



# Disaster Planning

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## Hurricane Matthew: “Expect the Unexpected”



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Disclaimer.....

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## Southeastern Health Overview

- Non Profit Health Care System
- DNV GL Accredited
- 452 Patient Beds
- Inpatient Short-Term Rehabilitation Center
- LTC, In-Patient Hospice, Cancer Center
- Offers Acute Care, Intensive Care and Psychiatric Services
  - 16,000 Inpatient Visits Annually
  - 68,000 Emergency Patients Annually
- 2,229 Employees (FTE)
- Southeastern Health Medical Education Program in partnership Campbell University School of Osteopathic Medicine



## Hurricane Irene 2011





## Hurricane Irene 2011





## Hurricane Irene 2011





## Hurricane Irene 2011







## Hurricane Irene 2011





## Objectives

- 1. Discuss emergency response issues during Hurricane Matthew**
  - The First Days
  - The Next Two Weeks
  - Ongoing After the Storm
- 2. Discuss unique Infection Prevention /Control issues related to flood.**
- 3. Share four lessons learned from losing power, water and communications**
- 4. Share three examples for supporting staff, families, volunteers, and shelters both during, and after the storm**

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## Pre-Planning

### Information

- High level leader meetings to discuss preparations
- Monitor weather forecasts
- Staff
  - ❑ Prepositioned in locations to respond to any issues during event
  - ❑ All vehicles topped with fuel
  - ❑ Home Health visits

### Supplies / Equipment

- Supplies brought in to provide coverage through Tuesday
  - ❑ Medications
  - ❑ Medical Supplies
  - ❑ Food
  - ❑ Linen
  - ❑ Pharmacy- Retrieve High-Cost Medicine /Narcotics from Outpatient Facilities

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## IMPACT OF HURRICANES: WATER-RELATED INFECTIONS

- Hepatitis A (ingestion; hepatitis)
- Hepatitis E (ingestion; hepatitis)
- Norovirus (ingestion; gastroenteritis)
- Cholera (ingestion; gastroenteritis)
- Leptospirosis (ingestion; systemic)
- Enterotoxigenic *E. coli* (ingestion; gastroenteritis)
- *Cryptosporidium* (ingestion; gastroenteritis)
- Giardia (ingestion)
- Group A strep (injury, immersion; skin)
- *Staphylococcus aureus* (injury, immersion; skin)
- *Aeromonas* (injury, immersion; skin and systemic and pneumonia)
- *Vibrio* spp. (injury, immersion; skin and systemic)
- Polymicrobial; *Pseudomonas*, *Klebsiella*, *E. coli* (injury, immersion; skin)
- Non-tuberculous bacteria (injury, immersion; skin)
- Melioidosis (injury; skin)
- Tetanus (injury in water or by wood; systemic)
- Fungi (inhalation or injury/immersion; skin or pneumonia)\*
- Legionellosis (inhalation; pneumonia)\*
- *Aeromonas* (inhalation; pneumonia)
- Mosquito-Borne\*
  - West Nile, Zika, Dengue, Chikungunya, Japanese encephalitis
  - Malaria

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## Hurricane Matthew

After leaving over a thousand dead in Haiti, then moving up the South Atlantic coast, the storm's outer bands arrived in N.C. on Oct. 8.



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## Hurricane Matthew

Even though the storm's center never made landfall in North Carolina, the statewide death toll was 28.



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## Hurricane Matthew

As Matthew's torrential rain swept across central and eastern North Carolina, approximately 4,000 people initially sought refuge in 109 shelters opened by the American Red Cross in 33 counties.



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## IMPACT OF HURRICANES: SHELTER-RELATED

- Respiratory infections (inhalation)
  - Viral respiratory infections: COVID-19, influenza, RSV, etc.
  - Systemic infections: Measles, mumps, rubella, varicella
  - Tuberculosis
  - Invasive meningococcal disease
- Skin (direct and indirect contact)
  - Ectoparasites: Scabies, lice
  - MRSA]]
- Gastrointestinal (ingestion)
  - Norovirus
  - Rotavirus
  - Shigella
  - Cryptosporidium
- Systemic (ingestion)
  - Hepatitis A



## Hurricane Matthew



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## Missouri Task Force 1



FEMA's Urban Search and Rescue Teams from Missouri Task Force 1 studied neighborhood maps to determine areas where residents potentially were stranded in Lumberton.

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## Hurricane Matthew

About 2,336 water rescues and 90 rescues by helicopter took place over the course of the storm and days following. More than 1,000 N.C. National Guard members assisted emergency responders, matched in number by state troopers.



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## Hurricane Matthew

Floodwaters even reached to interstate highway systems, washing over portions of Interstate 95.



