Tsunami disaster in Thailand, ICU experience

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Department of Medical Services,
Ministry of Public Health
Tsunami disaster

- Dec. 26, 2004 in Andaman Sea, India Ocean
- Causing: 214,344 death
  - 142,079 missing
  - 34,410 injured

WHO. Tsunami & health: situation report No. 31. Jan 29, 2005
Thailand

Tsunami occurred for the first time
Damaging 6 provinces: Phuket, Phung-Nga, Krabi, Ranong, Trang and Satun

Causing: 5,392 death
           : 3,100 missing
           : 8,457 injured

WHO. Tsunami & Health: situation report No.31. Jan 29, 2005
Tsunami in Thailand

**Takuapa General Hospital**
- a district hospital, 177 beds
- Patients were brought to ER: 2,285
  - injury - mild: 1,625
    - moderate: 390
    - severe: 270
- admitted: 628

After stabilization, wound cleansing, suturing, giving antibiotics and tetanus toxoid; they were transferred to other hospitals.

Wattanawaitunechai C et al; NEJM 352;10,2005
Tsunami in Thailand

• **Takuapa General Hospital**
  
a district hospital, 177 beds

Patients were admitted 628
  • Foreign tourists 294
  • Foreign labors 24
  • Thai, both tourists & locals 310
Takuapa General Hospital

The patients admitted to ICU up to Dec 31, 04

Total of patients: 19

- Improved (sending to wards): 5
- Transferred: 7
- Expired: 5
- On respirators with septic shock: 2
- There were 2 more Tsunami pts transferred to ICU for respirators
Tsunami in Thailand

Medical volunteer team from Rajavithi Hospital

Wilai Puavilai, MD; Pairaj Kateruttanakul, MD
Subsai Kongsaengdao, MD; Sakarn Bunnag, MD
Napa Siriwatanakul, MD; Anan Kriangkrichoke, MD
Kriangsak Atipornwanij, MD
Pornchanok Nontasut, Pulmonary RN.
(with bronchoscope & equipments, potent antibiotics)

Medical Residents
Korn; Pariwat; Sureeratana; Charnsak
Parinya; Nathanan; Krisada
Kamol: Nephrology Fellow
# Tsunami in Thailand

<table>
<thead>
<tr>
<th>Clinical Manifestation</th>
<th>Pt. 1</th>
<th>Pt. 2</th>
<th>Pt. 3</th>
<th>Pt. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age/gender</td>
<td>39/ male</td>
<td>26/female</td>
<td>64/female</td>
<td>35/female</td>
</tr>
<tr>
<td>Salt water aspiration</td>
<td>yes</td>
<td>yes, near drowning</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>First day of disaster admission</td>
<td>yes/ICU</td>
<td>yes/ICU</td>
<td>no, OPD case</td>
<td>yes, regular ward</td>
</tr>
<tr>
<td>Co-morbidity</td>
<td>- wound(s)</td>
<td>yes</td>
<td>no</td>
<td>yes, penetrating</td>
</tr>
<tr>
<td></td>
<td>- other</td>
<td>pelvic fracture</td>
<td>Premature labored</td>
<td>DM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yes, Lt. leg Lt. fibula open fracture</td>
</tr>
<tr>
<td>Antibiotic</td>
<td>IV</td>
<td>IV</td>
<td>PO</td>
<td>IV</td>
</tr>
<tr>
<td>(conventional)</td>
<td></td>
<td></td>
<td></td>
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## Tsunami in Thailand

