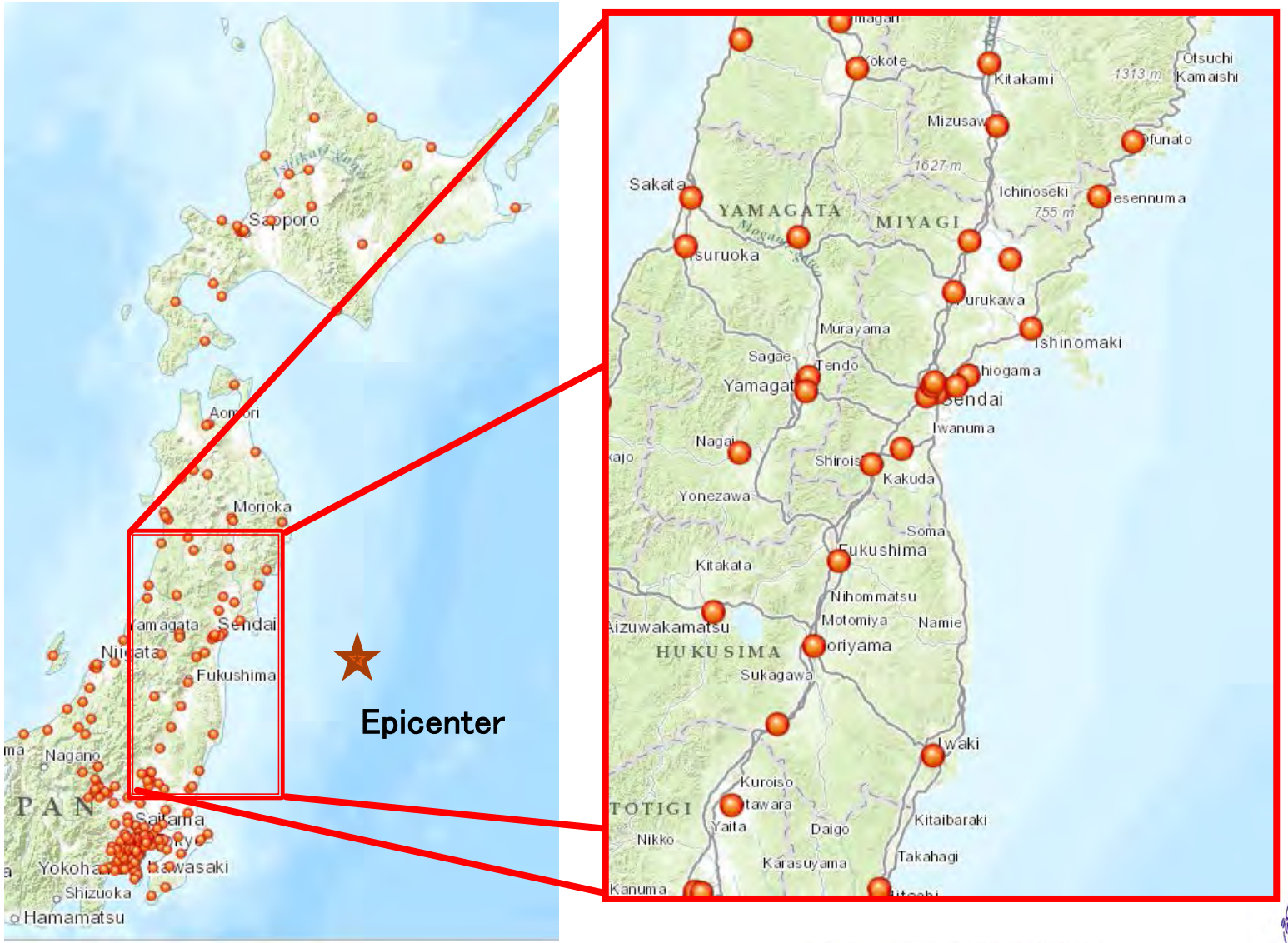
- No disaster specific hospital
  - **Establishment of Disaster Base Hospitals**
- Lack of medical care within 72 h
  - **Establishment of DMAT**
- No wide area transportation
  - **Establishment of Staging Care Unit (SCU) and Wide Transportation Network**
- No disaster medical information system
  - **Establishment of Emergency Medical Information System (EMIS)**
- No disaster medical coordinator
  - **Establishment of Disaster Medical Coordinator**

Disaster Base Hospital

- Provides intensive care of multiple injury, crash syndrome and severe burn in disaster.
- Responds to incoming and outgoing wide-area patient transportation
- Provides DMAT
- Provides medical resource to affected hospitals

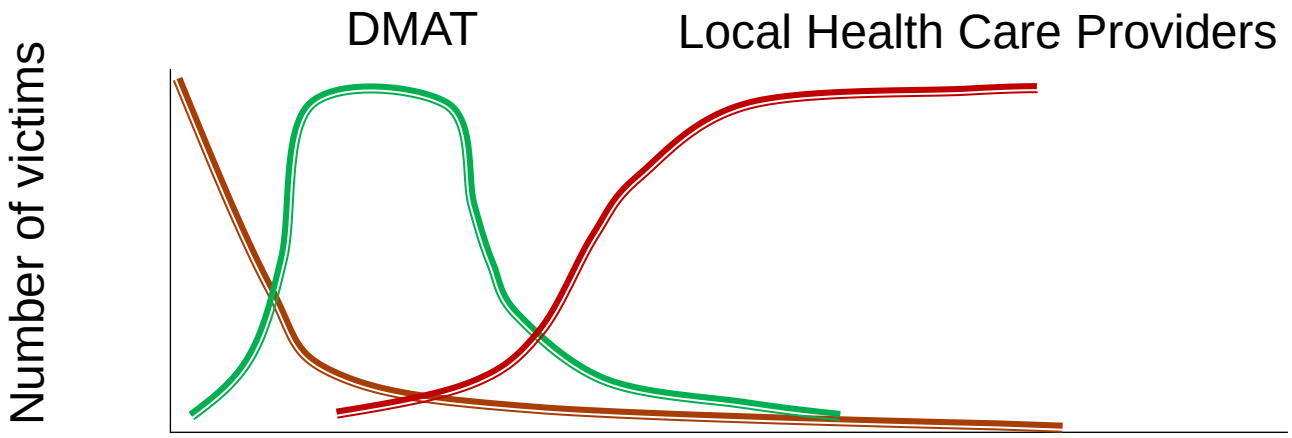
- 609 DBHs in Japan
  - 1 National Disaster Medical Center
  - 55 Central DBH
  - 378 DMAT providing DBH
  - 214 Emergency Center

Disaster Base Hospitals in East Japan



Disaster Medical Assistant Team (DMAT)

- More than 1000 teams were trained in Japan after Hanshin Awaji Earthquake
- Arrives in the affected area within 24 hours and save the lives from preventable death until 72 hours when the local health care recovers.
- Consists of a medical doctor, a nurse, a pharmacist and a logistician with self-standing materials and vehicle.
- Specific training for confined space medicine and wide area transportation.



