Disaster Medical Management: Alternate Care Sites

Presented by

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On

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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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Denver Health Medical Center
Some of the Current Terms

- 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

- **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

- 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

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

- 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

- 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

- 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

- 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?

you can protect yourself from...

RADIOACTIVE FALLOUT

GET THE FACTS!
FROM YOUR CIVIL DEFENSE DIRECTOR

FREE COURSE ON FALLOUT
place
date
time
Hospital Reserve Disaster Inventory

- 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

- 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

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

- 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 Hospitals

- 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

- 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

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

- 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

- Trailer
- Cots
- Linens
- IV polls
- Glove, gowns, masks
- BP cuffs
- Stethoscopes
Used During Katrina Evacuee Relief
Level II Cache: Regional Alternative Site

- 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

- 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

- 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

- 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

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

- PHS-CS Treatment
- Primary Care
- Non-Acute Treatment
- Special Needs

- PHS-CS Pharmaceutical
- Pharmaceutical
- Special Medications
- Prophylaxis

- PHS-CS Bed Aug (50)
- Beds
- Bedding
- Bedside Equipment
Demo Scenario

- 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
Station Layout

Hall A

Latrine Area and Patient Wash Area
250 sq. ft.

Feeding Area
126'-0"

To Generators

Bio-Med Tech Area
399 sq. ft.

House Support
760 sq. ft.

Administration & Admission
1614 sq. ft.

Admin Supp. Pallet

Tri-fold 2x7

Medical Support Curtain

First Aid Pack

Treatment Area

Isolated Power Holding Area

Curtain

Pharmacy

Main Power Distribution Box

Morgue 100 sq ft

Staging Area
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.
Additional Work at the Federal Level

- DHS: Critical care unit
  - Specified, not yet implemented
  - ICU level of care
- Specialty care units
ACS Issues and Decision Points

- “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

- Operational support
  - Meals
  - Sanitary needs
  - Infrastructure
- Documentation of care
- Security
ACS Issues and Decision Points

- Communications
- Relations with EMS
- Rules/policies for operation
- Exit strategy
- Exercising the plan
Some ACS Site Issues:

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

✓ Disaster event overwhels 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

- 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
Recreation Center
School
Church

Stadium
Potential Non-Hospital Sites

- 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

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

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Infrastructure Requirements

✓ 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

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Equal to or same as a hospital.</td>
</tr>
<tr>
<td>4</td>
<td>Similar to that of a hospital, but has SOME limitations (i.e. quantity/condition).</td>
</tr>
<tr>
<td>3</td>
<td>Similar to that of a hospital, but has some MAJOR limitations (i.e. quantity/condition).</td>
</tr>
<tr>
<td>2</td>
<td>Not similar to that of a hospital, would take modifications to provide.</td>
</tr>
<tr>
<td>1</td>
<td>Not similar to that of a hospital, would take MAJOR modifications to provide.</td>
</tr>
<tr>
<td>0</td>
<td>Does not exist in this facility or is not applicable to this event.</td>
</tr>
<tr>
<td>Potential Non-Hospital Site Analysis Matrix</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
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<td>Biohazard &amp; other waste disposal</td>
<td></td>
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<tr>
<td>Communications (# phones, Local/Long Distance, Intercom)</td>
<td></td>
</tr>
<tr>
<td>Door sizes adequate for gurneys/beds</td>
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</tr>
<tr>
<td>Electrical Power (Backup)</td>
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<tr>
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<td>Patient decontamination areas</td>
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</tr>
<tr>
<td>Pharmacy Area</td>
<td></td>
</tr>
<tr>
<td>Proximity to main hospital</td>
<td></td>
</tr>
<tr>
<td>Roof</td>
<td></td>
</tr>
<tr>
<td>Space for Auxiliary Services (Rx, counselors, chapel)</td>
<td></td>
</tr>
<tr>
<td>Staff Areas</td>
<td></td>
</tr>
<tr>
<td>Toilet Facilities/Showers (#)</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Total Rating/Ranking (Largest # Indicates Best Site)</td>
<td></td>
</tr>
</tbody>
</table>

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Customizing the Site Selection Matrix

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

✓ 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?

- 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?

✓ 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

- 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

- Most have high cost/patient
- Many have very high power requirements
EMERGENCY OXYGEN GENERATION AND DISTRIBUTION SYSTEM

O₂ Generation System

O₂ Storage System

O₂ Distribution System

Patient rooms

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EMERGENCY OXYGEN GENERATION AND DISTRIBUTION SYSTEM

LOX Storage / Filling Tank

LOX Storage System

NPTLOX

Patient rooms

O₂ 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:

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

- 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

- 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

- 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

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

- 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

- 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

- 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

- 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

- 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

- 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)

➢ A mutual aid agreement and partnership between states to facilitate sharing resources in times of emergency
Development of Gubernatorial Draft Executive Orders

- 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

- 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

- 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

- 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

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

Providing Mass Medical Care with Scare Resources: A Community Planning Guide

Submitted to:
AGENCY FOR HEALTHCARE RESEARCH AND QUALITY
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
JUNE 30, 2006

HEALTH SYSTEMS RESEARCH, INC.
1200 18th Street, NW
Suite 700
Washington, DC 20006

Cantrill www.ahrq.gov/research/mce/mceguide.pdf
Also available from AHRQ:

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


www.ahrq.gov/research/altstand/
United States Response to CBW Terrorism and Domestic Preparedness

This organizational structure chart is an overview of federal agencies, programs, and offices that play a role in anti-terrorism, counterterrorism, and domestic response. Some areas of the chart are currently under revision to achieve greater accuracy or organizational detail. Since the enactment of the Defense Against Weapons of Mass Destruction Act of 1996 (Nunn-Lugar-Domenici amendment to the National Defense Authorization Act for FY97), numerous offices have been created and reorganized to respond to the terrorism threat. Congress is currently considering passage of H.R. 4210, an amendment that would create an Office of Terrorism Preparedness. Located in the Executive Office of the President, this new office would coordinate and oversee policies related to domestic readiness.

"The President will establish the Office of Homeland Security that will be headed by the Assistant to the President for Homeland Security -- Governor Tom Ridge. The mission of the Office will be to develop and coordinate the implementation of a comprehensive national strategy to secure the United States from terrorist threats or attacks. The Office will coordinate the executive branch's efforts to detect, prepare for, prevent, protect against, respond to, and recover from terrorist attacks within the United States."


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The diagram illustrates the structure of the U.S. government with a focus on the National Coordinator for Terrorism, reporting to both the President and Congress. The diagram includes various departments and agencies such as the Department of Commerce, Department of Transportation, Department of the Treasury, and Department of State.

Key departments and agencies include:
- Department of Commerce
  - Bureau of Export Administration
  - Office of Nonproliferation Controls & Treaty Compliance
- Department of Transportation
  - Federal Highway Administration
  - Federal Aviation Administration
  - United States Coast Guard
- Department of the Treasury
  - Under Secretary for Enforcement
  - Asst Secretary for Enforcement
- Department of State
  - Bureau of Consular Affairs
  - Bureau of Alcohol, Tobacco, & Firearms


The diagram also includes other departments and agencies such as the Department of Justice, Office of the Secretary, Office of the Attorney General, and the Bureau of Diplomatic Security.
Summary: Alternative Care Sites

- 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