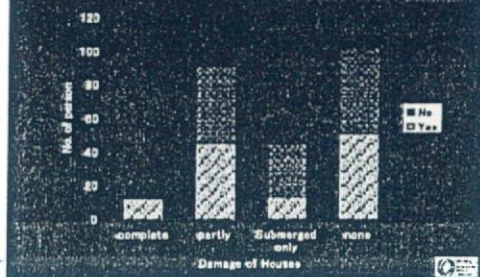


### Number of persons complained any symptoms by the damage of houses

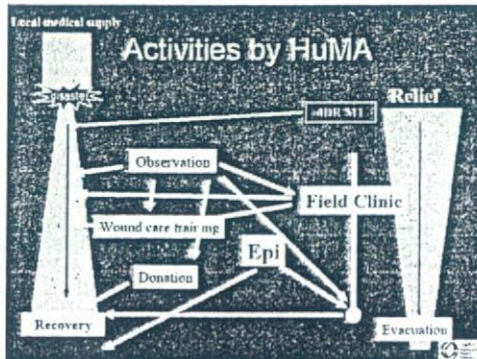


### Conclusion

- The decline in the acute medical needs was observed at the time of passing
- The increase of health damage was observed regardless of direct injury or the visible destruction of houses
- The medical aid from outside the disaster setting was utilized, but the situation during the sub-acute phase was not clarified

### Limitation

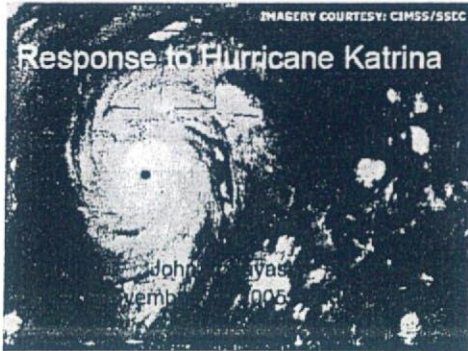
- Passage of time after the disaster
- Interview to the family's representative
- Interviews through interpreters
- Research by foreigners
- Characteristics in races, religions and localities
- Influence of seasonal problem or endemics
- Lack of baseline information
- Staffs and time for research activities



### Problem to be solved

- Continuous epidemiological activities in disaster settings
- Epidemiological research or public health activities linked to clinical activities
- Understandings of aid groups that bear acute period or donors





#### Contributors:

- Dr. Chris Sanford, University of Washington, part of initial emergency response team
- Dr. Eric Sergienko, CDC EIS Officer assigned to the Washington State DOH
- Dr. James Heffelfinger, CDC Epidemiologist

## Nine Days at the Airport: The Medical Response to Hurricane Katrina

Christopher Sanford, MD, MPH, DTM&H  
Co-Director, Travel Clinic,  
Clinical Assistant Professor  
School of Medicine  
University of Washington  
November 1, 2005



## Disaster Medical Assistance Team (DMAT)

• Disaster Medical Assistance Team

• Established 1984 by United States Public Health Service

• 61 DMATs in the US. Approx. 27 are "Level I," deployable within 8 hours, are self-sufficient for 72 hours

• Configured to manage 100-200 patients/day



## DMAT Team Meeting

•35 team members

•4 physicians:

- Team Commander
- pediatric ER
- public health, infectious disease, critical care
- anesthesiologist
- family practice

•Nurses, nurse practitioners, pharmacists, EMTs, logistics, communications



Hurricane Katrina: Sunday, August 28, 2005

- 10:00 am: US National Weather Service predicts catastrophic damage to New Orleans.



### Monday, August 29

- 5:20 am: New Orleans International Airport loses commercial electricity. With no air conditioning, the temperature inside the airport quickly rises to 36 °C.
- 5:35 am: Katrina, now a Category-4 hurricane, with winds reaching 140 miles per hour, makes landfall at the Louisiana-Mississippi border of the Gulf Coast. Accompanying the hurricane is a 29-foot surge of ocean water, the largest ever recorded.

