



WISCONSIN HEALTHCARE ENGINEERING ASSOCIATION

HEALTHCARE ENGINEERING AND
EMERGENCY PREPAREDNESS

OCTOBER 4TH, 2024

PREPAREDNESS

The only thing more difficult than preparing for disasters
(or any incident) is explaining why you didn't

Dr. Rex Archer, Kansas City Public Health

Expect the unexpected!

PREPAREDNESS AND YOU

- Communication is KEY – up, down, side to side
- What you do or don't do could have a significant impact on patient care, patient safety or staff safety!
- Don't want to play “Cry Wolf” but...
- It's easier to cancel or downgrade than
 - Wait 30, 60, 90 120 minutes into an incident
 - Play “catch up”
 - Scrambling because there's a high possibility it could impact patient care or safety
- Anticipate the needs.... Yours, patient care, patient safety
- 30,000 foot view

PLANNING, RESPONSE AND RECOVERY

- Planning
 - Hazard Vulnerability Analysis (HVA)
 - Emergency Operations Plans
 - Real world and planned events
 - Training
 - Reviewing
- Response
 - Exercises
 - Real world
 - Planned events
- Recovery
 - Getting back to “Normal” as quickly as possible

GETTING INVOLVED

- Hazard Vulnerability Analysis
- Emergency Management Planning
- Planned events – creating a response plan for unplanned
- Incident Management
- Exercises / Training

HAZARD VULNERABILITY ANALYSIS

- Required by CMS and the Joint Commission
- Identifies potential threats (Natural, Technological, Human and Hazardous)
- Based on probability and severity it calculates the relative risk/threat

PROBABILITY AND SEVERITY

EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						RISK
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPAREDNESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	<i>Likelihood this will occur</i>	<i>Possibility of death or injury</i>	<i>Physical losses and damages</i>	<i>Interruption of services</i>	<i>Preplanning</i>	<i>Time, effectiveness, resources</i>	<i>Community/ Mutual Aid staff and supplies</i>	<i>Relative threat*</i>
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 - 100%

PROBABILITY, HUMAN, PROPERTY, BUSINESS IMPACT

Issues to consider for **probability** include, but are not limited to:

- 1 Known risk
- 2 Historical data (**last 12 months - July 1st, 2022 to June 30th, 2023**)
- 3 Manufacturer/vendor statistics

Issues to consider for **human impact** include, but are not limited to:

- 1 Potential for staff death or injury
- 2 Potential for patient death or injury

Issues to consider for **property impact** include, but are not limited to:

- 1 Cost to replace
- 2 Cost to set up temporary replacement
- 3 Cost to repair

Issues to consider for **business impact** include, but are not limited to:

- 1 Business interruption
- 2 Employees unable to report to work
- 3 Customers unable to reach facility
- 4 Company in violation of contractual agreements
- 5 Imposition of fines and penalties or legal costs
- 6 Interruption of critical supplies
- 7 Interruption of product distribution

PREPAREDNESS, INTERNAL AND EXTERNAL RESOURCES

Issues to consider for **preparedness** include, but are not limited to:

- 1 Status of current plans
- 2 Training status
- 3 Insurance
- 4 Availability of back-up systems
- 5 Community resources

Issues to consider for **internal resources** include, but are not limited to:

- 1 Types of supplies on hand
- 2 Volume of supplies on hand
- 3 Staff availability
- 4 Coordination with MOB's

Issues to consider for **external resources** include, but are not limited to:

- 1 Types of agreements with community agencies
- 2 Coordination with local and state agencies
- 3 Coordination with proximal health care facilities
- 4 Coordination with treatment specific facilities

