Comparison of Disaster Medical Response System: Proposal of New Study

Chih-Hao Lin, M.D. Taiwan

Emergency Department, National Cheng Kung University Hospital

Medical Director, Fire Bureau of Tainan City

Deputy Manager, South branch of Medical Emergency Operation Center

Chi-Chi earthquake(1999), SARS(2003)

Outlines

- Common myths and fallacies in disaster medicine
- Frame of Medical Response in Taiwan
- Comparison of Disaster Medical Response System

What is a disaster???

Hazard
Contained energy with potential to harm

Incident
Release of energy with potential to harm

Damage
Adverse consequence of energy release = harm

Disaster
Needs produced by damage > resources available in community

- Needs may be:
  - Health-related
  - Material
  - Environmental
  - Economic

Sundnes KO, Birnbaum ML: Prehosp Disast Med 2003;17

Q1. Victims of disasters are often panic ?

- False. Most of victims are not panic.

Year	Disaster	Observation
1942	Fire Coconut Grove Nightclub Massachusetts, USA	Most persons calmly gathered their friends and evacuated (Quarantelli, 1972; 68)
1945	Atomic bomb explosion Hiroshima, Japan	No evidence of mass panic. Many tried to help others (Fritz 1961; 671)
1953	Tornado Waco, TX USA	No evidence of panic (Moore 1958; 7)
1964	Earthquake Anchorage, AK USA	No panic in patients or staff in hospitals at any time (Yutzy 1969: 68)
1977	Fire Beverly Hills Supper Club Kentucky, USA	No evidence of panic (Keating 1989; 89)

World Trade Center Attack, 2001

Q2. Who performs the most and the earlist search and rescue in large-scale, sudden impact disasters?

A. Police ?
B. Fire ?
C. EMS ?
D. Military ?
E. Victims themselves and other survivors ?

E. By victims and other survivors

Year	Disaster	Observation
1976	Earthquake Tangshan, China	200-300,000 survivors rescued themselves and then rescued 80% of others
1980	Earthquake Campania-Irpinia, Italy	90% of search and rescue by untrained, uninjured survivors
1985	Earthquake, Mexico City	>1.2 million involved in search and rescue
1989	Loma Prieta Earthquake San Francisco, CA USA	>31,000 in 2 counties involved in search and rescue; 5% of Santa Cruz and 3% of San Francisco population

Yong, C. The Great Tangshan Earthquake of 1976: An anatomy of disaster. Pergamon Press; Oxford. 1988
Dynes RR. 1990. Individual and organizational response to the 1985 earthquake in Mexico City, Mexico. Disaster Research Center, University of Delaware, Newark DE 1990
O'Brien PW. Citizen participation in emergency response. In: Bolton PA (ed). The Loma Prieta, California, earthquake of October 17, 1989: Societal response. Washington (DC). US Government Printing Office, 1993.

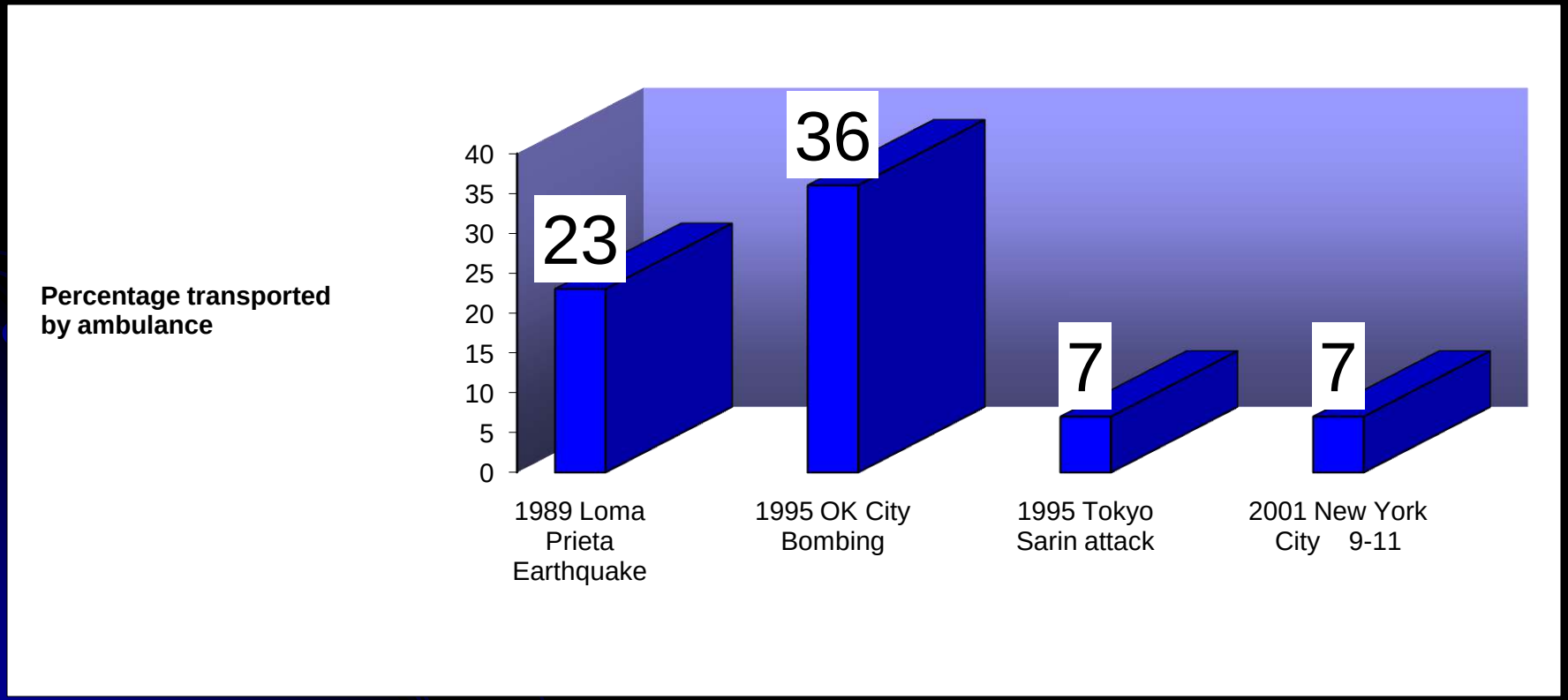
Marmara Earthquake, 1999

Madrid Bombing, 2004

Sichuan Earthquake, 2008

Q3. Most injured survivors are brought to hospitals by EMS in disasters ?

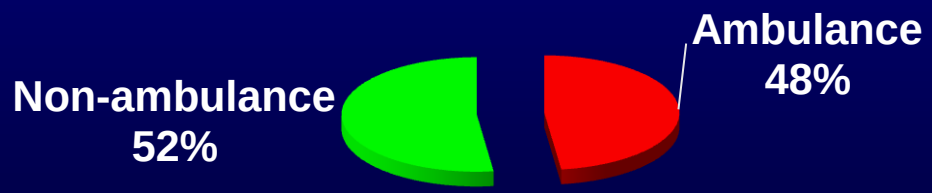
False. Most injured survivors bypass EMS to get to hospitals if not incapacitated and not located remotely.



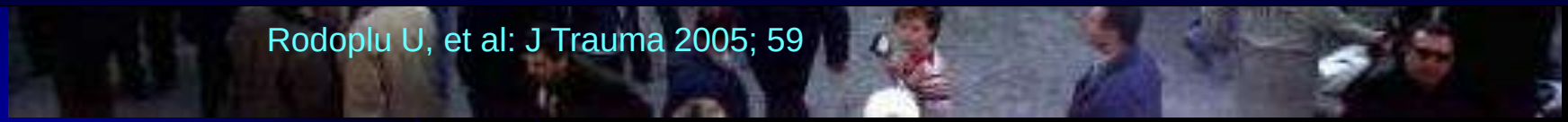
20 November 2003 Istanbul bombing

Transport mode to Taksim Education and Research State Hospital (%)

450 total injured, 33 dead



184 patients



Rodoplu U, et al: J Trauma 2005; 59

Most patients bypass EMS in chemical emergencies if not incapacitated

- 1995 Tokyo Subway sarin attack
  - 640 victims presented to St. Luke's International Hospital
  - 576 (90%) bypassed EMS and went directly to hospital
  - All potentially contaminated

This means:

1. Little decontamination is performed in the field!
2. Most hospital should have decontamination ability!

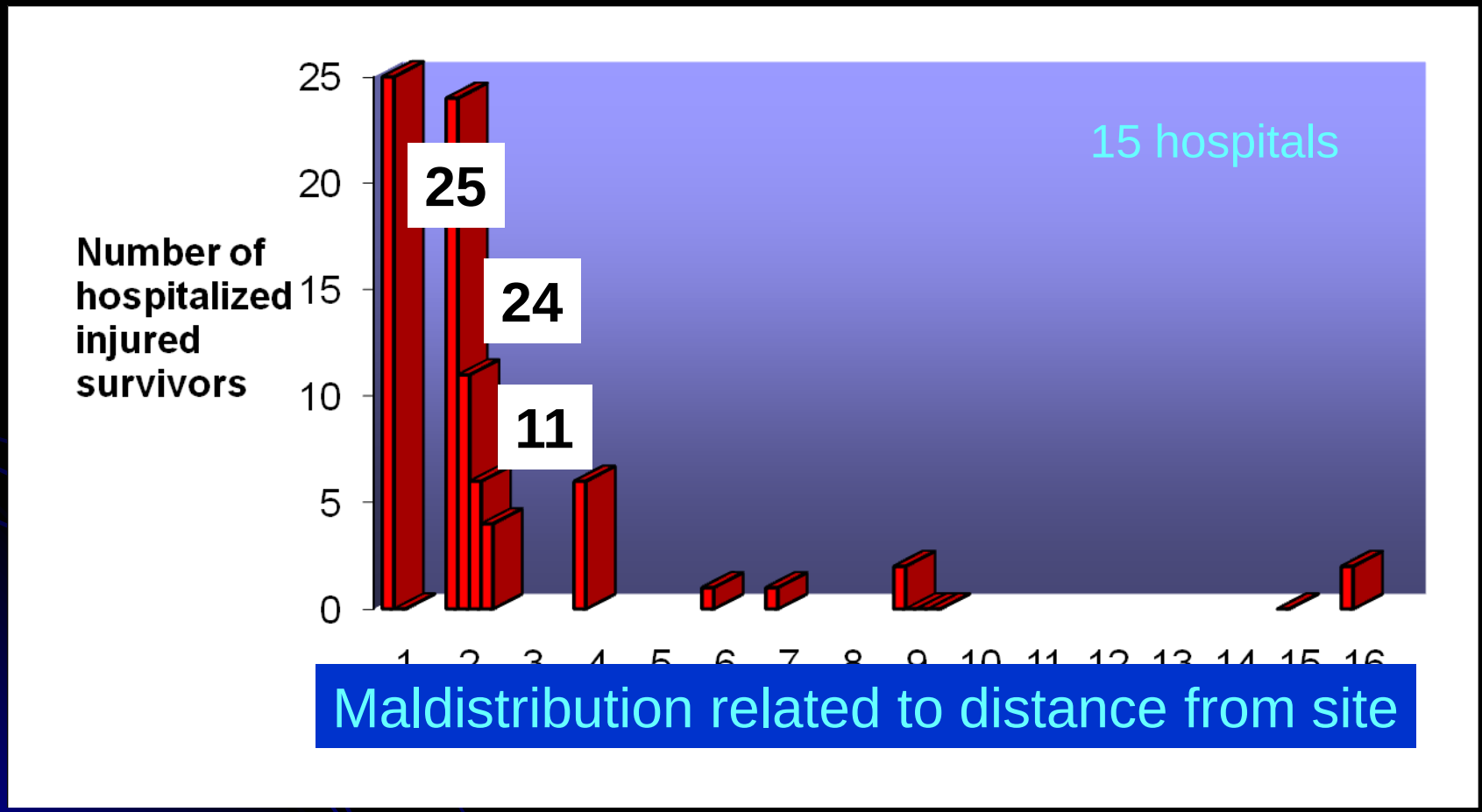
Okumura T. Report on 640 victims of the Tokyo Subway Sarin attack. *Ann Emerg Med* 1996;28:129-135.

Q4. Victims are usually evenly distributed to nearby hospitals in sudden-onset emergencies ?

False. Victims are often maldistributed to hospitals.

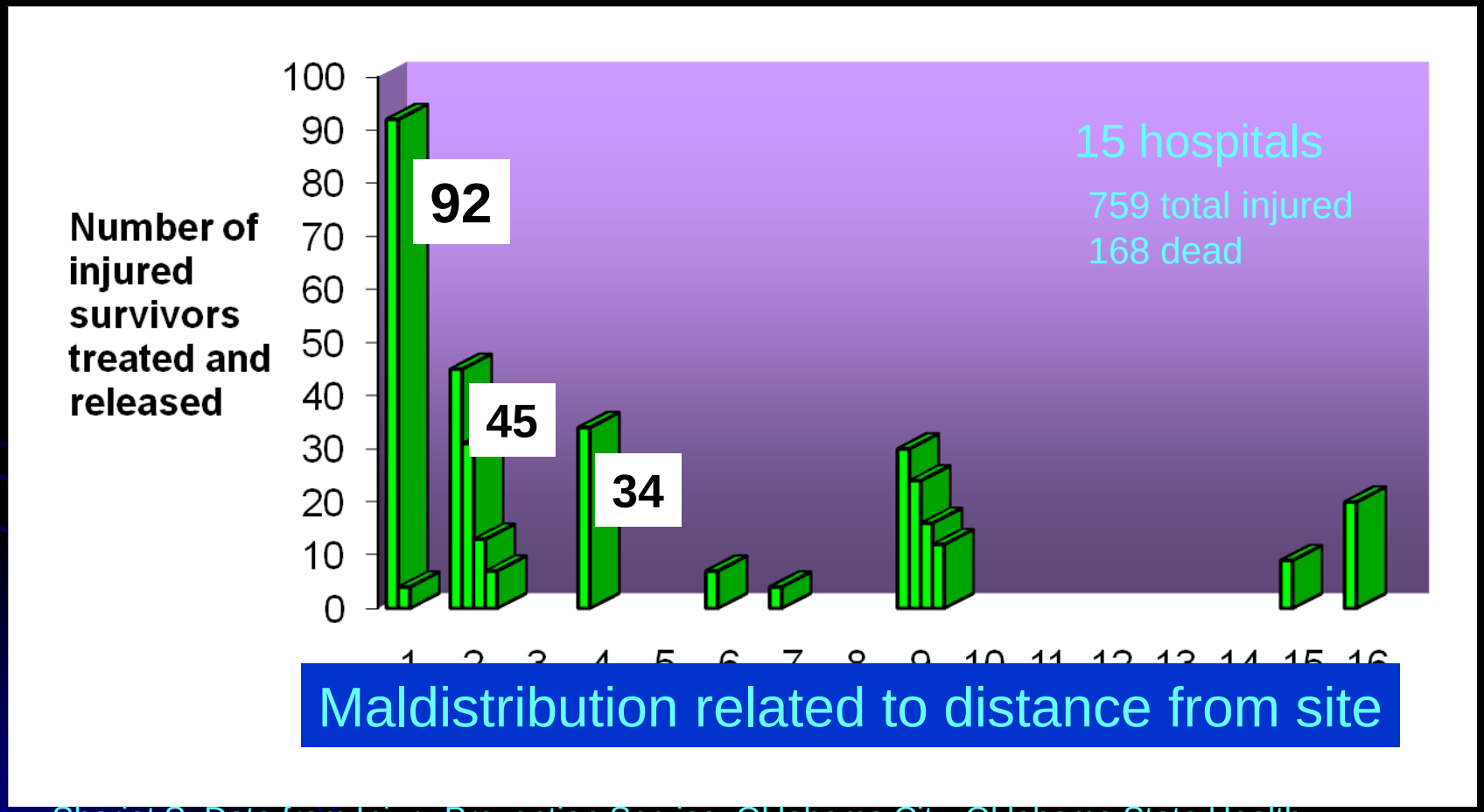
Year	Disaster	Observation
1964	Alaska Earthquake	Almost all victims taken to 1 of 5 available hospitals
1976	Train crash, Chicago, USA	85% of 381 injured taken to 3 of 11 available hospitals
1981	Hyatt Hotel Skywalk Collapse, Kansas City, USA	42% of 200 victims taken to 4 of 26 available hospitals
1982	Air Florida crash, Washington, DC, USA	86% of 22 victims taken to 1 hospital

Distribution of victims with serious injuries to hospitals - 1995 Oklahoma City bombing



