Disaster Planning: Healthcare Facilities

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Objectives

- Identify types of natural & man-made disasters & resulting infection control issues
- Identify components and purpose of an effective Emergency Operations Plan
- Provide references & resources for the development of an infection control disaster Emergency Operations Plan
Why do we plan…..
Climate patterns change wildly

La Niña creating drought in Midwest, South; more hurricanes in other places

By IRA DREYFUSS
Associated Press

WASHINGTON — Al Dutcher, Nebraska’s state climatologist, doesn’t wish any hard luck on West Texas. Just the same, it would be a relief for Nebraska if a hurricane from the Gulf of Mexico tracks lots of rain northward into his drought-striken state.

“We don’t pray for a hurricane,” Dutcher said. But he knows exactly where one ought to hit: “It has to be in the Brownsville area, and Amarillo, and pull into our area.”

Dutcher’s dilemma illustrates something about the nature of climate patterns that have created the worst drought in a century or more in some areas from Nebraska into Texas and Florida.

In weather, everything is connected, and changes as far from the United States as the Pacific Ocean off Peru can wind up literally hitting here in the Midwest, too.

The combination of dry air and heat as spring wears into summer will add to the soil evaporation that has left ground hard as pavement and riddled with cracks. Worse, for farmers who managed to plant, La Niña’s dry winter has kept the subsoil from capturing the normal reserve of water into which maturing crops extend their roots.

Hurricane cycles

In the Lubbock, Texas, area, farmers were able to get cotton planted in irrigated land or through the good fortune of some timely storms, said Randy Boman, a Texas A&M Extension cotton agronomist. But the ground below the topsoil is dry, and this could stunt growth, he said.

Like Dutcher, Boman is mulling the good that a hurricane or two could do. “At this stage of the game, it would be a tremendous benefit to us, as long as it didn’t set on us for too many days,” he said.

Paradoxically, La Niña could raise the likelihood of the big storms, climate experts say.

Among the Pacific-born weather pattern’s effects is a more favorable mid-level jet stream from Africa, where hurricanes are born.

The jet stream energizes developing storms. And researchers at Florida State University, who say hurricanes have their own cycles, believe the country has started a period of more frequent hurricanes.

But, with weather, you have to be careful what you wish for.

Hurricanes usually become more common in the later summer. Farmers in Boman’s area plant cotton capable of standing up to High Plains winds, Boman said. But a hurricane blasting through at harvest time, he added, could cost cotton farmers their crops.
Sumter Regional Hospital
2-29-07

Around 55 patients in the hospital had to be evacuated, three were in critical condition.

No patients died
Katrina: New Orleans, August 2005
Dermatologic Illnesses – Hurricane Katrina, 2005

Evacuees:
- Cluster of MRSA infections (30 cases)
- *V. vulnificus* & *V. parahaemolyticus* wound infections (24 cases) – 6 deaths

Rescue workers:
- Tinea Corporis
- Folliculitis
- Prickly heat (3 cases)
- Non-follicular lesions (97 cases)
- Circumferential lesions (chafing)

MMWR 54:38, 961-964
Diarrheal Illnesses – Hurricane Katrina, 2005

La: 20 clusters

MS & TX: ~1000 cases (Norovirus, Salmonella, V. cholerae O1)

MMWR 54:38, 961-964
Respiratory Illnesses – Hurricane Katrina, 2005

- URI, pneumonias
- 1 case of pertussis
- 1 new diagnosis of pulmonary TB
- Of 195 known persons with TB, 153 located to continue DOT

MMWR 54:38, 961-964
## NC FEMA Major Disaster Declarations 1996-2005

<table>
<thead>
<tr>
<th>Year</th>
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<th>Disaster Types</th>
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<tr>
<td>2005</td>
<td>10/7</td>
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<td>Tropical Storm Frances</td>
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<td>1999</td>
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<td>Hurricane Floyd &amp; Irene</td>
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<td>Severe Storms, Tornadoes and Flooding</td>
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<td>1996</td>
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<td>Storms/Flooding</td>
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<td>1996</td>
<td>1/13</td>
<td>Blizzard</td>
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Ivan: Asheville, September 2004
Hurricane Floyd

September 16, 1999

- 300 miles diameter
- 96-100 miles per hour wind
- >20 inches of rain
- affected 2.1 million persons
Tracing the flood

This image shows how far the floodwaters from Hurricane Floyd reached into Eastern North Carolina and most of the counties that experienced some degree of flooding.

