EMERGENCY MEDICINE IN DISASTER PLANNING

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WHAT IS DISASTER:
MASSIVE DESTRUCTION OUT OF CONTROL OF LOCAL GOVERNMENT
DISASTERS

Natural: Earthquake
Flood
Land Slide
Tsunami
Hurricane

Man Made: World trade center hit by plane
: Terrorism war fair
: Weapon of mass destruction
: Chemical war
Trimodal Distribution of Medical Problems in Large Scale Disaster

The Initial Phase: Seconds to minutes after disaster
- high mortality due to injuries
- incompatible with life
- drowning, suffocation entrapped in destroyed building

Second Phase: Minutes to hours after incidence
- early trauma management, ATLS
- Triage, Resuscitation, Stabilization
- Definitive treatment, Air way care
- hemorrhage control, Splint
Third Phase  :  Days ➔ Weeks ➔ Month or After
prevent and treat
complications sepsis, multiple organ failure
reconstructive surgery
psychological support

EFFECTS OF DISASTER : ACUTE STAGE

Dead and injuries
Mass destruction of building, community
Destroy communication system : Telephone, Radio station
Major interruption in transportation, bridge
Destroy food supply and contamination of water supply
Famine and poverty
Psychological impact on survivors and relative
FACTORS INDICATE INCREASE PROBABLY OF MASS CASUALTY

1. Increasing population in flood plain, seismic zone, hurricane
2. Production and transportation of toxic and hazardous material
3. Increase nuclear and chemical facilities
4. Terrorist activity
5. Catastrophic fires, explosions
FACTS ABOUT DISASTERS WORLDWIDE (WHO)

In the past 20 Years

Claimed About 3 Millions Lives
Affected 800 Millions People
Exceeding $ 500 Billion Property Damage
## Reported deads after tsunami over 8 richter since 1990

<table>
<thead>
<tr>
<th>Date UTC</th>
<th>Region</th>
<th>Magnitude</th>
<th>Number Killed*</th>
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<tr>
<td>1994 06 09</td>
<td>Northern Bolivia</td>
<td>8.2</td>
<td>10</td>
</tr>
<tr>
<td>1994 10 04</td>
<td>Kuril Islands</td>
<td>8.3</td>
<td>11</td>
</tr>
<tr>
<td>1995 07 30</td>
<td>Near Coast of Northern Chile</td>
<td>8.0</td>
<td>3</td>
</tr>
<tr>
<td>1995 10 09</td>
<td>Near Coast of Jalisco, Mexico</td>
<td>8.0</td>
<td>49</td>
</tr>
<tr>
<td>1996 02 17</td>
<td>Irian Jaya Region, Indonesia</td>
<td>8.2</td>
<td>166</td>
</tr>
<tr>
<td>1998 03 25</td>
<td>Balleny Islands Region</td>
<td>8.1</td>
<td>0</td>
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<tr>
<td>2000 11 16</td>
<td>New Ireland Region, P.N.G.</td>
<td>8.0</td>
<td>2</td>
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<tr>
<td>2001 06 23</td>
<td>Near Coast of Peru</td>
<td>8.4</td>
<td>138</td>
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<tr>
<td>2003 09 25</td>
<td>Hokkaido, Japan Region</td>
<td>8.3</td>
<td>0</td>
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<tr>
<td>2004 12 23</td>
<td>North of Macquarie Island</td>
<td>8.1</td>
<td>0</td>
</tr>
<tr>
<td>2004 12 26</td>
<td>Off West Coast of Northern Sumatra</td>
<td>9.0</td>
<td>283,543</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>283,922</strong></td>
</tr>
<tr>
<td>Country</td>
<td>Year</td>
<td>Disaster</td>
<td>Injured</td>
</tr>
<tr>
<td>--------------</td>
<td>------</td>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1984</td>
<td>Cyclone</td>
<td>5.8</td>
</tr>
<tr>
<td>Mexico</td>
<td>1985</td>
<td>Earthquake</td>
<td>40,000</td>
</tr>
<tr>
<td>Columbia</td>
<td>1985</td>
<td>Volcanic Eruption</td>
<td>170,000</td>
</tr>
<tr>
<td>Solomon</td>
<td>1986</td>
<td>Cyclone</td>
<td>90,000</td>
</tr>
<tr>
<td>Cameroon</td>
<td>1986</td>
<td>Toxic Gas</td>
<td>300</td>
</tr>
<tr>
<td>Cook Island</td>
<td>1986</td>
<td>Cyclone</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1988</td>
<td>Flood</td>
<td></td>
</tr>
<tr>
<td>USSR</td>
<td>1988</td>
<td>Earthquake</td>
<td></td>
</tr>
<tr>
<td>Event</td>
<td>Year</td>
<td>Location</td>
<td>Casualties</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------</td>
<td>------------------------</td>
<td>------------</td>
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<tr>
<td>San Francisco Earthquake</td>
<td>1989</td>
<td>California, USA</td>
<td>3,800</td>
</tr>
<tr>
<td>Flooding in Midwest USA</td>
<td>1993</td>
<td>USA</td>
<td></td>
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<tr>
<td>Earthquake in Northridge</td>
<td></td>
<td>California, USA</td>
<td></td>
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<tr>
<td>Bombing of federal building in Oklahoma</td>
<td>1995</td>
<td>Oklahoma, USA</td>
<td></td>
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<tr>
<td>Earthquake in Northridge</td>
<td></td>
<td>California, USA</td>
<td></td>
</tr>
<tr>
<td>Bombing of Olympic Games in Atlanta</td>
<td>1996</td>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>Servere EI Nino-Related Flooding</td>
<td>1997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hurricane Mitch</td>
<td>1998</td>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>World Trade Building Plane Crash</td>
<td>2001</td>
<td>USA</td>
<td>20,000</td>
</tr>
<tr>
<td>Indian Ocean Tsunami</td>
<td>2004</td>
<td>USA</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>
DISASTER PLANNING

