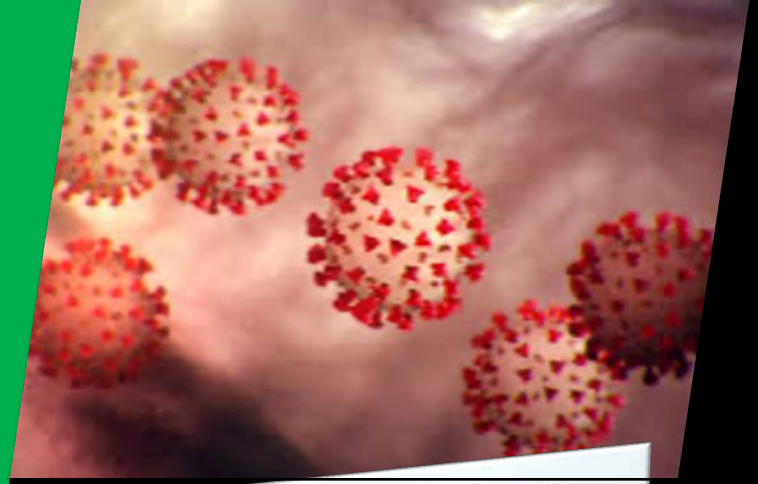

Presented By
Paul Rumbos ASSE 6010, 6020, 6030, 6050 & CMGV
MAJOR MEDICAL HOSPITAL SERVICES

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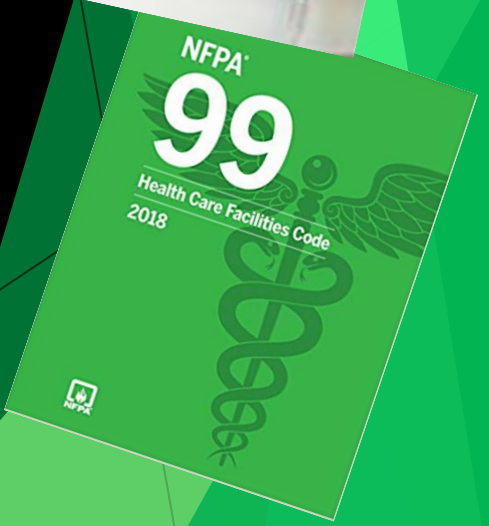
Emergency Management & System Design in Pandemic Times

And NFPA Code Changes



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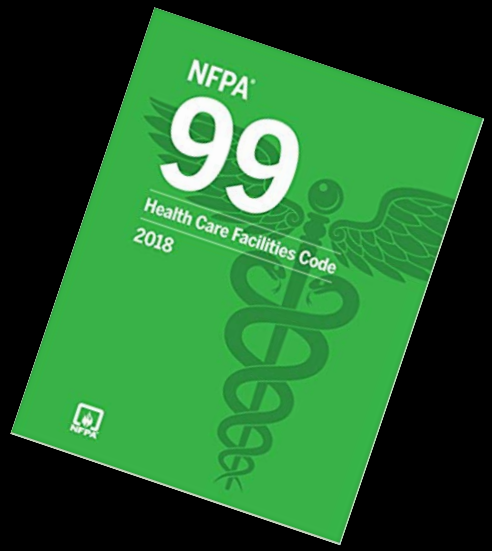
Prumbos@majormedicalinc.com

Your Presenter…

Paul Rumbos

Major Medical Hospital Services

- *Medical Gas Credentials: NITC/MGTI/MGPHO*
  - *ASSE 6050 Certified Medical Gas Instructor*
  - *ASSE 6030 Certified Medical Gas Verifier*
  - *ASSE 6020 Certified Medical Gas Inspector*
  - *ASSE 6010 Medical Gas System Installer*
  - *MGPHO Credentialed Medical Gas Verifier*
  - *NFPA 99 Committee Member (Alternate)*
  - *ASSE 6000 Committee Member*
  - *Affiliations in ASHE, ASSE and member in good standing with Hospital Engineers' Societies*



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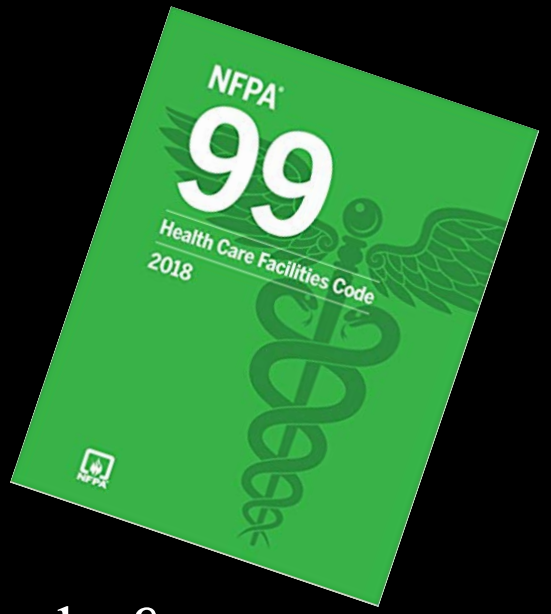
Presentation Outline



- Introduction & Overview
- Defining our Terms
- NFPA 2018 Summary of Changes
- Revised Emergency Management Code & Emergency Preparedness as it Related to Pandemic Response
- Conclusions & Discussion

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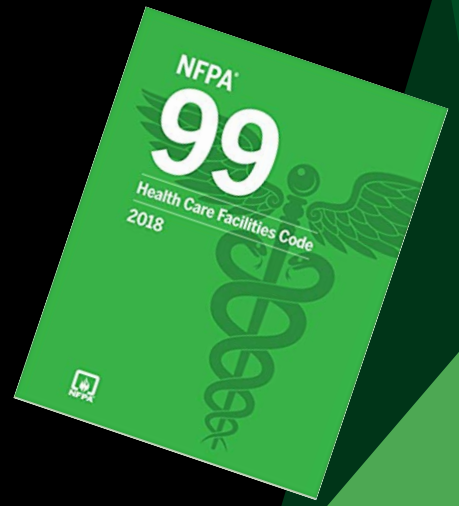
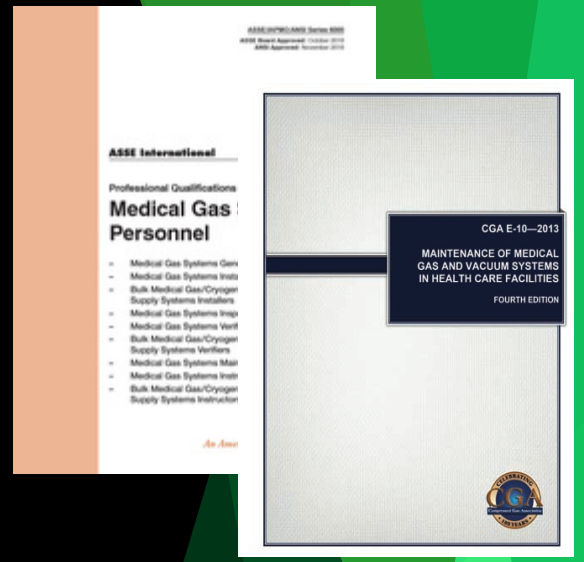


Other Reference Guides

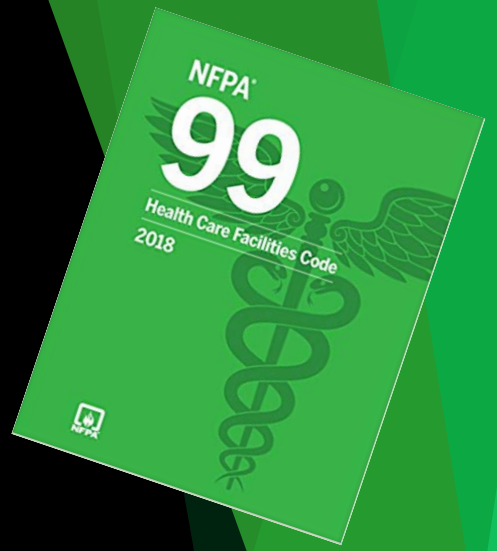
CGA E-10: Maintenance of Medical Gas and Vacuum Systems at Health Care Facilities



- ✓ A guide to the preparation of a maintenance program regarding piped medical gas/vacuum systems in health care facilities.
- ✓ National codes require health care facilities with these systems to have an effective, documented maintenance program.
- ✓ Covers inspection and testing of Gas/Vacuum Outlets, Gas/Vacuum Alarm Systems, Compressed Gas Manifolds, Vacuum Pumps, Medical Air Compressors, Suggested Frequency of Inspection, Test Methods, & Documentation.
- ✓ Also *CGA M-1*, P-1&2 Safe Handling, P-2.7 Guide for safe storage, Handling, and use of small portable liquid 02 systems, P-2.6 Trans- filling Liquid 02 use for Resp., P-30 Cryogenics, P-39 02 Rich Atm. & G-4 Oxygen

CGA
Compressed Gas Association
The Standard For Safety Since 1913

Emergency Management



- **Command Center went virtual posture**
- **Daily Operations Task Force Calls to support the Hospital needs**
- **Calls would transpire to other micro meetings when things come up**
- This format was very helpful and effective.
- Command Center was open around the clock, but it was used more for meetings, training prep sessions, micro meetings when needed.

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CBS NEWS

22 COVID patients die in Indian hospital as leak cuts oxygen supply

22 COVID patients die in Indian hospital as leak cuts oxygen supply

Emergency Management

- COVID Surge Council:
- This council was a very vast diverse leadership group to look at all areas of the hospital to decompress and expand for the surge for COVID.
- Health System Leadership Meetings Daily
- We meet daily to discuss all department of Medicine issues from training, negative pressure relationships, supplies, and more
- We had many departments report up to this committee then report up toe Command Center.

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Emergency Management Documentation

- Updating your Emergency Operations Plan
- Creating Surge Documentation
- Updating state responses and cross reference to the State Tracers
- Updating PPE Policy to meet the needs of COVID
- Document Training
- Document Rounding & SWAT Rounds sessions

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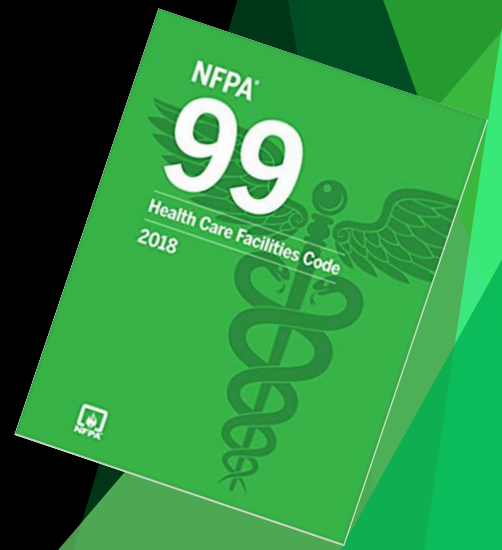
- Memorializing the Pandemic Response
- After Reports starting to complete them instead of waiting to the end
- So much more…..



