

# Disaster Medical Management: Alternate Care Sites

Presented by

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**Disclosure Statement: Dr. Cantrill states that he has  
nothing to disclose.**



# Alternative Care Sites:

## The Old, The New & The Difficult

Sioux Falls, South Dakota

November 7, 2007

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# Some of the Current Terms

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- Alternative Care Sites (ACS)
- Alternative Care Facilities (ACF)
- Alternative Care Center
- Acute Care Center
- Federal Medical Stations
- A location where non-ambulatory care can be provided
  - Hospital-based
  - Non-Hospital based

# Initial Work

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- MEMS: Modular Emergency Medical System
  - Developed under auspices of the Department of Defense
    - US Army Soldier and Biological Chemical Command
  - An expanded “system” of care
  - A framework for a massive medical response
  - Never implemented
- Rocky Mountain Regional Care Model for Bioterrorist Events

# Surge Capacity

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- Ability to manage a sudden, unexpected increase in patient volume that would otherwise severely challenge or exceed the current capacity of the health care system
  - Facility based
  - Community based
  - Extrinsic

# Surge Capacity Issues

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- Physical space
- Organizational structure
- Medical staff
- Ancillary staff
- Support (nutrition, mental health, etc)
- Supply
- Pharmaceuticals
- Other resources

# Part of the Problem:

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- ED overcrowding
- Inpatient bed loss: 38,000 (4.4%) between 1996 and 2000
- ICU capacity loss: 20% between 1995 and 2001
- Most health care is in the private sector not under governmental or municipal authority

# Facility Based Surge Capacity

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- Expedited discharges
- Adaptation of existing capacity
  - Single rooms become doubles
  - Take over areas of the hospital for acute care
    - Classrooms
    - Offices
    - Lobbies
    - Hallways

# DHMC Disaster Contingency Discharge Drill – 1/05

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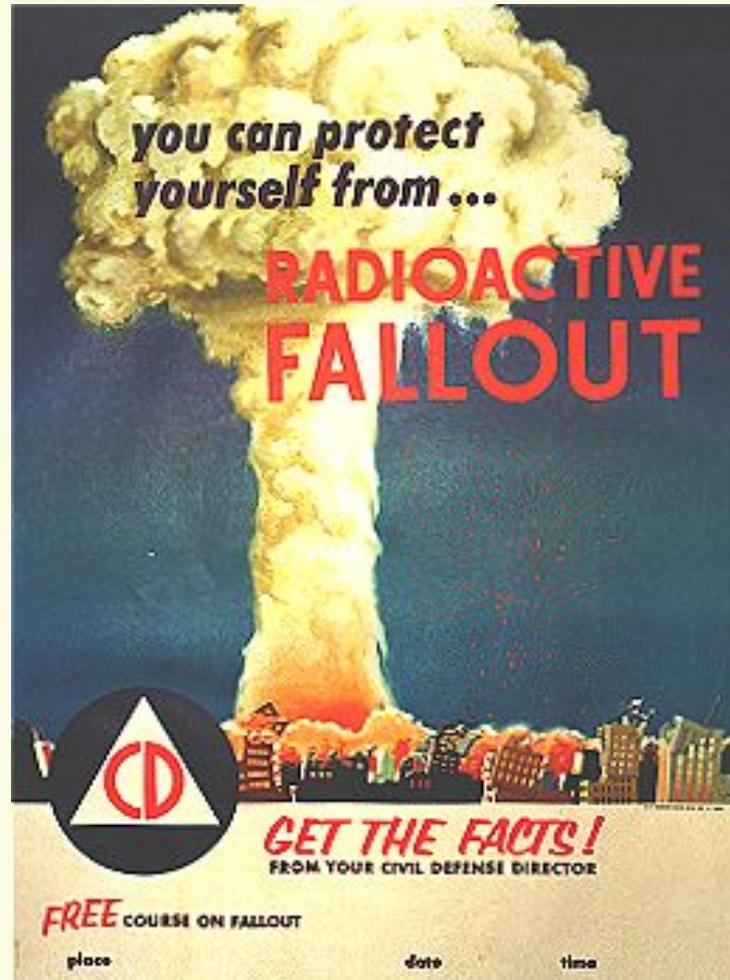
- Services participating: Internal Medicine, Surgery, Pediatrics
- 26% of patients could be transferred off-site to lower care facility (alternative care site)
- 28% of patients could be discharged home
- 14% could be transferred from ICU to ward
- Patients transferred with Problem List and Kardex

# Community Based Surge Capacity

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- Requires close planning and cooperation amongst diverse groups who have traditionally not played together
  - Hospitals
  - Offices of Emergency Management
  - Regional planners
  - State Department of Health
- MMRS may be a good organizing force