### Monday, August 29

- 8:00 am: Hurricane Katrina passes 20 miles to the east of New Orleans.
- 11:00 am: Floodwall of the Industrial Canal breaks open in two places, flooding the 9<sup>th</sup> Ward with 3-10 feet of water. Thousands of residents climb to their rooftops.



### Tuesday, August 30

- 1:30 am: 17<sup>th</sup> Street Canal barriers along two blocks fail, flooding 80% of New Orleans. The local pump station fails. A 300-foot section of the floodwall lining the London Avenue Canal fails, worsening the flood.
- 9:00 am: First helicopter arrives at New Orleans airport with evacuees from rooftops and hospitals.



### Wednesday August 31

- 1:00 am: Initial 3 DMATs arrive at airport.

### Thursday, September 1

•At the New Orleans International Airport: 23 of 26 New Orleans hospitals were flooded or otherwise incapacitated by flooding. Virtually all of these patients were transported to the airport.

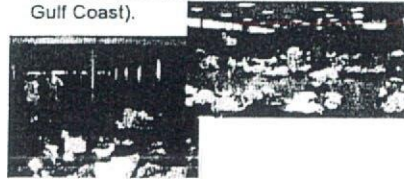
•Approx. 500 people on the floor: residents of nursing homes, hospitals, evacuees.

•Approx. 2,000 people waiting for triage.

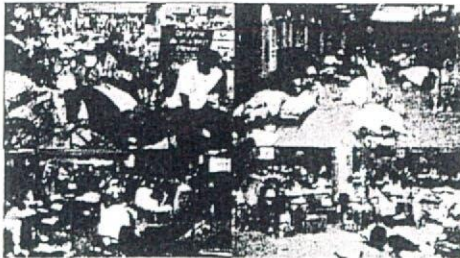
•Medical teams on-site exhausted.

### Thursday, September 1

• 3:00 pm: DMAT OR-2 arrives at airport.  
(Three days after Hurricane Katrina hit the Gulf Coast).



### First Impressions



“This is the worst I’ve ever seen.”

•No one—not Vietnam veterans, not those who responded to 9/11, not those with international relief work—had ever seen so dire and calamitous a scene.



### Triaging at airport

- Holding area for shelter
- Green Tent: ambulatory patients
- Yellow Tent: moderately ill patients
- Red Tent: critically ill patients
- Hospice: "expectant" care only



### Friday, September 2 - Saturday, September 3

- Medical staffing at the airport remains inadequate to address even basic nursing care.



### Primary task at hospital: triage

- Rapid stabilization, then transport to either:
  - hospital
  - or
  - shelter



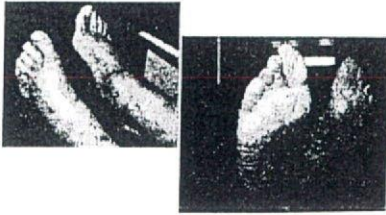
### Most patients were not injured by the direct effects of hurricane

- Most were ill as a result of the abrupt withdrawal of medical infrastructure, including medications.

- Diabetics without insulin for 5-7 days.
- Patients with chronic renal failure who had not had dialysis for 5-7 days.
- Hypertensives off antihypertensive medications having strokes and myocardial infarctions.



### Patients with skin damage from flooding



### Abrupt withdrawal of medical services

- Epileptics, asthmatics, and schizophrenics without medications
- Recent surgery, including brain surgery and organ transplant.



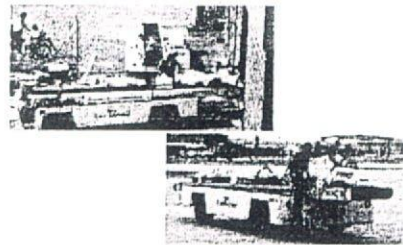
### Evacuee transport

•Jets, helicopters, and buses continued to bring evacuees and hospital patients to the airport.

•In the peak hour, 160 helicopters landed and took off in one hour.



### Transporting patients





### Airport Mortality

- Exact logs of patients and evacuees were not kept.
- However, the population at the airport varied from 2,000-10,000, and about 36 deaths occurred between August 31 and September 3.