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## Hurricane Matthew

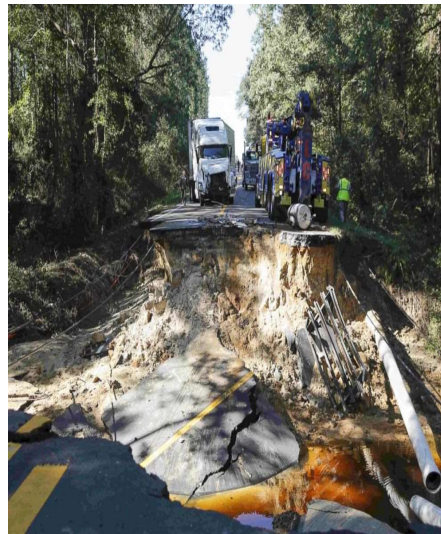
The closing of Interstate 95 in Lumberton, near the South Carolina border, drew a wave of national attention to North Carolina's flood crisis. The city had already received up to 10 inches of rain on Sept. 28.



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## Hurricane Matthew

The peak of the storm left approximately 635 roads inaccessible.



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## Predicted vs. Actual

### Predicted



### Actual

NEWS 2

HURRICANE MATTHEW RAIN TOTALS

FRI - SUN AM

CENTRAL NORTH CAROLINA

DUART	16.87"	RDU	6.96"
FAYETTEVILLE	14.83"	DURHAM	5.90"
LUMBERTON	12.82"	BURLINGTON	3.96"
DUNN	12.28"	SANFORD	3.91"
GOLDSBORO	11.09"	GREENSBORO	3.90"
SMITHFIELD	11.08"	RANDLEMAN	3.82"
BENSON	10.07"	LEXINGTON	3.51"
HOLLY SPRINGS	9.26"	WINSTON-SALEM	3.34"

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- IPs have a critical role in the creation of disaster planning and management policies for their facilities and in disaster response, and it is important for the IP to advocate for their own involvement if that need is not clear to administrators.
- Hurricanes can cause floods that may result in mold growth and bacterial contamination of water systems, power outages that may cause food spoilage, overcrowding of units which can increase transmission of infections, the inability of healthcare workers to cover their shifts, and interruption of supply chains that may prevent delivery of critical infection prevention and control (IPC) supplies including soap, hand sanitizer, and PPE. IPs should include these potential hazards in their annual risk assessment, disaster management, and water management plans. IPs should be included in incident command training and tabletop exercises and should be activated when a disaster poses any additional risk of infection.

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## NON-INFECTIOUS IMPACT OF HURRICANES: HEALTHCARE FACILITIES WITHIN DESTRUCTION ZONE

### Water intrusion from rain or flooding

- Possible microbial contamination of environment/equipment with pathogens, human/animal waste and hazardous chemicals
- Wet areas unless properly remediated may lead to fungal growth with risks for infection (especially among immunocompromise patients) and/or respiratory ailments (e.g., asthma)
- May lead to electrical hazards
- May damage key equipment
- May impair all healthcare services

### Impact of high winds

- Direct infrastructure damage
- Flying objects
- Tornados
- Impaired transportation
- Staffing shortages

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## NON-INFECTIOUS IMPACT OF HURRICANES: HEALTHCARE FACILITIES WITHIN AND NEARBY DESTRUCTION ZONE

### Loss of power

- Inability to perform sterilization/disinfection
- Inability to use EMR (e.g., isolation alerts)
- Possible impact on laboratory (microbiology)
- Spoilage of food
- Inability to provide heat and cooling (may result in high humidity; may impact sterile packs)
- Impaired transportation; to and within hospital (elevators)

### Loss of potable water

- Inability to use sinks for HH
- Inability to flush toilets
- Impact on sterilization/disinfection
- Impact on dialysis
- Boiled water advisories (will not eliminate chemical contaminants)

### Infections

- HAls (e.g., post Katrina, increased MRSA)

### Other

- Staffing difficulties due to transportation issues and/or staff housing
- Increased patient demand
  - Storm related medical events
  - Closing of local medical offices
- Supply shortages
  - Limited transportation
  - Damage to production facilities
- Increased staff stress
- Lack of access to healthcare exacerbating pre-existing conditions
- Increase in violence

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## Hurricane Matthew

So what is the role of the Infection Preventionist?



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## Saturday October 8, 2016

Started having many water leaks within the facility.

Things to look for.....



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## Mitigating Leaks and Flood Waters in the Healthcare Setting

Excessive amounts of wind and rain and failure of dams and levees can cause water damage to healthcare facilities. If water from floods and leaks is not mitigated correctly, especially for porous items and materials, then conditions may promote the growth of mold, which can cause infections and outbreaks. Mitigation of a leak or flood depends on the type of material that is wet. Nonporous materials may simply need to be dried and disinfected as they will not retain water, while semiporous and porous materials need special consideration since they do retain water and can thus support the growth of mold.