# Where Have We Been?



# Hospital Reserve Disaster Inventory

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- Developed in 1950's-1960's
- Designed to deal with trauma/nuclear victims
- Developed by US Dept of HEW
- Hospital-based storage
- Included rotated pharmacy stock items

# Packaged Disaster Hospitals

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- Developed in 1950's-1960's
- Designed to deal with trauma/nuclear victims
- Developed by US Civil Defense Agency & Dept of HEW
- 2500 deployed
- Modularized for 50, 100, 200 bed units
- 45,000 pounds; 7500 cubic feet

# Packaged Disaster Hospitals

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- Last one assembled in 1962
- Adapted from Mobile Army Surgical Hospital (MASH)
- Community or hospital-based storage



# Packaged Disaster Hospital: Multiple Units

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- Pharmacy
- Hospital supplies / equipment
- Surgical supplies / equipment
- IV solutions / supplies
- Dental supplies
- X-ray
- Records/office supplies
- Water supplies
- Electrical supplies/equipment
- Maintenance / housekeeping supplies
- Limited oxygen support

# Packaged Disaster Hospital



# Packaged Disaster Hospitals

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- Congress refused to supply funds needed to maintain them in 1972
- Declared surplus in 1973
- Dismantled over the 1970's-1980's
- Many sold for \$1

# The Re-Emergence of a Concept

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- Medical Armory (Medical Cache)
  - Think of the National Guard Armory
- Driving Forces:
  - Loss of institutional flexibility
    - “Just-In-Time” Everything
  - Loss of physical surge capacity
    - Denver has 1000 fewer physical beds that it did 10 years ago

# The Re-Emergence of a Concept: The Medical Cache

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- Issues:
  - Augmentation vs Alternative Site?
  - Inclusion of actual structure?
  - Cost?
  - Storage?
  - Ownership?
  - Pharmaceuticals?
  - Level of care provided?

# Level I Cache: Hospital Augmentation

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- Bare-bones approach
- Physical increase of 50 beds
- Would rely heavily on hospital supplies
- Stored in a single trailer
- About \$20,000
- Within the realm of institutional ownership
- Readily mobile - but needs vehicle

# Level I Cache:

## Hospital Augmentation

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- Trailer
- Cots
- Linens
- IV polls
- Glove, gowns, masks
- BP cuffs
- Stethoscopes

# Used During Katrina Evacuee Relief

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# Level II Cache: Regional Alternative Site

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- Significantly more robust in terms of supplies
- Designed by one of our partners, Colorado Department of Public Health and Environment

# Level II Cache: Regional Alternative Site

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- Designed for initial support of 500 patients
  - Per HRSA recommendations of 500 patient surge per 1,000,000 population
  - Modular packaging for units of 50-100 pts
- Regionally located and stored
- Trailer-based for mobility
- Has been implemented
- Approximate price less than \$100,000 per copy

## Level III Cache: Comprehensive Alternative Care Site

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- Adapted from work done by US Army Soldier and Biological Chemical Command
- 50 Patient modules
- Most robust model
- Closest to supporting non-disaster level of care, but still limited
- More extensive equipment support

# Work at the Federal Level

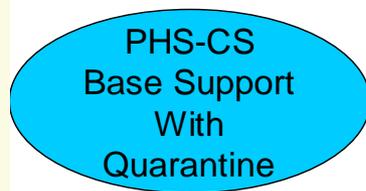
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- **DHHS: Public Health Federal Medical Stations**
  - Specified and demonstrated
  - 250 beds in 50 bed units
  - Quarantine or lower level of care
  - For use in existing structures
  - Multiple copies to be strategically placed
  - Owned and operated by the federal government
  - Utilized during Katrina and Rita

# Basic Concept: HHS Public Health Service Federal Medical Stations

## “PHS-CS” 250 Bed Module

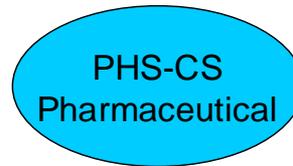
### Configuration



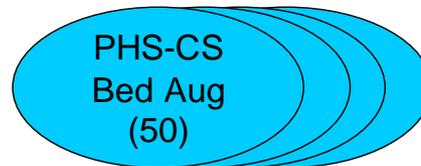
- Administration
- Support
- Feeding
- Quarantine
- Beds(50)
- Housekeeping
- First Aid Equipment
- Pediatric Care
- Adult Care
- Personal Protective Equipment