J-DMAT: Japan Disaster Medical Assistance Team on Training

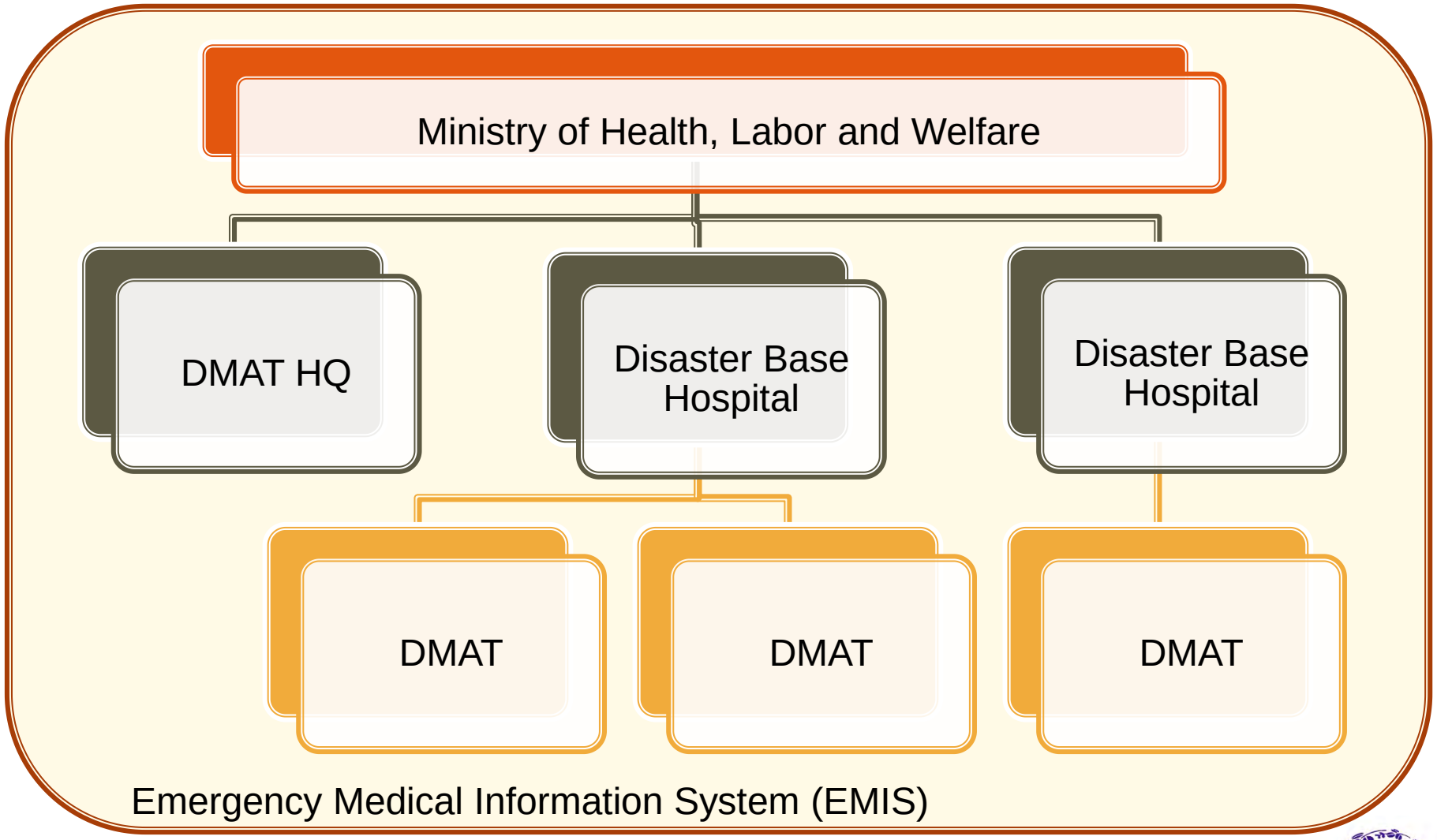
Staging Care Unit

DMAT not only provide medical care, but also assists the local HQ and Staging Care Unit (SCU) in medical coordination.

Confined Space Medicine

Wide Area Transportation

Medical Management System



Aircrafts for Wide Area Transportation

C1 (Self Defense Force)

C130 (Self Defense Force)

CH-47 (Self Defense Force)

Capacities
8 Patients with stretchers in C1 and C130
4 Patients with stretchers in CH-47

SCU triages
Multiple injuries, Head injury, Crash syndromes and Severe burns that require intensive care in Life saving emergency center outside the affected area.

Emergency Medical Information System (EMIS)

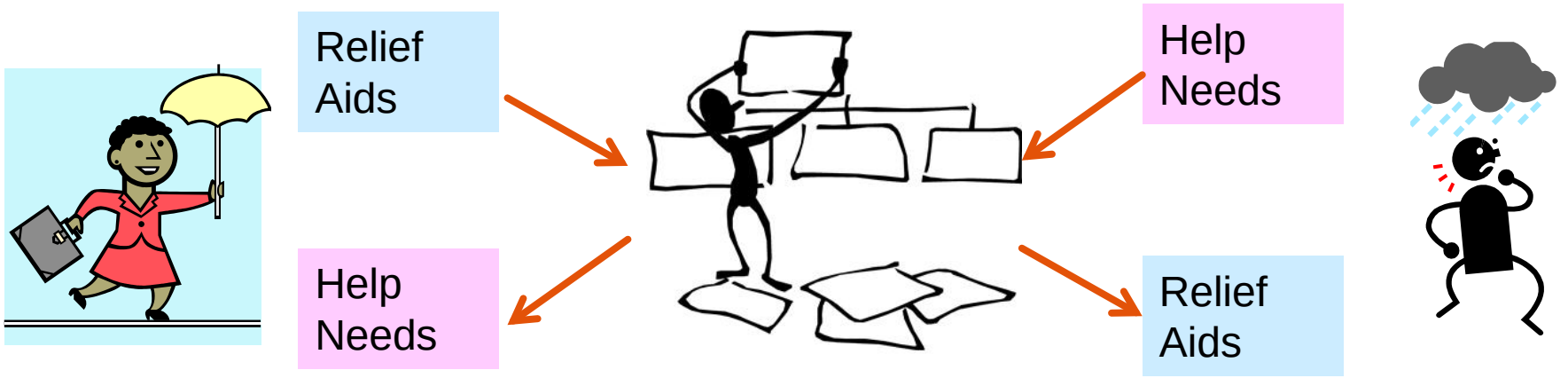
- Database of Regional Hospitals
  - Capability of EU, Nuclear medicine, DMAT, Drs, ICU beds, ORs, Acceptable number of severely injured patients.

宮城県

医療機関名	種別	勤務医師数		病棟情報		年間救急患者数				災害時受入重症患者数	平常時の診療能力			更新日時
		医師総数 (人)	救急科医師数 (人)	ICU病床数 (床)	手術室数 (床)	救急外来患者数 (人)	受け入れ救急車数 (台)	緊急入院患者数 (人)	三次救急患者数 (人)	(人)	多発外傷を同時に根本治療できる患者数	広範囲熱傷を同時に根本治療できる患者数	クラッシュ症候群を同時に根本治療できる患者数	
公立刈田綜合病院	災拠 DMAT	25	0	4	4	7561	1168	420	0	1	1	1	1	2010/11/09 10:51
みやぎ県南中核病院	災拠 DMAT	68	1	6	5	15000	3100	2500	10	2	1	1	2	2012/08/30 18:17
坂総合病院	災拠 DMAT	2	2	6	4	20000	3000	860	0	2	2	受入不可	2	2013/01/06 13:01
仙台医療センター	災拠 救命 被ばく DMAT	152	4	6	11	5224	4317	4099	1111	3	2	1	1	2012/11/26 14:20
仙台市立病院	災拠 救命 DMAT	89	7	16		11763	5529	4957		3	1	1	1	2011/05/12 09:22
仙台赤十字病院	災拠 DMAT	76		0	7	3776	841	1666	0	1	1	1	1	2010/12/06 09:31
東北厚生年金病院	災拠 DMAT	89	0	8	7	3834	1722	1429	0	3	1	受入不可	2	2010/11/09 17:20
東北大学病院	災拠 救命 被ばく DMAT	543	20	30	18	6296	2038	841		10	2	2	2	2013/01/06 12:57
東北労災病院	災拠 DMAT	102	0	0	8	3383	1430	601		1	受入不可	受入不可	受入不可	2010/11/09 17:02
大崎市民病院	災拠 救命 DMAT	89	1	9	8	4373	3853	2305	497	3	1	1	1	2011/10/03 15:40
栗原市立栗原中央病院	災拠 DMAT	29	0	6	4	4151	1730	1145	0	0	受入不可	受入不可	受入不可	2012/08/29 21:16
登米市立登米市民病院	災拠	22	0	6	5	6226	976	401			1	受入不可	受入不可	2012/09/25 16:25
石巻赤十字病院	災拠 救命 被ばく DMAT	99	2		7	21841	4274	3494	483	5	3以上	1	3以上	2010/11/09 10:52
気仙沼市立病院	災拠 DMAT			0		10120	1801	1957		1	受入不可	受入不可	受入不可	2010/11/09 17:51
合計 14件		1385	37	97	88	123548	35779	26675	2101	35	-	-	-	-

Disaster Medical Coordinator

- First established in Hyogo in 1997
- Four out of 47 prefectures（10.6%）had designated medical coordinators before GEJE.
- Miyagi prefecture assigned 6 coordinators, but Iwate and Fukushima did not.