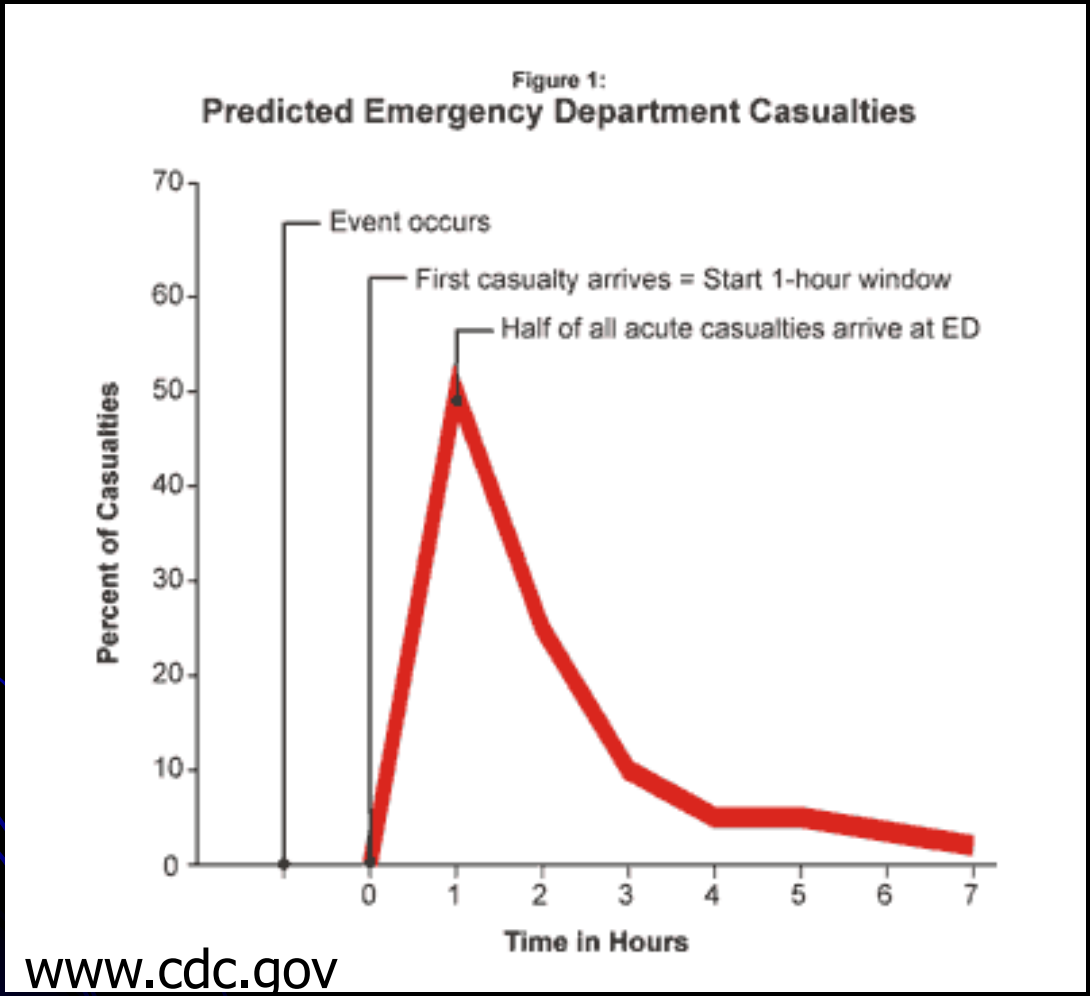
Shariat S. Data from Injury Prevention Service, Oklahoma City, Oklahoma State Health Department. 2002

Distribution of victims with minor injuries to hospitals - 1995 Oklahoma City bombing



Shariat S. Data from Injury Prevention Service, Oklahoma City, Oklahoma State Health Department. 2002

Q5. The first victim usually arrives at the hospital about one hour after a sudden-onset emergency ?



www.cdc.gov

False. Victims often arrive at hospitals immediately after an event.

Mass Casualty Terrorist Bombing	Type	Time (min)	Number hospitals	Reference
London Old Bailey 1973	Open air	5	1	Caro D. *Lancet* 1973; 1
Buenos Aires 1994	Collapse	"mins"	1	Biancolini CA. *J Trauma* 1997; 47
New York City 2001	Collapse	"mins"	5	CDC. MMWR 2002; 51
Cu Chi 1969	Mixed	15	2	Henderson, JV. *JWAEDM* 1986; 2
Tel Aviv 1995	Open Air	15	1	Paran H. *J Trauma* 1996; 40
London Victoria 1991	Open Air	16	3	Johnstone DJ. *Injury* 1993; 24
Madrid 2004	Collapse	17	1	Gutierriez de Ceballos U. *CritiCare* 2005; 8
Tower of London 1974	Conf space	20	1	Tucker K. *BMJ* 1975; 3
Oklahoma City 1995	Collapse	20	17	Anteau CM. *Crit Care Nurs Clin* 1997; 9
Enniskellen 1987	Collapse	23	1	Brown MG. *BMJ* 1988; 297
Barcelona 1987	Conf space	38	1	Morell PAG. *Burns* 1990; 16
London Soho 1999	Conf space	38	2	Williams KN. *Brit J Anesth* 2000; 85

Earliest time for ALL victims to arrive at hospital(s)

Mass casualty terrorist bombing	Type	Time (min)	No. victims	No. hospitals	Reference
Cu Chi 1969	Mixed	15	12	1	Henderson, JV. *JWAEDM* 1986; 2
London Victoria 1991	Open air	45	43	3	Johnstone DJ. *Injury* 1993; 24
Tel Aviv 1998	Open air	50	150	NA	Stein M. *Surg Clin NA* 1999; 79
Istanbul 2003	Open air	60	184	1	Rodoplu U. *J Trauma* 2005; 59
London Old Bailey 1973	Open air	70	160	1	Caro D. *Lancet* 1973; 1
Bologna 1980	Collapse	90	218	5	Brismar B. *J Trauma* 1982; 22
London Soho 1999	Confined space	143	59	2	Williams KN. *Brit J Anesth* 2000; 85
Saigon 1966	Open air	180	123	1	Withers JN. *Mil Med* 1966; 131

Time course of emergency needs

- First wave phenomenon
  - Ambulatory injured survivors with minor injuries – often self-transport
- Second wave phenomenon
  - Incapacitated injured survivors with immediately life-threatening and serious conditions – usually require EMS transport

Hogan DE. *Ann Emerg Med* 1999; 34; Gutierrez U. *Critical Care Med* 2005; 33; Rodoplu U. *J Trauma* 2005; 59

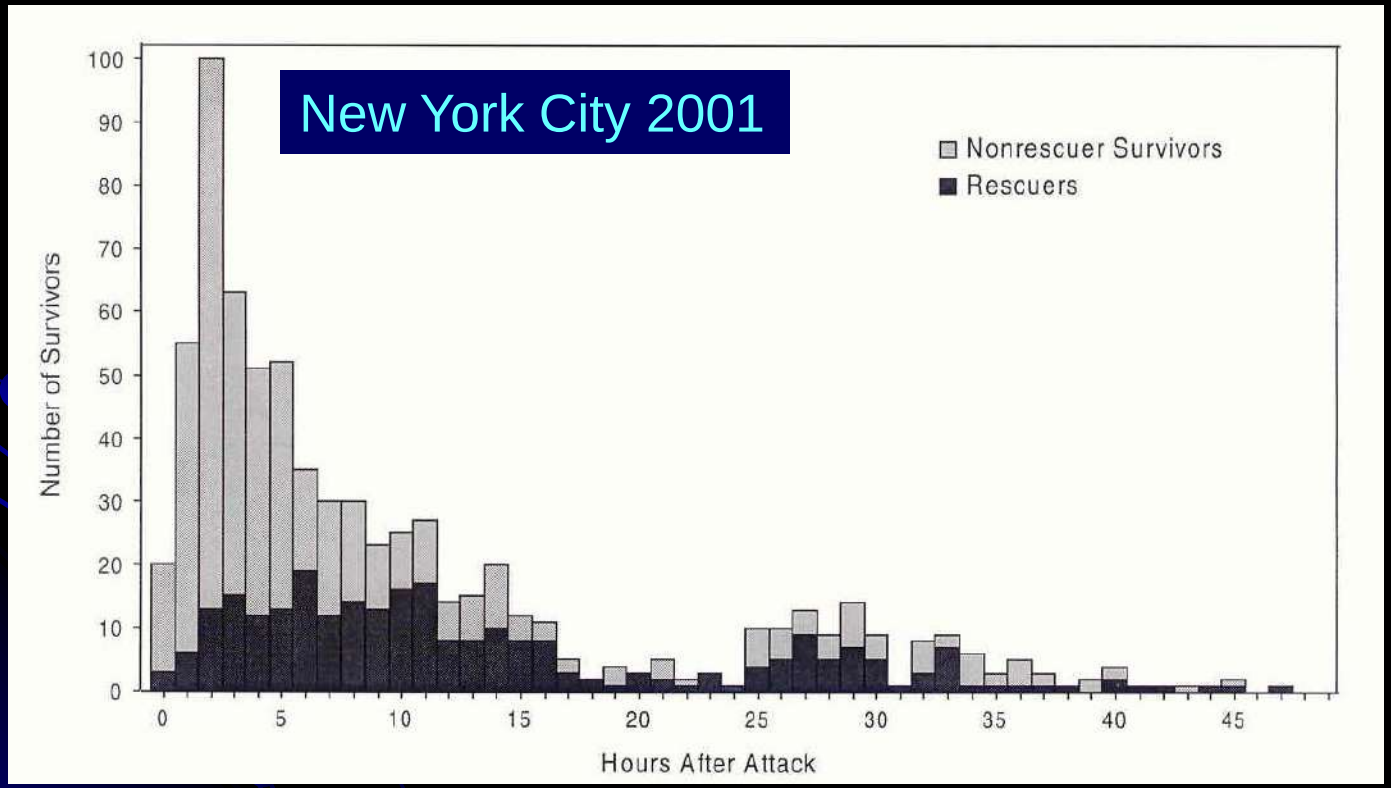
Third wave: very small

- Secondary distribution of injured survivors to other hospitals for definitive care (<24 hrs +)
- Istanbul 2003
  - 7 (9%) patients transferred to American Hospital on 15 Nov – 4 required operative care
  - 4 (20%) patients transferred to American Hospital on 20 Nov – 1 received operative care
- Bali 2002
  - Secondary distribution of burn victims to Australia

Rodoplu U. *Acad Emerg Med* 2005; 12. Rodoplu U. *J Trauma* 2005; 59

Fourth wave in large scale events

- Injured responders during clean-up



CDC. *MMWR* 2002; 51

Q6. START system is useful in all mass casualty incidents?