- Primary Care
- Non-Acute Treatment
- Special Needs



- Pharmaceutical
- Special Medications
- Prophylaxis



- Beds
- Bedding
- Bedside Equipment

# Demo Scenario

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- Denver (notionally) experiences an event that demands 100 beds of surge relief.
- OPHEP initiates set up of a PHS Contingency Station
  - The Denver Convention Center serves as the building of opportunity
- Denver Health Medical Center decides which patients transfer to the Station, and then makes these transfers
- Federal manpower operates the Station
  - PHS and/or Medical Reserve Corps provide professional services
  - Federal Logistics Manager operates Station logistics
- Colorado and Denver PH/EMS provide service support (notionally)—food, water, utilities, etc

B-5

B-6

B-7

B-8

EXIT

NO SMOKING



A-3

A-4

EXIT  
G

EXIT  
PULL TO OPEN  
OUTSIDE







## House Support Area

- The House Support Area will be used to store cleaning supplies for the CS custodians.
- It will be staffed by 2 full-time and 1 part-time custodians.
- The Medical Logistician will manage the custodian staff and develop the cleaning schedule.

## Medical Support Area

- The Medical Support Area will be staffed with one Medical Logistician and two Medical Supply Technicians who will provide 24 hour coverage.
- The Medical Support Area will be responsible for requisitioning and distribution of supplies within the Contingency Station (CS).
- The Medical Logistician will develop procedures for each CS area to request and receive supplies.
- Specific forms will be used by each CS area to track request, receipt, and turn in of supplies.

## Medical Support Area (cont.)

- The Medical Support Area will maintain a stockpile of all medical material to ensure it is always available and ready to go.
- The Medical Support Area will ensure medical material and support items are stored in a secure and accessible location.
- Supply requisitioning will be done via the Contingency Station (CS).
- Specific forms will be used by each CS area to track request, receipt, and turn in of supplies.

CS00000000

CS00000000

B

HANDLE WITH CARE  
RECYCLE CONTAINER

PT





Patient Wash  
and Latrine  
Area





Pharmacy



# Additional Work at the Federal Level

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- DHS: Critical care unit
  - Specified, not yet implemented
  - ICU level of care
- Specialty care units

# ACS Issues and Decision Points

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- “Ownership”, command and control
  - HICS is a good starting structure
- Who decides to open an ACS?
- Scope of care to be delivered?
  - Offloaded hospital patients
  - Primary victim care
  - Nursing home replacement
  - Ambulatory chronic care / shelter

# ACS Issues and Decision Points

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- Operational support
  - Meals
  - Sanitary needs
  - Infrastructure
- Documentation of care
- Security

# ACS Issues and Decision Points

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- Communications
- Relations with EMS
- Rules/policies for operation
- Exit strategy
- Exercising the plan

# Some ACS Site Issues:

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- Private sites vs Public sites
- Who can grant permission to use?
- Need for decontamination after use to restore to original function

# Problem

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- ✓ Disaster event overwhelms current hospital capacity
- ✓ An “Alternative Care Site” must be opened to treat victims

**What is the best existing infrastructure/site in the region for delivering care?**

# Concept of Alternative Care Site

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- It is not a miniature hospital
- Level of care will decrease
- Need to decide in advance: What types of patients will be treated at the site?
  - Disaster victims?
  - Low-level of care patients from overwhelmed hospitals?

# Possible Alternative Care Sites

## Hotel



## Stadium



## Recreation Center



## School



## Church



# Potential Non-Hospital Sites

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- ✓ Aircraft hangers
- ✓ Churches
- ✓ Community/recreation centers
- ✓ Convalescent care facilities
- ✓ Fairgrounds
- ✓ Government buildings
- ✓ Hotels/motels
- ✓ Meeting Halls
- ✓ Military facilities
- ✓ National Guard armories
- ✓ Same day surgical centers/clinics
- ✓ Schools
- ✓ Sports Facilities/stadiums
- ✓ Trailers/tents (military/other)
- ✓ Shuttered Hospitals
- ✓ Detention Facilities

# Factors to Weigh in Selection an Alternative Care Site

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- ✓ Ability to lock down facility
- ✓ Adequate building security personnel
- ✓ Adequate lighting
- ✓ Air conditioning
- ✓ Area for equipment storage
- ✓ Biohazard & other waste disposal
- ✓ Communications
- ✓ Door sizes
- ✓ Electrical power (backup)
- ✓ Family Areas
- ✓ Floor & walls
- ✓ Food supply/prep area
- ✓ Heating
- ✓ Lab/specimen handling area
- ✓ Laundry
- ✓ Loading Dock
- ✓ Mortuary holding area
- ✓ Oxygen delivery capability
- ✓ Parking for staff/visitors
- ✓ Patient decon areas
- ✓ Pharmacy areas
- ✓ Toilet facilities/showers (#)
- ✓ Two-way radio capability
- ✓ Water
- ✓ Wired for IT and Internet Access

