Medical Equipment and Utilities Management

Plant Operations and Maintenance Clinical Engineering

This self-directed learning module contains information you are expected to know to protect yourself, our patients, and our guests.

Target Audience: All Employees

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Instructions:

The material in this module is an introduction to important general information and procedures regarding medical equipment management and utilities management. After completing this module, contact your supervisor to obtain additional information specific to your department.

- Read this module.
- If you have any questions about the material, ask your supervisor.
- Complete the online posttest for this module. Once you pass the posttest, print it or a copy of your transcript and give it to your manager.
- Customize the Job Aid on page 13 to fit your department’s policies and procedures and use the Job Aid as a quick reference guide.
- Record the date you completed the module on your Employee Annual Continuing Education Record.

Learning Objectives:
When you finish this module, you will be able to:

- Describe the primary function of the Medical Equipment Management Program at Carolinas HealthCare System (CHS).
- State the types of electrically operated equipment that may and may not be used at CHS facilities.
- Explain your role in the Medical Equipment Management Program.
- Describe how to handle defective medical equipment.
- Recognize the Clinical Engineering (CE) labels used on electrically operated medical equipment.
- Describe the hazards of electricity and explain ways to prevent accidents involving electrical shock.
- Describe the procedure for reporting faulty electrical equipment or frayed cords.
- State the steps to take when a person has been injured in an accident involving medical equipment.
- Describe the Utility Systems at CHS and steps to take when these systems fail.
- Understand the policy on use of wireless communication devices and your role in minimizing potential interference.
Medical Equipment Management

The Medical Equipment Management program promotes safe and effective use of medical equipment. The program ensures all medical equipment is properly selected, inventoried, maintained, and replaced and that users are trained to safely operate equipment and properly report equipment failures/incidents.

The primary purpose of the Medical Equipment Management Program is to:

1. ensure all equipment has been properly inspected; and
2. provide information and instruction regarding the proper use of equipment, equipment maintenance requirements, and the risks associated with the use of various medical devices to contribute to patient and staff safety.

Examples of Electrically Operated Equipment

Three types of electrically operated equipment are used at healthcare facilities:

1. Medical equipment used in patient care areas,
2. Medical equipment used in non-patient care areas (i.e., lab and CRC), and
3. Non-medical equipment used by an employee or a patient.

Patient care medical equipment may include:

- Ventilators
- IV Pumps
- Heart Monitors
- Suction Machines
- Warming Blankets
- Thermometers

Other medical equipment may include:

- Centrifuges
- Lab analyzers

Non-medical equipment may include:

- Vacuum Cleaners
- Pencil Sharpeners
- Radios
- Refrigerators
- Coffee Makers (Commercial grade)
- Microwaves
- Desktop Computers
There are times when a patient may want to bring his or her own medical equipment to use in the hospital. It is best to substitute CHS-owned equipment for use in the hospital.

If substitution is not possible:

- Notify the manager of the area where the item will be used.
- Obtain a doctor’s order for a patient to use his/her own medical equipment.
- Call the CHS Support Center at 704-446-6161 or 866-446-6161 to have the item inspected BEFORE it is used in the hospital. It may NOT be used until this inspection has occurred. Clinical Engineering will apply a “Non-Hospital Owned Equipment” label on the item after completing the safety inspection.

All electrical items, both medical and non-medical, must be inspected and listed for safety by an outside listing organization (i.e. UL, MET, CSA, ETL/ITS, and Entela). All listed items will have a label with these letters, or similar ones of a different agency, on the equipment.

If you have questions about whether an item is approved, please call Clinical Engineering.

Electrical Equipment Prohibited from Use at CHS Facilities

Some types of electrical equipment may not be used in CHS facilities. A complete listing of electrical equipment prohibited from use at CHS facilities may be found in the Safety Management Program Manual.