- CareFlight Triage
- CESIRA Triage
- Triage Sieve
- Pediatric Triage Tape
- Sacco Triage Method
- MASS Triage
- SALT Triage
- SAVE Triage

START = Simple Triage And Rapid Treatment System

Category	Findings	Triage response
Minimal	Can walk	Minor treatment unit
Expectant	No respiratory effort	Skip
Immediate	Abnormal respirations, tachypnea, delayed capillary refill, no radial pulse, cyanosis, altered mental status, decreased LOC	Immediate treatment unit
Delayed	All remaining	Care can wait – Delayed treatment unit

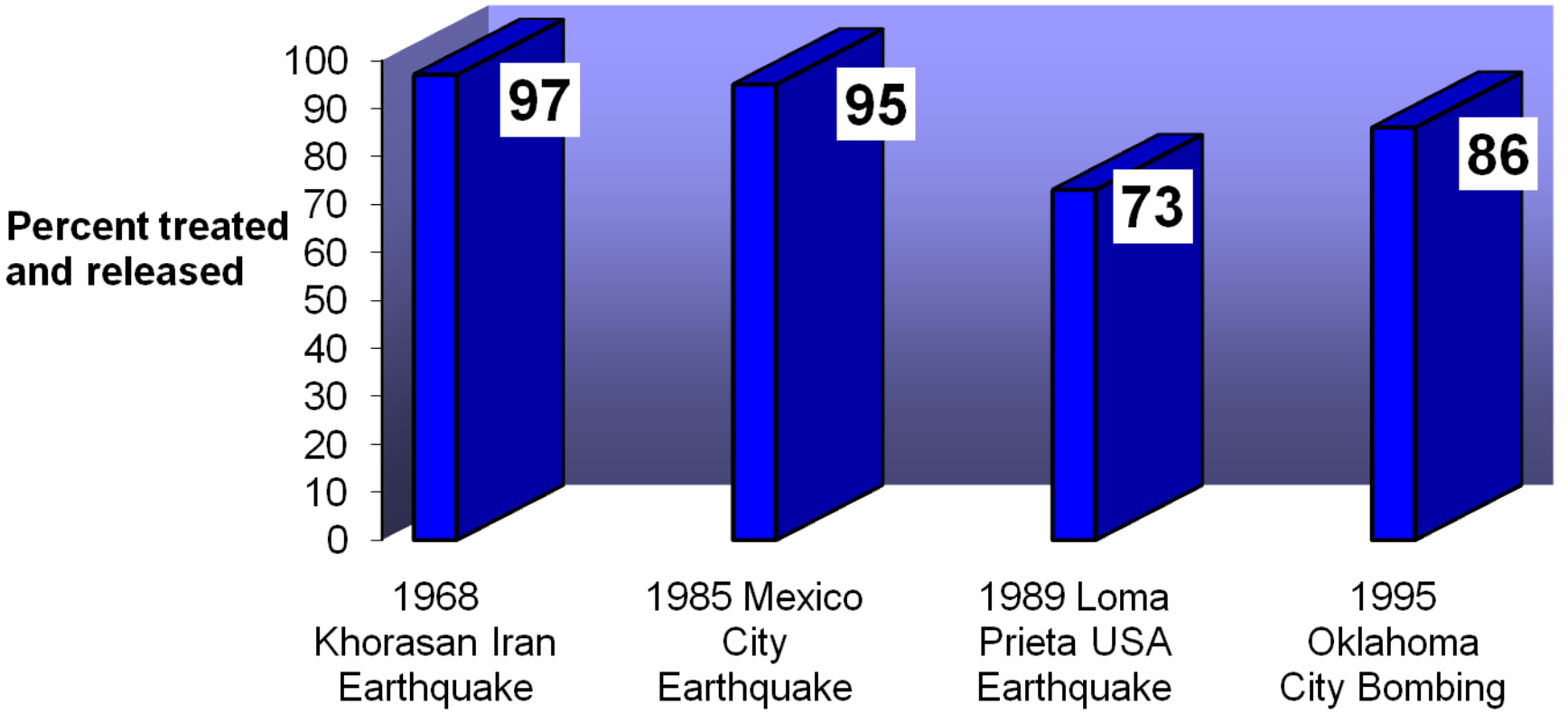
Really??

"Expectant" triage category not appropriate in resource-sufficient hospitals

Q7. What is the usual disposition of most victims reaching hospitals in sudden-impact disasters?

A. Most victims are hospitalized
B. Most victims receive critical care
C. Most victims receive operative care
D. Most victims are transferred to other hospitals
E. Most victims are treated and released from emergency departments

E. Most victims are treated and released from EDs.



Principles of external medical assistance in health disasters

- External medical assistance may be beneficial when:
  - Teams can be onsite and functional < 24 hrs
  - Local health care system severely damaged or destroyed
    - Catastrophic disasters - earthquakes
  - Casualties are ongoing
    - Complex emergencies – civil wars, conflicts
  - Specialized medical care is required
    - Earthquakes: orthopedic surgeons, nephrologists (RRT)
    - Radiation emergencies: hematologists (bone marrow transplantation)

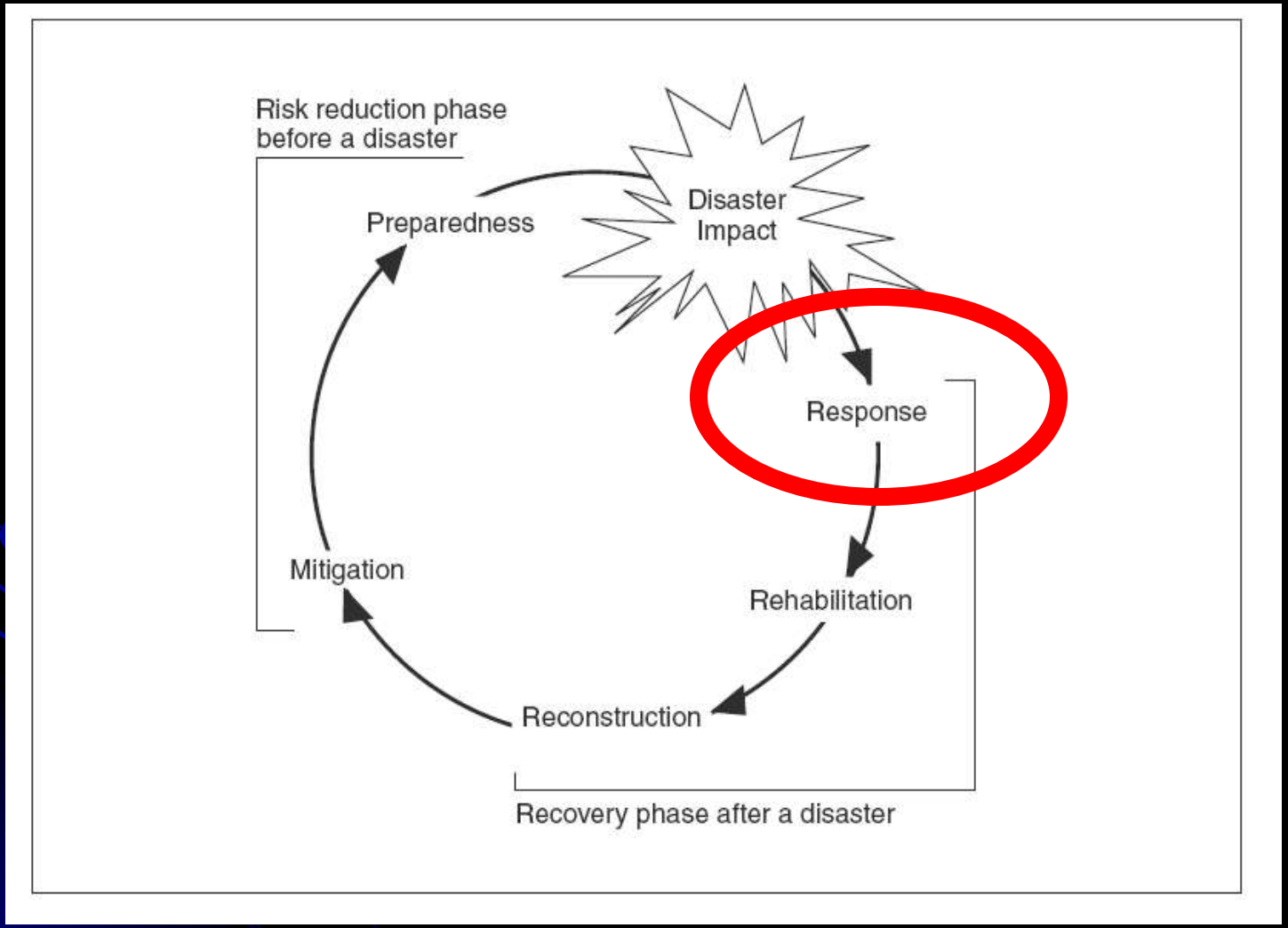
Kirsch TD: External emergency medical disaster response: Does a need exist? Ann Emerg Med 1996; 28

- More Myths and Fallacies:
  - Dead bodies cause communicable disease outbreaks after disasters ?
  - Early critical incident stress debriefing (CISD) helps prevent post-traumatic stress disorder (PTSD) after disasters ?
  - Disaster Medical Assistance Teams (DMATs) usually provide substantial emergency medical care during disasters ?
  - Hungry victims are willing to take anything edible?