Approximate flooded area based on satellite imagery

Source: State of North Carolina, FEMA

GREY BLACKWELL / The News & Observer
Deaths Related to Hurricane Floyd
North Carolina - 1999

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<tr>
<th>Cause of Death</th>
<th>Number (n=52)</th>
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<tr>
<td>Drowning</td>
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<td>Motor-vehicle crash</td>
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<td>Myocardial infarction</td>
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<td>Fire</td>
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<tr>
<td>Fall</td>
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MMWR Vol 49, no 17, p 369-372
Non-fatal Illnesses

Hurricane Floyd 1999

- ↑asthma [RR] 1.4, 95% CI 1.2-1.7
- ↑diarrhea [RR] 2.0, 95% CI 1.4-2.8
- ↑suicide attempts [RR] 5.0, 95% CI 1.4-17.1
- ↑dog bites [RR] 4.1, 95% CI 2.0-8.1
- ↑febrile illnesses [RR] 1.5, 95% CI 1.3-1.9
- ↑basic medical needs [RR] 1.4, 95% CI 1.2-1.8
- ↑dermatitis [RR] 1.4, 95% CI 1.2-1.6
- ↑arthropod bites [RR] 2.2, 95% CI 1.4-3.4

MMWR 49:17, p 369-372
We Plan Because....

- It is our obligation to the people of North Carolina
- Regulatory and accreditation agencies mandate it
- And.....
Because there is no such thing as an EASY BUTTON ® for Disasters or Emergencies!
Emergency Management Phases and Planning Cycles
Emergency Management Phases

- Preparedness
- Response
- Mitigation
- Recovery

The cycle of emergency management phases.
Emergency Planning Cycle

1. Identify or Review Hazards and Risks
2. Develop Mitigation Strategies
3. Exercise the Plan
4. Revise the Plan as Needed
What is the Purpose of Emergency Operations Planning?
The Purpose of Emergency Operations Planning

- Establish a flexible all-hazards response and recovery framework that can reach across disciplines

- Establish a common operating picture

- Integrate plans and policies internally and externally with other organizations and agencies
Regulation-based Planning vs. Hazard-based Planning
Regulation-based Planning

Based on regulations that control certification, accreditation, and funding.

Provides program guidance and management rather than the Emergency Operations Planning.
Hazard-based Planning

- Based on a Hazard Vulnerability Analysis
- Provides function plans that incorporate multiple hazards along with the appropriate standards
- Proactive and Reactive
Hazard Vulnerability Analysis (HVA)

1\textsuperscript{st} step in the emergency planning process

Matrix that compares the likelihood and impact potential of a particular hazard or threat against the level of preparedness

Community input is essential
<table>
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<tr>
<th>EVENT</th>
<th>PROBABILITY</th>
<th>HUMAN IMPACT</th>
<th>PROPERTY IMPACT</th>
<th>BUSINESS IMPACT</th>
<th>PREPAREDNESS</th>
<th>INTERNAL RESPONSE</th>
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<td>3</td>
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<td><strong>1.06</strong></td>
<td><strong>1.06</strong></td>
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*Risk increases with percentage.*

\[
RISK = PROBABILITY \times SEVERITY
\]

\[
0.12 \quad 0.40 \quad 0.31
\]
Common Hazards, Associated Risks, and Considerations
Earthquakes