Some examples of equipment that may not be used are:
- Coffee pots (non-commercial grade)
- Heating pads
- Clothes irons
- Electric blankets
- Hotplates
- Popcorn poppers
- Radiant heaters
A nurse manager, a charge nurse, or your supervisor must inspect each piece of personal electrical equipment. If a piece of equipment looks unsafe, it may NOT be used and should be taken home.

**Inspect Electrical Equipment Before Use**

One of your most important roles for safety in the hospital is to inspect electrical equipment before each use. Look for frayed cords, broken or bent prongs, missing “ground” prongs, exposed wires, equipment that causes a tingling sensation when plugged in, or other obvious hazards.

If any equipment is defective or does not work properly, DO NOT USE IT!

**Instructions for Handling Defective Equipment**

If a piece of electrical equipment does not work properly, follow these guidelines:

1. Place a red “DEFECTIVE” tag on the equipment. Labels may be obtained from your supervisor, the distribution center, or Clinical Engineering. On the label, describe the nature of the problem, enter the current date, and then print your name so you may be contacted if additional information is required.

2. Remove the equipment from the work area so it will not be used and place it where it may be picked up by Maintenance or Clinical Engineering.

3. Call the CHS Support Center at 704-446-6161 or 866-446-6161. Explain the problem and where to find the equipment.

4. To get the repair completed as quickly as possible, be prepared to give the information listed below to the Support Center:
   - Your name.
   - Your department.
   - Department telephone number.
   - LOCATION OF THE EQUIPMENT.
   - Name of equipment/device (i.e., Dinamap, ECG monitor, etc.)
   - A brief description of the problem.
   - Clinical Engineering (CE) number if applicable. The CE number is located on a white or silver label or the asset tag located on the back of the equipment, either near the serial number or on the right front or side of the piece of equipment.
CE Labels Used on Medical Equipment at CHS

Potential Hazards

In modern healthcare facilities, the use of electrical equipment is essential to perform most aspects of our work, but it may be dangerous if not used properly. According to the National Safety Council, approximately six percent of work-related deaths result from electric shock. Learning about the hazards associated with the use of electricity, maintaining electrical equipment in good working order, and following safe work practices will help prevent most electric shock injuries.

Electric Shock

Electric shock occurs when your body becomes part of an electrical circuit. Shocks usually occur when a person touches exposed electrical wires (i.e., wires exposed in a damaged or frayed electrical cord or plug). Shocks may also result from the dangerous combination of water and electricity.

One painful consequence of electric shock is burned skin and other tissue. Depending on the amount of current and duration of exposure, the burns resulting from electric shock may be as deadly as the shock itself. Also, be aware that most electrical equipment contains a heating element. Contact with these heated surfaces (e.g., blood warmers, incubators, and coffeepots) may produce serious burns.

Fire

An overlooked hazard associated with the use of electrical equipment is fire. Since heat is generated from the passage of electric current, an overloaded circuit or a spliced or frayed wire may generate enough heat to cause a fire.
Electrical Safety Tips

- When unplugging an electrical device, pull the plug, not the cord. Over time, pulling the cord may result in damage to both the cord and plug, leading to exposed wires.

- Inspect all electrical equipment prior to use. Report any frayed cords, broken adapters, or equipment without proper labels immediately to your supervisor, safety officer, or the Corporate Safety Department.

- Never use an adapter, doing so may overload the circuit, which may result in a fire. “Cheater plugs” or adapters that allow three-pronged (grounded) plugs to be used in two-pronged outlets should never be used.

- Always follow manufacturers’ directions for proper and safe use of equipment.

- A surge protector outlet strip must only be plugged directly into an electrical wall receptacle. Strips in patient care use must be hospital grade and UL (or other agency) listed. These outlet strips are prohibited in certain high risk areas (wet areas) such as the OR.

- Extension cords may only be used temporarily in non-patient care areas. Extension cords must be plugged directly into an electrical wall receptacle (not into another extension cord), and must never be used for refrigerators, microwaves, heaters, or coffee pots, or in designated high risk areas. Extension cords may only be used on a temporary basis.