Surge Council Grid….ICU

HUP COVID ICU Surge Plan										
Location	Capacit	OVID cens	UI cens	pen bed	Open COVID beds if this unit closed	Open COVID beds if ~half of this unit closed	Activation trigger	Staffing	Native patients' des	Notes/Questions
ACTIVE COVID ICUs										
Rh1	22	13	1	8	-14	-3	Active. Threshold for contraction to new 1 team: census = 10-11 (stably).	Novel MICU D & Novel MICU F. ECMO patients covered by F5 team.	Rv8/9 (surg, vascular, bariatrics)	All negative pressure. Note: Not licenced ICU (will need to be addressed if PA emergency status expires).
TOTAL ACTIVE COVID ICUs	22	13	1	8	Excludes 6 inactive beds on Rh5; includes Rh5 crash OR/ECMO beds					
POTENTIAL COVID ICUs if ever needed (ordered)										
Rh5	24	0	0				Re-activating as non-COVID SICU. Can use as mixed unit (1-16 non-COVID, 17-24 COVID) if COVID re-surges			All negative pressure.
Rh2	22	0	0				Alternate COVID ICU. Currently active as native neuro ICU. Begin with front 8, then back 14. Currently would need to move patients in order to open.	NeuroCC (Native) + Anesthesia/Surgical CC team (SICU Bronze), adding anesthesia/CC overnight fellow. Planning lead-Brian Anderson/Mona Kumar/Carinna Sicoutris.	F5 w/ neuro team for neuromedical, F5/GrDo for neurosurgery; continued care by neuroCC. Silver 9/NICU is another	All negative pressure. Need to confirm S9 vent capabilities.
D3	8	0	0				Currently active w/ non-COVID MICU. Alternate COVID ICU only until AC needed (lose negative pressure); 2 remaining negative pressure rooms w/ AC.	Native.	F9	All negative pressure. Consider as COVID ECMO unit if there are 3 COVID ECMO patients (first 2 to Rh5). Consider as COVID ICU + ward if new surge. Note: Cannot be neg pressure and AC (so no summer COVID)
F10	28	0	0				Currently active w/ non-COVID cardiology.	Native.		Can be all negative pressure. Confirmed presence of medical gas in all rooms.
South PACU Surge ICU	18	0	0				Orientation done but standing down.	Novel ICU teams (anesthesia/surgical CC, CC APPs/residents, PACU nursing); CRNAs as RN/RT?; Planning lead-Meghan Lane-Fall/Carinna Sicoutris, Nicole Hoke		Epic build done.
North PACU Surge ICU	8	0	0					As above		Epic build done.
Courtyard PACU Surge	8	0	0					As above		Epic build done.
White Pre-op Surge	20	0	0					As above		Epic build done.
Ravdin 2 EDOU	10							Novel ICU teams (PCCM, CC APPs/residents, CC nursing)	wards, home	Neutral pressure (needs anteroom); use as ward?
Cath/EP/cath recovery	17							Novel ICU teams (pulm/anesthesia/surg CC, CC APPs/residents, CC nursing); CRNAs as RN?	d/c elective cases	Requires discussion. ?negative pressure; minus continued normal operations

HUP COVID WARD SURGE PLAN….

HUP COVID Ward Surge Plan											
Location	Capacity (usual)	Rooms	COVID census	PUI census	Open beds	Open COVID beds if this ward closed	Open COVID beds if ~half of this ward closed	Activation trigger	Staff (attendings, resident/APPs, nurses, RT	Native patients' destinati	Notes/Questions
ACTIVE COVID WARDS											
Rh6	29	17	12	0	17	-12	3	Active.	Martin	S9 (onc)	All negative pressure. Can overflow to Rh5 (+/-Rh1).
TOTAL ACTIVE COVID WAR	29	17	12	0	17						
POTENTIAL COVID WARDS if ever needed (ordered)											
S7 + PEEC/L&D (Women's health)	27	17	2	0				Negative pressure rooms active for laboring COVID+/PUIs. Can take female non-COVID med/surg			COVID count includes many asymptomatic positives. Cohorted nursing. COVID pts in negative pressure.
COVID ICUs								Can put/keep overlow COVID ward patients in open COVID ICU beds as temporizing measure (if there is ICU capacity) or to avoid new COVID ward activation			
Doubling								Consider doubling private rooms on COVID wards to avoid opening new COVID ward.		n/a	Option for COVID and non-COVID. Begin w/ Rh4.
D3	8	8						Currently active as non-COVID MICU.	PCCM	F9	Cannot do negative pressure and AC.
F10	30	28						Re-activating for cardiology Mon 5/4.	Martin Surge	F11	Can be all negative pressure (work in progress).
Rv6 + Pavilion	24	24						Re-activating for onc from S9.		S10, S12, Rv9	Neutral pressure (COVID positive only; no PUIs).
Rh4	29	26						Non-COVID surgery 5/20			
Rh3	27	25						Non-COVID onc 5/4			
D6	29	22								HUP East	Neutral pressure (COVID positive only; no PUIs). Received Rh3 onc patients.

Total Number of Negative pressure room capacity and tabs on bottom of the spreadsheet

19	PCAM PACU/ORs	64									Pros - PACU/OR space; lots of beds. Cons - distant location.
20	Other wards (Rh3, Rh4, Rh6, Founders, Silver, Ravdin, Dulles) - approx total	350							Novel ICU teams (pulm/anesthesia/surg CC, CC APPs/residents, CC nursing)	wards, expansion wards	Assumes 1 ICU patient per ward room; includes HUP East = 119. Could theoretically double some
21	**Current non-COVID ICUs**										
22	F9	24									
23	F8	12									
24	F5	32									
25	Ground Donner	17									
26	**Doubling (order of preference; both COVID and non-COVID)**	189							Novel ICU teams (pulm/anesthesia/surg CC, CC APPs/residents, CC nursing)	n/a	Ordering: Based on ease due to room size, infrastructure, etc. Considerations: fitting equipment (vents, beds); 2nd vent hook-up; 2nd monitor/alarms
27	Rh5	24									Larger rooms than Founders ICUs. First ICU doubling location. Earliest go-live 4/20.
28	D3	8									Doubling could increase efficiency (1 CC attending for 16 pts)
29	Rh2	22									Larger rooms than Founders
30	Rh1	22									Larger rooms than Founders
31	F9	24									
32	F8	12									
33	F5	32									
34	Ground Donner	17									
35	F10	28									
36	**TOTAL native ICU beds**	**#REF!**									
37	**TOTAL ICU beds before doubling/other wards**	**179**									
38	**with doubling/using all wards**	**1080**									
39											
40	**Notes:**										
41	Staff supplements/expansion: pulm/CC consultants; overnight intensivists; elevated fellows; non-CC med/surg w/ supervision; SCCM tiered supervision										
42	CCOPS: F9/D3 MICU C AM admissions suspended.										
43	PUIs follow COVID ICU pathway until negative test, then transferred to non-COVID native ICU										
44	Neutral pressure spaces: no PUIs										
45	ECMO: First 2 to Rh5; 3+ move to D3.										
46											
47											

Capacity | **COVID ICUs** | COVID Wards | COVID mixed ICU-ward | Non-COVID ICUs | Non-COVID wards | Transfers | ED | Surge notes_old

Emergency Management

- PPE Task Force Meetings – we say the need to have a daily meeting to go over all issues, supplies, allocations, ordering from all sources, training, huddle sheets, communications with staff needs.
- PPE Command Center
- PPE SWAT Team Rounds for hole complex
- SME Work Force – Subject Matter Experts – 125 nurses available around the clock on all shifts to help out with training, assistance with patients, rapid responses, and much more

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Emergency Management & Security

- Security: We locked down the entire complex and had staff socially distance at the entrances, there are pics later on in the presentation
- Security staff did extra rounding to meet the needs to protect the staff along with Penn Police Department from the University when protests were happening in Philly!
- WE got the staff special PPE to help protect them from any combative patients.
- We had bi-weekly calls with other hospitals and associations for information sharing, IAHSS, Allied Barton, & Grainer, & ASHE.
- Command Center Bi-Weekly Conference call for Information Sharing
- Local & State EM Conference calls to share information coming down from state level.

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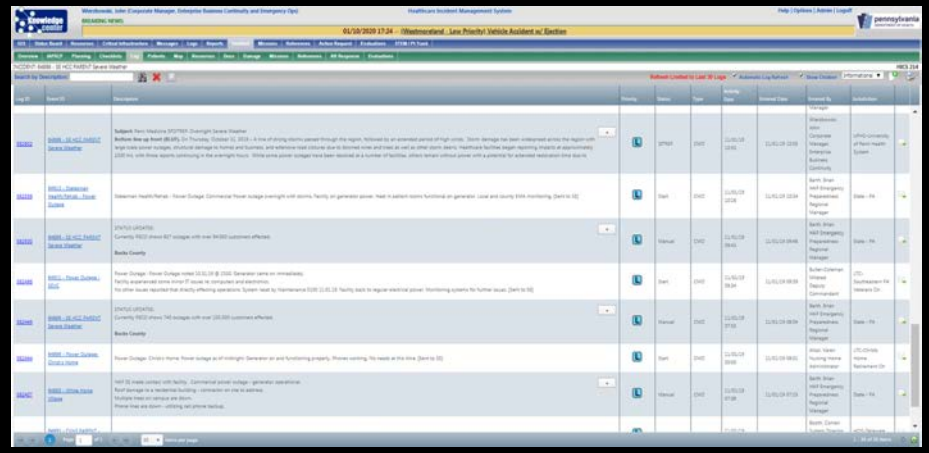
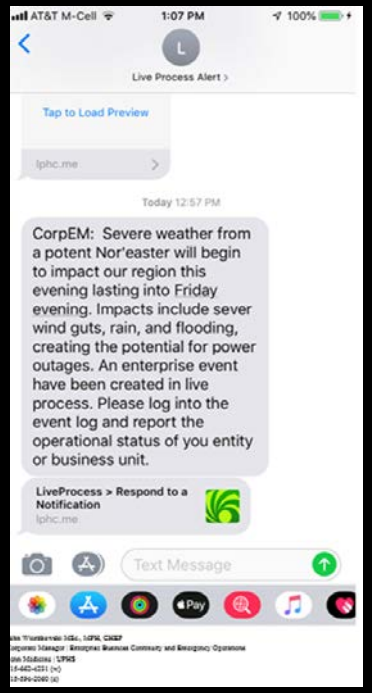
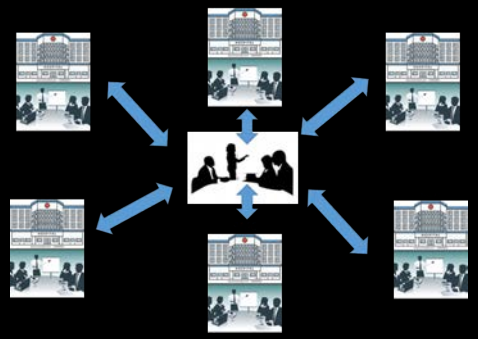
EM Communications

- We used Knowledge Center as our center of collecting all information reported up to the state.
- Live Process is a inter-health system tool to stay connected with all staff.
- We bought 60 new radios for Command Center and ED for Surge







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Emergency Management Utility Risk Assessment

- Completed before COVID Surge, during COVID Response and after the space is turned back over to normal use.

Hospital of the University of Pennsylvania
Philadelphia, PA.

	Main Hospital									
Building and Floor	**DONNER**									
Location										
Location -	Ground ICU/EDOU - 17 Rooms - 101-117	3rd Floor - 8 Rooms 301a-308a								
Utilities										
Emergency Power	Yes	Yes								
Electrical	Yes	Yes								
Medical Gas	Yes	Yes								
Isolation	Yes	Yes								
HVAC	Yes	Yes								
Water	Yes	Yes								
Staff										
Physician	Yes	Yes								
Reg. Nurse	Yes	Yes								
Clin-tech	Yes	Yes								
Pathologist	Yes	Yes								
Pastoral Care	Yes	Yes								
Social Work	Yes	Yes								
Child Life	Yes	Yes								
Security	Yes	Yes								
Resources & Assets										
Medical Equipment	Yes	Yes								
Surgical Equipment	Yes	Yes								
Pharmaceuticals	Yes	Yes								
Personal Protective Equipment	Yes	Yes								
Negative Pressure	Yes	Yes								

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Risk Assessment Continue…

Individual Assessments

Location	**HUP Complex**		**Utilities**	
Building	**Wards & ICU - Please see Surge Matrix**		Electrical	Yes
Floor			Fuel	Yes
Area			Gases	Yes
Square Footage			Generators	Yes
			HVAC- separate	Yes
Access			HVAC- shared	Yes
Grade Level Entry			Isolation	Yes
Doors-# and size			Lighting	Yes
Ramps			Sewage	Yes
Stairs			Vacuum	Yes
			Water	Yes
Toileting & Bathing Facilities			Medical Gases	Yes
Sinks	Yes		**Site Security**	
Showers	Yes		Door badge	Yes
Restroom	Yes		Fences	No
			Key locks	Yes
Communication			Keypad locks	Yes
Telephone	Yes		Lighting	Yes
Wireless	Yes		Windows open	No
Computers	Yes		**Rooms**	
Data	Yes		Waiting	Yes
HAM Radio	No		Clean	Yes
Ceilings			Medication	Yes
Open no grids	No		Soiled	
Grids	Yes			
Solid	No		**Exterior**	
Flooring			Parking	Yes
Carpet	No		Valet	Yes
Concrete	No			
Laminate/Tile	Yes			
			Comments	

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Do you currently have a Medical Gas Emergency Preparedness Plan in place?

The forgotten Utility?