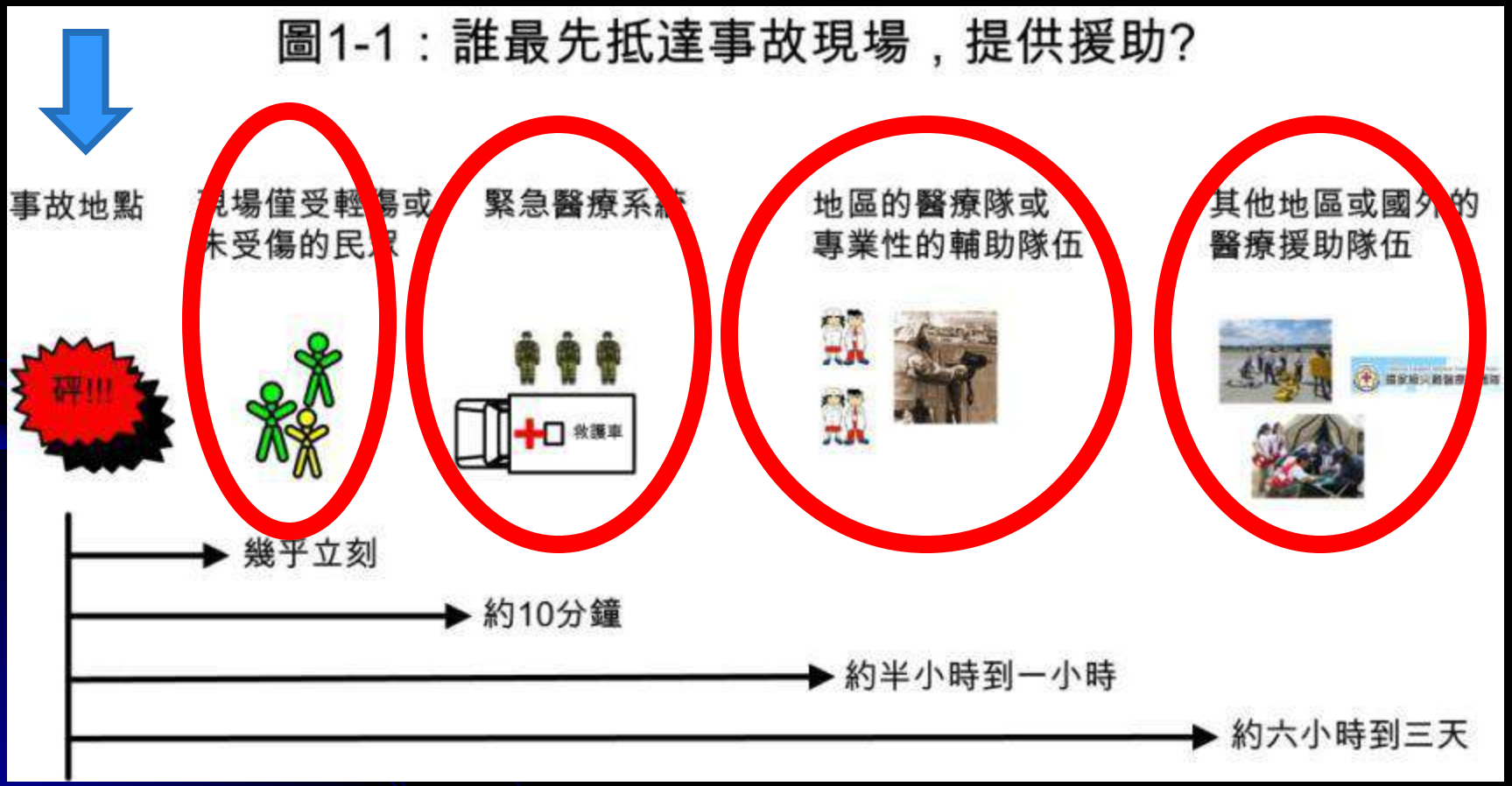
De Ville de Goyet C: Epidemics caused by dead bodies: A disaster myth that does not want to die. Pan Am J Public Health 2004; 15

Hurricane Katrina, 2005

Disaster Cycle

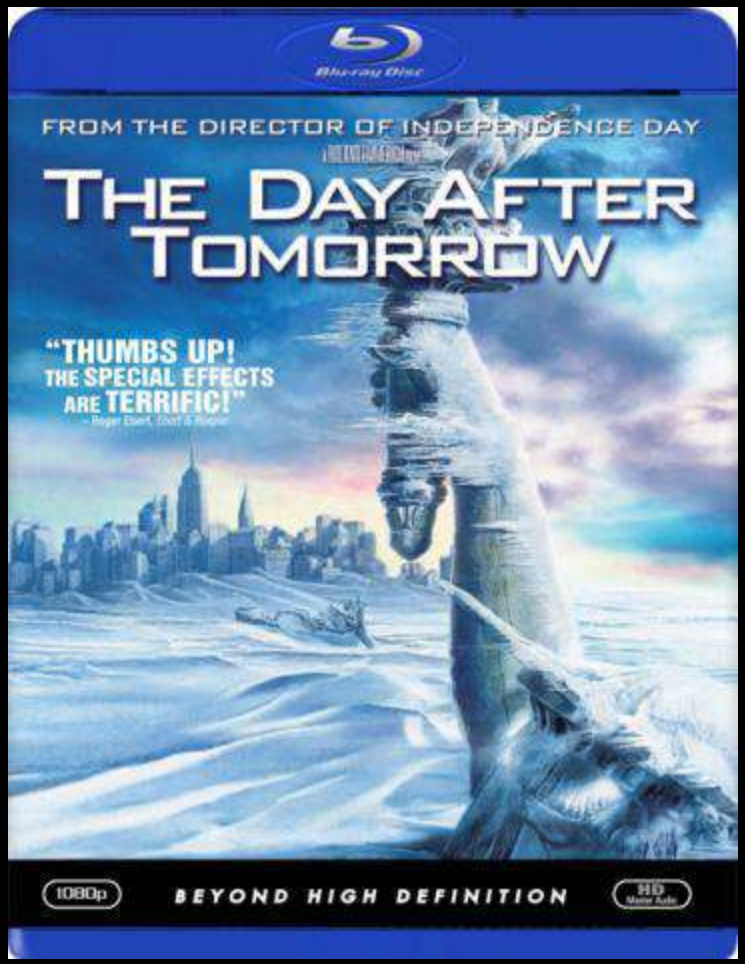


Timeframe of Responders



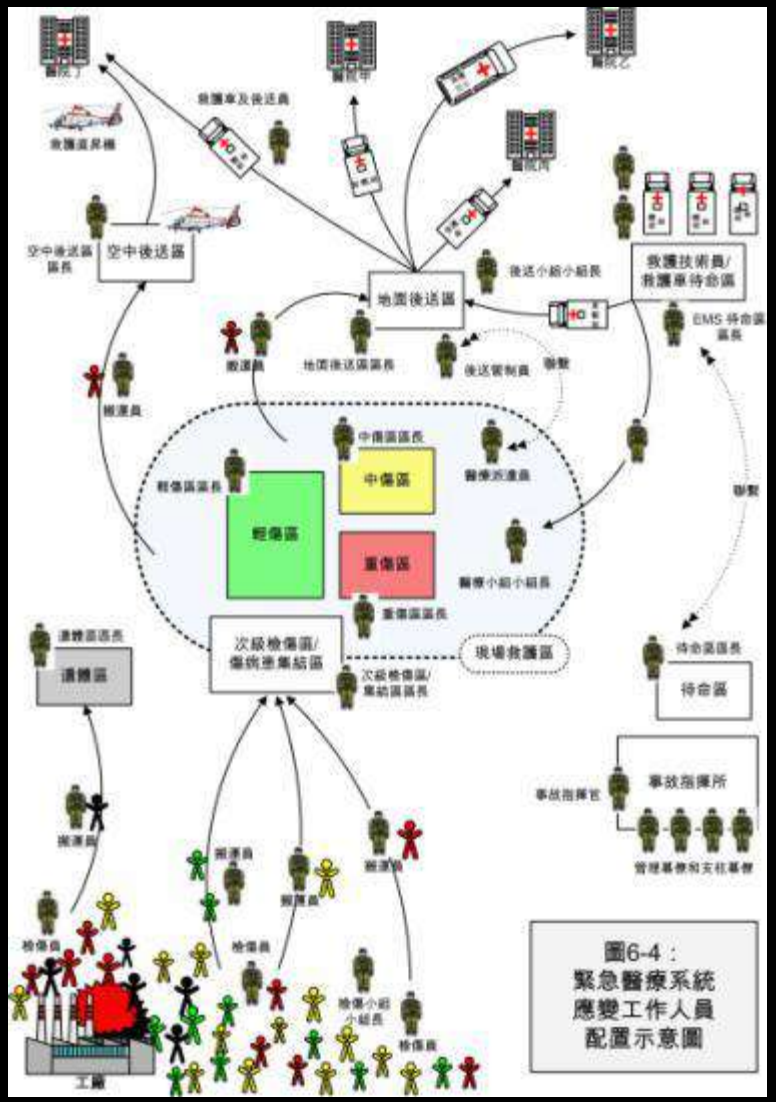
1. Community Disaster Response Team

- Bombing exercise in case of mainland china came into our towns…
- Nuclear factory
- High end tech but…
- Public education: TV news or hollywood movies ?