- No warning
- Significant impact on infrastructure
- Look at environment as resource (be innovative)
- Transportation impacted

Priorities:
- Sewer and utility function
- Safe water
- Dust (aspergillus)
Floods

Some warning
Evaluate roads for history of flooding
Evacuation plan
Priorities:
  - Most likely to compromise the quality of available potable water
  - Estimated 48 to 72 hours to get construction materials dry (i.e., wallboard, wood, flooring)
  - Use moisture meter to determine extent of water damage
Hurricane

- Some warning
- Significant infrastructure damage and disruption
- Hospitals used for shelters (plan accordingly)
- Evaluate supplies of fuel for generators
- Protection of supplies and supply routes
- Possible proactive or reactive evacuations

Priorities:
- May involve prolonged power outages
- Water quality likely to be compromised
- Sewers likely overwhelmed
Wildland Fire

- May or may not have warning
- Facilities adjacent to wooded areas should evaluate possibility of wildfire
- Risk to firefighters
- Evacuation may be necessary
  - Resources for receiving/evacuating patients should be evaluated & written into plan

Priorities:
- Air quality may be affected by smoke
Tornado

May or may not have warning

Significant infrastructure damage or disruption

Water supply and sewers intact

Plan for rapid evaluation of building structure

Plan for evacuation should be clear

Priorities

- Resources for receiving patients documented
Emerging Infectious Diseases/Terrorism

- May or may not have warning
- Include biologicals, chemicals, and emerging infectious diseases in planning process
- Key: recognition of suspected cases
- Seek advice from experts
- Consider community resources – NC PHRST, HAZMAT, fire dept, & law officials
Power Failure

- Loss of primary electrical source
- Possible loss of generators
- Plan for possible evacuation
- Priorities
  - Generators
  - HVAC
  - Sterilizers
The Functional Hazard-based Emergency Operations Plan (EOP)
EOP Layout

Numerous templates available:
- Emergency Support Function (ESF)
- State and Local Guide to Emergency Planning (SLG 101)
- Target Capability Planning
- Hybrid

Layouts should be able to integrate with other local, regional, state and federal plans

Most adequately address the National Incident Management System (NIMS) and other appropriate regulatory requirements
Basic Plan

- Purpose and Objectives- outlines the overall purpose and objectives of the plan

- Scope- identifies who the plan is applicable to

- Authorities- identifies who or what body authorizes the creation and implementation of the plan

- Planning Assumptions- provides basic background concerning the planning environment and process
Basic Plan cont.

- Plan Activation and De-activation- identifies who can activate and deactivate the plan and under what conditions

- Concept of Operations- provides guidance on how the plan should be implemented

- Organizational Responsibilities- identifies responsible individuals and indicates their role in activating implementing and de-activating the plan
Functional Annexes

- Provides guidance for implementing basic support functions or target capabilities that would be required during a pandemic.

- These include resource and utility management, personnel management, security, patient and staff safety, communication, incident management, evacuation, etc.

- Annexes can be activated independently or in coordination with each other based on specific need and conditions.
Other EOP Components

- Job Aids
- Organizational Charts
- Special Response Plans or Response Information (radio frequencies, phone numbers, email addresses, etc.)
Flexibility

Disaster are not one size fits so EOP’s must be readily adaptable and not rigid

Plans should be living documents and should be evaluated after every exercise or actual event

A good EOP should bend but not break!!
Scalability

- An EOP should be adaptive for incidents of varying size, duration, and intensity

- Consider a tiered response approach

- Tiers improve the scalability and greatly assists in recovery and demobilization
ICS and NIMS
Hospital Incident Command System (HICS)

Incident management system
- developed to assist medical facilities’ operations during emergency situations

Based on the Incident Command System (ICS)
- developed by Fire Service as disaster management tool for first responders (e.g., Fire, EMS, Law Enforcement)
HICS Advantages