CMS Emergency Preparedness Rule

CMS.gov
Centers for Medicare & Medicaid Services

- *To increases patient safety during emergencies.*
- *To establishes consistent emergency preparedness requirements across provider and supplier types.*
- *Establishes a more coordinated response to natural and man-made disasters.*
- Applies to 17 Medicare and Medicaid providers and suppliers.
- Final rule published in the *Federal Register* on September 16, 2016.
- Rule is effective as of November 15, 2016.
- Rule must be implemented November 15, 2017.
- There have been some updates since then.

CMS.gov
Centers for Medicare & Medicaid Services

Goals for the Rule

- Address systemic gaps
- Establish consistency
- Encourage coordination
- Establish conditions of participation within organization or network
- Collaborate with external resources

The rule is to serve to protect all individuals receiving care from those organizations.

The Joint Commission

Elements of Performance for Emergency Management

- Standard EC.01.01.01 EP 9
  - Create and document a detailed plan for managing utility systems during an emergency.
- Standard EM.02.01.01 EP3
  - In the event of a catastrophic event or system failure, an Emergency Preparedness Plan (EPP) should assume no less than 96 hours of utility management.

The Joint Commission

Elements of Performance for Emergency Management

Standard EM.02.02.09 EP 07

- For organizations that plan to offer services during an emergency: The Emergency Management Plan describes how the organization will deliver alternative means of meeting essential building utility needs and provide *continuous* services during an emergency.
- Examples of potential utility problems might include disruption to piped medical gas systems, failure of backup generators and/or water pipe rupture.

The Joint Commission

Elements of Performance for Emergency Management

- Standard EM.03.01.03 EP 11
  - Monitor the management of staff roles and responsibilities during emergency response exercises.
- Standard EC 04.01.01 EP 11
  - Investigate and report utility failures with a focus on team-based communications.

Provisions of the Emergency Preparedness Program (EPP)

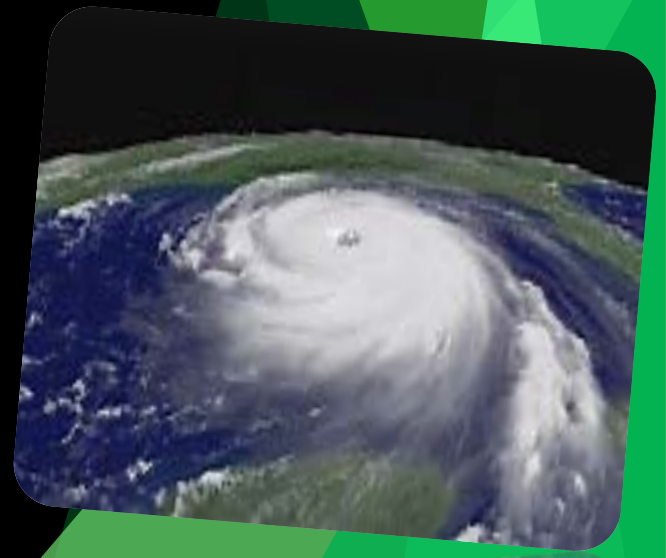
Risk Assessment and Planning

Policies and Procedures

Emergency Preparedness Program

Communication Plan

Training and Testing



Utilizing the Regulatory Codes & Standards

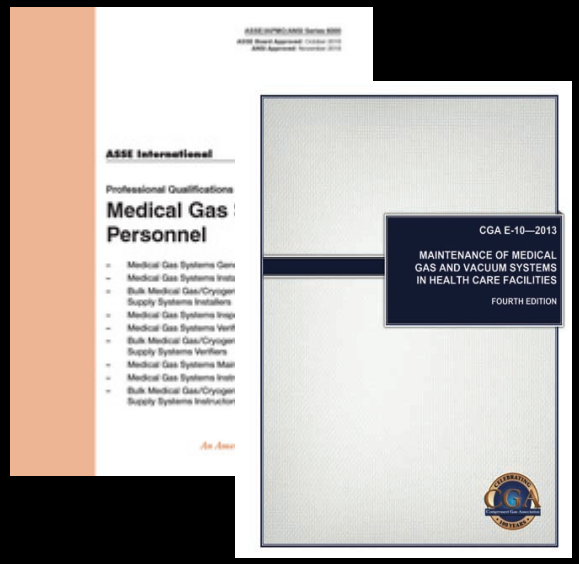
NFPA 99: *Health Care Facilities Code*

The scope of the NFPA 99: *Health Care Facilities Code* is to establish criteria to minimize the hazards of fire, explosion, and electricity in health care facilities providing services to human beings.

Chapter 5, Gas and Vacuum Systems, covers the performance, maintenance, installation, and testing of nonflammable medical gas systems with operating pressures below a gauge pressure of 300 psi, vacuum systems used within health care facilities, waste anesthetic gas disposal (WAGD) systems, also referred to as scavenging systems, and manufactured assemblies that are intended for connection to the medical gas, vacuum, or WAGD systems

ADDITIONAL REFERENCE GUIDES

ASSE 6000 series and CGA E-10: Maintenance of Medical Gas and Vacuum Systems at Health Care Facilities



- ✓ This publication is a guide to the preparation of a maintenance program regarding piped medical gas/vacuum systems in health care facilities.
- ✓ National codes require health care facilities with these systems to have an effective, documented maintenance program for these systems.
- ✓ It covers; inspection and testing related to Gas/Vacuum Outlets, Gas/Vacuum Alarm Systems, Compressed Gas Manifolds, Vacuum Pumps, Medical Air Compressors, Suggested Frequency of Inspection, Test Methods, & Documentation.
- ✓ Also *CGA M-1*, P-1&2 Safe Handling, P-2.7 Guide for safe storage, Handling, and use of small portable liquid 02 systems, P-2.6 Trans- filling Liquid 02 use for Resp., P-30 Cryogenics, P-39 02 Rich Atm. & G-4 Oxygen

AHA & ASHE have templates for emergency preparedness programs and Medical Gas Guidelines.

Provisions of the Emergency Preparedness Program (EPP)

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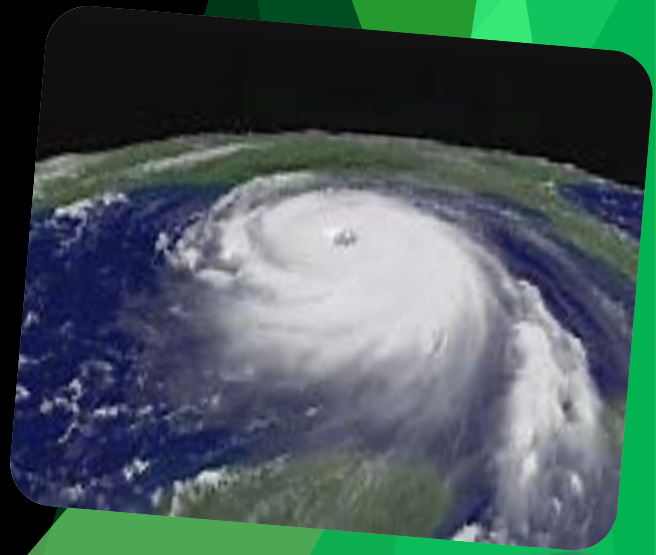
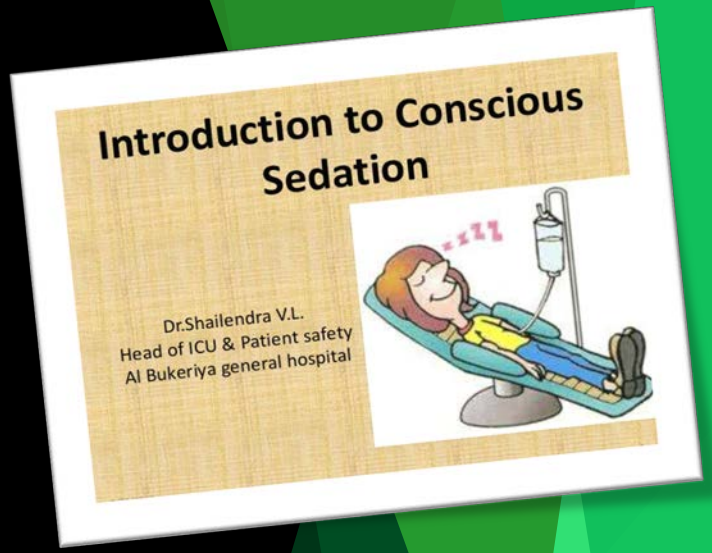
Training and Testing



Risk Assessment: Levels of Sedation

NFPA 99 Chapter 4 Fundamentals

- The scope of necessary safety precautions will be determined by a risk assessment of levels of anesthesia (Ex: Use of ZVB & Area Alarms).
- It is the responsibility of the facility's "governing body" to determine through a *documented* process the maximum level of sedation to be used in a given location.
  - ❖ Results of this assessment determine use of
  - ❖ Zone Valves & Area Alarms.



NFPA 99 Risk Assessment.....

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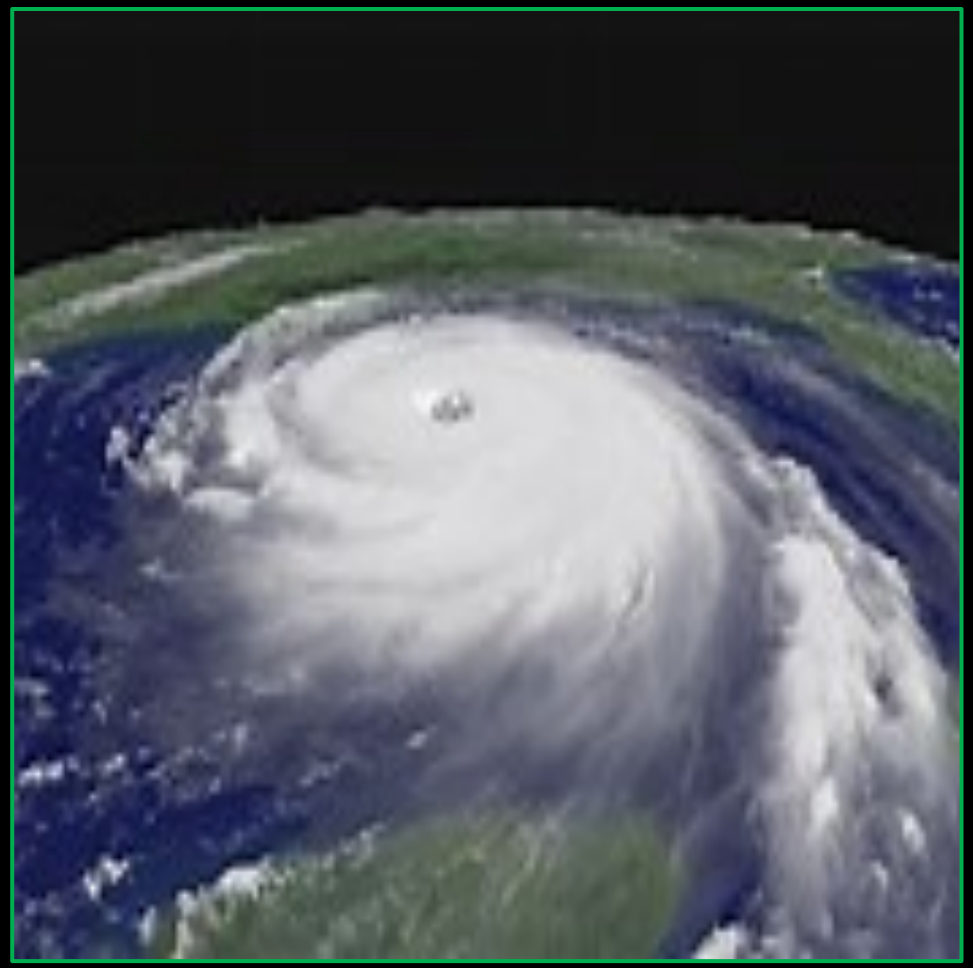
NFPA 99 2012 Risk Assessment

						Chapter 5							Chapter 6				Chapter 7				Chapter 8										Chapter 9			Chapter 10		Chapter 11		12	
						Gas & Vacuum Systems							Electrical Systems				IT & Communications				Plumbing										HVAC			Electrical Equipment		Gas Equipmemt		EM	
Building Code	Building Name	Floor Code	Room Code	Room Description	Room Class Type Description	Oxygen	Medical Air	Nitrous Oxide	Nitrogen	Medical/Surgical Vaccuum	Instrument Air	HeliOx	Normal Power	Critical	Life Safety	Equipment	Data Transfer	Phone	Nurse Call	Cable	Potable Water-Cold	Potable Water-Hot	Non-Potable Water	Water Heating	Water Cooling	Steam	Non-Med.Compressed Air	Waste Water	Storm Water	Heating	Cooling	Ventilation	Elecrial Equipment	(See Equipment Tab	Cylinder sources	Cylinder Storage	Emergency Management	Notes
2002	White	B	W0B001	Electrical Equipment Room	Mechanical Room-Electr	4	4	4	4	4	4	4	4	4	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4			4	4	3	
2002	White	B	W0B002	Private Corridor	Circulation	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			4	4	4	
2002	White	B	W0B002A	Stairs	Circulation	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			4	4	2	
2002	White	B	W0B003	Mechanical Equipment Area	Mechanical Room-Electr	4	4	4	4	4	4	4	4	4	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4			4	4	3	
2002	White	B	W0B004	Central Storage	Storage	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			4	4	4	
2002	White	B	W0B005	Central Storage	Storage	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			4	4	4	
2002	White	B	W0B006	Public Corridor	Circulation	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			4	4	4	
2002	White	B	W0B007	Public Corridor	Circulation	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			4	4	4	
2002	White	B	W0B008	Electrical Closet	Mechanical Room-Electr	4	4	4	4	4	4	4	4	4	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4			4	4	3	
2002	White	B	W0B009	Central Storage	Support Facilities	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			4	4	4	
2002	White	B	W0B010	Shaft	Structural Area	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			4	4	4	

Risk Assessment and Planning



Develop	Develop an emergency plan based on a risk assessment.
Perform	Perform risk assessment using an “all-hazards” approach, focusing on capacities, capabilities and collaborations.
Update	Update emergency plan at least annually.