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<tr>
<td>Respiratory support</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Shock</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>(dopamine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On 6th day</td>
<td>worsening pneumonia/pul. Congestion</td>
<td>worsening severe pul. congestion</td>
<td>resp. failure Lobar(Rt.&gt;Lt.) pneumonias</td>
<td>VF in OR non-cardiac pul. Edema</td>
</tr>
<tr>
<td>- chest X-ray</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilator/Fl O2/PEEP</td>
<td>yes/Fl O2(0.4-0.6)/low</td>
<td>yes/Fl O2(0.7-0.9)/high</td>
<td>yes/Fl O2(0.6-0.8)/moderate</td>
<td>yes/Fl O2(0.7-0.9)/high</td>
</tr>
<tr>
<td>Continuous Sedation</td>
<td>no</td>
<td>yes (twice)</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Complication</td>
<td>non-cardiac pulmonary congestion</td>
<td>ARDS UGI bleeding pneumothorax</td>
<td>septic shock</td>
<td>shock, resp. failure pneumothorax</td>
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</tr>
<tr>
<td>Organisms</td>
<td>P. aeruginosa, Klebsiella spp.</td>
<td>P. aeruginosa, Neisseria spp.</td>
<td>B. pseudomallei, cultured MRSA, E.coli, negative Enterobactor spp.</td>
<td></td>
</tr>
<tr>
<td>-sputum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td>no growth</td>
<td>no growth</td>
<td>B. pseudomallei</td>
<td>no growth</td>
</tr>
<tr>
<td>Vx. Discharge</td>
<td>-</td>
<td>Sternotrophomonas spp.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Antibiotics IV</td>
<td>Meropenem / ciprofloxacin / metronidazole</td>
<td>imipenem/ clindamycin/ ciprofloxacin / cotrimoxazole (oral)</td>
<td>imipenem/ meropenem/ clindamycin/ ciprofloxacin / cotrimoxazole (oral)</td>
<td>vancomycin/ cotrimoxazole IV</td>
</tr>
</tbody>
</table>
Figure 6 Sequence of radiological findings showed diffuse infiltration with ARDS (6A), then rapidly progressive course (6B), and (6C). 

Pt.2
Near Drowning

Acute respiratory failure

• Failure of gas exchange due to inadequate function of one or more essential components of the respiratory system

• Diagnosis:
  hypoxemia $P_{O_2} < 60$ mmHg at sea level
  or
  $P_{CO_2} > 45$ mmHg

Near Drowning

**Acute respiratory distress syndrome (ARDS)**

- A clinical syndrome of severe dyspnea, rapid onset of hypoxemia and diffuse pulmonary infiltration, leading to respiratory failure
- Caused by diffuse lung injury from many underlying medical and surgical illness
- Diagnosis:
  $$aP_{O_2} \text{ (mmHg)}/ \text{FiO}_2 \text{ (inspiratory O}_2\text{ fraction)} < 200 \text{ mmHg}$$

Levy BD, Shapiro SD; in 16th Edition Harrison’s Principle of Internal Medicine 2005
Lobar Pneumonias Rt. > Lt.
Fig. 1 Distribution of reported melioidosis cases and isolation of *Ps. pseudomallei* from natural sources in Thailand.

Punyagupta S, et.al; Melioidosis 1989
There were 4 pts, serious Cardio-Cerebrovascular problems after Tsunami disaster ≥ 7 days, admitting to ICU

- Acute coronary syndrome (ACS):AMI 2
  (having salt water aspiration )
- Acute pulmonary edema 1
  (underlying hypertrophic obstructive cardiomyopathy with no significant CAD)
- Ischemic stroke with seizure 1
  (underlying aspirated pneumonia from salt water aspiration)
Tsunami in Thailand

All 8 Tsunami ICU patients got intensive treatment:

- close monitoring of Fi O2, PEEP, BP, finger-tip oxymetry
- continuous IV sedation & muscle relaxant in severe respiratory failure/ARDS
- potent (empirical) antibiotics
- negative fluid balance ~400-600 ml/d keeping BUN : Cr ≤ 20:1 in pts with pulmonary congestion

Resulting in no hospital mortality
One young looked healthy man, salt water aspiration from Tsunami, having **non-septicemic pulmonary melioidosis (Burkholderia pseudomallei)**, with underlying HIV positive
Antibiotics: ceftazedime + cotrimoxazole
Lessons from Tsunami disaster:

• Wound cleansing properly, if contaminating with soil, mud, salt water

• Aware about Melioidosis (B. pseudomallei) from soil, mud from South-western Thailand contaminated wounds, aspiration; especially having underlying DM, HIV positive

• There should be an internist/pulmonary physician in a mobile rescuer team with potent antibiotics and a volume respirator.
ผู้ป่วยนอก ให้การรักษาผู้ป่วยเพิ่มเติม