2. EMSS

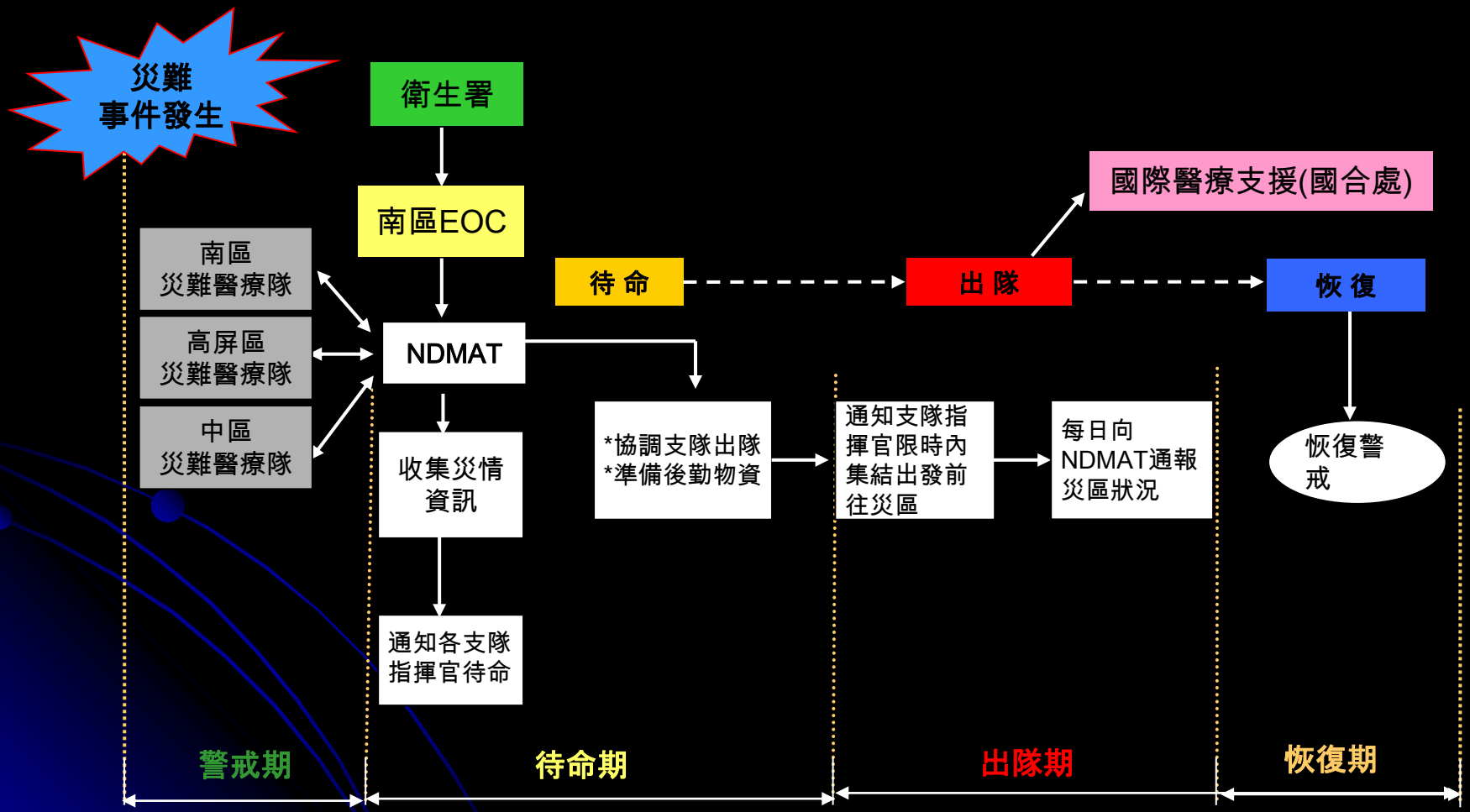
- The basic form of disasters: mass casualty incident—more than15 victims
- START triage
- Most EMSS have MCI exercise or HAZMAT exercise once or twice per year, but only 2 of 25 EMSS have some kind form of standard protocols



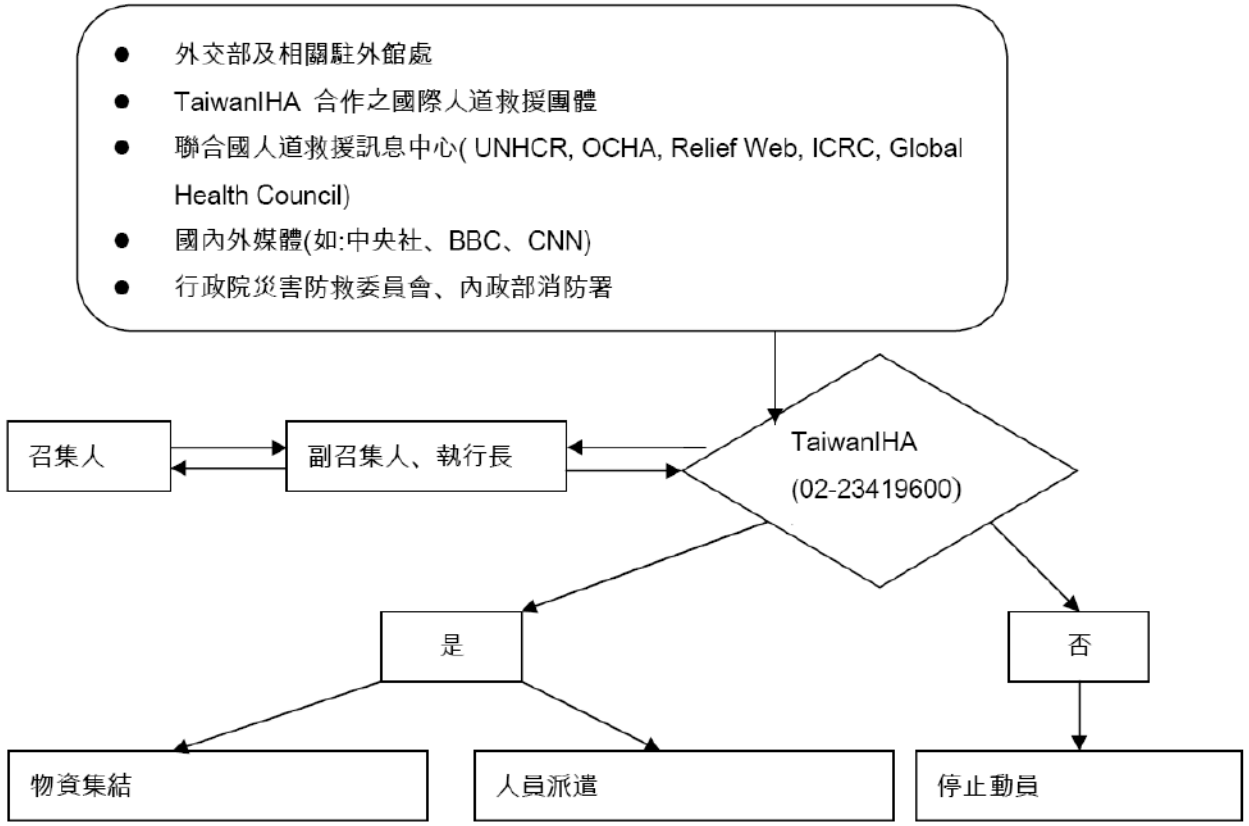
3. Local DMAT or Specialty Team

- Disaster medical assistance team
  - Each city or county
  - Hospital-base
  - Training course
- Specialty team
- Hospitals
  - Emergency Operation Plan: Acceptance, Evacuation, Relocation, Isolation, HAZMAT
  - Exercise