RISK ASSESSMENT

WHAT ARE THE WORST CASE SCENARIOS?

Look for them

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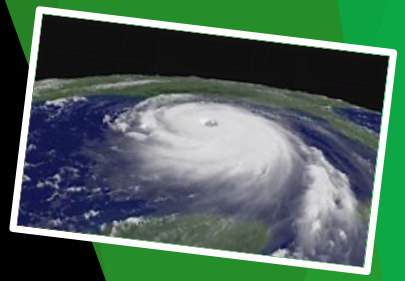
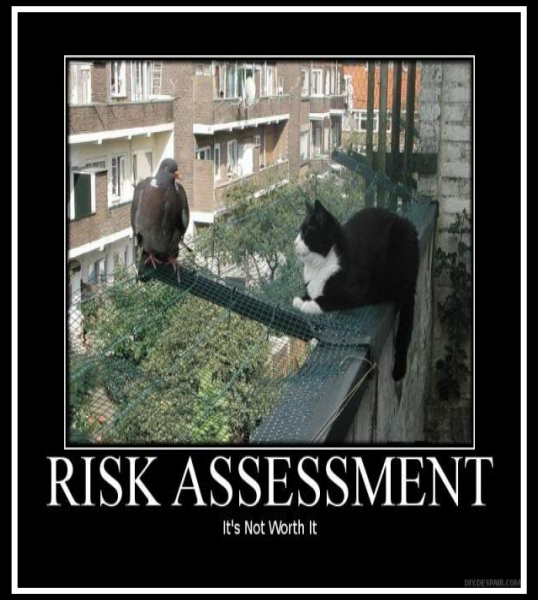
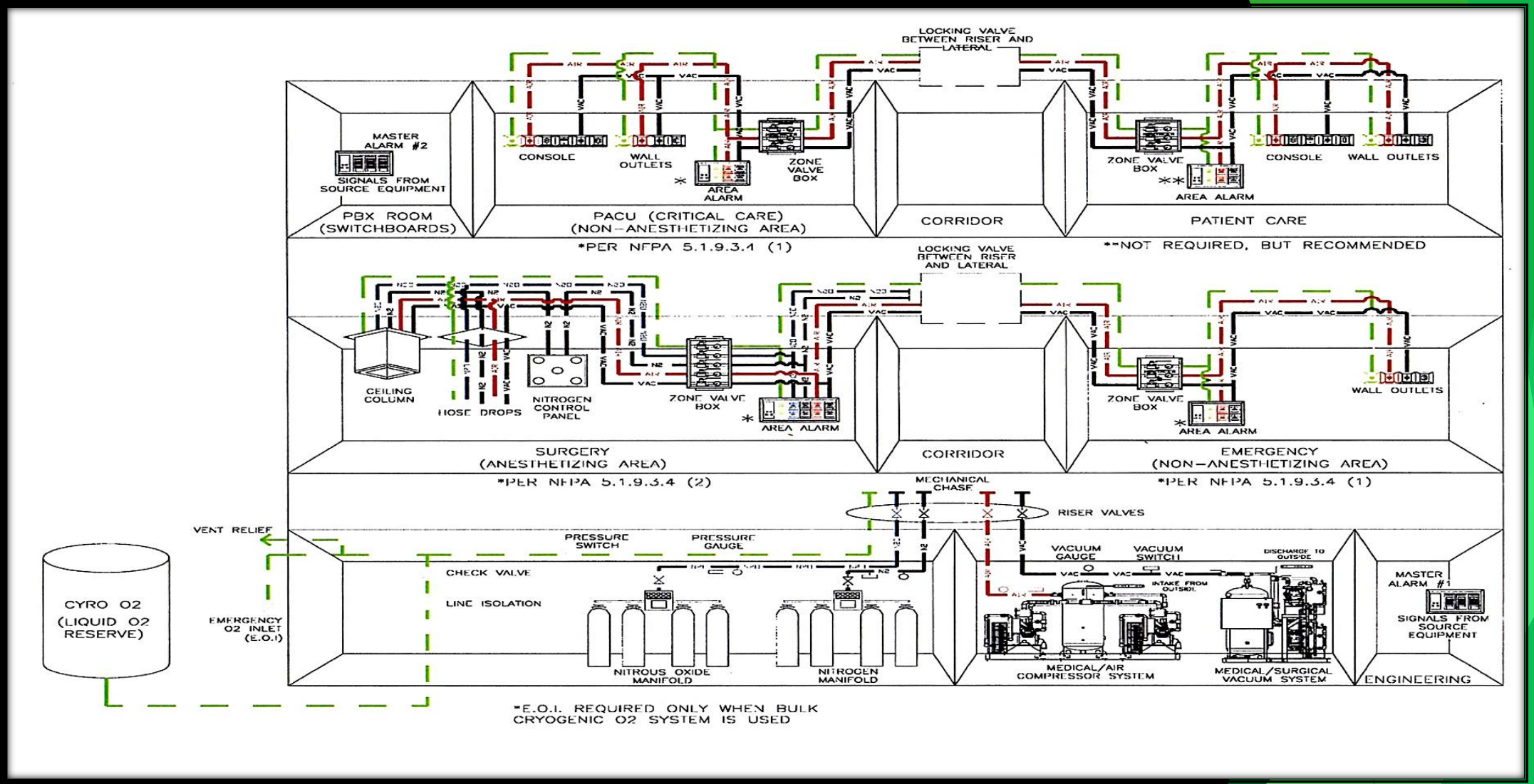




Typical Medical Gas System



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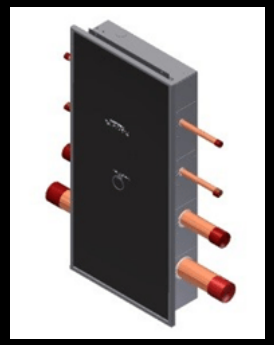
Knowing and Utilizing Inventories & PM's
Will help with your Risk Assessment and Emergency Preparedness Program

- ✓ Maintenance Programs
  - 5.1.14.2.2.1 Inventories
  - 5.1.14.2.2.2 Inspection Schedules (PM's)
  - 5.1.14.2.2.3 Inspection Procedures (Risk Assessment)
  - 5.1.14.2.2.2 Maintenance Schedules

Organizational Facility Memory Documented



Know the Components of Hospital Medical Gas Systems and Document

SOURCE EQUIPMENT

- Bulk Tank
- Manifolds
- Med Air Compressors
- Med Surgical Vacuum
- Instrument Air
- New Technologies

VALVES

- Master
- *Service*
- Zone Valve Box

ALARMS

- Local
- Master
- Area

OUTLETS

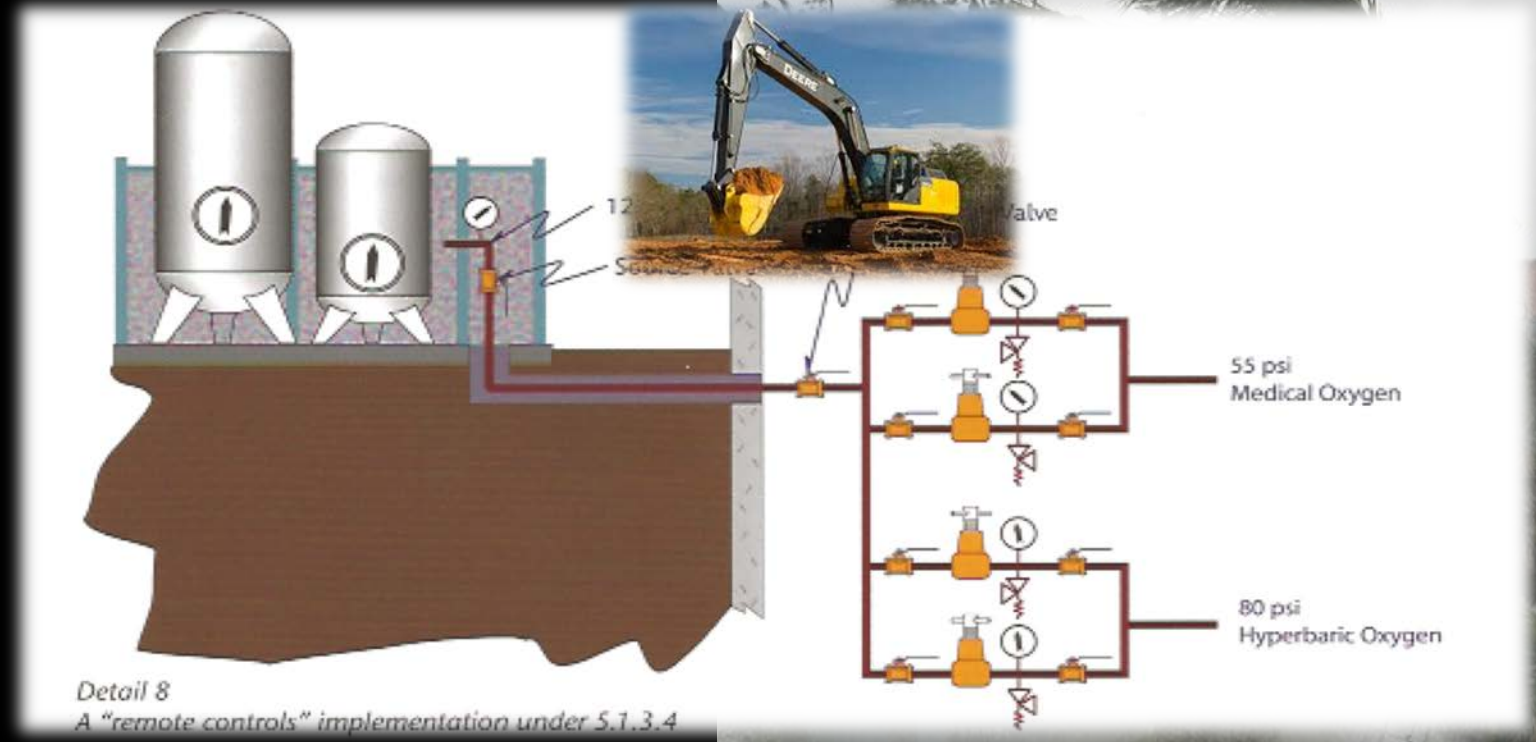
- Boom Arms
- Hoses
- Columns

FACILITY MEMORY

- The expertise held by a select few key staff who have gained their facility-specific knowledge through experience within that organization

- Avoid the pitfall of relying on staff knowledge and experience in responding and recovering from an emergency.
- Without proper documentation, lay offs, retirement or natural attrition can cause enormous gaps in transfer of knowledge.
- Train and learn from your Subject Matter Experts. Document while the info is accessible!