Mar.11, 2011

Great East Japan Earthquake Outline

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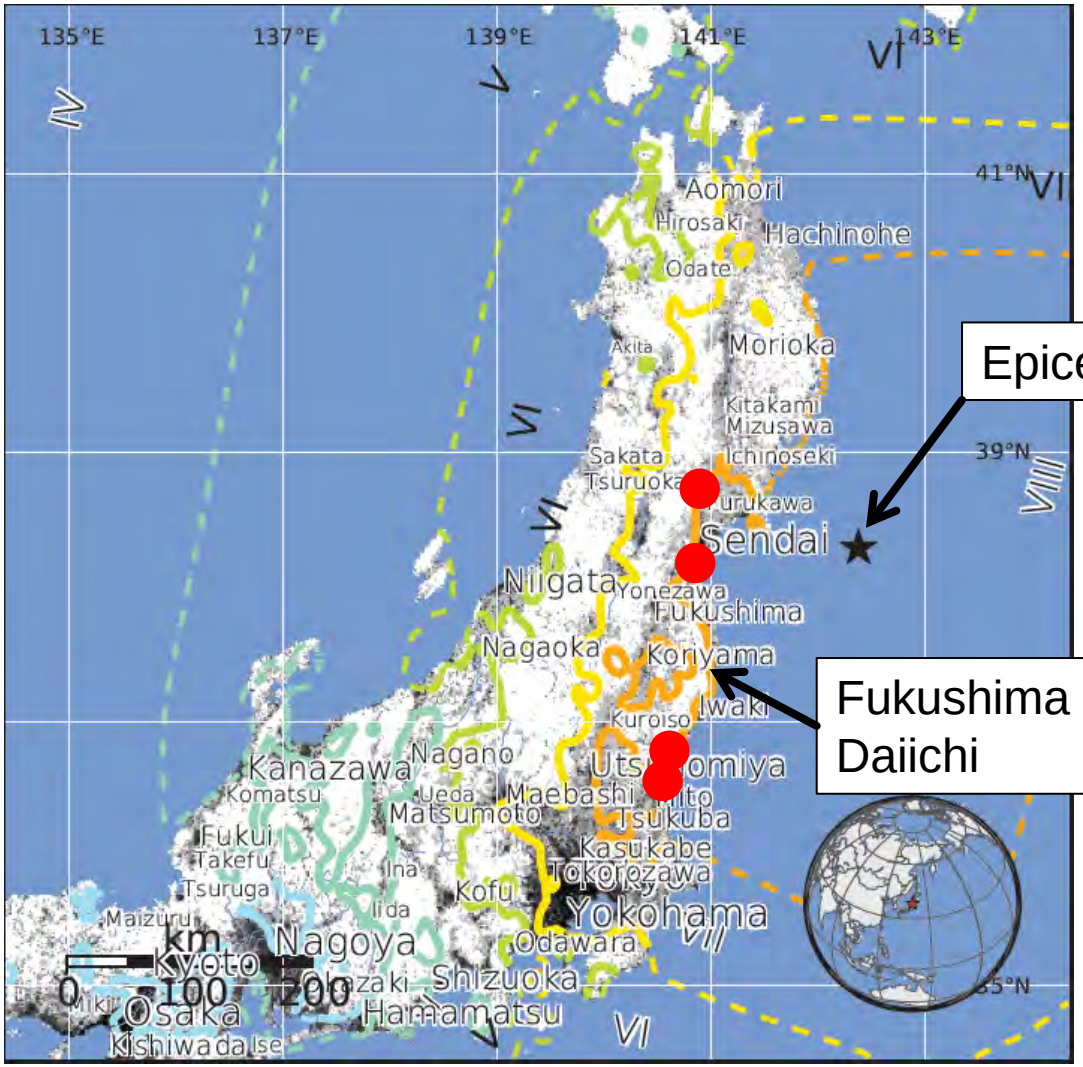
14:46:24 Friday, Mar. 11, 2011

- Richter Scale (Magnitude) 9.0
- Biggest earthquake in Japanese history
- Luckily,
  - Friday afternoon with sun light
  - Out patients were on their way home.
  - Medical staff were on the job.
  - The weather was cold but getting warmer.

2011 Shaking of whole Japan



Epicenter

Fukushima Daiichi

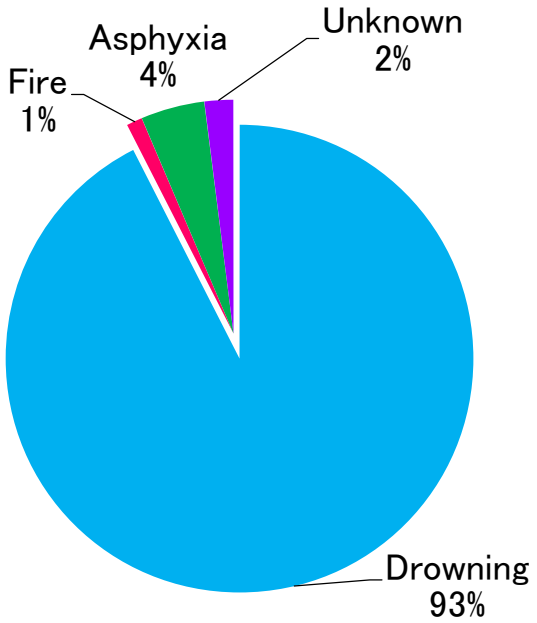
Mercalli Intensity Scale	Population at risk
I. Instrumental	126,000k
II. Weak	13,803k
III. Slight	
IV. Moderate	21,142k
V. Rather Strong	8,416k
VI. Strong	9,464k
VII. Very Strong	34,740k
VIII. Destructive	5,816k
IX. Violent	257k
X. Intense	
XI. Extreme	
XII. Catastrophic	

● Maximum MMI was IX

http://earthquake.usgs.gov/pager

Lessons from 2011 Great East Japan Earthquake

Mar. 11, 2011, 14:46 M9.0

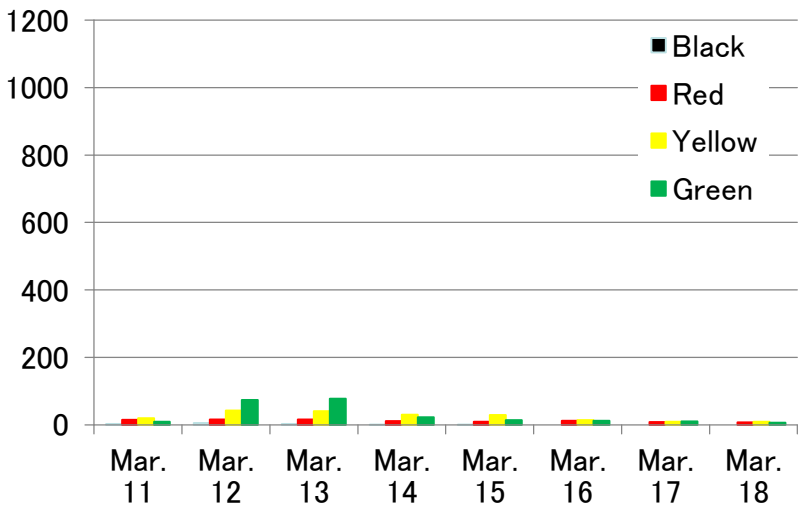


2011 White pages,
Japan Gov.

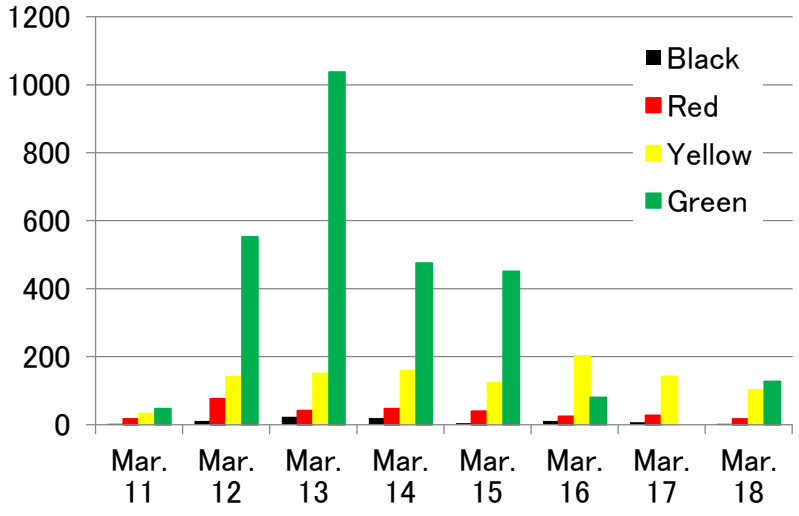
Tohoku University as a Disaster Base Hospital