Steps to Take if a Person Has Been Injured Involving Medical Equipment

If a person is injured or involved in an incident involving medical equipment:

1. Offer to get treatment for the injury (i.e., visitors would go to the Emergency Department; physicians would be notified for in-patients).

2. If a person is badly injured or dies, inform your supervisor immediately.

   - If the injured person is an employee: Fill out the Report of Occupational Injury and Illness Form.
   - If the injured person is a patient or visitor: Fill out an Incident Report. Be sure to fill out Section V.

4. If the injury is serious call Risk Management immediately at 704-355-3238. If the injury happens after hours, tell your supervisor, who will then call the Administrator On-Call.
5. If the injury possibly happened because the equipment did not work properly, save all the parts, including disposable ones. Do not change the control settings on the equipment. Tag the equipment as “defective,” remove it from service, and hold it for Risk Management or Clinical Engineering to pick up. Be sure to let Clinical Engineering know that the equipment is involved in an incident. Be prepared to provide additional details to assist in the evaluation of the potential device malfunction.

**Use of Wireless Communication Devices**

The widespread use of wireless communication devices has created a potential hazard to hospital patients attached to clinical monitoring devices, such as heart monitors, pacemakers, apnea monitors, defibrillators, infusion pumps, ventilators, and infant incubators.

Cellular phones, two-way pagers, internet accessible PDAs, two-way radios, and other wireless devices emit radio frequency energy that may interfere with clinical patient monitoring equipment when used in close proximity to the clinical equipment. The effect of the radio frequency energy is greatly diminished as the distance between the radio frequency source and the clinical equipment is increased.

An effective way to manage radio frequency interference is to regulate the use of wireless communication devices inside the hospital and/or patient care facilities. **Wireless communication devices shall not be used in restricted areas.** Reference your facility policy 3.09 in the Safety Management Program Manual for restricted areas. The policy applies to staff, patients, visitors, contractors, vendors, volunteers, emergency personnel, and anyone who enters a CHS facility.

**Restricted Use of Cellular Phones and Two-Way Radios**

Two-way radios may interfere with patient monitoring devices when they are used to transmit messages. Therefore, they should not be used to send messages in spaces near clinical monitoring equipment. However, two-way radios may be safely used to monitor incoming messages.

In the event of emergency, individuals such as EMS, Fire Department, Police Department, and hospital personnel are allowed limited use within patient care areas. If a cellular phone or two-way radio must be used in an emergency, the users must be at least 3 feet away from the patients and/or clinical equipment.

Each employee should be watching for potential interference when a wireless communication device is near clinical equipment. If any irregularities or other
interference is noted, move away from the equipment, turn off the device, and notify Clinical Engineering.

Utilities Management

CHS’s vast system of utilities include the electrical system, heat and air conditioning systems, plumbing, boilers and steam plant, medical gases, emergency power, and the communications systems. The primary function of the Utilities Management Program is to ensure all elements of the utilities system at CHS are maintained and properly operated. Another important function of the program is to ensure the loss of one or more elements of the system does not adversely affect the smooth operation of patient care processes in the CHS facility.

Two Types of Electrical Systems

Under normal conditions, Duke Energy supplies electricity to all electrical outlets. “Normal” power outlets are brown, ivory, or gray. In the event of a power failure, "normal" outlets may be without electricity, and electricity is supplied to the red outlets by emergency generators.

Equipment that should always be plugged directly into emergency, or red outlets includes the following: ventilators, specialty beds, defibrillators, patient monitoring systems, UPS, other life support equipment, and communications systems.

Steps to Take if the Electrical System in Your Area Fails:

1. Notify the CHS Support Center at 704-446-6161 or 866-446-6161. **Note:** All facilities managed by Lincoln Harris should notify the Lincoln Harris Response Center at 1-800-933-4357.
2. Notify the clinical supervisor of the area.
3. Verify life-support equipment is on emergency power or staff is providing interim life support.