# Infrastructure Requirements

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- ✓ Infrastructure factors listed on axis of a matrix.
- ✓ Additional relevant factors can be added/deleted based on your area or the type of event.
- ✓ Relative weight scale created on 5-point scale comparing factor to that of a hospital

# Weighted Scale

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- 5 = Equal to or same as a hospital.
- 4 = Similar to that of a hospital, but has **SOME** limitations (i.e. quantity/condition).
- 3 = Similar to that of a hospital, but has some **MAJOR** limitations (i.e. quantity/condition).
- 2 = Not similar to that of a hospital, would take modifications to provide.
- 1 = Not similar to that of a hospital, would take **MAJOR** modifications to provide.
- 0 = Does not exist in this facility or is not applicable to this event.

# Potential Non-Hospital Site Analysis Matrix

	Aircraft Hangars	Churches	Community/Recreation Centers	Convalescent Care Facilities	Convention Facilities	Fairgrounds	Government Buildings	Hotels/Motels	Meeting Halls	Military Facilities	National Guard Armories	Other	Same Day Surgical Centers	Schools	Sports Facilities/Clinics	Trailers/Tents (Military/Other)	USAF
Ability to lock down facility																	
Adequate building security personnel																	
Adequate Lighting																	
Air Conditioning																	
Area for equipment storage																	
Biohazard & other waste disposal																	
Communications (# phones, Local/Long Distance, Intercom)																	
Door sizes adequate for gurneys/beds																	
Electrical Power (Backup)																	
Family Areas																	
Floor & Walls																	
Food supply/food prep areas (size)																	
Heating																	
Lab/specimen handling area																	
Laundry																	
Loading Dock																	
Mortuary holding area																	
Oxygen delivery capability																	
Parking for staff/visitors																	
Patient decontamination areas																	
Pharmacy Area																	
Proximity to main hospital																	
Roof																	
Space for Auxillary Services (Rx, counselors, chapel)																	
Staff Areas																	
Toilet Facilities/Showers (#)																	
Two-way radio capability to main facility																	
Water																	
Wired for IT and Internet Access																	
<b>Total Rating/Ranking (Largest # Indicates Best Site)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# Customizing the Site Selection Matrix

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A facility and/or factor can be easily added as a new row to excel spreadsheet.

# Issues to Consider

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- ✓ Is each factor of equal weight?
- ✓ What if another use is already stated for the building in a disaster situation?
  - (i.e. a church may have a valuable community role)
- ✓ Are missing, critical elements able to be brought in easily to site?

# WHO needs this tool?

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- ✓ Incident commanders
- ✓ Regional planners
- ✓ Planning teams including: fire, law, Red Cross, security, emergency managers, hospital personnel
- ✓ Public works / hospital engineering should be involved to know what modifications are needed.

# WHEN should you use this tool?

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- ✓ Before an actual event.
- ✓ Choose best site for different scenarios so have a site in mind for each “type”.

<http://www.denverhealth.org/bioterror/tools>

# The Supplemental Oxygen Dilemma

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- Supplemental oxygen need highly likely in a bioterrorism incident
- Has been carefully researched by the Armed Forces
- Most options are quite expensive
- Most require training/maintenance
- All present logistical challenges
- Remains an unresolved issue

# Some Proposed Oxygen Solutions

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- Most have high cost/patient
- Many have very high power requirements

# EMERGENCY OXYGEN GENERATION AND DISTRIBUTION SYSTEM

## O<sub>2</sub> Generation System



## O<sub>2</sub> Storage System

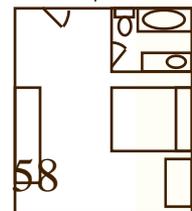
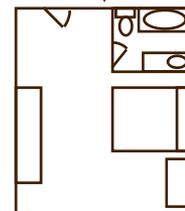
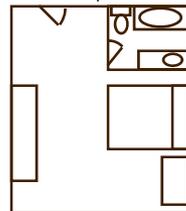
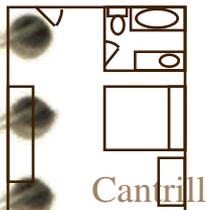