BULK SUPPLY ISSUES



Provisions of the Emergency Preparedness Program (EPP)

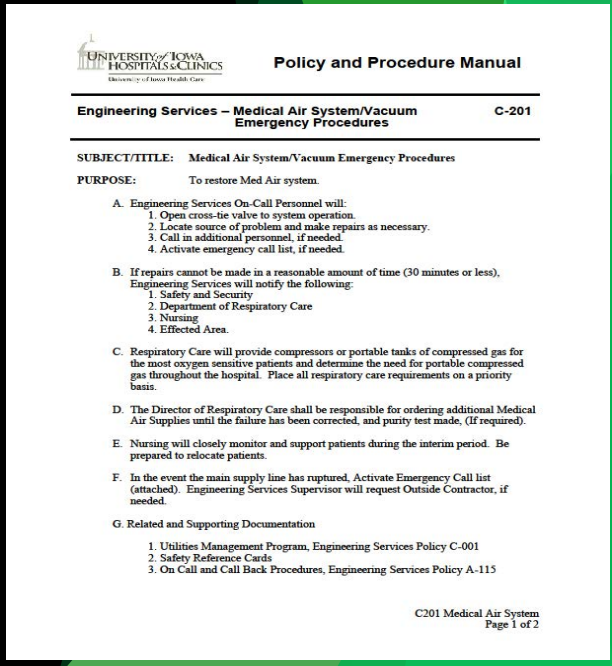
Risk Assessment and Planning

Policies and Procedures

Emergency Preparedness Program

Communication Plan

Training and Testing



University of Iowa Hospitals & Clinics

Policy and Procedure Manual

Engineering Services – Medical Air System/Vacuum Emergency Procedures **C-201**

SUBJECT/TITLE: **Medical Air System/Vacuum Emergency Procedures**

PURPOSE: To restore Med Air system.

A. Engineering Services On-Call Personnel will:
   1. Open cross-tie valve to system operation.
   2. Locate source of problem and make repairs as necessary.
   3. Call in additional personnel, if needed.
   4. Activate emergency call list, if needed.

B. If repairs cannot be made in a reasonable amount of time (30 minutes or less), Engineering Services will notify the following:
   1. Safety and Security
   2. Department of Respiratory Care
   3. Nursing
   4. Effected Area.

C. Respiratory Care will provide compressors or portable tanks of compressed gas for the most oxygen sensitive patients and determine the need for portable compressed gas throughout the hospital. Place all respiratory care requirements on a priority basis.

D. The Director of Respiratory Care shall be responsible for ordering additional Medical Air Supplies until the failure has been corrected, and purity test made, (If required).

E. Nursing will closely monitor and support patients during the interim period. Be prepared to relocate patients.

F. In the event the main supply line has ruptured, Activate Emergency Call list (attached). Engineering Services Supervisor will request Outside Contractor, if needed.

G. Related and Supporting Documentation

   1. Utilities Management Program, Engineering Services Policy C-001
   2. Safety Reference Cards
   3. On Call and Call Back Procedures, Engineering Services Policy A-115

C201 Medical Air System
Page 1 of 2

Policies and Procedures

Develop and implement policies and procedures based on the emergency plan and risk assessment.

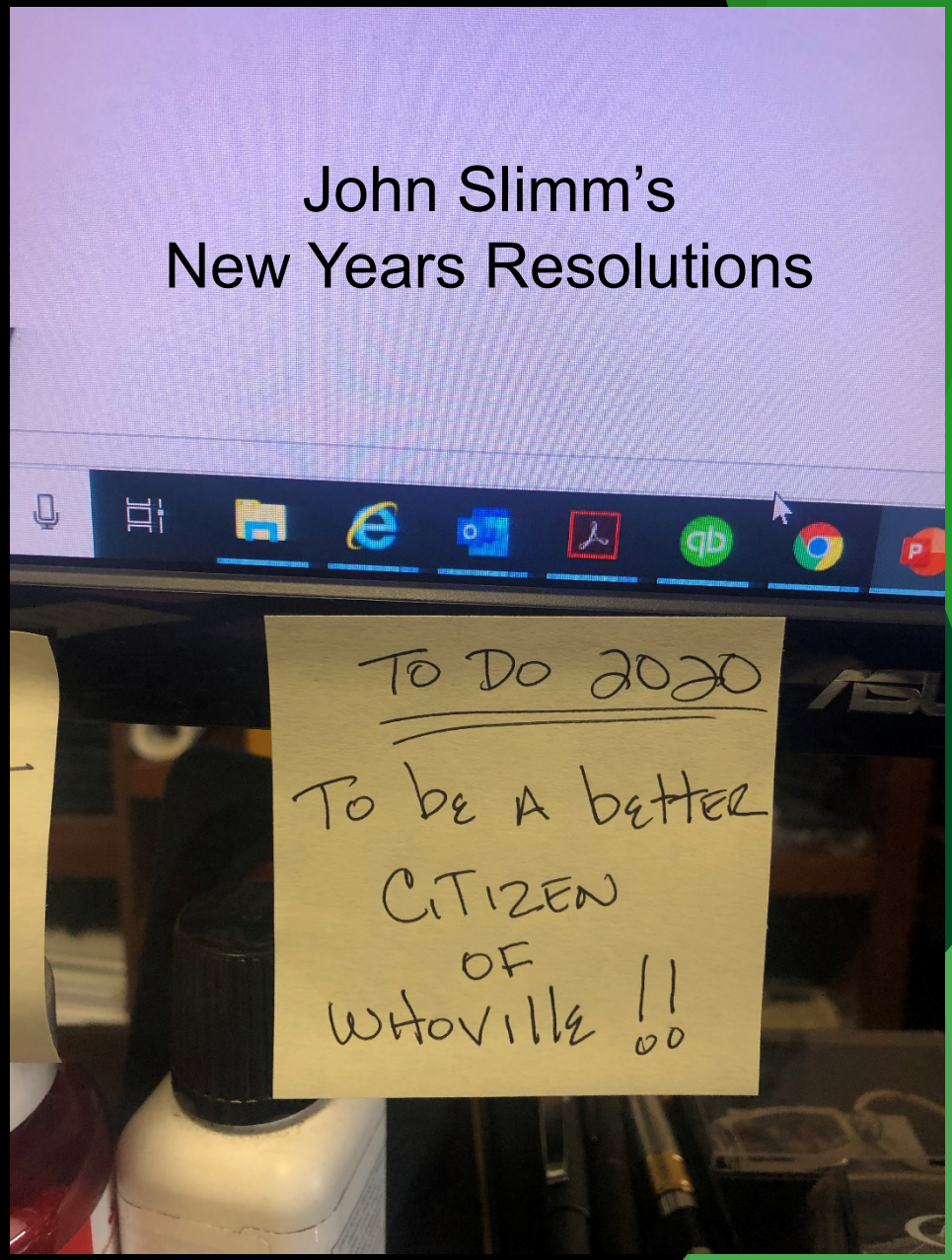
Policies and procedures must address a range of issues including communication (Administration, staff, vendors, sister facilities (etc.) supply, coordination and tracking patients needs during an emergency.

Review and update policies and procedures at least annually and always following disasters, including customizing for each scenario.

During Medical Gas Shutdowns (Example)

CMS.gov
Centers for Medicare & Medicaid Services

Policies and Procedures



Provisions of the Emergency Preparedness Program (EPP)

Risk Assessment and Planning

Policies and Procedures

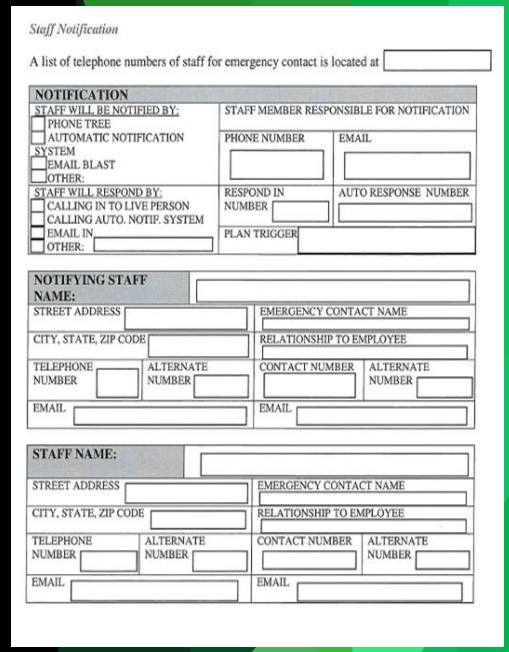
Emergency Preparedness Program

Communication Plan

Training and Testing

Communication Plan

- Develop a communication plan that will supply all medical gas needed for the most strategic Critical Care Areas and have a Primary/Backup
- Coordinate patient care needs with the clinical staff to meet the requirements for supply
- Consult with community partners, local vendors, neighboring facilities and consultants including fire and safety departments
- Review and update plan annually or after each event



Staff Notification

A list of telephone numbers of staff for emergency contact is located at

NOTIFICATION		
STAFF WILL BE NOTIFIED BY: ☐ PHONE TREE ☐ AUTOMATIC NOTIFICATION SYSTEM ☐ EMAIL BLAST ☐ OTHER:	STAFF MEMBER RESPONSIBLE FOR NOTIFICATION PHONE NUMBER	EMAIL
STAFF WILL RESPOND BY: ☐ CALLING IN TO LIVE PERSON ☐ CALLING AUTO. NOTIF. SYSTEM ☐ EMAIL IN ☐ OTHER:	RESPOND IN NUMBER PLAN TRIGGER	AUTO RESPONSE NUMBER

NOTIFYING STAFF NAME:			
STREET ADDRESS		EMERGENCY CONTACT NAME	
CITY, STATE, ZIP CODE		RELATIONSHIP TO EMPLOYEE	
TELEPHONE NUMBER	ALTERNATE NUMBER	CONTACT NUMBER	ALTERNATE NUMBER
EMAIL		EMAIL	

STAFF NAME:			
STREET ADDRESS		EMERGENCY CONTACT NAME	
CITY, STATE, ZIP CODE		RELATIONSHIP TO EMPLOYEE	
TELEPHONE NUMBER	ALTERNATE NUMBER	CONTACT NUMBER	ALTERNATE NUMBER
EMAIL		EMAIL	

Provisions of the Emergency Preparedness Program (EPP)

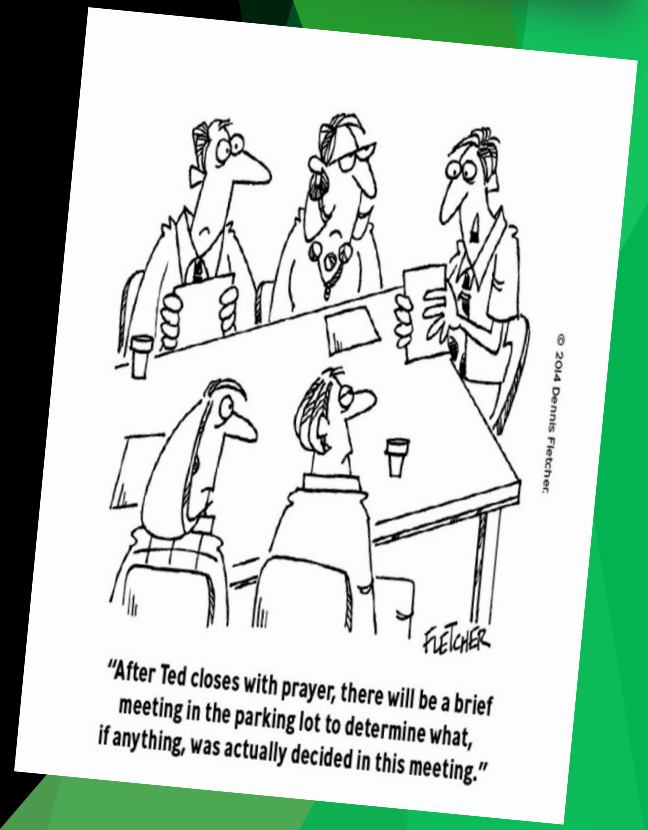
Risk Assessment and Planning

Policies and Procedures

Emergency Preparedness Program

Communication Plan

Training and Testing



Team Based Approach to Emergency Preparedness

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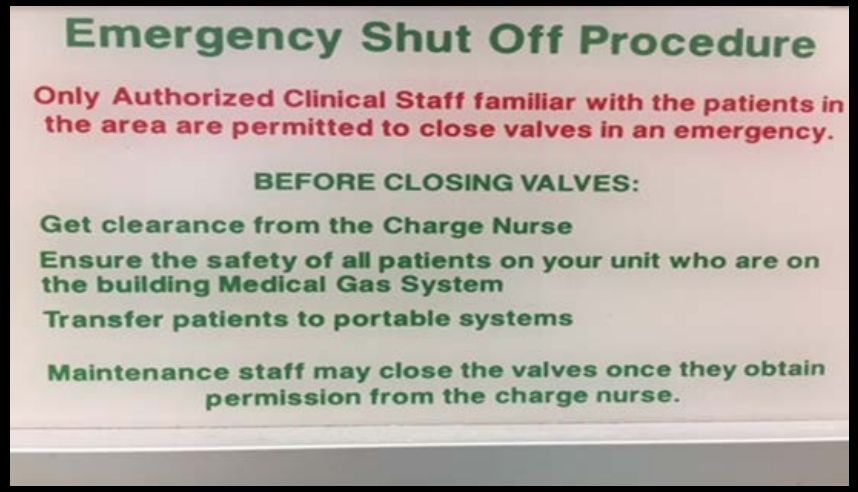
Training and Testing Program

- Develop and maintain training and testing programs, including initial training in policies and procedures.
- Demonstrate knowledge of emergency procedures and provide training at least annually.
- Conduct drills and exercises to test the emergency plan when medical gas shutdowns occur.