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## Mitigating Leaks and Flood Waters in the Healthcare Setting

The U.S. Centers for Disease Control and Prevention (CDC) recommends that any porous materials that have a moisture content of greater than 20% at 72 hours after the water event should be removed.

1. Leaks from compromised roofing or windows may not immediately be noticed and may cause infections even years later.
2. One Maryland facility experienced an outbreak of polymicrobial fungal isolates from patients in the burn intensive care unit (ICU) that lasted 18 months after Hurricane Sandy struck. This outbreak was attributed to diffuse contamination of the environment and was mitigated by sealing windows in the unit, converting overhead light fixtures to prevent air from flowing around the fixture, and the installation of nonporous ceiling tiles.

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## Saturday October 8, 2016

Loss of power, went onto emergency generator power.



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Saturday October 8, 2016



Loss of television and internet service



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## Saturday October 8, 2016

**29<sup>th</sup> Street flooded, redirected ambulance traffic.**



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Saturday October 8, 2016

Began to call in all levels of staff  
that lived close to hospital.



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## Hurricane Matthew

Woodhaven (Long Term Care)  
and Hospice House are  
impassable/downed trees.



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Started providing certain medical supplies to community shelters.



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## Hurricane Matthew

Provided oxygen cylinders to shelters for residents requiring oxygen



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## Hurricane Matthew

Robeson County Emergency Operation Center reports I-95 closed. Persons routed off I-95 at Exit 20 began to arrive at hospital for shelter.



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## Hurricane Matthew

Community began to arrive at hospital to use cafeteria. CAFETERIA WAS CLOSED TO PUBLIC.



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## Food Safety After a Disaster

A boil water notice and a loss of power can both affect food safety, so nutritional services policies should include information on how to safely prepare and serve food to patients during and after a hurricane/disaster.

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## Food Safety After a Disaster

- Discard food from refrigerator or freezer if: It has been above 40o F for two hours or more.
- It is in a full freezer without power for 48 hours or more
- It is in a full refrigerator without power for 4 hours or more
- It is perishable food that was frozen and is now completely thawed
- Food has an unusual odor, color, or texture
- Also discard: Food that has come in contact with flood waters, including home-canned food
- Commercially canned food that has bulges and damages
- Wooden cutting boards that were exposed to floodwater

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Disinfectants like bleach can be used to sanitize hard surfaces that come in contact with flood water. Gloves, boots, goggles, and N-95 masks are important for infection control during cleanup efforts. In case of evacuation to a shelter, face masks should be included in emergency kits for protection from respiratory infections when in close proximity to other evacuees.

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## Hurricane Matthew

Employees that were stranded at the hospital working needed medications.



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## Hurricane Matthew

Employee's stayed at work several days while receiving reports they had lost property.



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## Hurricane Matthew

City and County issued a curfew.



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## After Day One

**Visitor restriction put into place due to large volume of community members staying in patient rooms.**



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## After Day One

Employees started to report routes they took to work the day before are now flooded.

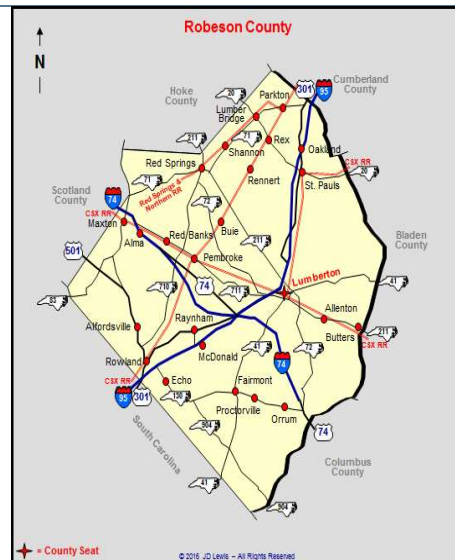


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## After Day One

**Access Routes to  
Southeastern Health changed  
everyday**



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## After Day One

**Placed SE Health  
representative at Robeson  
County Emergency  
Operations Center**



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## After Day One

**Provided clinical staff  
(Physicians, Nurse  
Practitioners and nurses) to  
shelters**



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## After Day One

**Funeral homes could not function due to lack of power.**



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## After Day One

**Police Escorts provided for supply trucks, with I-95 clos**



53

## After Day One

Community began to arrive at the hospital for prescription medicine needs.