or



Patient rooms ←

## O<sub>2</sub> Distribution System



Patient rooms

# EMERGENCY OXYGEN GENERATION AND DISTRIBUTION SYSTEM

## LOX Storage / Filling Tank



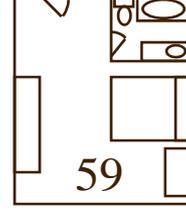
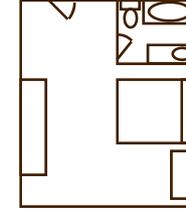
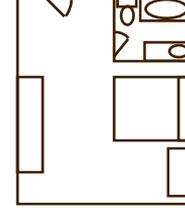
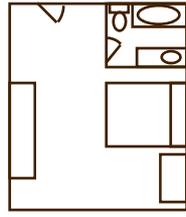
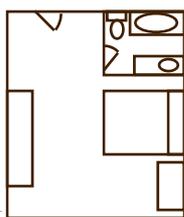
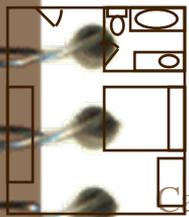
## LOX Storage System



NPTLOX

→ Patient rooms

## O<sub>2</sub> Distribution System



6 patients per LOX

# Oxygen Concentrator



- Up to 10 liters per min  
@ 7 psi
- 110V AC
- 57 lbs
- Approx \$1,400

# HOBS -

# Hospital Oxygen Backup System

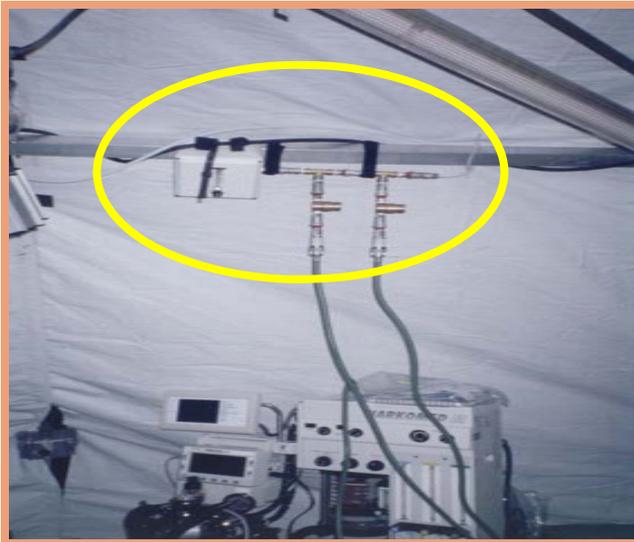
- Configured bank of eight steel cylinders with manifold connection for large storage needs
- 55,000L capacity



# Distribution Systems

## ➤ PODS - Patient Oxygen Distribution System

- Mimics hospital system
- Off the floor - no tripping hazard



## SODS - Surgical Oxygen Distribution System

(Operating room equivalent to PODS)

# And Then The “Other” Problems:

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- Ventilators:
  - Currently in US: 105,000
  - In daily use: 100,000
  - Projected pandemic need: 742,500
- Respiratory Therapists