NATURALLY OCCURRING EVENTS

EVENT	PROBABILITY <i>Likelihood this will occur</i>	SEVERITY = (MAGNITUDE - MITIGATION)						RISK <i>Relative threat*</i>
		HUMAN IMPACT <i>Possibility of death or injury</i>	PROPERTY IMPACT <i>Physical losses and damages</i>	BUSINESS IMPACT <i>Interruption of services</i>	PREPAREDNESS <i>Preplanning</i>	INTERNAL RESPONSE <i>Time, effectiveness, resources</i>	EXTERNAL RESPONSE <i>Community/ Mutual Aid staff and supplies</i>	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 - 100%
Hurricane								0%
Tornado								0%
Severe Thunderstorm								0%
Snow Fall								0%
Blizzard								0%
Ice Storm								0%
Earthquake								0%
Tidal Wave								0%
Temperature Extremes								0%
Drought								0%
Flood, External								0%
Wild Fire								0%
Landslide								0%
Dam Inundation								0%
Volcano								0%
Epidemic								0%
AVERAGE SCORE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	TRUE
<i>*Threat increases with percentage.</i>								
RISK = PROBABILITY * SEVERITY								
0.00 0.00 0.00								

TECHNOLOGICAL EVENTS

EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						RISK
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	Preplanning	Time, effectiveness, resources	Community/ Mutual Aid staff and supplies	Relative threat*
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 - 100%
Electrical Failure								0%
Generator Failure								0%
Transportation Failure								0%
Fuel Shortage								0%
Natural Gas Failure								0%
Water Failure								0%
Sewer Failure								0%
Steam Failure								0%
Fire Alarm Failure								0%
Communications Failure								0%
Medical Gas Failure								0%
Medical Vacuum Failure								0%
HVAC Failure								0%
Information Systems Failure								0%
Fire, Internal								0%
Flood, Internal								0%
Hazmat Exposure, Internal								0%
Supply Shortage								0%
Structural Damage								0%
AVERAGE SCORE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%
*Threat increases with percentage.								
		RISK = PROBABILITY * SEVERITY						
		0.00	0.00	0.00				

HUMAN RELATED EVENTS

EVENT	PROBABILITY <i>Likelihood this will occur</i>	SEVERITY = (MAGNITUDE - MITIGATION)						RISK <i>Relative threat*</i>
		HUMAN IMPACT <i>Possibility of death or injury</i>	PROPERTY IMPACT <i>Physical losses and damages</i>	BUSINESS IMPACT <i>Interruption of services</i>	PREPARED-NESS <i>Preplanning</i>	INTERNAL RESPONSE <i>Time, effectiveness, resources</i>	EXTERNAL RESPONSE <i>Community/ Mutual Aid staff and supplies</i>	
		SCORE <i>0 = N/A 1 = Low 2 = Moderate 3 = High</i>	SCORE <i>0 = N/A 1 = Low 2 = Moderate 3 = High</i>	SCORE <i>0 = N/A 1 = Low 2 = Moderate 3 = High</i>	SCORE <i>0 = N/A 1 = High 2 = Moderate 3 = Low or none</i>	SCORE <i>0 = N/A 1 = High 2 = Moderate 3 = Low or none</i>	SCORE <i>0 = N/A 1 = High 2 = Moderate 3 = Low or none</i>	
Mass Casualty Incident (trauma) (Active shooter)								0%
Mass Casualty Incident (medical/infectious)								0%
Terrorism, Biological								0%
VIP Situation								0%
Infant Abduction								0%
Hostage Situation								0%
Civil Disturbance								0%
Labor Action								0%
Forensic Admission								0%
Workplace Violence								0%
Bomb Threat								0%
AVERAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%

*Threat increases with percentage.

RISK = PROBABILITY * SEVERITY		
0.00	0.00	0.00

HAZARDOUS MATERIALS EVENTS

EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						RISK
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	Preplanning	Time, effectiveness, resources	Community/ Mutual Aid staff and supplies	Relative threat*
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 - 100%
Mass Casualty Hazmat Incident (From historic events at your MC with >= 5 victims)								0%
Small Casualty Hazmat Incident (From historic events at your MC with < 5 victims)								0%
Chemical Exposure, External								0%
Small-Medium Sized Internal Spill								0%
Large Internal Spill								0%
Terrorism, Chemical								0%
Radiologic Exposure, Internal								0%
Radiologic Exposure, External								0%
Terrorism, Radiologic								0%
AVERAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%
*Threat increases with percentage.								
		RISK = PROBABILITY * SEVERITY						
		0.00	0.00	0.00				