### Mass evacuations

- 2,700 patients were evacuated from the airport to hospitals; this represents the largest air evacuation in history.
- Approximately 25,000 people were transported from the airport to shelters.



### Loading of wounded



Immediately prior to being loaded onto aircraft

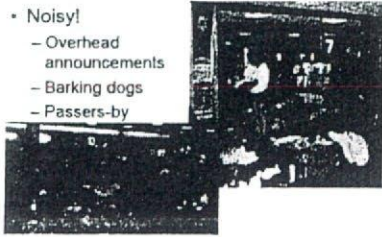
### Sunday, September 4

- Increasing staff and a lessened flow of incoming patients allows transport of surviving occupants of the hospice to hospitals.
- Thereafter no patients are designated to receive hospice care only.



### Our bedroom: luggage carousels

- Noisy!
  - Overhead announcements
  - Barking dogs
  - Passers-by



### Public Health Implications of Hurricane Katrina

Personal Observations from Eric Serglenko



### Background

- State of Louisiana requested the US PHS
  - Assess evacuation centers in LA
- PHS partner - American Red Cross
  - Survey developed
  - Piloted at five shelters
- 89 PHS & 12 ARC volunteers
  - Organized into 24 teams in 8 regions

### Objective

- Conduct a baseline public health assessment of the needs of shelters
  - key health problems requiring attention
  - environmental health problems
  - supply and equipment needs

## Objective

- Conduct a baseline public health assessment of the needs of shelters
  - key health problems requiring attention
  - environmental health problems
  - supply and equipment needs

## Incidence of Medical Conditions

Condition	Incidence per 1000 residents
Hypertension/ Cardiovascular	108.2
Diabetes	65.3
New Psychiatric Conditions	59.0
Pre-existing Psych Conditions	50.0
Rash	27.6
Asthma/ COPD	27.5
Influenza like illness	26.3

## Environmental health needs

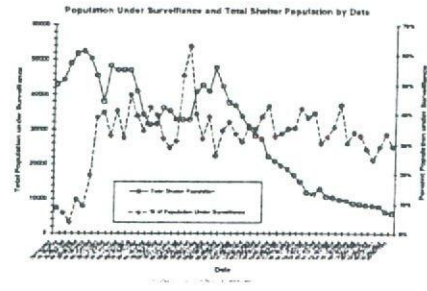
- Toilets not cleaned enough (85%)
- < 1 shower per 30 residents (51%)
- Food in sleeping area (49%)
- Signs of pestilence (49%)
- <40 sq. ft. per resident (32%)
- < 1 sink per 20 residents (31%)

## Lessons Learned

- Initial assessment needs to be rapid
  - Can be beneficial
    - Feedback mechanism to ARC and state
    - Limitation - finding but not solving problem
  - Should have forms prior to disaster
  - Regional coordination beneficial
- We kept finding more shelters
  - Data will always lag behind reality

## Syndromic surveillance in the shelters

- Daily surveillance in Louisiana
- One page form
  - Communicable disease syndromes
  - Mental health
  - Chronic medical issues



## Communicable Diseases

	Avg Daily incidence/Thousand	Largest cluster
Fever >100.4° F (38° C) ALONE	0.6	10
Bloody diarrhea	0.1	6
Watery diarrhea with or without vomiting	2.0	22
Vomiting only (One episode or more)	1.5	13
Flu-like	6.6	47
Rash	3.2	35
Scabies, lice, or other infestation	0.8	60
Wound infection	1.9	34
Conjunctivitis (pink eye)	0.02	10

## Lessons Learned

- Establish system prior to landfall
  - Appropriate staffing and IT support
  - Standardize reporting form
- Over reporting of syndromes
  - Influenza like illness
  - Syndrome education for shelter staff
- Persistence = higher rate of return

Assessment and surveillance at  
natural disaster in Japan  
Kobe earthquake and after  
自然災害時の評価とサーベイランス  
阪神淡路大震災時とその後