# Ventilators – Surge Supply

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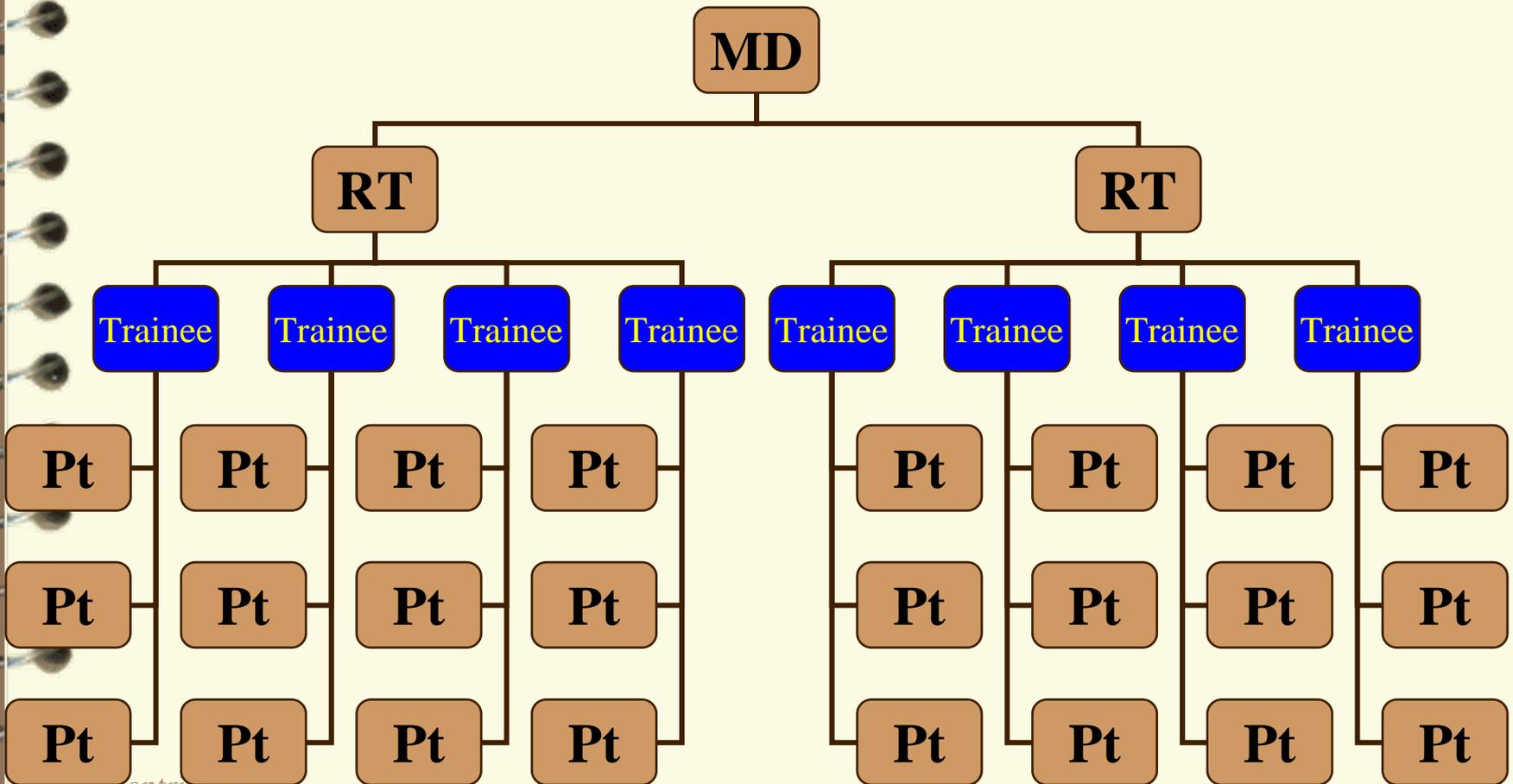
- Additional full units - \$32,000 each
- Smaller units for \$6,000 each



- Many “Disposable” Units - \$65 each



# Respiratory Therapists: Just-In-Time Training



# Staffing: Classes of Providers

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- Physician
- Physician extenders (PA/NP)
- RNs or RNs/LPNs
- Health technicians
- Unit secretaries
- Respiratory Therapists
- Case Manager
- Social Worker
- Housekeepers
- Lab
- Medical Asst/Phlebotomy
- Food Service
- Chaplain/Pastoral
- Day care/Pet care
- Volunteers
- Engineering / Maintenance
- Biomed-to set up equipment
- Security
- Patient transporters

# Per 12 Hour Shift: 33

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- Physician [1]
- Physician extenders (PA/NP) [1]
- RNs or RNs/LPNs [6]
- Health technicians [4]
- Unit secretaries [2]
- Respiratory Therapists [1]
- Case Manager [1]
- Social Worker [1]
- Housekeepers [2]
- Lab [1]
- Medical Asst/Phlebotomy [1]
- Food Service [2]
- Chaplain/Pastoral [1]
- Day care/Pet care
- Volunteers [4]
- Engineering/Maintenance [.25]
- Biomed [.25]
- Security [2]
- Patient transporters [2]

# Staffing Considerations

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- Requires significant pre-planning
  - State {S}
  - Local {L}
  - Institutional {I}
- Unclear who would volunteer
- Contained vs Population-based Surge event

# Facilitation of Emergency Staffing

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- Establish legal authority to utilize out-of-state licensed personnel {S}
- Establish supervision criteria for volunteer and out-of-state licensed personnel {S}
- Establish/maintain list of retired individuals who could be called upon to staff {S L I}
- Availability of prophylaxis for employees and volunteers (? and their families) to guarantee workforce availability {S L I}

# Facilitation of Emergency Staffing

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- Communication of institutional workforce plan in advance to employees {I}
- Develop, test and maintain emergency call-in protocol {L I}
- Expectation and capacity for flexibility in roles {S L I}
- Establish linkages with community resources (ie. hotel housekeeping) {L I}

# Facilitation of Emergency Staffing

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- Address specific needs of employees (transportation, single mother, pets) {I}
- Implement a reverse 911 or notification system for all employees {S L I}
- Establishment of institutional policies for credentialing of non-employees {S L I}

# Institution:

## Surging with Limited Staff

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- Database of retired healthcare personnel and former trainees
  - Legal issues (e.g. licensing) being reviewed
- Limit non-essential patient care
- Use of phone triage to free up providers
- Restructuring/reassigning HCW tasks daily through incident command
  - Just-In-Time training, LEAN
- Use of family members (bathing, bathroom, vital signs, meals)
- Maximize protection of current personnel: vaccines, prophylaxis, infection control
- Day care center for employee families?