Medical management

Number of patients within a week

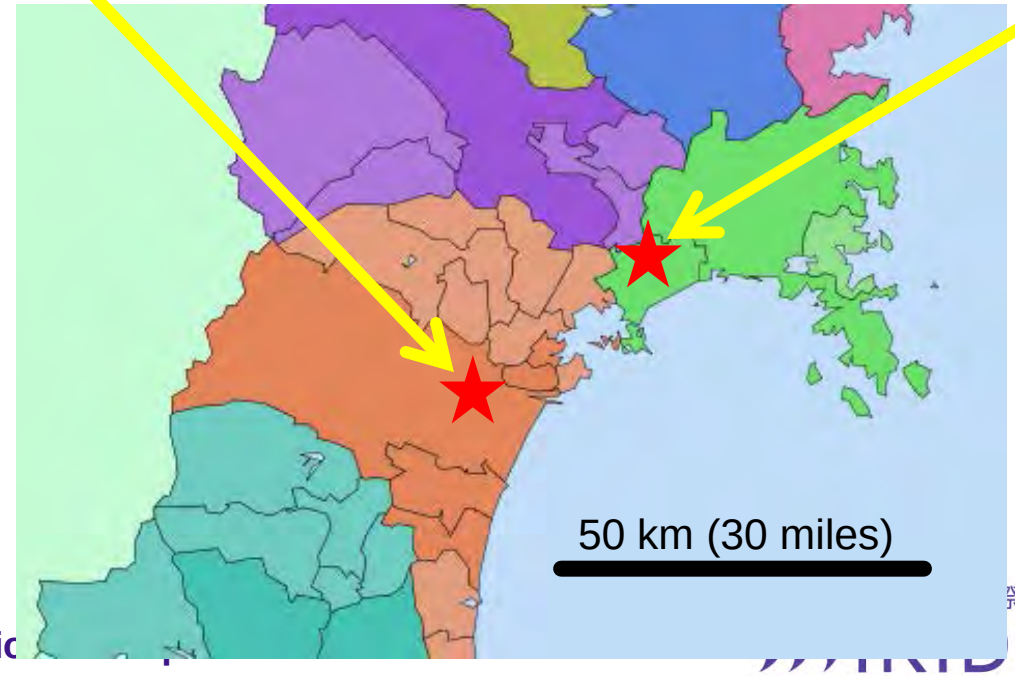


Tohoku Univ. Hp.



Ishinomaki Red Cross Hp.