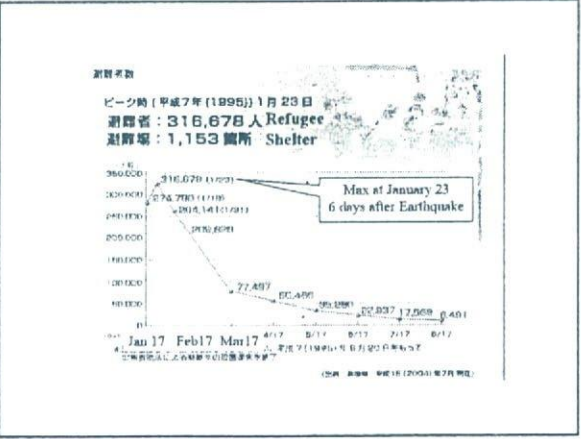
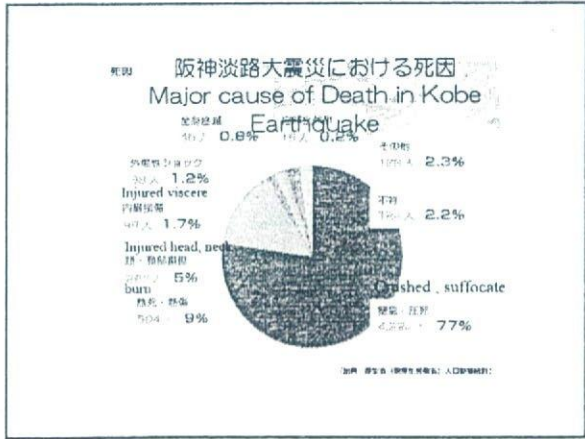
November 23

岡山市保健所・国立感染症研究所  
中瀬克己  
www.city.okayama.okayama.jp

Are the health assessment  
and surveillance enough in  
Japanese disaster relief ?

日本の災害救助において健康状況の  
被災後および継続把握は十分か？

IBSCC 香野山幸





難民・国内移動民における  
感染症のコントロール  
infectious diseases control  
refugee and internal  
displaced population



HDSC

香川山電

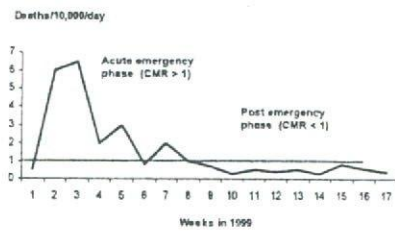
### The ten top priorities

- 初期評価 Initial assessment
- 水と衛生 Water and sanitation
- 食品と栄養 Food and nutrition
- 住居と配置 Shelter and site planning
- 麻疹予防接種 Measles immunisation
- 感染症コントロール  
Control of communicable diseases
- サーベイランス Public health surveillance
- 基礎的医療 Basic health care
- 人材と訓練 Human resources and training
- 調整 Co-ordination

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### 緊急時期 Emergency phases



HDSC

香川山電



### Role of Public health nurse in natural disaster

- 86% of PHN in HC operated health assessment for refugee
- 82% of PHN consulted and supported

2003 宮崎ら 保健所保健師の健康危機に關する活動体制に関する調査

IDNC

岡山市

### 岡山市地域防災計画 食料供給計画 Food supply plan, Okayama city

- 対象：避難所収容者、住宅が被害を受け炊事できない者等  
subject: evacuated person
- 提供基準：一人1日あたり1570円以内（岡山市）  
supply standard: 1570 yen per person per day
- 一人当たり熱量 (kcal) などの栄養面の基準はない  
No energy and nutritional standard
- 食品給与方針  
調理の不要なパン類、給食弁当、インスタント食品等。日給の経過と併に栄養に配慮の上通常の家庭料理に近づける
- 食料使用状況、配給状況、受給者名簿
- カバー率の把握は定められていない  
No mention about cover rate.