- Consistent terminology
- Definitive chain-of-command & communication lines
- Manageable span of control (i.e., scope of supervision)
- Flexible organizational structure that can easily expand and contract
National Incident Management System (NIMS)

- Provides for a unified approach to incident management
- Focuses on preparedness, mutual aid, resource management, and communication.
Infection Control Planning Considerations
Priorities

- Communication
- Surveillance/Communicable Diseases
- Patient Management
- Resource Management
  - Transportation Loss
- Decontamination
- Water/Food Sanitation
- Sewage/Sanitation Management
Communication

- Know organizations’ plan for communication (telephones, radios, foot runners)
- Key personnel decision makers
- Evaluate range of services capacity
- Use information as bait to move people away from key areas such as ER

Disaster Log
- Begin ASAP
- Include: Events, information, decisions made/by whom, problems/actions, needed follow-up, questions
Surveillance

- Focus on problems related to disaster
- Monitor existing problems
- Surveillance styles adjusted
  - Making rounds
  - Using key people
  - Listening to the grapevine
  - Know what to expect (diarrhea, waterborne illness, foodborne illness)
  - Credible data stops rumor mills
Communicable Diseases

- Meticulously supervise food & water sanitation
- Maintain reports/communication with LHD
- Evaluate local communicable diseases problems/issues
  - Maintain precautions
- Major outbreaks of infectious diseases rare!
Patient Management

- Surge capacity
- Rapid triage
  - Alternative triage sites
  - ‘Worried well’
- Mass vaccination clinics
- Quarantine
  - Involves multi-disciplinary team
- Alternative care facilities
- Mortality
  - Contact funeral home in advance (capacity & transport)
  - Temporary morgue
Resource Management

Pre-arrangements with healthcare facilities, vendors

- Staff
- Supplies (PPE, Med Surge, Linen, Scrubs, etc.)
- Medication
  - Vaccines
  - Abx prophylaxis

May need to ration based upon priority
  - E.g., gloves in ED & plastic baggies other areas

Consider HLD in place of sterilization
Transportation Loss

Pre-determine alternate routes
  - Staff, patients, visitors
  - Supplies

Temporary locations
  - Storage of supplies
  - Triage
Decontamination

Types:
- Physical
- Chemical
- Environmental

When

How

Where
Water

For:

- Hand washing/ necessary bathing
- Cooking/washing dishes
- Washing linen
- Sterilization & processing of scopes
- Dialysis
- Hydrotherapy
- Flushing toilets
Water

Supply:

- Estimate water needs for facility for 3 days
- Drinking water - **minimum** of 2 liters per day for healthcare workers & patients
- Backup water - 25 gals/day per patient
- State and Federal agencies may provide portable water purification systems & power generators
Water Sources

Internal Sources:
- Dietary department, Tanks for engineering purposes, Sterile water or IV solution, Spring well on premises

External Sources:
- Local brewers (can water), Local supermarkets (bottled water), Public health department (water tanker), Military (escort water tankers)
Water

Purification:
- Boil for 5-10 minutes
- Add 10 drops of bleach per gallon
  - Mix thoroughly
  - Allow to stand for 30 minutes before using (can be used for 24 hours)

Response Phase:
- Assess tap water immediately (Individual specified in plan)
- Obtain clearance from public health
- Communicate findings
Hand washing

Waterless alcohol agents (supplies)

- Storage location
- Estimate:
  - 4 HW per nurse per h or 32 washes per 8 h shift
  - Each 4 oz (188 mL) bottle of rinse can supply 3 nurse shifts
  - Number of shifts expected in 24 hours
  - Number of nurse shifts per 24 hr is the number of 4 oz bottles needed for 3 days

Hand washing stations (coffee urn & bucket)

Towelettes
Food

**Preparedness Phase:**
- Assess: number of people, emergency power
- Review order food used with dietary
  - Refrigerated food
  - Food from unpowered freezer
  - Disaster reserve supplies

