Introduction to Disaster Medicine
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Large Impact
- Worldwide > 3.4 million deaths in 25 yrs
- Hundreds of millions suffered
- Tens of billions of dollars to recover

Nature of Disasters
- Low probability, high impact
- Only 10-15/yr with >40 deaths
- Results in funding deferred

Frequent!
- Disaster occurs almost daily - somewhere
  - September 11 attacks
  - Tsunami affecting Indian Ocean countries
  - Gulf Coast Hurricanes

Complacency
- Relative infrequency of major catastrophe
- Underestimation of impact
- Reluctance to devote adequate resources
- Best time for change – immediately after

Rare in US by world standards
- Only 10 have resulted in > 1000 deaths

<table>
<thead>
<tr>
<th>Year</th>
<th>Occurrence</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1865</td>
<td>Steamship explosion</td>
<td>1547</td>
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<tr>
<td>1875</td>
<td>Forest fire – Wisconsin</td>
<td>1182</td>
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<tr>
<td>1889</td>
<td>Flood, Pennsylvania</td>
<td>&gt;2000</td>
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<tr>
<td>1900</td>
<td>Hurricane, Texas</td>
<td>8000</td>
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<tr>
<td>1904</td>
<td>Steamship fire</td>
<td>1021</td>
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<td>1906</td>
<td>San Francisco Earthquake</td>
<td>&gt;3000</td>
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<td>1928</td>
<td>Hurricane, Florida</td>
<td>2000</td>
</tr>
<tr>
<td>1941</td>
<td>Pearl Harbor Attack</td>
<td>2403</td>
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<td>2001</td>
<td>September 11 Attack</td>
<td>2819</td>
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<td>2005</td>
<td>Hurricane Katrina</td>
<td>&gt;1300</td>
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Public Expectations

- Public expects rapid response
  - Local, state, federal
- Preservation of life & health
- Medical personnel included in planning

Classifying Disasters

- Natural versus technological
  - Several crossovers
    - Building collapse from natural disaster
    - Katrina – fires while rescuing flood victims
- Several generalities:
  - Tornadoes lethal but short lived
  - Hurricanes longer, more long term effects

Hurricane Andrew

- Only 44 deaths
- Affected lives of 3 million people
- >3 billion dollars in damage

Technologic Disasters:

- More contained but quite lethal
- Toxic spills:
  - Cyanide gas from Bhopal, India
  - Nuclear mishaps - Chernobyl

Classifying Disasters:

- Level 1
  - Local response adequate
- Level 2
  - Regional aid from surrounding communities
- Level 3
  - Requires statewide or federal assistance

Level 1 Disaster

- Only local resources
- Escalated EMS response
- Municipal resources
- Community agencies
Level 2 Disaster
- Regional resources
- State level
- Mutual aid agreements
- Specialized equipment (e.g. cranes)
- Confined space medicine teams

Level 3 Disaster
- Widespread & massive
- State & Federal resources needed
- National Guard
- NDMS – National Disaster Medical System
- DMAT
  Disaster Medical Assistance Team

Disaster Cycle:
- Quiescent Phase
  - Inter-disaster period
  - Combination of events will lead to disaster
  - May not be obvious
  - Underlying cause may be apparent
  - (retrospectoscope)
  - Risk assessment may be of benefit

Disaster Cycle:
- Prodrome Phase
  - Warning phase
  - Variable time
  - Hurricane
  - Volcanic eruption
  - Armed conflict
  - If recognized, steps may be taken

Disaster Cycle:
- Impact phase
  - Short e.g. earthquake
  - Long e.g. famine
  - Tough to impact if no preparation

Disaster Cycle
- Rescue Phase
  - Immediate assistance can save lives
  - Bystander rescue
Response
- Typically, manpower not a problem
- Layperson response
  - Outpouring from the community
- Professionals response
  - Coffee break not an issue

Layperson response
- Initial response to the scene
- Most uncomplicated search & rescue
- Disaster plans – laypersons removed
  - Most laypersons cooperative

Voluntary medical personnel
- Respond out of altruism
- or
- Requested by news agencies
- Blessing & curse

Voluntary medical personnel
- Docs generally in controlled environment
- Unaware of dangers
- Injury or death of volunteers
- Austere conditions
  - Docs no more helpful than paramedics
- In general, docs should report to hospital
  NOT to disaster site