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岡山市

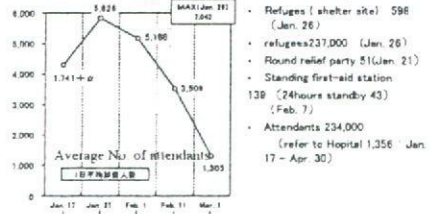
### Shelter in Niigata earthquake, 2004

- Some refugees death caused intravenous thrombosis were reported. They stay in the car after earthquake.
- Shelter have some problem.

IDNC

岡山市

### Medical Relief activities Kobe city, Kobe earthquake



- Refugees (shelter site) 596 (Jan. 26)
- refugees 237,000 (Jan. 26)
- Round relief party 51 (Jan. 21)
- Standing first-aid station 138 (24hours standby 43) (Feb. 7)
- Attendants 234,000 (refer to Hospital 1,356 Jan. 17 - Apr. 30)

IDNC

Fig. 2 Relief activities (医科, Jan. 17 - Mar. 31, Kobe city) 岡山市



Table 1 rate of at work 被災者に対する医療供給の状況 - Ⅱ  
 其比率 (期間: 震害12月17日、復旧12月27日の集計)

	Medical office (1,000)	Doctor's office (100)	Hospital (10)
Jan. 30 (1995.1.30)	87%	87%	87%
Apr. 27 (1995.4.27)	86%	86%	86%
地震 後 Earthquake After	87%	87%	87%
地震 前 Before	87%	87%	87%

Medical  
services  
Kobe  
earthquake  
被害を受けた  
医療供給

Table 2 兵庫県内被災地区132診療所の被災状況 132 Hospital in disaster area of Hyogo Prefecture

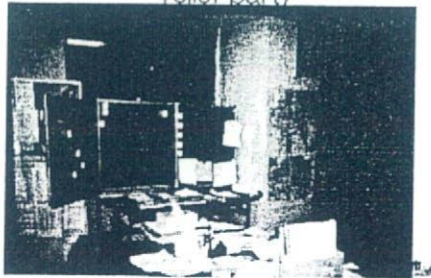
計 数 率							
area	earthquake	household assets	gas	fireproof	drugs	reception	others
the city	87%	87%	87%	87%	87%	87%	87%
in urban area	87%	87%	87%	87%	87%	87%	87%
[震害の状況] and rate of day 1 after Earthquake							
doctor	87%	87%	87%	87%	87%	87%	87%
nurse	87%	87%	87%	87%	87%	87%	87%
pharmacist	87%	87%	87%	87%	87%	87%	87%
multidisciplinary technologist	87%	87%	87%	87%	87%	87%	87%
the others	87%	87%	87%	87%	87%	87%	87%

IBSC

Mar. 1995 兵庫県地震被害調査報告書



救護班の配置 arrangement of relief party



救護班への医薬品供給  
medicine supply for relief party



Infectious diseases control for emergency situation

- ・ 難民等において重要な感染症の同定 (health assessments)
- ・ これら疾患の検出とモニター (surveillance)
- ・ 予防 (清潔な水、食料、トイレ、予防接種 clean water, food, sanitation, immunisation)
- ・ 即時治療 (標準治療法 standard protocols)
- ・ 拡大防止 (発生時対応の備え epidemic preparedness)
- ・ 集団発生への即時の対応

HDNC

香川県立

There is no data for preparedness about disease surveillance after natural disaster

And there is no mention the temporary surveillance about disaster refugee in disaster relief plan.

HDNC

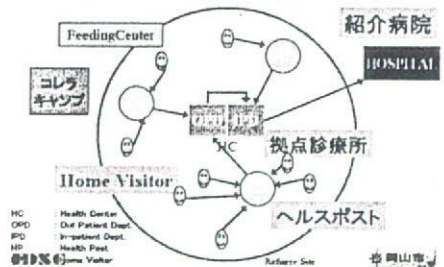
香川県立

Medical Relief are controlled by Health Center in big City in Japan

HDNC

香川県立

緊急時における医療供給の4レベル



### Voluntary Health Check for refugee at shelter

- Mar 16-31, 2 months after Earthquake
- Place 100 points in 6 wards of Kobe city
- Weight, Height, BP, Chest-Xp, Urin and blood test
- Health guidance and consultation by Doctors, PH Nurses, Nutritionists.