4. National DMAT



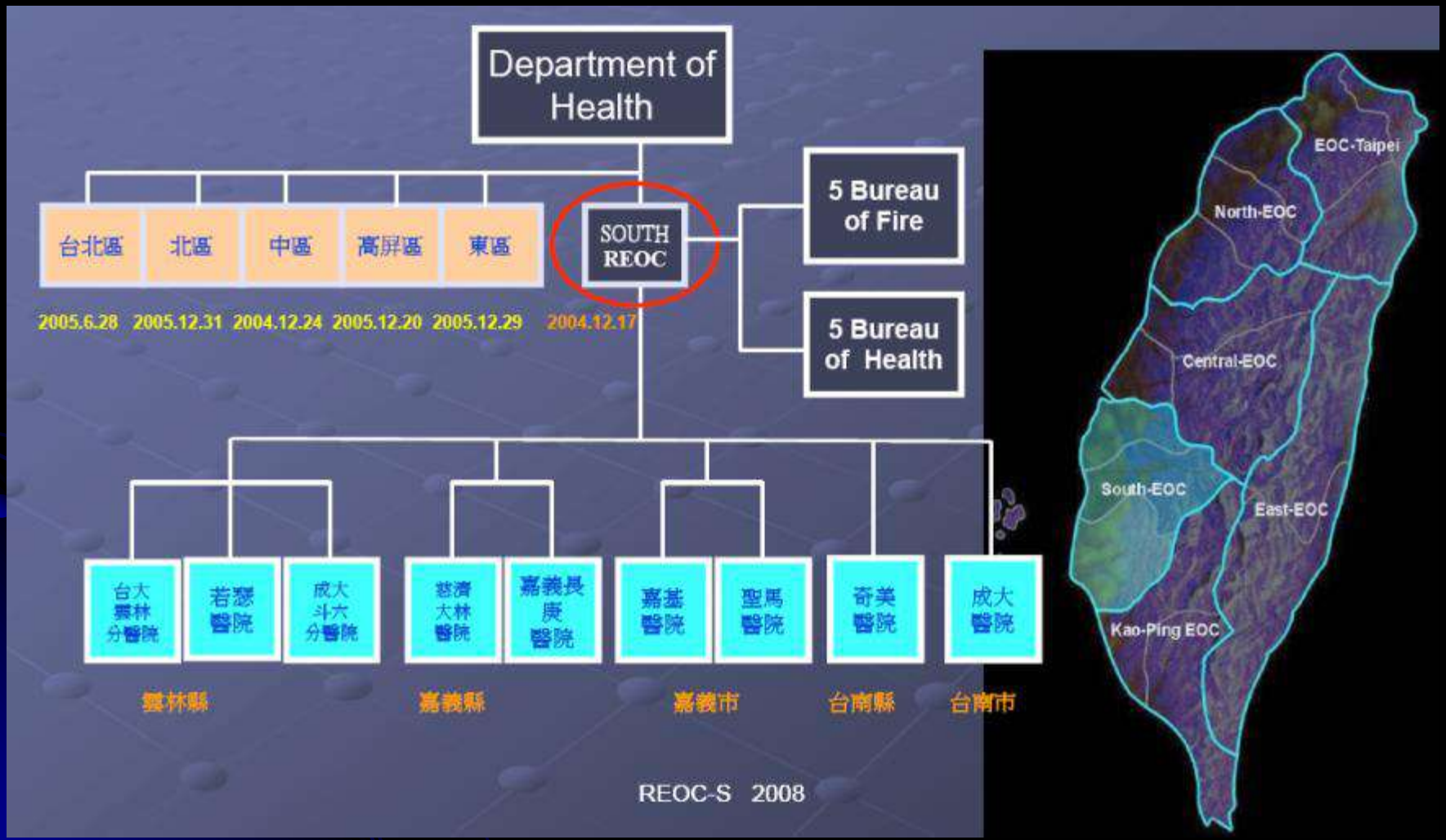
TaiwanIHA 國外緊急醫療援助醫療隊出隊流程圖



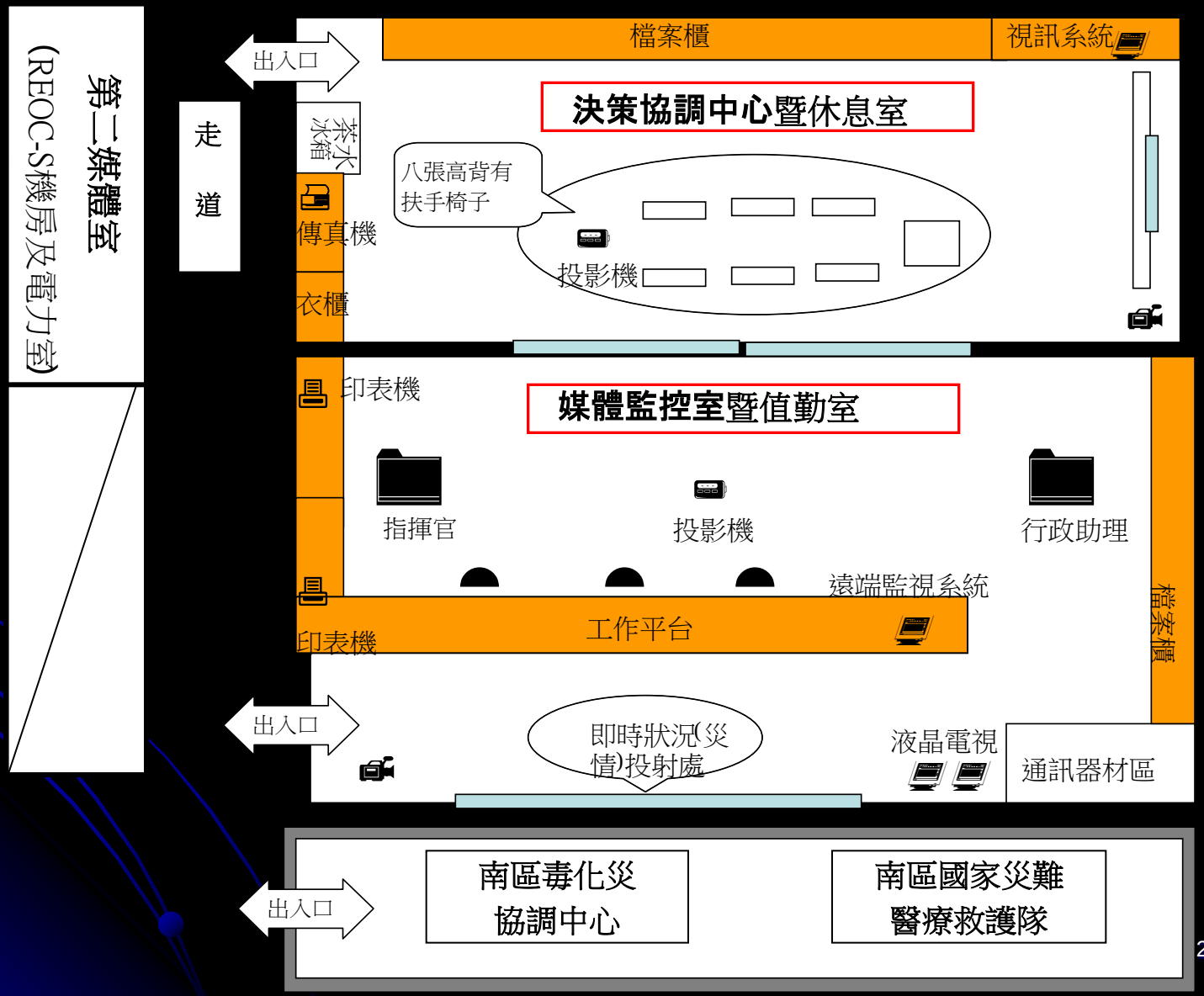
Emergency Operation Center

- Surveillance
- Coordination
- Consultation/ Intelligence
- Operation

Regional (Medical) EOC



REOC


第二媒體室
(REOC-S機房及電力室)
走道
出入口
檔案櫃
視訊系統
決策協調中心暨休息室
茶水
茶箱
八張高背有
扶手椅子
傳真機
投影機
衣櫃
印表機
媒體監控室暨值勤室
指揮官
投影機
行政助理
遠端監視系統
工作平台
印表機
檔案櫃
出入口
即時狀況(災
情)投射處
液晶電視
通訊器材區
出入口
南區毒化災
協調中心
南區國家災難
醫療救護隊

REOC: Monitor Criteria

Etiology of Incident	Monitor
A. Natural Incidents: Typhoon, flood, earthquake…	Victims more than 5 persons
B. Transportation: traffic accident, airplane crash…	
C. Fire	
D. HAZMAT incidents, social impact incident…	All incidents

Notification and Activation Criteria

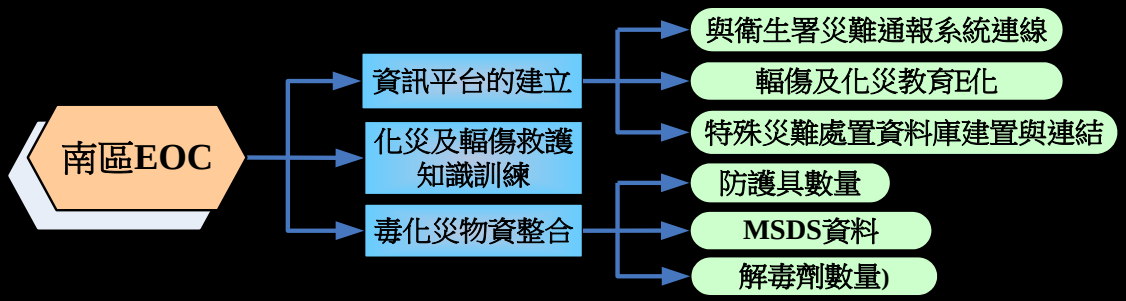
Notification Criteria:

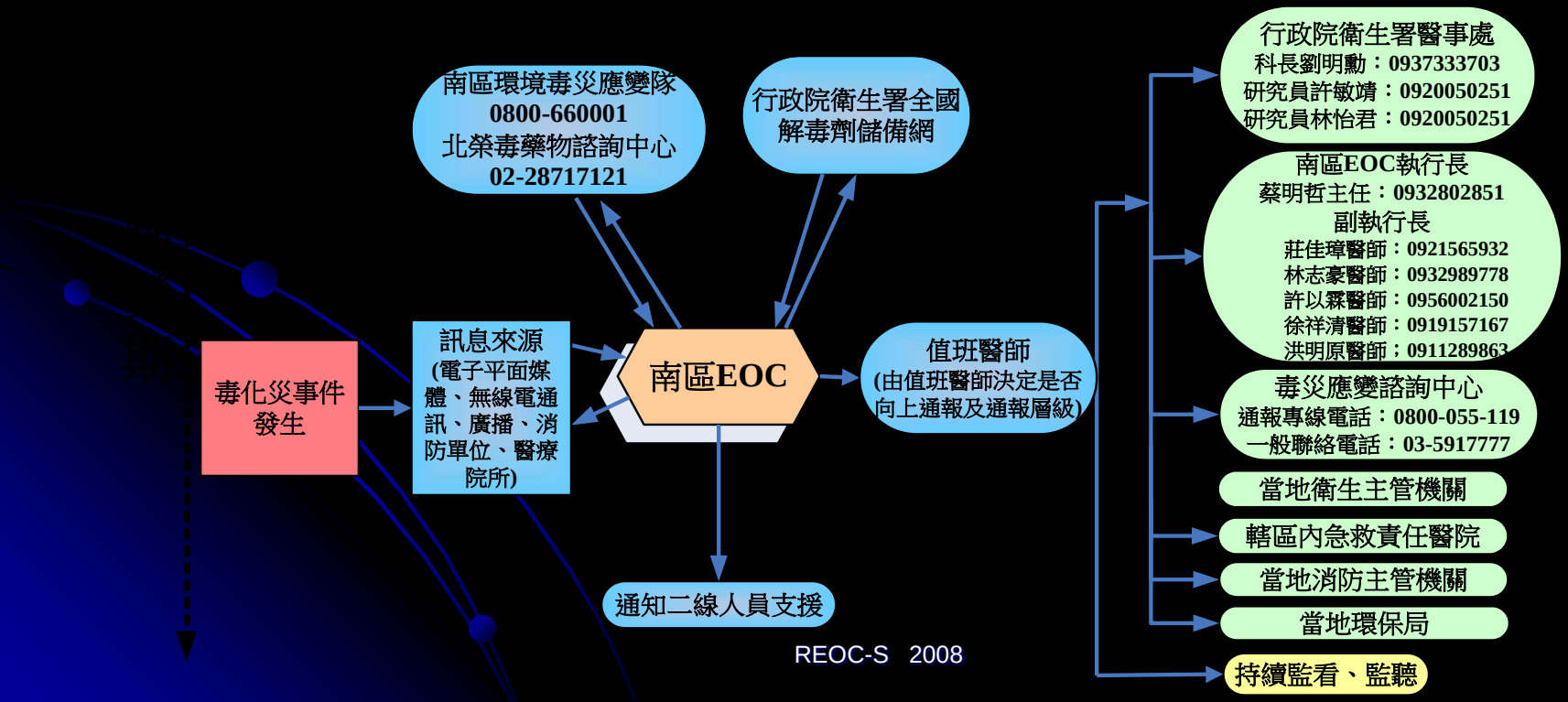
- Text Notification—T1 or Death >3 or total victims > 10
- Telephone Notification—T1 or Death >5

Activation Criteria:

- Level III, Green: Victims >15, Local Incidents
- Level II, Yellow: Regional
- Level I, Red: National

行政院衛生署南區緊急醫療應變中心
毒化災標準作業流程





PREHOSPITAL AND DISASTER MEDICINE
VOLUME 17/SUPPLEMENT 3

HEALTH DISASTER MANAGEMENT GUIDELINES FOR EVALUATION AND RESEARCH IN THE UTSTEIN STYLE

VOLUME I. CONCEPTUAL FRAMEWORK OF DISASTERS

Task Force on Quality Control of Disaster Management
&
The World Association for Disaster and Emergency Medicine
&
The Nordic Society for Disaster Medicine

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United Nations Department of Humanitarian Affairs
World Health Organization

Let's go back to disaster itself: 2003

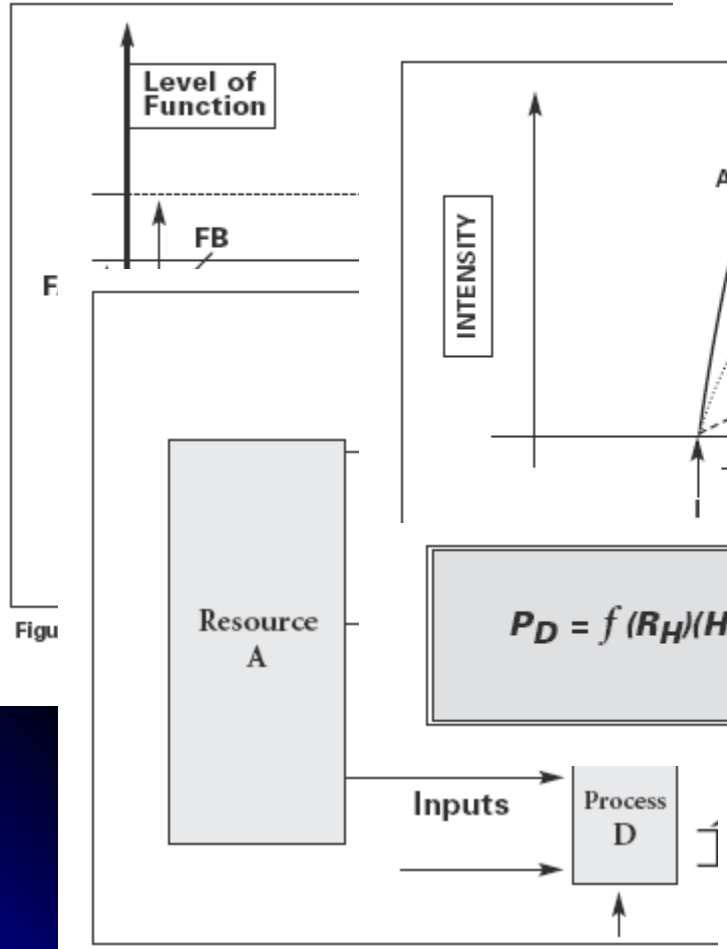
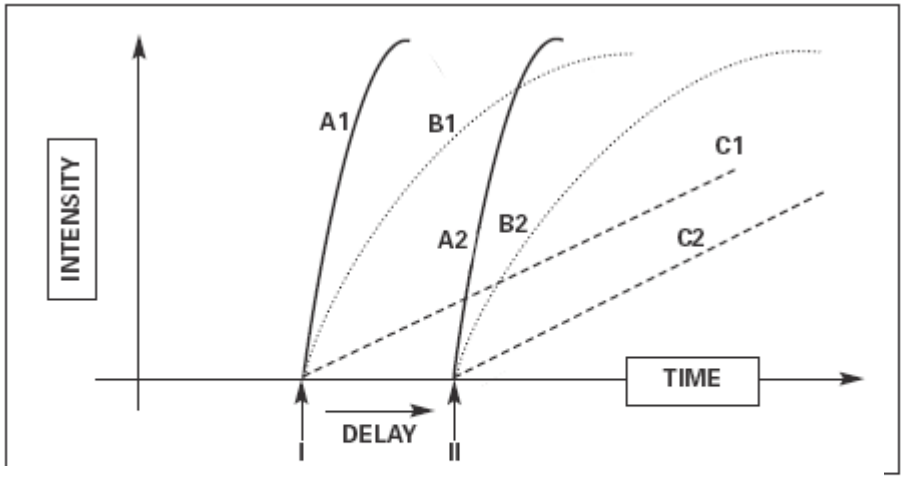


Figure 5.10—Schematic diagram depicting how several proce
one key commodity in addition to other resources
specific process



$$P_D = f\,(R_H)(H_{nat} + H_{man})(V_{nat} + V_{man})$$

Equation 4.2

Figure 5.14—Theoretical model depicting the impact of Events A and B of different magnitudes on a given society. The broken lines are the levels of function after damage from the events (A and B) as detected by the indicator (none specified). This figure does not take into account conditional needs or a possibility for increased consumption that may have resulted from a response to the event. If the absorbing capacity is not consumed, there is no disaster.

EMS, Local DMAT, National DMAT

- Terminology
- Administrative
  - Organization and Jurisdiction
  - Financial support
  - Education program
  - Responsibility
- Operative
  - Personnel / Team
  - Activation
  - Operation: Triage
  - Demobilization
  - Patient tracking / Reporting system

Location, Location, Location!