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## After Day One

**Community began to show up at hospital to charge cell phones to call family members.**



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## After Day One

**Physicians instructed patients who had electrical medical equipment to go to hospital .**



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## After Day One

**Patients were being brought in by EMS because they had no power to operate their home medical equipment.**



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## After Day One

**Generator issue developed at hospital**



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## After Day One

- **Crowds arrived starting evening of hurricane.**
- **Crowds continued to arrive the first week of hurricane**



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## After Day One

Crowds wandering the streets in the evening hours, which lasted until the power was restored.



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**Access to facility  
through one door; as  
crowd control  
measure.**



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## Security

Brought in additional security resources prior to storm and during storm to flex up staffing.

National Guard and additional state resources arrived after Tuesday.



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## After Day One

City of Lumberton lost water and  
sewer



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## After Day One

Infection Control recognized the need for hand hygiene. We had 6 C Diff patients in house.



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## Handwashing Station



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## After Day One

Evacuated, NICU and  
Critical Care Patients



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## After Day One



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## After Day One

We have a well on site so we used the well water and started a bucket brigade to manage flushing of toilets.



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## After Day One

Provided medications to residents in community shelters



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## After Day One

Brought in tanker trucks to provide water (this had to be approved by the EOC.)

1- taker to Woodhaven

1- tanker to Hospice House.

1- Tanker to the Health Park.

Several Tankers on main campus.



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## After Day One

Effectively moved water resources between our three inpatient facilities .



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## Take a Guess

How much water do you think we used in 2 weeks from these tanker trucks?

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## After Day One

Outsourced linen and scrub service



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## After Day One

Volunteers assembled linen packs for staff that were staying over and sleeping in house.

- 1 wash cloth
- 1 towel
- 1 bar soap
- 1 Tooth brush/paste
- 1 flat sheet
- 1 fitted sheet
- 1 pillow
- 1 blanket
- 1 set disposable scrubs

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## Day 3 +



**Community began to receive essential needs from faith based groups and business donations as well as much needed supplies and help from other healthcare organizations.**

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- Carolinas Med One – Provider Mobile health services arrived October 11th



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## Patient Acute Care



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- Community showed up to use restrooms, with house bathrooms not functional.
- Provided Transportation to the shelters using SE Health vehicles.
- Provided housing for Law Enforcement being brought in from outside of Robeson County Region.

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October 12, 2016

Wednesday evening went back onto normal power.

**Electric Power Distribution**

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## Week Two

- Began to phase off of water tankers and back onto city water
- Staffing began to resemble normalcy



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## As of Today 10/17/24

- One clinic remains closed (will not reopen)
- A few community members remain in “semi shock” due to losing their home.
- Some families remain housed in hotels (various counties)
- Employees still struggling from emotional and financial impact of the storm
- IP’s continue to educate on standing water and contaminated water every chance we get.

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- Employee Assistance Hotline





## Prevention of Infectious Diseases after a Hurricane

- Hurricanes rapidly change environments, which can create new opportunities for infectious disease transmission.
- Waterborne, foodborne, and vector-borne infectious diseases can increase post-hurricane and can cause gastrointestinal, respiratory, skin, and soft tissue infections.

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## Best Practices

- Immediately after disaster declaration, designate key person(s) to coordinate recordkeeping
- Establish separate and distinct cost center
- Ensure costs claimed under a FEMA project are reasonable, necessary and thoroughly documented – prepare for AUDIT

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## Issues Discovered

### **During**

- Emergency Dispensing of Medicine
- Emergency Credentialing
- Vehicle Transport for community members
- Monitoring of food/water/vector borne illness in the community

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## Lessons Learned

- Develop more in-depth Incident Command Training.
- Communication System Redundancies.
- Review placing HVAC onto emergency power
- Create specific cost account numbers for disaster to track costs
- Use FEMA labor logs to track time before, during, and after disaster for all staff, exempt and non-exempt
- Clinical leader at County Command Center

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## Lessons Learned

- Remove additional medication from clinics
- Initiate lockdown of facility sooner
- Request lights for outside areas
- Develop relationships with your churches ahead of time
- Develop relationships with local businesses
- Insure access to cell phone numbers for Community Emergency Management

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## Lessons Learned

- Print manual copies of the phone numbers for Healthcare System (Staff/Units)
- Post Day/Date in Command Center
- Track run times for generators and other equipment
- Review organization of labor pool, especially documentation (work area/hours)
- Understand language used to request healthcare equipment from County Emergency Management

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## Lessons Learned

- Matthew challenged every plan we've ever written, every resource, every piece of inventory.

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## Clearing the roads

Infection Preventionist  
can do anything.....

Even use a chain  
saw....



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## Hurricane Matthew



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## Hurricane Matthew



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## Hurricane Matthew



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## Questions



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