1199 beds
Drs. >1,000
Ns. >2,000
Population 1,5M
Age >65 21%

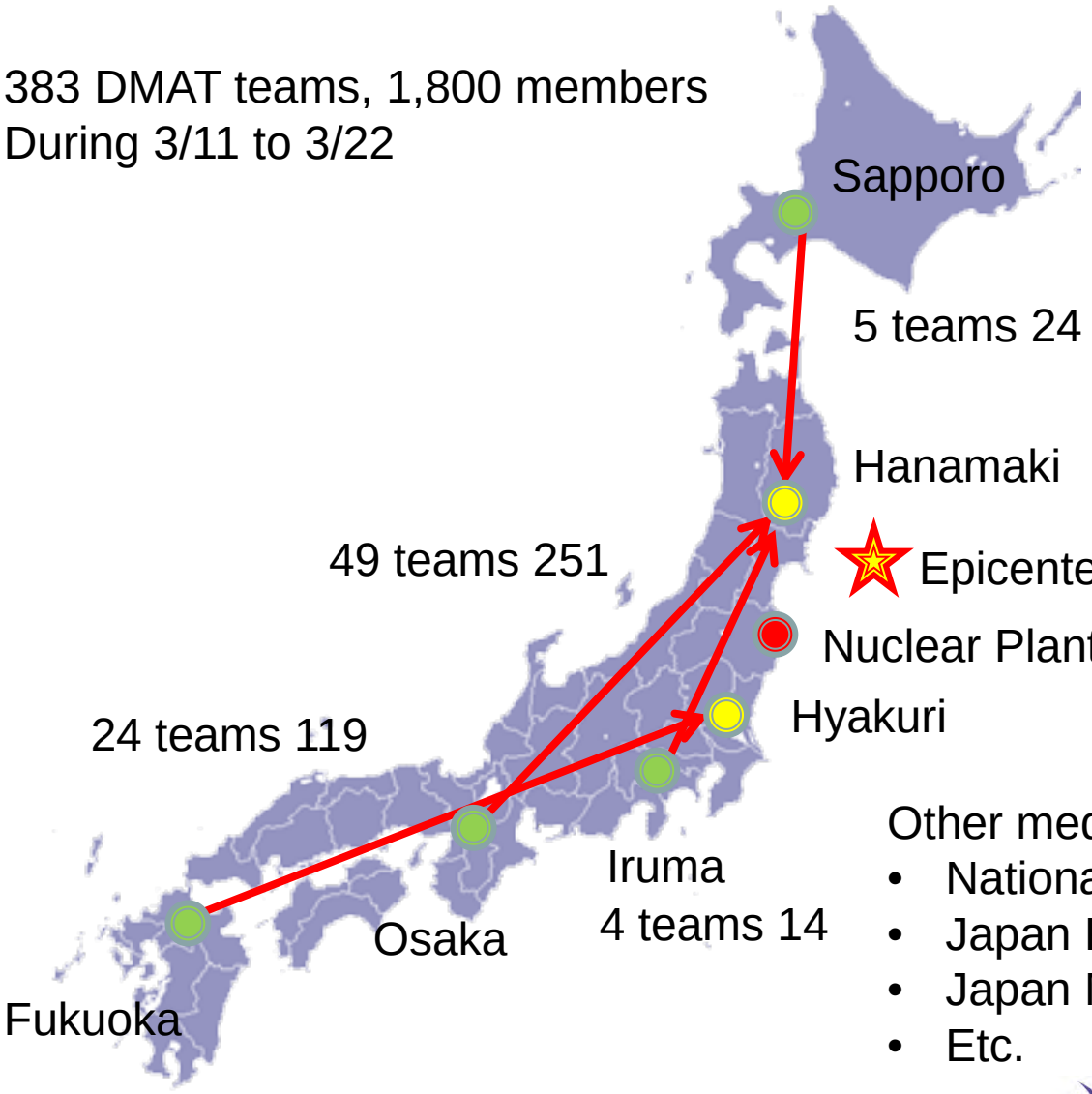


452 beds
Drs. 50
Ns. 300
Population 0.25M
Age >65 25%

J-DMAT HQ and Assistance at Miyagi Pref. HQ

DMAT gathering

383 DMAT teams, 1,800 members
During 3/11 to 3/22

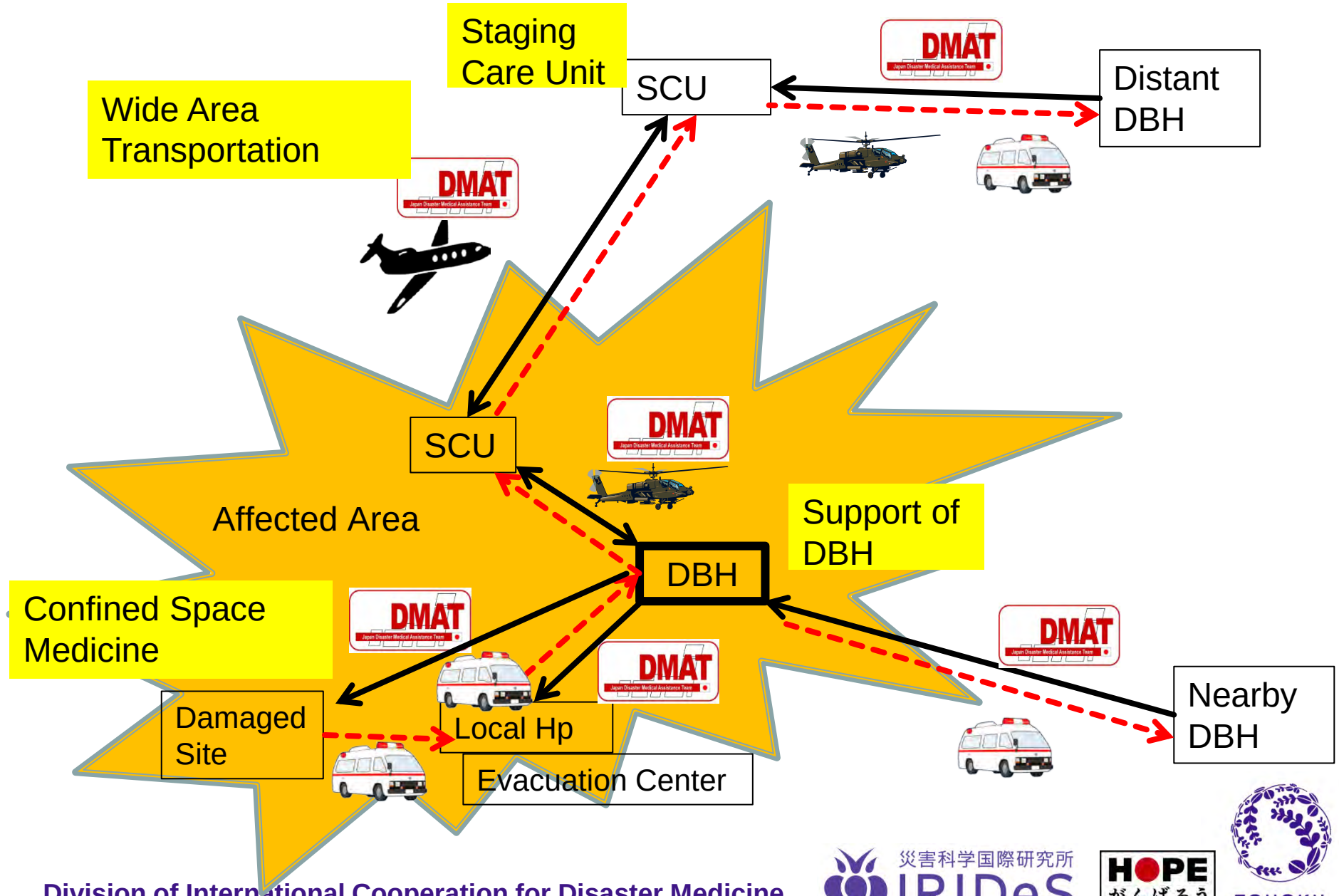


82 teams 406 members flied to nearby SCU using four C1 and five C130 airplanes.

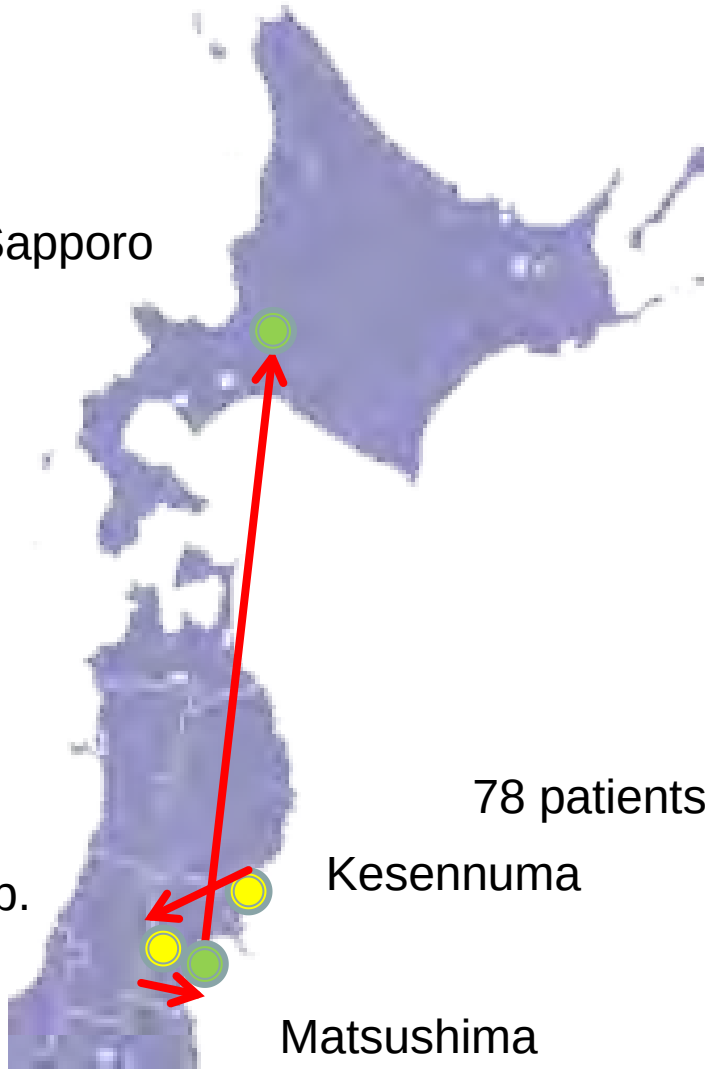
Other medical assistance team:

- National University Hospitals
- Japan Red Cross Hospitals
- Japan Medical Association
- Etc.

Role of DMAT


Staging Care Unit
SCU
DMAT
Distant DBH
Wide Area Transportation
DMAT
SCU
DMAT
Affected Area
Support of DBH
DBH
Confined Space Medicine
DMAT
DMAT
DMAT
Nearby DBH
Damaged Site
Local Hp
Evacuation Center

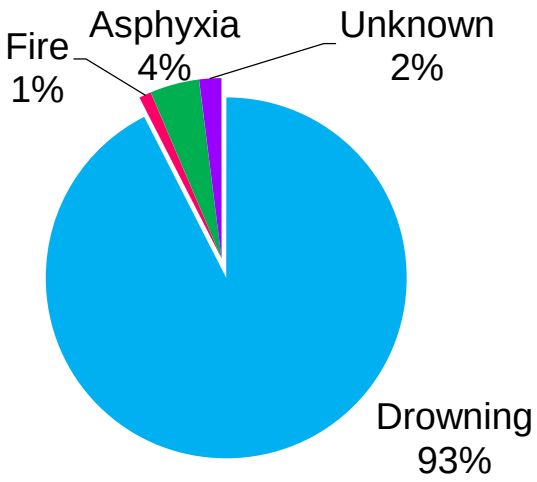
Wide area transportation based on network centric operation



Change of medical needs

	Injured (a)	Dead or lost (b)	(a)/(b)
Hanshin-Awaji Earthquake	43,800	6,433	6.8
Great East Japan Earthquake	5,942 ⇩	19,582 ⇧	0.3

Oct 24, 2011 Japan Gov.



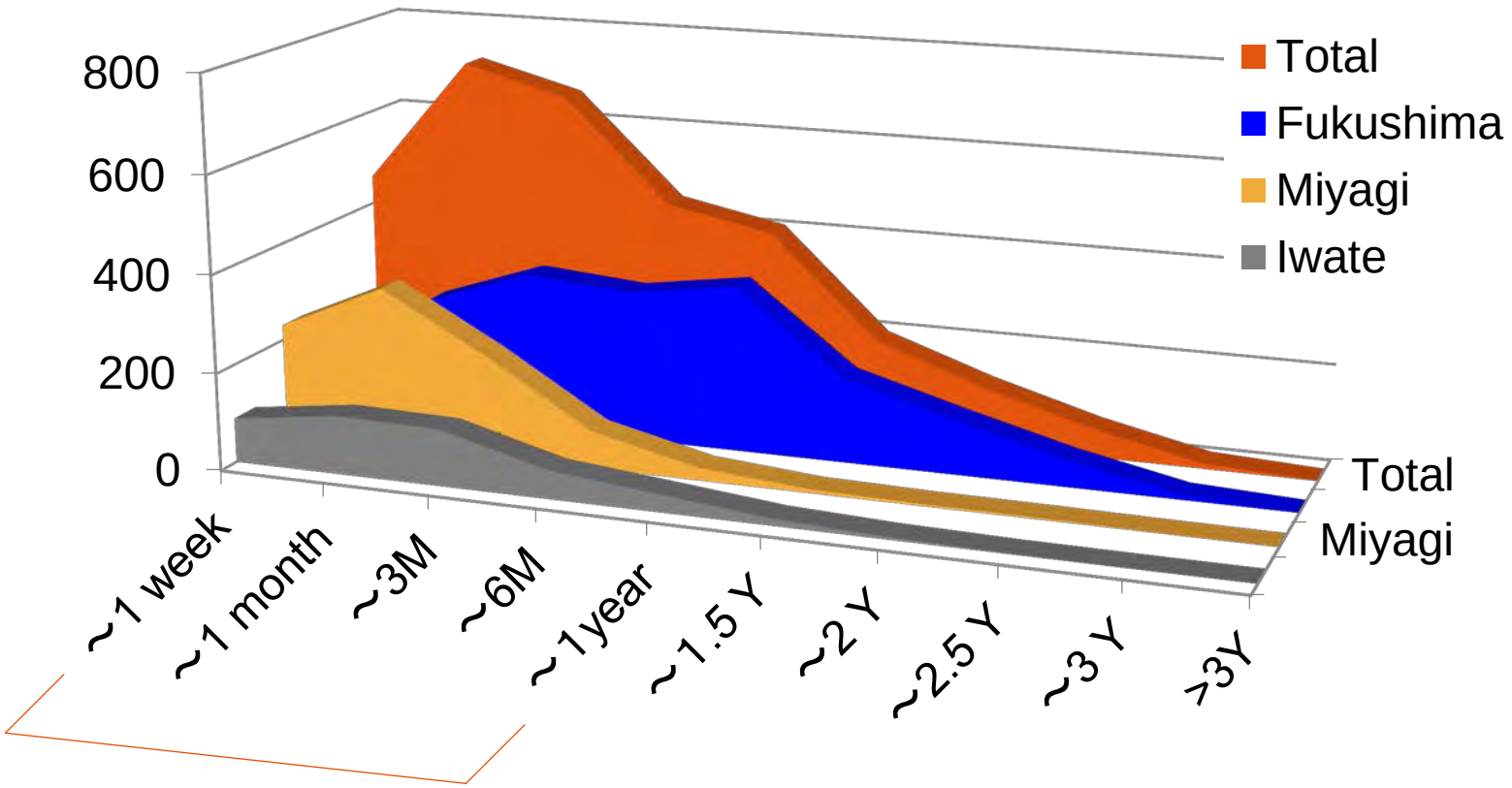
J. Natl. Inst. Public Health, 60(6):2011