Emergency and Standby Equipment Needs

- Identify your additional requirements for hospitals, off-site and long-term care facilities.
- Coordinate with Bulk Supplier and Equipment Vendors to supply per the (NFPA) guidelines. (Have documentation to confirm strategies).
- Conduct Medical Gas testing, inspection, and maintenance as required.
- Maintain enough Medical Gases to the system during an emergency utilizing the clinical staff to confirm needs, i.e.. respiratory, biomed, clinical managers etc.

Training with staff…..



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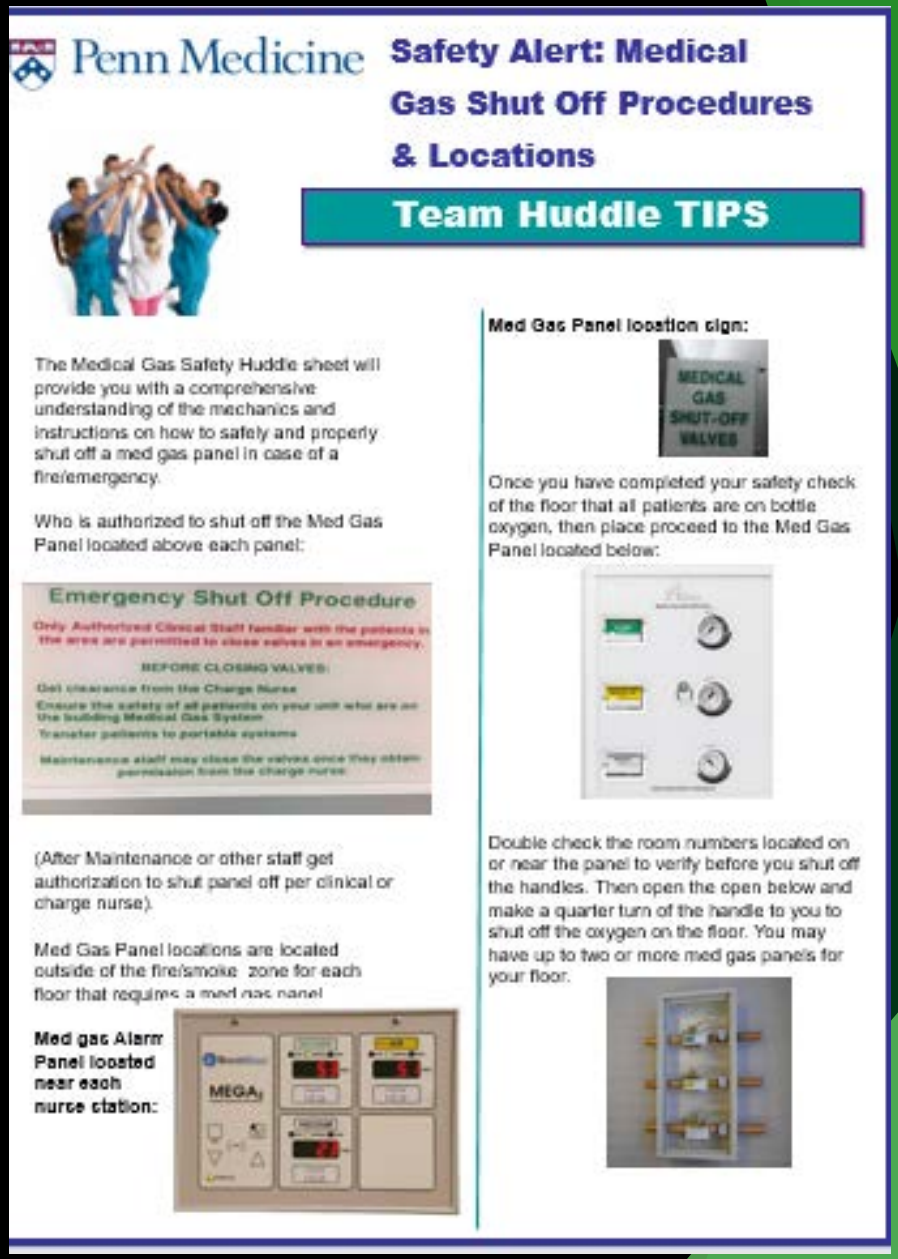
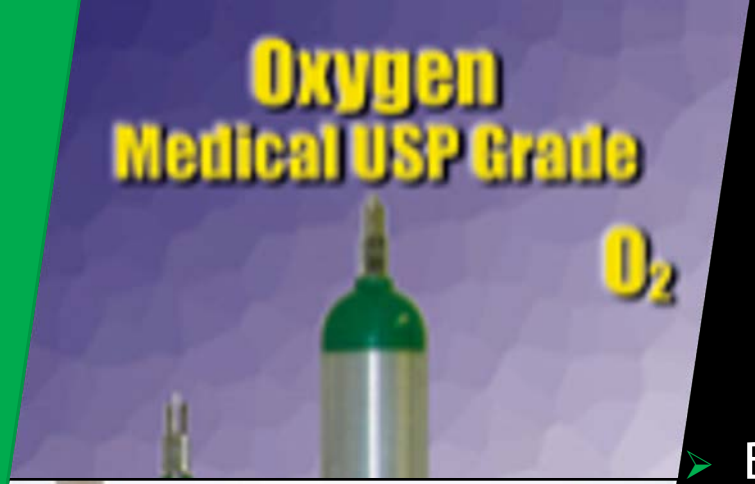




What are Typical Solutions?

- Bring cylinders to patients or transport multiple tanks with headers/regulators/carts for back feeding.

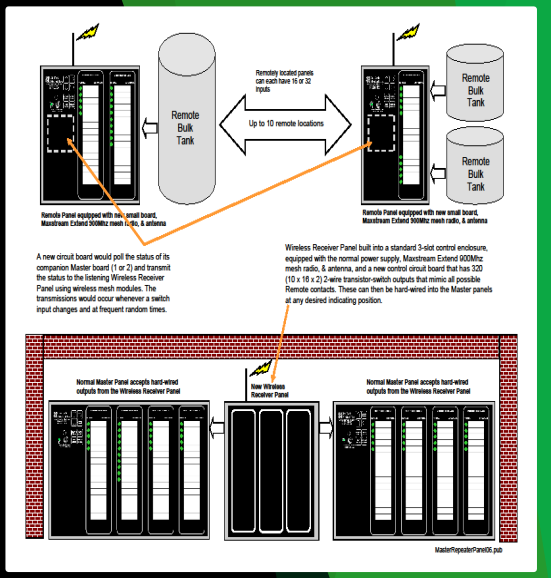
  (Always keeping safety in mind when transporting)

- Call the Bulk Supplier to bring an Oxygen Trailer/Truck with Vaporizers to site. Make sure area is cleared for truck (How long will that take and other contingencies?).

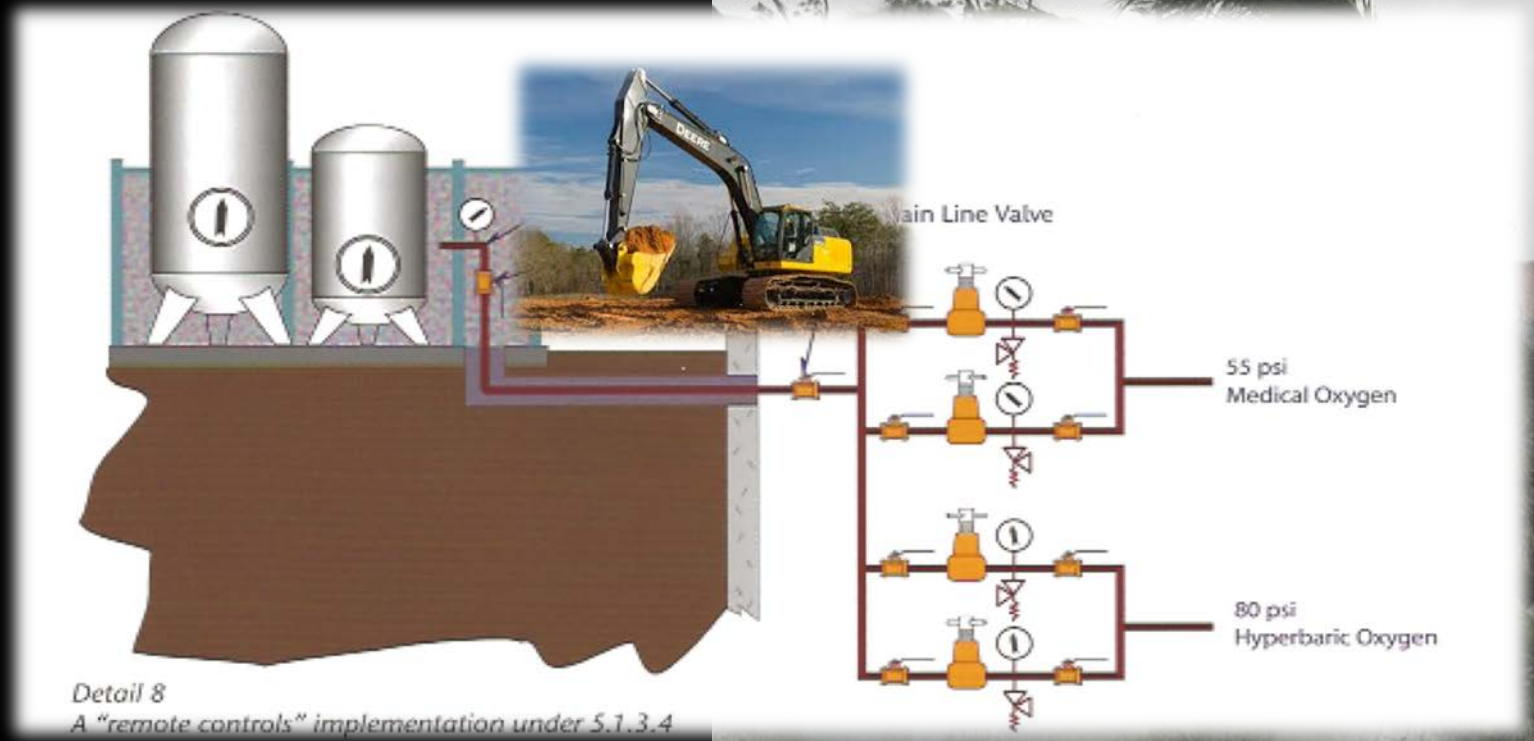
- Communicate with your Medical Gas Company & Suppliers to acquire enough rental supplies, cylinders/headers regulator/hoses, on hand for catastrophes.
- Or just a thought, utilizing resources within network and other local facilities.

EMERGENCY PREPAREDNESS

- New technology allows for combo units Alarms/ZVB and easier access to sensors
- Also includes “EZ Back Feed”
- Alternate Emergency supply manifolds



“EZ Find” Back-Feed Technology



Detail 8
A "remote controls" implementation under 5.1.3.4

BULK SUPPLY DISASTERS

Alternative Oxygen Supply

Emergency
Oxygen
Supply
Manifolds

How does it work?