RISK MANAGEMENT

RISK	High Risk Low Frequency	High Risk High Frequency
	Low Risk Low Frequency	Low Risk High Frequency
	Frequency	

RISK MANAGEMENT

- **High Risk / Low Frequency events**
 - Water failure - Hot / Cold or both
 - Fire
 - Chemical / Hazmat situation
 - Generator failure – partial or complete
 - HVAC failure
 - Flood
 - Medical gas failure

<https://youtu.be/GvOSoTA4JMg?si=I2SR345DaOhhn7s3>

PLANNING FOR THE WORST HOPING FOR THE BEST UNPLANNED EVENTS

- You should have emergency response plans for:
 - Generator outages
 - Power failures
 - Sewer failures
 - Water outages
 - HVAC
 - Fire Alarm System failure
 - Hazmat / Decontamination



PLANNING FOR THE WORST HOPING FOR THE BEST UNPLANNED EVENTS

Have you collaborated and shared your plans with Emer Prep and are they included in your facilities emergency operations plans?

Have you PRACTICED, TRAINED, TESTED your emergency plans?

With your Incident Management Team?

With the rest of your hospital (s)?



UNPLANNED EVENT

Multi-victim / Mass Casualty Chemical decontamination event

- Multiple victims exposed to an unknown chemical
- Who would / could be impacted?
 - Patient Registration – walk in's
 - Emergency Department
 - Security
 - Facilities?

ANTICIPATING THE NEEDS

ED – decontaminating patients

- Decontamination room and / or Decon tent
- If there is a Decon tent – who sets it up for the ED staff?
- Where is the tent set up?
 - Access to water? Hot / Cold?

ANTICIPATING THE NEEDS

Is your department part of the plan?

- When are you notified?
- How are you notified?
- Who responds?
- What are your responsibilities during a decontamination event?
- Neg pressure rooms – does nursing switch room to neg?
 - If not, how is the request made?
 - What is the time frame from notification to switch to neg?

ANTICIPATING THE NEEDS

Holding tank? Decon room / Decon tent

- Who monitors the tank?
- How or who empties the tank?
- Disposing of water from Decon tent?
- Who do you contact if liquid is flushed down the drains?

Is there a regular maintenance plan for checking the holding tank?

Does your tank have a valve that pumps direct to your community DPW? Or is it a holding tank that needs regular pumping?

ANTICIPATING THE NEEDS

- Staffing needs
- What if the incident occurs M-F 8a – 430?
- What if the incident occurs on a Sun morning at 3a?
- How does or would the time and day impact any of your plans?
- Build those anticipated changes into your response plans

PLANNED EVENTS

Encourage you to involve emergency preparedness

- Communications to leaders
 - Maintenance leadership to other leaders (side to side)

Emergency preparedness can assist with communications above and below

Can provide a 30,000 ft view to assist in anticipating any needs or resources

PLANNED EVENTS

Perfect opportunity to develop an emergency response plan for an unplanned outage

- **Hot water outage (extended ex. 9 hours)**
 - Equipment repairs that will shut down hot water throughout entire facility
 - Who would / could be impacted?
 - Patient care
 - Food services
 - Surgical procedures
 - Sterile processing
 - Emergency Department
 - Lab
 - Radiology

ANTICIPATING THE NEEDS

- Anticipating the need for hot water usage
 - ED – bed bugs, fecal matter, chemical contamination
 - Sterile processing – downtime longer than planned event
 - Testing of water after event
 - Equipment getting back to temperature
 - Surgery – need for sterile equipment
 - Food Services - limited food prep for and during mealtime and heating of water for ED and storing in insulated containers
 - Patient bathing – alternative options if needed

ANTICIPATING THE NEEDS

What if the planned outage lasts longer than anticipated

- Equipment failure
- Unplanned or anticipated issues?

How would you communicate that to all impacted departments?

How are the issues documented and information shared with all?