Elevator Safety

Vertical transports or elevators are used to move people and equipment vertically in the building. Follow these tips if an elevator stops between floors while you are in it:

1. Remain calm.
2. Use the emergency phone in the elevator. Tell the operator what elevator you are on; if there is a medical emergency, how many people are on the elevator, and the floor closest to you.
3. Activate the alarm, usually a red button or switch.
4. Stay on the elevator. **Do Not** try to exit an elevator that is stuck between floors.

**Pneumatic Tube System**

The pneumatic tube system transports a variety of materials including pharmaceuticals, laboratory specimens, and other critical patient care items. When maintained and used properly, this system allows staff members to concentrate on the patient without having to walk floor to floor to obtain the information or medical supplies that are required for the patient.

Every employee using the pneumatic tube system has the responsibility of keeping the pneumatic tube system running. The number one cause for the tube system stopping is user error. User error includes overstuffed carriers, improper packaging of carriers, and sending broken carriers throughout the system. These conditions can cause blockages or spills in the system.

The Plant Operation and Maintenance Department maintains the tube system. Users should contact the CHS Support Center at 704-446-6161 to report any spills or blockages as soon as possible, and to report any broken carriers.

**Medical Gases Safety** - See Annual Continuing Education Modules for Medical Gases

**Heating Ventilation Air Conditioning (HVAC)**

A variety of air-handling systems (HVAC) help to maintain a safe and comfortable environment for patients, visitors, and staff.

The thermostats should be set at a comfortable setting, usually between 72-75 degrees. If a situation requires the temperature be outside the 72-75 degree range, reset the thermostat within the normal range as soon as the situation has been corrected. Do not adjust locked thermostats. If the HVAC system fails or is not working correctly, notify the CHS Support Center on 704-446-6161 or 866-446-6161, or, where applicable, contact the Lincoln Harris Response Center on 1-800-933-4357.

**Plumbing Safety Tips**

- Do not pour hazardous chemicals or unknown substances into a sink or floor drain until you have checked the container for the disposal instructions. Check department specific procedures for handling of hazardous chemicals and/or waste. If you have any questions or concerns regarding proper disposal of waste, read the label, ask your supervisor, and check the Material Safety Data Sheet (MSDS), or call the Corporate Safety Department on 704-512-7283.

- Carefully dispose of chemical and biological waste according to departmental
• Contain the flow of any water leaks by wrapping a towel around the source of the leak, closing a valve, or placing a trash can to catch the flow.

• Notify the CHS Support Center immediately to correct the cause of leaks.

• If a drain becomes backed up, **STOP** the flow into the drain.

• Secure the area around a wet floor until it can be cleaned.

• Attempt to contain the water, if safely possible.

• Block off the area from traffic flow.

• Notify the CHS Support Center, so a clean-up crew can be dispatched.

**Steam Safety**

A boiler system provides steam used for heating, sterilization, humidity controls, and cooking. Steam piping is located throughout most facilities. If you notice a leak or any other problem, call the CHS Support Center on 704-446-6161 or 866-446-6161, or, where applicable, contact the Lincoln Harris Response Center on 1-800-933-4357.

**DO NOT ATTEMPT TO ADJUST OR REPAIR THE PROBLEM YOURSELF.**

**Steam is under high pressure and may cause serious burns.**

**Communication Systems Safety**

The communication system includes telephones, nurse call systems, pagers, overhead paging, code alpha systems, and computers.

**CHS Overhead Paging Systems**

This paging system is used to page persons without a beeper and notify staff of emergencies such as Code Red and system failures. The hospital operator makes overhead pages.

**Departmental Paging**

These systems are operated from the respective departments and are heard only by staff members in that department.
Steps to take if the Pager System Fails

If the **overhead paging system** is out of order, a computer message will be sent out to all areas having a **HBOC STAR** computer terminal. Beepers should then be utilized when possible. If the person needing notification does not have a beeper, the department should send an employee as a "runner" to deliver the message.