HSC

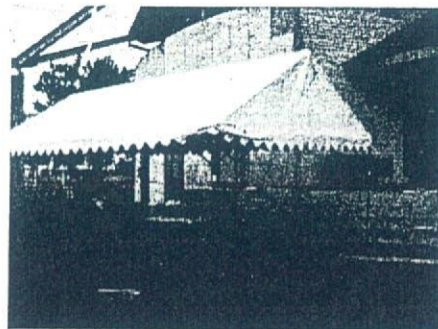
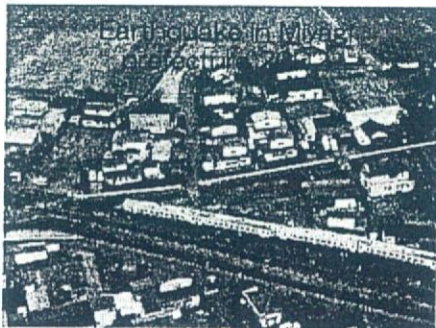
神戸市

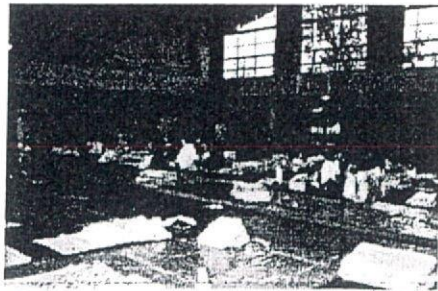
### result

- Attendants 4,163
- In Higashi-Nada ward: 1148/6239
- 42% of attendants are needed for treatment. Include 1 TB patient

HSC

神戸市





IDNC

香川県山本町

### 被災地域・避難所における活動1 -避難所健康相談- 本震 26日7時 assessment and

県内全県の保健医療により構成

- 活動
- 7月28日(2日目) day2: 避難所における健康相談 assessment and health consultation at shelter site
  - 7月29日: 夜間避難所巡回健康相談 assessment and health consultation at night  
矢本町(15名)、鳴瀬町(16名)  
No of attendants 15 at yamato town, 16 at naruse town
- 石巻保健福祉事務所からの派遣人員
- 7月28日避難所健康相談 矢本町、鳴瀬町各6名
  - 7月29日夜間避難所巡回健康相談 矢本町4名、鳴瀬町各

IDNC

香川県山本町

### 被災地域・避難所における活動2 -医療チーム巡回健康相談- mobile medical relief team

- 日時: 被災後4日目(7月30日) から3日間  
from day 4, period 3 days
- 構成: 石巻保健所、がんセンター精神保健福祉センター、名取病院、公立栗谷病院の職員 staff from Health Center and other hospitals
- 活動: 役場などの前に設置された救護所や避難所を巡回し、健康相談を行った。
- 石巻保健福祉事務所からは、各町へ2名ずつ3日間に渡り、延べ18人派遣した。  
Cumulated 18 staff dispatched to 2 towns

IDNC

香川県山本町

医療チーム巡回健康相談

	派遣町	派遣人数						相談件数	派遣避難所数
		医師	保健師	精神保健センター	看護師	ケースワーカー	連絡員		
7月30日	矢本町	1	1	1	2	1	6	25	14
	鳴瀬町	1	1	1	2	2	7	49	6
	河内町	2	1	1	2	1	7	15	6
	計	4	3	3	6	4	20	89	26
7月31日	矢本町	1	1	1	2	1	6	52	10
	鳴瀬町	1	1	1	2	1	6	36	7
	河内町	2	2	1	2	1	9	20	5
	計	4	4	3	6	3	21	118	22
8月1日	矢本町	1	1	1	2	1	6	30	13
	鳴瀬町	1	1	1	2	1	6	47	10
	河内町	1	1	1	2	1	6	25	5
	計	3	3	3	6	3	18	102	28

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香川県山本町