SURVEY - Community hazards analysis
- Regional, Geographic, National

Prevention of possible disaster

Public education, organized disaster team

Health care resource management
- EMS, Ambulance service, EMT
- Hospital beds, critical care, ICU
- Health personnels M.D, Nurses, AID
- Blood bank, Drug stock, Water supply
- Electrical supply, Communication systems
PREVENTION OF POSSIBLE DISASTER

Survey of possible hazards and disaster
Public education - prevention, management
Warning system - with back up system
Disaster information management system (DIMS)
Seek international co-operation

UNDRO, JICA,
Prepared, Readiness, Training
Opportunity for Successful Disaster Management

- Warning System Management Dims
- Resource
- Strategic Planning System
- Subgroup Distribution
- Regularity of Refreshing Knowledge and Action
- Training and Public Education
Strategic Plans

- Responder and Commander
- Communicating System
- Traumatic Supportation Network
- Supportation Team
- Instruments and Equipment
- Traffic Control System
Implementation of Emergency Medicine and Disaster Planning in Medical Curriculum
Incidence of Terrorism

- 9 September 2001  World Trade Building
- In 2001  348 events
- In 2003  175 events
- In 2004  650 events
- August 2005  London Bomb
- From 2004 to 2005  More than 1,500 events
EMERGENCY MEDICAL SERVICE FOR DISASTER

Well prepared and ready for possible disaster
Prehospital – EMS system protocol, disaster sconce
Incident command system, planning section
Logistics section, hospital facilities, resource
Comprehensive planning for hospital response in emergency
Review hospital and community disaster response
Disaster stress management plan
FACTORS INFLUENCING GOOD EMS

การก่อการร้าย/การต่อสู้ IRELAND, ภาคใต้
DISEASES RPEVALENCE-CHD, PE
อุบัติเหตุ (TRAUMA), MASS CASUALTIES
DISASTER Earthquake, Tsunami PUBLIC
AWARENESS, ความรับผิดชอบของรัฐบาล
SOCIOECONOMIC CEED
PATIENT CARE IN TRAUMA AND EMERGENCY

At Scene of the accident – Triage
Emergency medical service – EMS
Transfer and referring system
Care during transfer – air way, c-spine protection
Analgesic administration
Air transportation – helicopter, fixed wing
Good EMS System in Developed Country
USA, Japan, Singapore

Patient reach hospital in 3-5 minutes

Two way communication, Good ambulance service

Good prehospital care and resuscitation

Specialist on duty 24 hours

Good co-ordinating system between hospital

Good referring and transfer system

Central office co-ordination 24 hours/day
EMS System in Japan

RESPONDER

EMERGENCY
TRAUMA
PUBLIC
TELEPHONE
COMMUNICATION

Advise EARLY
MANAGEMENT

TOKYO
FIRE STATION
M.D., 24 HRS
COMMANDER

AMULANCEE
CLOSE TO THE SCONCE
REPORT-PREPARE
RESUSCITATION

AMBULANCE 1500
HELIICOPTER, BOAT, FIRE
ENGINES, AIR PLANE LIFE
SAVING EQUIPMENT

Tokyo road map
Apartment, Home name,
age, sex of residence
regular, holiday

Specialist on call for
receiving consultations
Emergency Medicine in Disaster Planning

Axiom: Planning for small scale simple disaster is possible in small hospital.
For large scale and complex is impossible.
Emergency medical care has inadequate personal.
Appropriate critical care must available.
First responder and prehospital care is important.

Triage → Resuscitated → Transport
Command – Communication – Co-Ordination
Our Pitfalls in Management of Tsunami Disaster 24 December 2004
What Happen in Disaster?
Tsunami, December 26, 2004

Sumatra Earthquake 9.0 Richter’s

Wave Height 7-15 Meters

Wave Speed 500 Km/Hr

The most powerful wave in 40 years

310,000 Reported dead and loss

Million Injured

34,000 Severe Injured
Earthquakes happen when the plates that make up the Earth's surface suddenly move against each other.