If the **paging system fails (i.e. beepers)**, the operator will call a, "**Paging Conference**" on the overhead paging system. This alerts the staff to listen to overhead pages, since that will become the primary means of communication.

If an individual pager (beeper) is not working, check to see if the battery is low. If this is the problem, obtain a replacement battery from your department. If this action does not solve the problem, contact the CHS Support Center on 704-446-6161 or 866-446-6161.
JOB AID

1. All electrical items must be inspected and listed for safety by an outside approval organization (UL, MET, CSA, ETL/ITS, and Entela).

2. Inspect electrical equipment before each use. Look for frayed cords, broken, or bent prongs, missing “ground” prong, exposed wires, a tingling sensation when plugged in, or other obvious hazards. If any equipment is defective or does not work properly, DO NOT USE IT.

3. Cellular phones must be turned completely off before entering restricted areas containing clinical monitoring equipment.

4. Under normal conditions, Duke Power supplies electricity to all electrical outlets. Normal outlets are brown, ivory, or gray in color. In the event of a power failure, electricity is supplied to the red outlets by emergency generators.

5. There are four main types of medical gases: oxygen, medical air, surgical gases (used during surgery and dental procedures), and vacuum.

   It is vital all employees know where the shut-off valves for the medical gas devices in their area are located.

6. A variety of air-handling systems (HVAC) help to maintain a safe and comfortable environment for patients, visitors, and staff.

   If the HVAC system fails or is not working correctly, notify the CHS Support Center on 704-446-6161 or 866-446-6161, or, where applicable, call the Lincoln Harris Response Center on 1-800-933-4357.
Posttest

Name: _____________________________________________

Date: _____________________________________________

Circle the correct answer.

1. The _____ outlets will provide access to emergency power.
   a. Yellow
   b. Red
   c. Gray
   d. Brown

2. What type of electrical equipment may not be used at CHS facilities?
   a. Coffee pots (non-commercial grade)
   b. Radiant heaters
   c. Hot plates
   d. All of the above

3. The wireless devices that are permitted to be used anywhere in the Hospital are (but must still maintain the 3 feet away rule).
   a. Laptop that connects to Hospital Network
   b. Cellular Phone
   c. PDA Connecting to Hospital Network
   d. both a and c

4. If heating or air conditioning in your area is not working properly, call:
   a. Maintenance
   b. Clinical Engineering
   c. CHS Support Center or, where applicable, the Lincoln Harris Response Center
   d. None of the above

5. True or False (Circle One)
   When unplugging an electrical device pull the plug and not the cord to prevent damaging the device wiring.
6. If the power goes out in your department, you must:
   
   a. Notify the clinical supervisor  
   b. Ensure all life support equipment is on emergency power  
   c. Call the CHS Support Center or, where appropriate, the Lincoln Harris Response Center  
   d. All of the above  

7. If medical equipment does not work properly, you should:
   
   a. Tag it as defective and remove it from the work area  
   b. Call (704) 446-6161 to report the problem  
   c. Try to fix it yourself  
   d. a and b  

8. If you have problems with the overhead paging system, a beeper, or nurse call systems, contact:
   
   a. CHS Support Center  
   b. Maintenance  
   c. Clinical Engineering  
   d. None of the above  

9. True – False (Circle One)

   Blood specimens, test results, and certain medications are items that can typically be transported in the pneumatic tube system.

10. True – False (Circle One)

   The number one cause of downtime associated with the tube system is user error.

11. A two-way radio or cellular phone user must be at least ___ feet away from the patients and/or clinical equipment.
   
   a. 10  
   b. 3  
   c. 5  
   d. None of the above
12. If an elevator stops between floors, you must NOT:

   a. Use the emergency phone
   b. Activate the alarm
   c. Exit the elevator
   d. Stay calm

13. True or False (Circle One)

   One important employee responsibility in the Medical Equipment Management Program is to inspect electrical equipment before each use.

Score: __________
Manager’s Initials: __________

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