- What did you during COVID? How were your vaporizers?
- Oxygen is supplied to the facility from portable Dewers cylinders.
- Dewers can often be received in a few hours.
- Trucks/Trailers with vaporizers may take hours or days.
- Includes Built in alarms

Connection Points

- Emergency Oxygen Connection
- Inside facility
- Back feed zones

Emergency Oxygen Manifold in Use

Benefits of Portable Oxygen Manifold

- Portable - Fits through normal doors and can be easily moved throughout the facility
- No external storage requirements (can be stored at facility)
- Runs on Cylinders or Dewers
- Primary and secondary supply
- Can be installed with an in-line manifold system to achieve a passive back-up solution
- Cost effective and affordable

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Vacuum Systems Standby

Have you thought about Vacuum backup

Contact your supplier for:

- **Portable Vacuum Pumps**
- **Ambulatory Vacuum Systems 3-20HP**

Medical Air

Contact your supplier for:

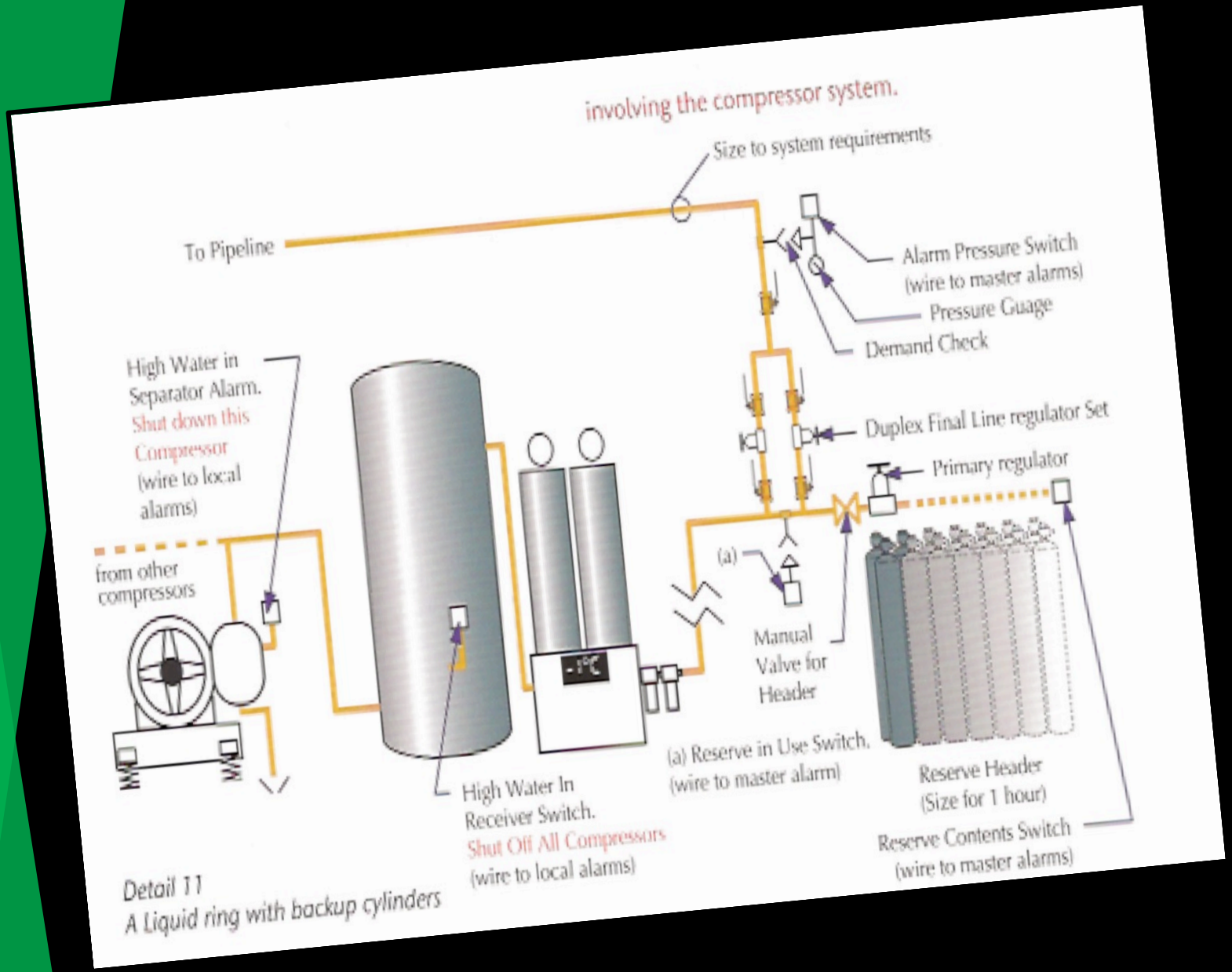
- *Portable Medical Air Tanks*
- *Ambulatory Medical Air Systems 3-20 HP*
- *Concentrators*

MEDICAL AIR SYSTEMS

Liquid Ring Compressors

- What is your back-up if there is a water loss?
- Older Facilities have water supplied systems, if your water system goes down so does your medical air compressors?
- Must have By-Pass Extension.
- Must be provided with cylinder backup.
- Must have water tanks.
- Communication with your local fire departments

LIQUID RING SYSTEM



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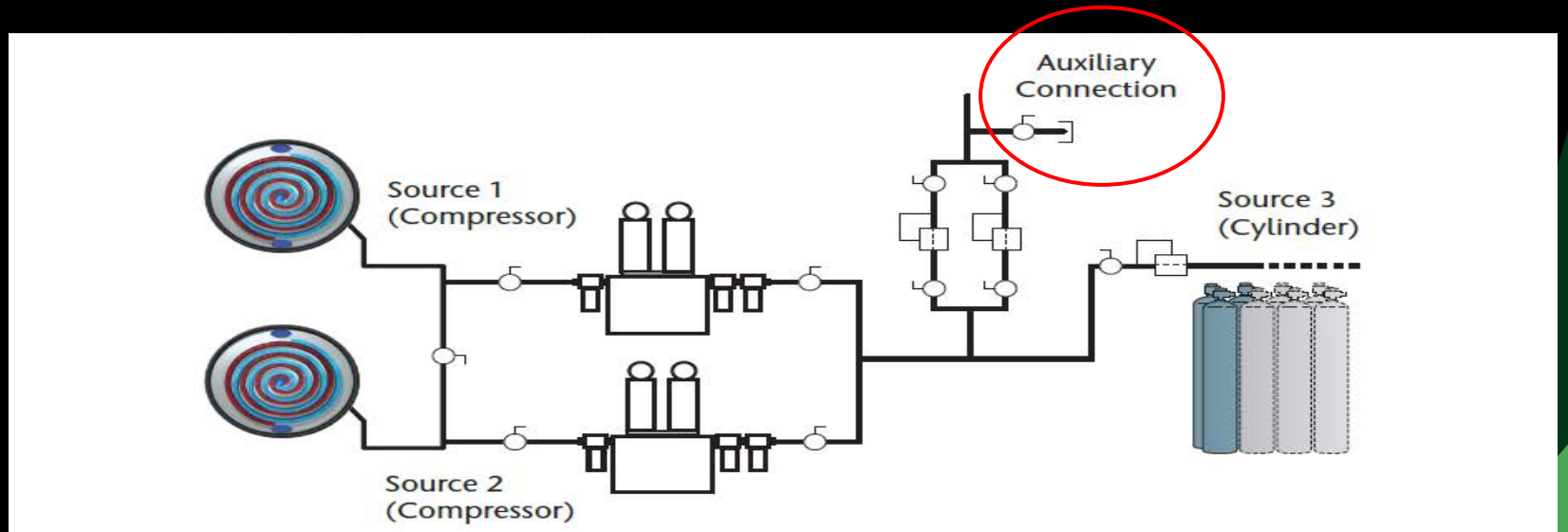
Auxiliary Connection for all sources has been added with valved and capped connection point.

5.1.3.5.7 Auxiliary Source Connection. All source systems shall be provided with an auxiliary source connection point of the same size as the main line, which shall be located immediately on the patient side of the source valve.

5.1.3.5.7.1 The connection shall consist of a tee, a valve, and a removable plug or cap.

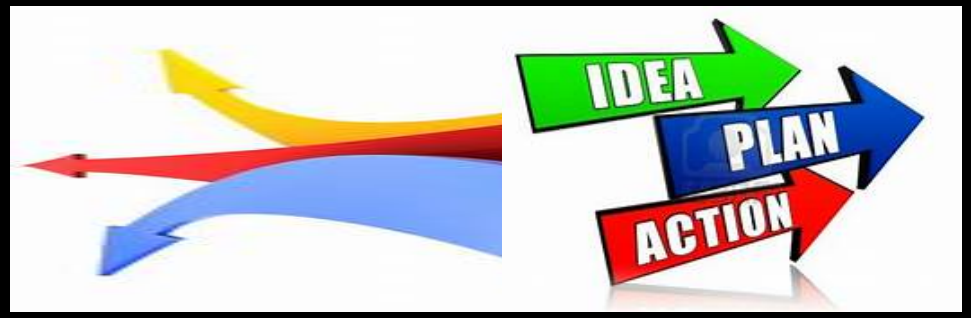
5.1.3.5.7.2 The auxiliary source connection valve shall be normally closed and secured.

ALL NEWLY INSTALLED SOURCE SYSTEMS



Detail 14: The Auxiliary Connection (note that the system illustrated also shows a third source, which is NOT required)

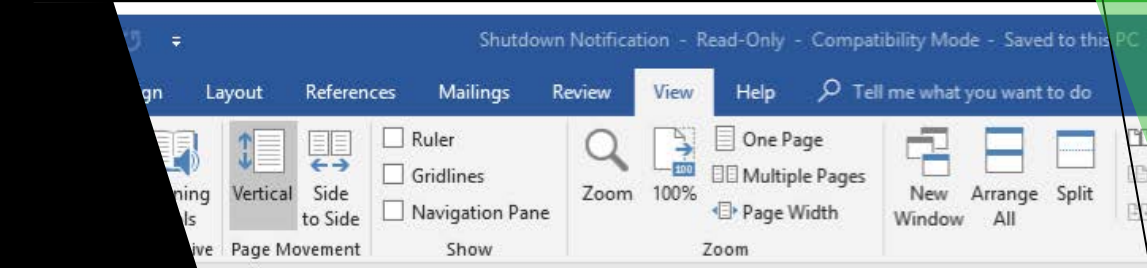
Utilizing a Shutdown and Temporary Back-feeds for Medical Gas systems helps the facility organize for Emergency Preparedness



Make a Plan ➡ Execute ➡ Document & Evaluate

Identify and assign responsibilities to the Healthcare Facility personnel, the Shutdown/EPP Coordinator should have a plan

Shutdown Communication & Documentation



NAME of FACILITY: _____

DEPARTMENT: _____

IMPORTANT NOTICE

SERVICE INTERRUPTION

SERVICE AFFECTED: _____

DATE: _____

TIME: _____

AREA(s) AFFECTED: _____

_____

_____

REMARKS: _____

_____

_____

_____

FOR INFORMATION CALL: _____

DATE ISSUED: _____

BY: _____

TITLE: _____

DISTRIBUTION: _____

_____

_____

MAJOR MEDICAL HOSPITAL SERVICES, INC.

856-768-1300

ADD TO THE POLICY AND PROCEDURES DOCUMENTATION

MGPHO

Medical Gas Professional Healthcare Organization

Before Shutdown: Shutdown/EPP Coordinator

- Coordinate and communicate with relevant facility departments to determine back-feed & portable gas needs.
- Verify labelling on valves used for back-feed and that isolation valve provides positive shut off.
- Identify alarm devices affected by shut down.
- Test flow capability of outlets used for back-feeding.
- Fully test new piping and verify ready for tie in.

ADD TO THE POLICY AND PROCEDURES DOCUMENTATION

Before Shutdown: Additional info

- Create a project plan including a detailed task list and timeline to completion.
- Communicate duration of shut down to all applicable team members.
- Identify areas to be affected and valves requiring shut off.
- Procure and coordinate materials, equipment and labor (both external and internal).
- Document of ASSE 6010/6030 for installer/verifier per the NFPA 99 standard for your state.