**Response Phase:**
- Monitor for basic sanitation
- Monitor holding temperatures
  - Danger zone 45° to 140°F
- Discard food held in danger zone for 4 hours
Sewage & Sanitation Management

Trash pickup disrupted
- Sanitary storage of solid waste & RME

Sewage (Preparation)
- Assess disaster type likely to damage sewer
- Floods and hurricanes overwhelm them
- Plan for accessibility to service trucks
- Define who will assess sewer function in time of disaster
- Don’t flush until assessment done

Pre-needs contract with chemical toilet supplies
Sewage

- Intact sewers
  - Bucket of gray water for flushing
    - One good flush in the system
    - Use toilets without flushing
  - Empty or discard bedpans if heavily soiled; may mold a plastic bag inside to form a liner
Sewage

Broken sewers: Plan for temporary toilets

- 3 plastic bags in a bucket
  - Store used bags in a leak proof container
  - Monitor until half full
- One small bag for one use only
- Commercial disposable urinals are available
- Evacuate??
Advantages of Emergency Operations Planning
Increased Efficiency

- Eliminates duplicated effort through the responsible management of resources and personnel
- Easier transition from response to recovery to normal operations
Cost Mitigation

- Plans that promote responsible resource and personnel management are not only more efficient practically, but economically as well.

- A well developed plan can help avoid the citations and fines that often follow a major incident.
Team Building

- Brings together personnel with varied background from internal and external to the organization

- Allows for pre-disaster networking

- “During an Emergency is not the time to be exchanging business cards”
Reputation Management

Reputation of an organization can be elevated dramatically by mitigating potential hazards through the use of effective planning.

Especially true during large well-publicized disasters or emergencies.
Consequences of not Planning
Loss of life

Claims of negligence resulting from gross lack of planning can lead to:

- Legal issues
- Monetary losses from settlement
- Damage to reputation
- Loss of accreditation and funding sources
Reputation Damage

- Damage to an organization's reputation from a lack of planning can be very difficult and sometimes impossible to repair.

- Loss of accreditation resulting from a lack of planning can further damage the organization's reputation.

- A damaged reputation will make it very difficult to recruit quality employees in the future.
Monetary losses

Failure to plan can lead to monetary losses as a result of:

- Ruined equipment
- Legal settlements
- Increase in workers compensation claims from unsafe and unhealthy practices and conditions
- Disruption of business
- Loss of accreditation that results in the suspension of funding sources
Summary

- Preparation is essential!
  - Appropriate for situation/location
  - Collaborate with local community
- Communicate
- Educate
- Exercise
Resources

- Disaster Response in APIC Text of Infection Control and Epidemiology
- Healthcare at the Crossroads (The Joint Commission)
- Public Health Issues in Disaster Preparedness: Focus on Bioterrorism (Aspen Publications)
- [www.hazmatforhealthcare.org](http://www.hazmatforhealthcare.org)
- SPICE Bioterrorism I & II, Chemical charts
- 2000 CDC Guidelines for Biological and Chemical Terrorism: Strategies for Preparedness and Response
  - MMWR 2000 Apr 21;49(RR-4)1-14
- Planning Against Biological Terrorism: Lessons from Outbreak Investigations. Emerging Infectious Diseases
Resources Cont.

- State of California Emergency Medical Services Authority
  http://www.emsa.ca.gov/hics/hics.asp
- FEMA www.fema.gov
- NIMS Integration Center
  http://www.fema.gov/emergency/nims/index.shtm
- Emergency Management: Principles and Practice for Local and State Government
- CDC Emergency Preparedness and Response
  http://www.bt.cdc.gov/
- CDC Morbidity and Mortality Weekly Report
  http://www.cdc.gov/mmwr/
- National Weather Service www.nws.noaa.gov
Resources Cont.

- CDC Preparation and Planning- http://emergency.cdc.gov/planning/
- Lessons Learned Information Sharing System- www.llis.gov
References