Should facilities be expected to anticipate all of those needs? **NO**

Emergency Preparedness can assist and anticipate

PUTTING IT ALL TOGETHER

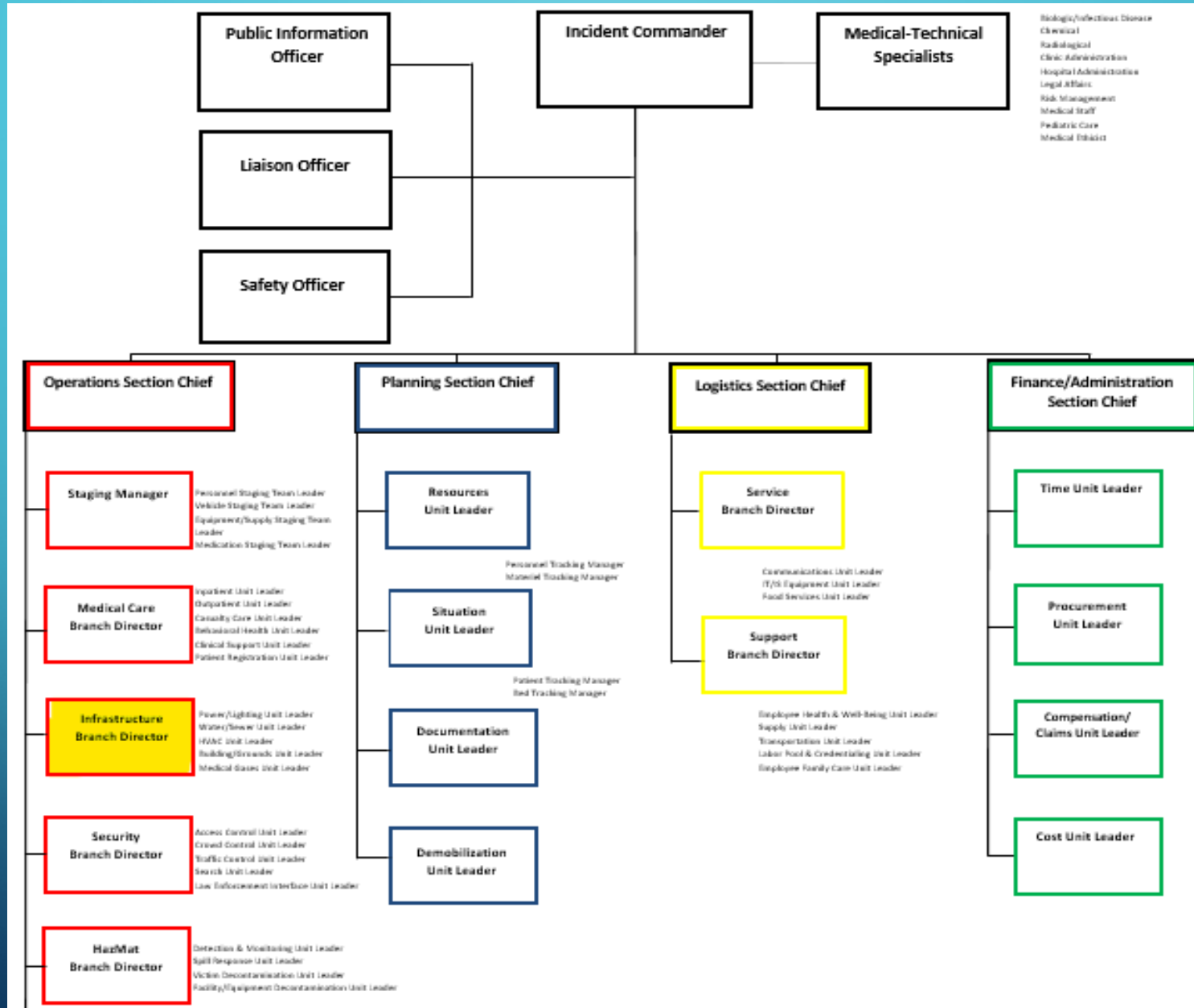
- Improve planning & response
- Improve individual and team performances
- Policies, plans and procedures
- Develop, test and validate
- Training and competency
- Equipment
- Agreements
- Identify gaps in resources
- Repeat