ADD TO THE POLICY AND PROEDURES DOCUMENTATION

During Shutdown: Health Care Facility

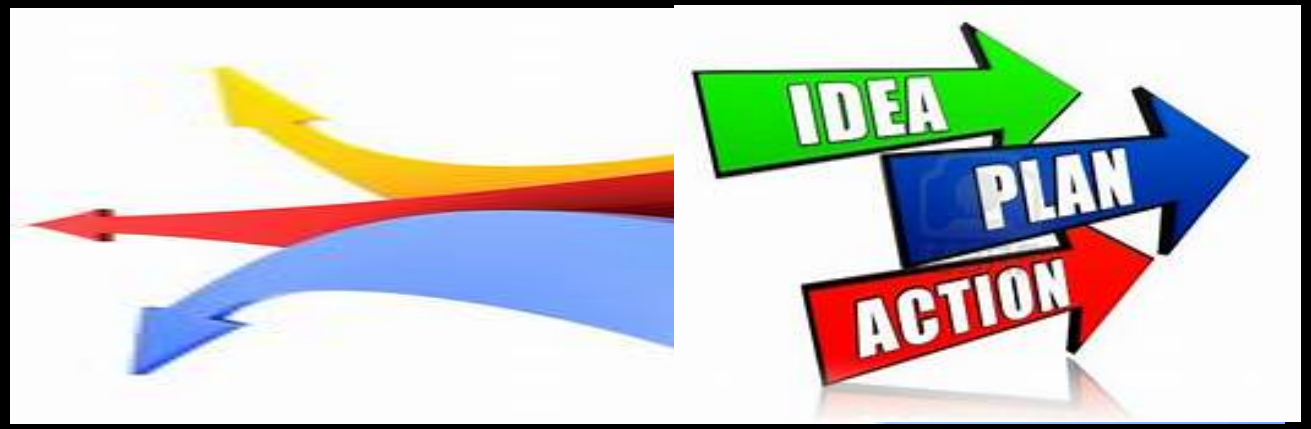
- Count and distribute/transfer patient care services.
- Notification to entities involved when it's safe to proceed.
- Commence shutdown procedure and wait 15 minutes before components construction.
- Monitor cylinders after install. Verify and review test results and start reversing back-feed procedures.

ADD TO THE POLICY AND PROCEDURES DOCUMENTATION

During Shutdown: Emergency Preparedness Coordinator

- Maintain all systems, checklist pressures, inventory cylinders, stability of cylinders (carts, chains, etc.).
- Monitor all aspects of the Emergency for Medical Gases.

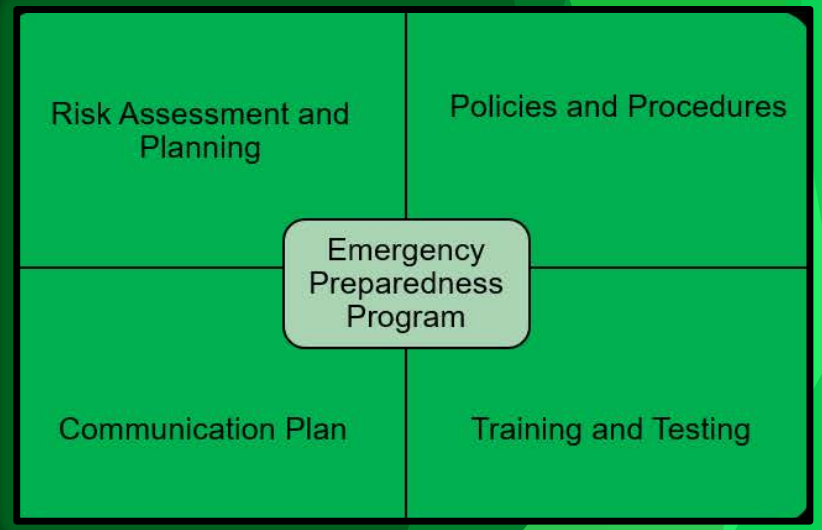
Emergency Preparedness:
Addressing the 4 Phases of an Emergency



Plan ➡ Execute ➡ Document ➡ Evaluate

How is this different than a planned shutdown?
And
How does it relate to your provisions for the EPP?

Provisions of the
Emergency Preparedness Program (EPP)



The Bigger Picture: Where Preparedness Falls into the Plan for Emergency Response

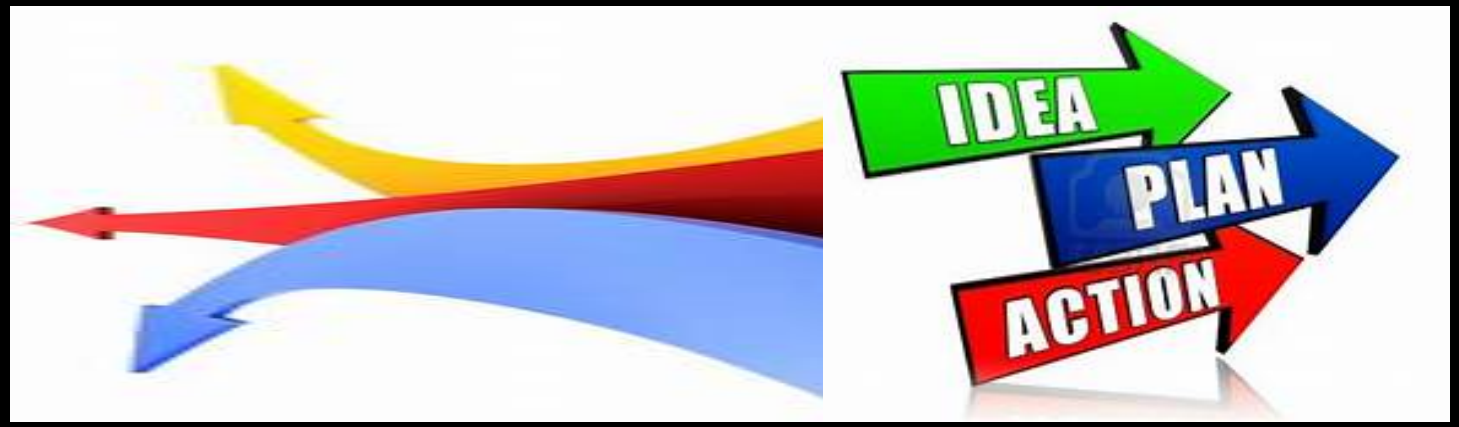
- 1. MITIGATION
  - Redundancy or duplication
- 2. PREPAREDNESS
  - Documented Inventory – Needed Systems
  - Resources & Assets – Replacing supplies consumed during emergency
  - Clinical Support Activities – Administration of medications
  - Essential Utilities – Plan for operation of critical systems
- 3. RESPONSE
  - Activation / Deactivation of EPP
- 4. RECOVERY
  - Restore Operational Capacity
  - Access & Update EP

A manufacturer or consultant can be an asset during an emergency. Seek expert advice when putting together your plan.

Summary

Emergency Preparedness:

Addressing the 4 Phases of an Emergency



Plan ➡ Execute ➡ Document ➡ Evaluate

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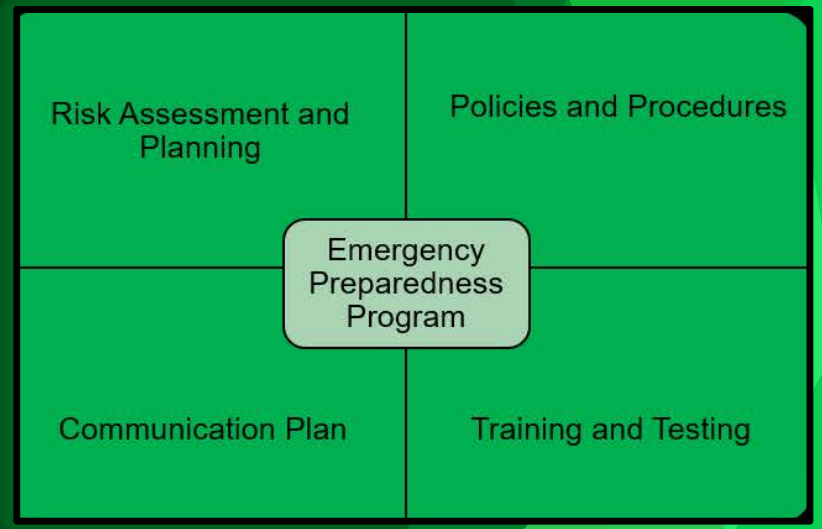
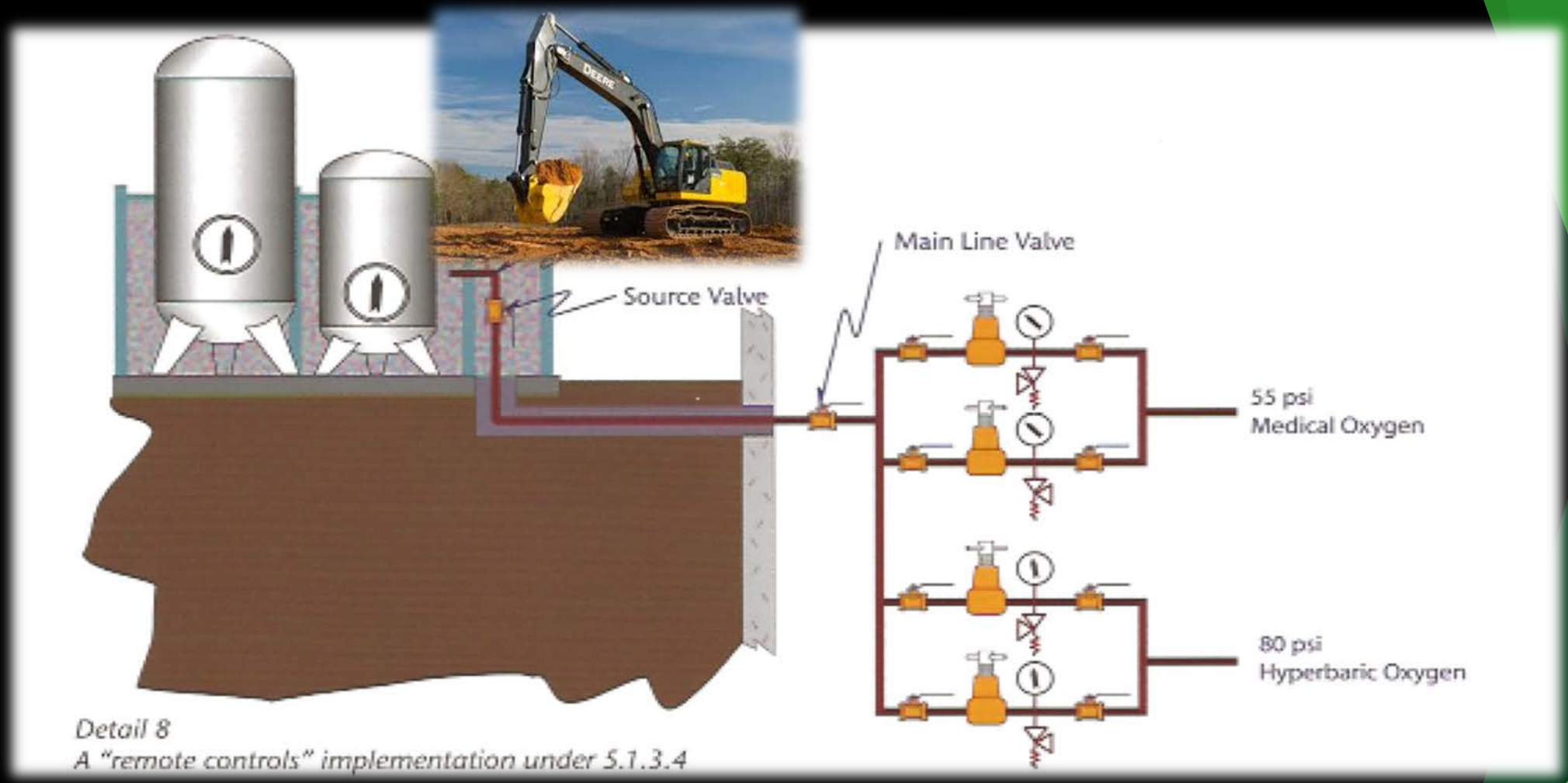
Provisions of the
Emergency Preparedness Program (EPP)



Utilities Management

KNOWING YOUR FACILITY

- Educating your staff - (ASSE 6040) thru vendors or in-house
- Having in-line Drawings (up to date)
- Utilizing a Software medical gas management program
- Managing your medical gas inventory
  - Helps with *Planning & Consulting*
  - Helps with *Design*
- Knowing Flow Parameters
- Having and *Emergency Plan*
- Providing a *Risk Assessment*



Detail 8
A "remote controls" implementation under 5.1.3.4

WHAT ARE THE WORST CASE SCENARIOS?

Look for them

Thank you for your time, partnership and leadership during the toughest time in US history?

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Questions?