Triage
- World War I
  - Triage at central casualty collection point
- World War II
  - Tiered approach
  - First treated in field by medics
  - Passed to higher level care as needed

Triage
- Korean War – air evacuation
- Vietnam – further refinement
  - WWII – 4.7% mortality (12 – 18 hrs till care)
  - Vietnam – 1% mortality (<2 hrs till care)
**Disaster Triage**
- Greatest good for greatest number
- Identify those likely to survive

**START Simple Triage & Rapid Treatment**
- Developed in 1983
  - Newport Beach Fire Department & Hoag Hospital, California
- Updated in 1994

**START Simple Triage & Rapid Treatment**

**START**
- Simple Triage & Rapid Treatment
Triage Categories

- Priority 1 – Red
  - Critically injured
  - Good chance of survival
  - Controllable massive bleed
  - Tension pneumothorax

- Priority 2 – Yellow
  - Significant injury "but" tolerate delay in care
  - Simple but significant fracture
  - Femur
  - Hip
  - Humerus

- Priority 3 – Green
  - Minimal, non-urgent
  - Abrasions
  - Contusions
  - Sprains
  - Simple lacerations
  - Walking wounded

- "Expectant" patient – Black
  - Minimal chance of survival
  - Massive head injuries
  - >93% 3rd degree burn

Triage Categories

- Some have suggested a 5th level
  - Blue
  - Massive injury, but transport after Reds
  - Most priority 2 can wait
  - This is not yet generally accepted

Minimal acceptable care:

- Divert resources from less injured
- Less severe injuries – lower level of care
- Splint long bone fractures without x-ray
- Minimize CT use
- Empiric chest tube placement
Minimal acceptable care

- No good studies
- Must use logic

Under- & Over-triage

- Under-triage
  - Underestimate the degree of injury
  - No triage system is perfect
  - Acceptable rate defined as <5%

Under- & Over-triage

- Over-triage
  - Noncritical triaged as critical
  - Up to 50% historically defined acceptable
  - Has been shown to have adverse effect
  - Dilutes medical resources

Disaster Control Center

- Keep away from center
- Learned the hard way
- Need for calm
- Need for communication devices

ICS

Incident Command System

- Who’s in charge?
- Predesignate responsibilities
- Predesignate hierarchy e.g.:
  - Command system
  - Medical
  - Supplies
  - Repair
  - Communications

NDMS

National Disaster Medical System

- Part of US Health & Human Services

- Partners include:
  - FEMA
  - Dept of Defense
  - Dept of Veterans Affairs
**NDMS Teams**
- **DMAT** – Disaster Medical Assistance Team
- **DMORT** – Disaster Mortuary Operational Response Team
- **NMRT** – National Medical Response Team

**NDMS Operations:**
- Evacuation
- Conducted by Air Force

**DMAT**
- Professional & Para-professional personnel
- Rapid response medical care
- Casualty decontamination

**DMAT**
- 55 teams
- Spread across the country
- Local groups of healthcare providers
- Defined by capability & experience

**DMAT**
- Deploy to disaster sites
- Enough supplies to be self-sufficient
- Responsibilities include:
  - Triage
  - High-quality care in austere environment
  - Prepare patients for evacuation
  - Augment overloaded local facilities

**DMAT Composition**
- Physicians
- NP, PA, RN
- Pharmacists
- Resp. therapists
- Paramedics
- EMTs
- 50-125 members
- 35 deploy to most missions
DMAT Composition
- “Intermittent” federal employee
- Active federal employee when deployed
- Protected from tort while activated

Domestic Pharmaceutical Preparedness
- 1999 – Congress initiated plans
- Stockpile of pharmaceutical agents: NPS National Pharmaceutical Stockpile
  - Provide medicine & supplies on short notice

Domestic Pharmaceutical Preparedness
- 2001 – Homeland security briefly assumed control
  - Now back to DHHS & CDC: “SNS” Strategic National Stockpile

Domestic Pharmaceutical Preparedness
- Once deployed – <12 hours till arrive
  - Each state received special training
    - Receiving supplies
    - Distributing supplies

Domestic Pharmaceutical Preparedness
- National repository of:
  - Antibiotics
  - Chemical antidotes
  - Antitoxins
  - Life support medications
  - IV administration
  - Airway supplies
  - Med/surg items