Unmet medical needs

- Chronic illness
  - Home Oxygen Treatment: Lack of O_2 tanks
  - Hemodialysis: Lack of dialyzers and fluids
  - Hypertension, DM: Loss of daily drugs and insulin
  - Loss of glasses, teeth brushes
- Crowded shelter without enough heat, food and water
  - Fear of outbreak of diarrhea and pneumonia
  - Loss of privacy
  - Quarrel and harassment
- Loss of family and job
  - Psychological depression, alcoholism
  - PTSD
- Loss of gas supply: Sleeping in a car to wait fuel
  - Deep vein thrombosis
- Lack of substitutes of local medical staff

Disaster related deaths

Ministry of Reconstruction, Mar. 31, 2014
Total 3, 089



Tohoku University as a Disaster Base Hospital

Hospitals in disaster

Hospital Evacuation

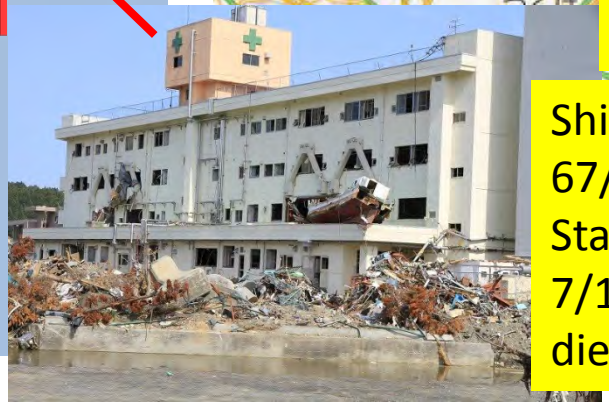
Futaba Hospital
Forced to evacuate
Misinformation created unattended patients
45/440 Pts died during Tx

Nucl. PP

Ogatsu Hospital
Three story was inundated.
40/40 Pts, 66/70 Medical Staff were killed

Rikuzen Takada Hospital
Four story was inundated
12/51 Pts, 8/82 Medical Staff were killed
170 Isolated people

Ishinomaki Municipal Hospital
120 Pts, 250 Medical Staff were isolated



Shizugawa Hospital
67/109 Pts, 4 Medical Staff were killed
7/150 Isolated people died of hypothermia

Hospital should be the last building standing in disaster

Flood-in of supporting medical teams and lack of coordination

University Hospital Alliance

Tohoku University Hospital

Medical Societies

Japan Medical Associati[on]

Japan Red Cross

Ishinomaki Red Cross Hospital

PCAT

DMAT

Sendai Medical Center

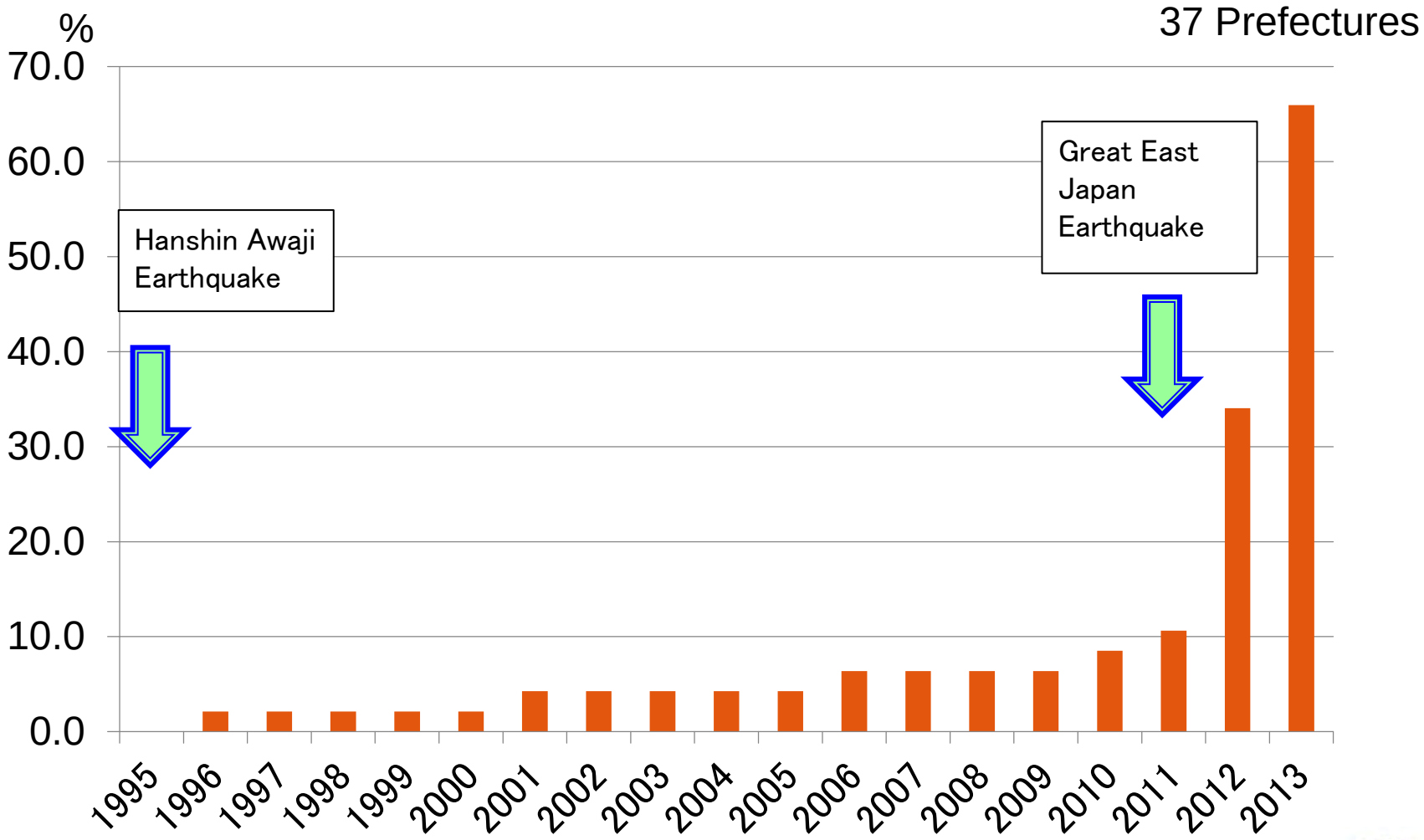
AMDA

TMAT

Foreign Medical Team

HELP!