INCIDENT MANAGEMENT (IM) RESPONSE

All hazards

- Organized way to manage any type of incident
- Not just for the “BIG” incidents or mass casualty incidents
- Facilities/Maintenance/Engineering plays a key role in IM
- Infrastructure Branch Director

ORGANIZATIONAL CHART



INFRASTRUCTURE BRANCH DIRECTOR

Operations Section Chief

**Infrastructure
Branch Director**

Power/Lighting Unit Leader
Water/Sewer Unit Leader
HVAC Unit Leader
Building/Grounds Unit Leader
Medical Gases Unit Leader

FACILITY SYSTEM STATUS REPORT

HICS 251 – FACILITY SYSTEM STATUS REPORT

Department Use

1. Incident Name		2. Time Completed: (#) DATE: FROM: _____ TO: _____ TIME: FROM: _____ TO: _____	
3. Name of Department / Unit Reporting Status Below		Contact Number:	
4. System	5. Status	6. Comments If not fully functional, give location, reason, and estimated time/resources for necessary repair. Identify who reported or inspected.	
Power Routine and emergency	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Lighting	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Water	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Sewage / Toilets	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Nurse Call System	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Medical Gases / Oxygen	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Communications IT systems, telephones, pagers	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
7. Remarks (Cracked walls, broken glass, falling light fixtures, etc.)			

HICS 251 – FACILITY SYSTEM STATUS REPORT

1. Incident Name		2. Operational Period (#) DATE: FROM: _____ TO: _____ TIME: FROM: _____ TO: _____	
3. Name of Facility / Building Reporting Status Below			
4. System	5. Status	6. Comments If not fully functional, give location, reason, and estimated time/resources for necessary repair. Identify who reported or inspected.	
COMMUNICATIONS			
Fax	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Information Technology System Email, registration, patient records, time card system	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Nurse Call System	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Overhead Paging	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Paging System Code teams, standard paging	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Radio Equipment Facility handheld, 2-way radios, antennas	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Radio Equipment EMS, local health department, other external partner	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Radio Equipment Amateur radio	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		
Satellite Phones	<input type="checkbox"/> Fully functional <input type="checkbox"/> Partially functional <input type="checkbox"/> Nonfunctional <input type="checkbox"/> N/A		

RECOVERY

- Getting back to “Normal” as quickly as possible
- Minimal business interruption
- Minimal interruption of critical supplies
- Types and volume of supplies on hand
- Staff availability
- Agreements with contractors
- Contractor availability
- Coordination with local and state agencies
- Coordination with proximal health care facilities



GET INVOLVED!

- Emergency Preparedness may already be part of your job description
- Be part of your Hazard Vulnerability Analysis (HVA) review
- Include your departments emergency plans in your hospitals Emergency Operations Plan (EOP)
- Joint Commission requirement
 - 2 community based / full scale exercises each year (real world, high stress)



EXPECT THE UNEXPECTED

If your facility is doing a mass casualty exercise, ask to incorporate an infrastructure “issue”

- Tube system went down - forces staff to walk orders/supplies etc.
- HVAC went down
- On generator back up
- “Bubba with a backhoe” hit a water line outside your facility



Train as if its the real thing you WILL fall back on your training

- Evaluate drills/responses to improve your plan
 - Drill until you fail – identifies gaps
 - Store emergency response supplies where you will need to use them
 - Keep shut-off tools near equipment
 - Make emergency supplies easily portable
 - Grab bags at locations throughout facility
 - Paper and pen
 - Flashlights & batteries
- 
- 

TABLETOP EXERCISES

Participate in Tabletop exercises

- Ask EM to create a tabletop specific to an infrastructure failure
- Low stress/no stress
- Discuss possible scenarios
- Review your response plans during the tabletop
- Ask the hard “What if” questions
- Identify gaps or solutions to those “What if” questions
- DOCUMENT your plans
- Train all of your staff

The background is a blue gradient with white circuit-like lines in the corners. The lines consist of straight segments and small circles, resembling a network or data flow diagram.

QUESTIONS?

THANK YOU!