On 26 December 2004 the biggest earthquake for 40 years occurred between the Australian and Eurasian plates in the Indian Ocean. The quake triggered a tsunami - a series of large waves - that spread thousands of kilometres over several hours.
Causes

1. Lack of First Responder
   - Knowledge for Disaster Sequence
   - Experience
   - Communicating
   - Human Resource Team Supportation
   - Team Action
   - Team Management
2. Lack of Commander

- Who ? Suitable ?
- Commander Roles ?
- Commander Receiving Datas ?
3. Lack of work Cooperation

- Team Work
- Individualization
- Communicating
- Knowledge
- Experience
Lack of Triage and Prehospital Care

- Place ? Area ?
- Team Work
- Optimal Prehospital Care ?
- Experience
- Instrument for Primary Care
- Hospital Facility Inadequate
Lack of In Hospital Cooperation

- Emergency Room
- Operating Theater
- Radiology Department
- Intensive Care Unit
- Ward
- Blood Bank
- Human Resource
- Strategic Plan for Mass Casualty
Lack of Transferring Network System

- Doctor to Doctor Discussion
- Patients Details Information
- In Adequacy of ICU Care
- Infection esp. HIV
Lack of Management System

- Human Resource
- Medical Instruments
- Food and water supply
- Prevention of secondary disaster
- epidemic, psychiatric problem
- Finance and budget
Lack of Rehabilitation System and Protecting System for Repeated Events
Problems of Evacuation and Transportation

- Destruction of bridge and road
- Failure of communication – telephone
- Ambulance - inadequate number
  - inadequate equipment
- Traffic difficulty due to mass gathering
- Traffic police not function properly
- No commander, No organized system
Long Distance Air Transportation : Requirement

Air bus 310 MRT Med Evac (Germany)
Full Equipped ICU Instrument 6 Stations
2 Pressure gas bottle – 100% oxygen, 8 hours
Ventilators, monitor, 25 highly train specialist
Able to carry another 38 PT. Less injuries
PITFALLS IN WOUND MANAGEMENT
## Synopsis of injuries sustained

<table>
<thead>
<tr>
<th>Type of Injury</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large-scale soft-tissue injury, lower extremity/hip</td>
<td>15</td>
<td>88</td>
</tr>
<tr>
<td>Thoracic trauma/ hemopneumothorax</td>
<td>7/3</td>
<td>41/18</td>
</tr>
<tr>
<td>Fractures (closed)</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>Large-scale soft-tissue injury, upper extremity</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>Fractures (open)</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Head</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>18</td>
</tr>
</tbody>
</table>

Some patients had more than one type of injury (n=17)
A pattern of severe large-scale soft tissue damage including high-level contamination was common to all tsunami victims evacuated to this medical facility.
# Resistance patterns for isolates from wound swabs and respiratory tract specimens

<table>
<thead>
<tr>
<th>Antibiotic Agent</th>
<th>Acinetobacter baumanil</th>
<th>Pseudomonas aeruginosa</th>
<th>Stenotrophomonas maltophilia</th>
<th>Escherichia coli (ESBL+)</th>
<th>Klebsiella pneumoniae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Piperacillin</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Piperacillin/ tazobactam</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Ampicillin/sulbactam</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
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<tr>
<td>Cefuroxim</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
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<tr>
<td>Cefotaxim</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Ceftazidim</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
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<tr>
<td>Imipenem</td>
<td>R</td>
<td>S</td>
<td>R</td>
<td>S</td>
<td>S</td>
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<tr>
<td>Meropenem</td>
<td>R</td>
<td>S</td>
<td>R</td>
<td>S</td>
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<tr>
<td>Aztreonam</td>
<td>R</td>
<td></td>
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<tr>
<td>Gentamicin</td>
<td>R</td>
<td>R</td>
<td>R</td>
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<td>R</td>
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<tr>
<td>Tobramycin</td>
<td>R</td>
<td>R</td>
<td>R</td>
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<tr>
<td>Amikacin</td>
<td>R</td>
<td>S</td>
<td>R</td>
<td>S</td>
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<td>Netilmicin</td>
<td>R</td>
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<td>Levofloxacin</td>
<td>R</td>
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<td>Ciprofloxacin</td>
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<td>I</td>
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<td>R</td>
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<tr>
<td>Fosfomycin</td>
<td>R</td>
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<tr>
<td>Colistin</td>
<td>S</td>
<td>S</td>
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</table>

ESBL, extended-spectrum B-lactamase; R, resistant; S, Sensitive; I, intermediate sensitive.
Definitions

- Emergency - Urgent Treatment
- Mass Casualty - Large Number
- Multiple Casualty - Many Casualty
- Disaster - Out of Control
Role of Doctors and Nurses

In

Disaster and Emergencies
Confusing Busy
The Roles of Doctors and Nurses
In
This Sequence Situations
روبกูน

ผศ.นพ.เพชร นิวติวงศ์

ศ.นพ.ทองจันทร์ หงส์ลวดลาย

รศ.นพ.อุติเรก ณ กลาง