Prefectures assigning disaster medical coordinator



Role of

Tohoku University and IRIDeS

Implementation of new research institute in Tohoku University

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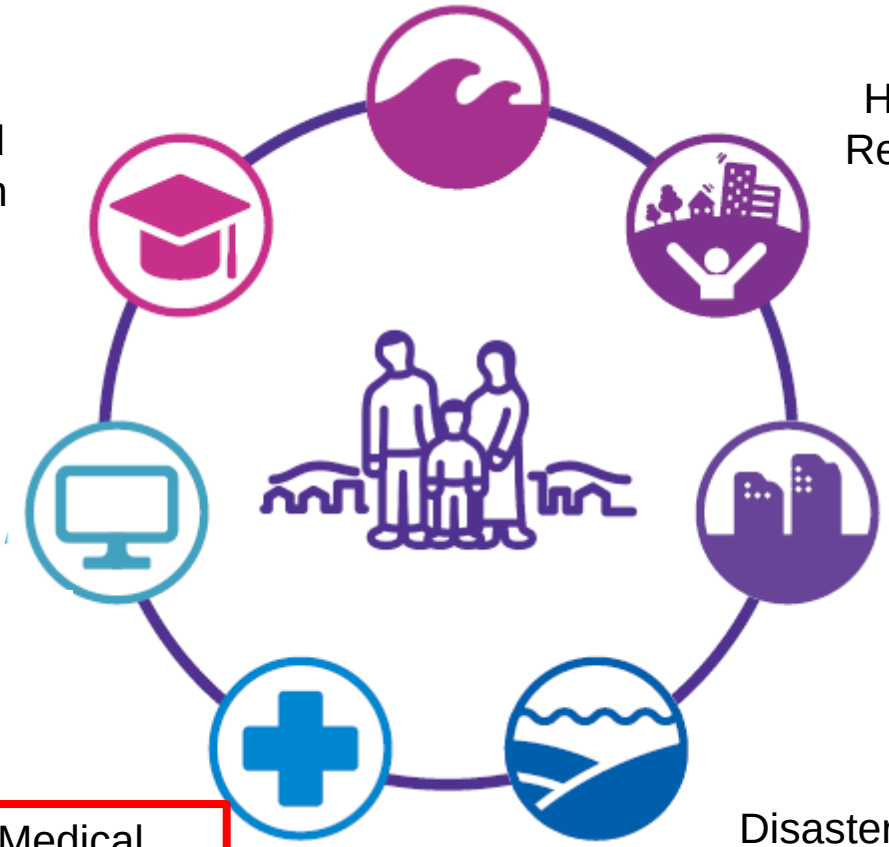
災 =  = 

Chinese
“disaster”

Turn a misfortune into a blessing
Irides: pleural of *iris*, comes from ancient Greek *rainbow*
Iris means “*hope*”

Multidisciplinary Approach of IRIDeS



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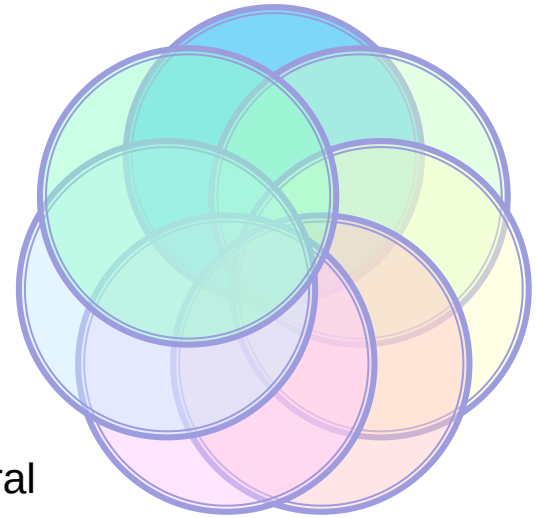
Disaster Medical Science



International Cooperation for Disaster Medicine

Radiation Disaster Medicine

Disaster Psychiatry

Disaster-related Public Health

Disaster-related Infectious Disease

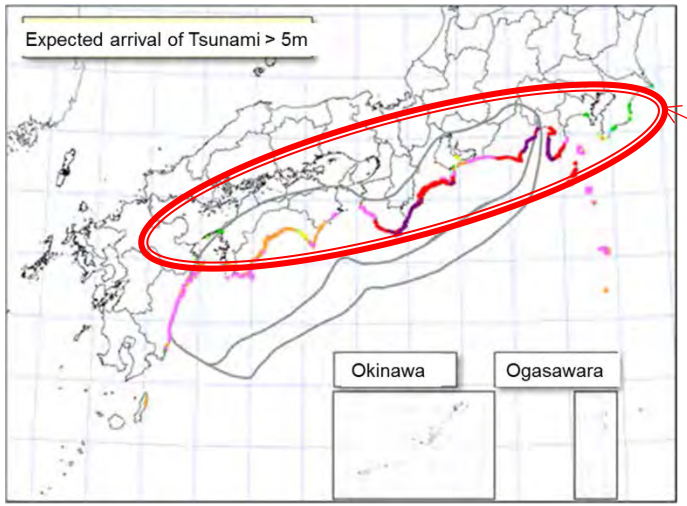
Disaster Oral Science

Disaster Obstetrics and Gynecology

Disaster Medical Informatics

Expectation of damage by Tsunami

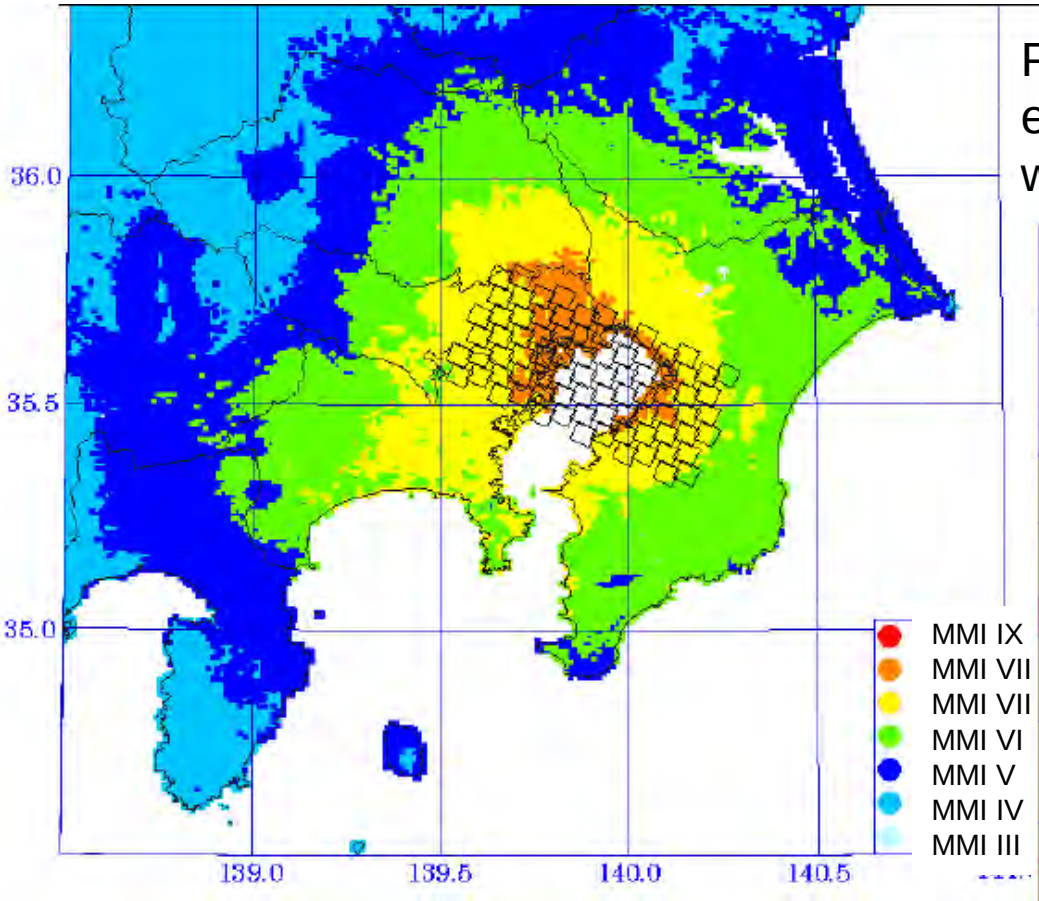
	RS (M)	Inundation Area	Population at risk	Dead and Lost	Destructed Buildings
Great East Japan Earthquake (2011)	9.0	561 km^2	0.62M	18,800	130,400
Great South Trough Earthquake (90% within 30y)	9.0	1,015 km^2	1.63M	323,000	2,386,000