# Emergency System for Advanced Registration of Volunteer Health Professionals: ESAR-VHP

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- State-based registration, verification and credentialing of medical volunteers
- Should allow easier sharing of volunteers across states
- Still missing:
  - Liability coverage
  - Command and control

# Medical Reserve Corps

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- Local medical volunteers
- No corps unit uniform structure
- 330 units of 55,000 volunteers
- Deployments do not qualify for FEMA reimbursement
- Liability concerns are still an issue
- ESAR-VHP may help with credentialing

# Emergency Management Assistance Compact (EMAC)

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- A mutual aid agreement and partnership between states to facilitate sharing resources in times of emergency

# Development of Gubernatorial Draft Executive Orders

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- Developed by the Colorado Governor's Expert Emergency Epidemic Response Committee (GEEERC)
- Multi-disciplinary
  - 20 different specialties/fields (from attorney general to veterinarians)
- To address pandemics or BT incidents
- Work started in 2000

# Development of Gubernatorial Draft Executive Orders

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- Declaration of Bioterrorism/Pandemic Disaster
- Suspension of Federal Emergency Medical Treatment and Active Labor Act (EMTALA)
- Allowing seizure of specific drugs from private sources
- Suspension of certain Board of Pharmacy regulations regarding dispensing of medication

# Development of Gubernatorial Draft Executive Orders

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- Suspension of certain physician and nurse licensure statutes
  - Allows out-of-state or inactive license holders to provide care under proper supervision
- Allowing physician assistants and EMTs to provide care under the supervision of any licensed physician
- Allowing isolation and quarantine
- Suspension of certain death and burial statutes

# Katrina: ACS Lessons Learned

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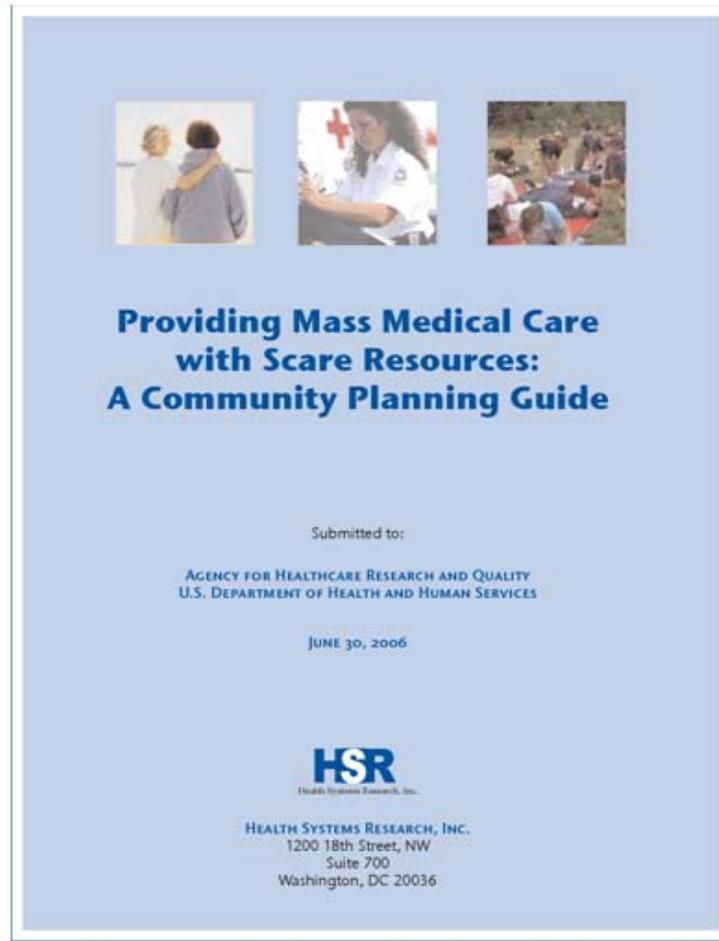
- Importance of regional planning
- Importance of security: uniforms are good
- Advantages of manpower proximity
- Segregating special needs populations
- Organized facility layout
- Importance of Incident Command

# Katrina: ACS Lessons Learned

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- The need for “House Rules”
- Importance of public health issues
  - Safe food
  - Clean water
  - Latrine resources
  - Sanitation supplies