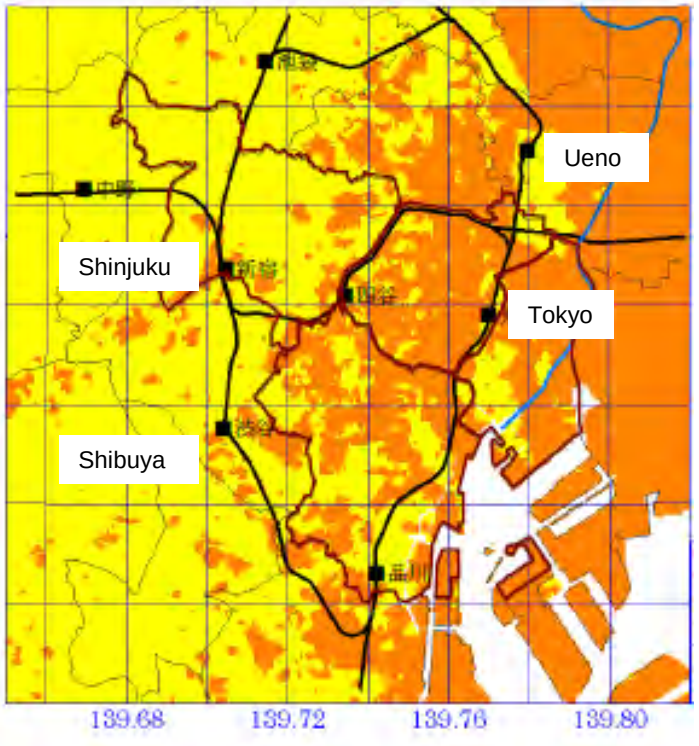
Population in the circle: 56.0 M
Population of Japan: 120.0 M

Cabinet Office, Japan Gov.
Aug. 29, 2012

Another threat: Tokyo metropolitan area

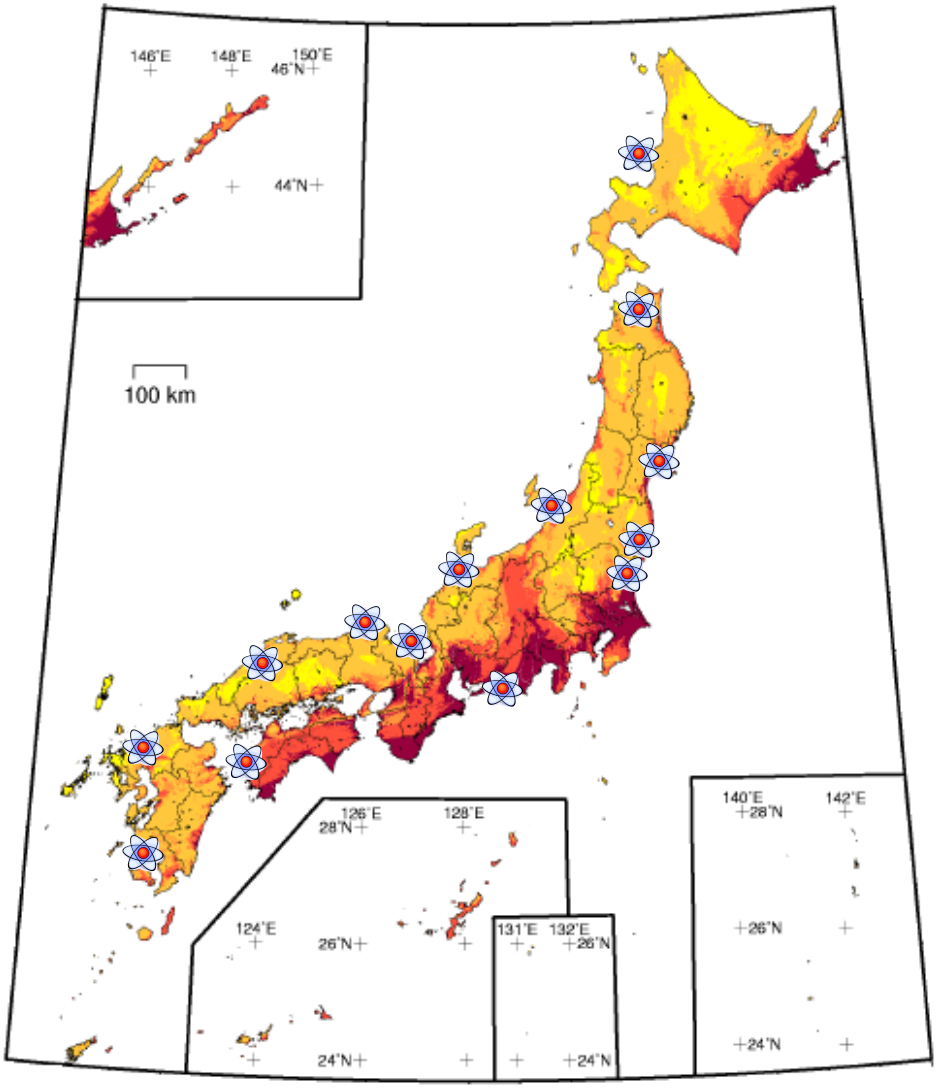


Probability of RS (M) 7 earthquake with MMI VIII-XI within 4-years is 70%



Tokyo Metropolitan Government
Disaster Prevention Information 2012

Destructive earthquake hazard map of Japan



Probability of MMI VIII-XI within 30-years as of Jan. 1, 2013

Power Plants: 17
Reactors: 50 (No active plant)

To the future

HFA-2 in Sendai World Conference on Disaster Risk Reduction

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HOPE
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ISDR

International Strategy for Disaster Reduction

HFA

Hyogo Framework for Action 2005 - 2015:

Building the Resilience of Nations and Communities to Disasters

http://www.unisdr.org/eng/hfa/docs/HFA-brochure-English.pdf

UNISDR

The United Nations Office for Disaster Risk Reduction

Health in HFA

- Only three words and one paragraph of “health” in 10,130 words of HFA.
  - (e) Integrate disaster risk reduction planning into the health sector; promote the goal of “hospitals safe from disaster” by ensuring that all new hospitals are built with a level of resilience that strengthens their capacity to remain functional in disaster situations and implement mitigation measures to reinforce existing health facilities, particularly those providing primary health care.

Who responds to the health risks?

The voice of health professionals in risk reduction is very weak

Change the concept of Risk Reduction

Needs

Top 3 priorities for communities (UN Survey)

1. **A good education**
2. **Better healthcare**
3. **An honest and responsive government**

Paradigm Shift

Climate Change
Rapid urbanization
Poverty
Lack of resource
Loss of biodiversity
All hazards

Change of Risk

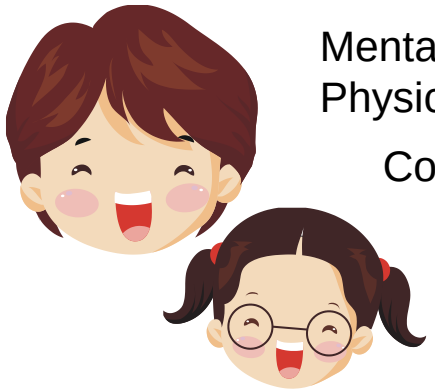
Resilient Community

Better access
Effective Response
Safe Hospital
Safe School
Mental and Physical
Communication
Funding and Development

Quality of Life

Injury
Illness
disability

Hazard-proof Structure
Early Warning



Voice of Health Professionals

International Symposium on Disaster Medical and Public Health Management:
Review of the Hyogo Framework for Action

May 21-22
Washington, DC

School of Medicine & Health Sciences
THE GEORGE WASHINGTON UNIVERSITY

Children's National

Base Camp

1. Frameworks and policies
2. Planning and vulnerable populations
3. Psychosocial/behavioral
4. Infrastructure/resources
5. Education

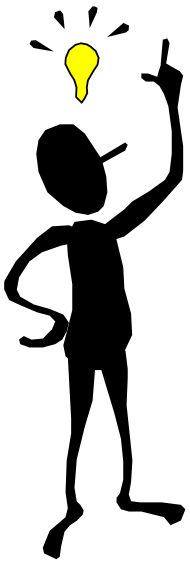
Plenary

- Position Paper at PreventionWeb
- Editorial in DMPHP (Burkle and Egawa)
- Proceedings in DMPHP

Proposal to HFA2

Health sector

Risk Reduction



- Know your risk
- Reduce your risk
- Prepared to act

Division of International Cooperation for Disaster Medicine

災害科学国際研究所
IRIDeS
International Research Institute of Disaster Science

HOPE
がんばろう
TOHOKU

TOHOKU
UNIVERSITY

Risk Reduction Together

Tindog Tacloban!

Leyte Provincial Hospital

UPMSHS in Palo