# Available from AHRQ:



## Also available from AHRQ:

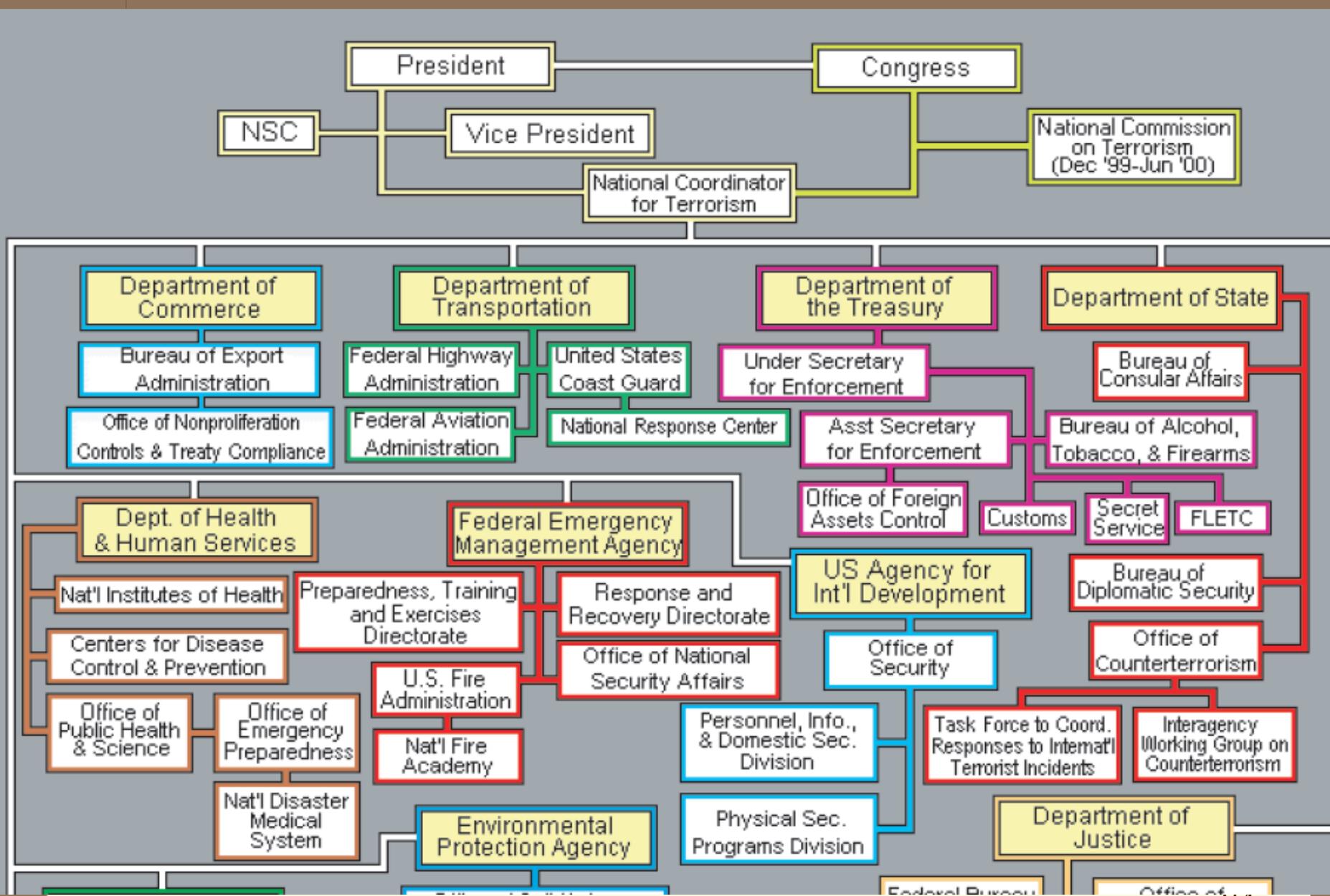
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*Altered Standards of Care in Mass Casualty Events: Bioterrorism and Other Public Health Emergencies.*

AHRQ Publication No. 05-0043, April 2005.  
Agency for Healthcare Research and  
Quality, Rockville, MD.

[www.ahrq.gov/research/altstand/](http://www.ahrq.gov/research/altstand/)





# Summary: Alternative Care Sites

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- We are rediscovering some old concepts
- Medical caches can exist at multiple levels
  - Augmentation of institutional capability
  - Support, to varying degrees, of alternative care site
- Supplemental oxygen and respiratory support remain problems
- Surge staffing facilitation requires advance planning at multiple levels and may still fail