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MUNSON MEDICAL CENTER
MUNSON HEALTHCARE

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Area/ Department	Trauma Services
Applicability	MMC
Tags	Procedure

Massive Transfusion Protocol

Purpose

To provide a process in the case of a massive transfusion.

Policy

Indications

A. Massive blood loss and profound hemorrhagic/hypovolemic shock.

B. Triggers:

1. Greater than 6 units packed red blood cells (PRBC) transfused within 2 hours.
2. Hemodynamically unstable patient with identified or suspected coagulopathy of trauma or disseminated intravascular coagulopathy (DIC)
3. Any time at the discretion of the trauma surgeon / intensivist.
4. Assessment of blood consumption (ABC) score of greater than or equal to 3 (total possible score 4)
    a. Penetrating mechanism (no= 0; yes= 1)
    b. Emergency department (ED) systolic blood pressure less than 90 mmHg (no= 0; yes= 1)
    c. ED heart rate greater than 120 bpm (no= 0; yes= 1)
    d. Positive Ultrasound FAST Exam (no= 0; yes= 1)
5. Trauma patient who requires more than 1 liter crystalloid to maintain systolic blood pressure greater than 90mmHg.

Responsible Parties

A. Team leaders: depending on area in hospital
    1. Trauma surgeon (trauma bay, operating room (OR), intensive care unit (ICU))
    2. Intensivist (in ICU when trauma surgeon unavailable).
    3. ED physician (in ED when trauma surgeon unavailable)
    4. Anesthesiologist (in OR or Post Anesthesia Care Unit (PACU))
    5. Trauma advanced practice provider (APP)
    6. Obstetrician (OB)
    7. Sound hospitalist

B. Clinical pathologist

C. Lab blood bank / laboratory personnel

D. Pharmacy

E. Nursing supervisor / charge nurse

F. Clinical team:
    1. Trauma physician assistant (PA)/nurse practitioner (NP)
    2. ED registered nurse (RN)/paramedic
    3. ICU RN
    4. OR RN
    5. ED Technician / ICU technician / OR technician

G. Vascular Access

Procedure

A. Initiation of the massive transfusion protocol (MTP):
    1. Trauma surgeon, intensivist, ED physician, trauma APP, anesthesiologist, Sound hospitalist, or OB initiate MTP.
        a. Staff member call switchboard to page out MTP overhead and to all responsible parties.
        b. Staff member enter order for Massive Transfusion in Cerner
            i. Initiate *Lab - every 30 minutes* immediately
        c. Blood bank and lab supervisor notified (by switchboard) of MTP initiation.
        d. Nursing/house supervisor to come to area if needed.
        e. Blood bank will notify clinical pathologist of MTP initiation
        f. Maintain communication with blood bank during the initiation and maintenance of MTP.

g. Consider the use of tranexamic acid (TXA) on patients greater than 18yrs old, initial 1g dose over 10 minutes and then a second 1g dose over the next 8 hours. **MUST BE USED WITHIN 3 HOURS OF INITIAL INJURY, IDEALLY less than 1 HOUR

h. Communicate with pharmacy the need for anticoagulation reversal agents.

2. Clinical pathologist or designee:
    a. Supervises procurement of lab tests.
    b. Tracks the use and available supply of blood and blood products.
    c. Advises the clinical team on the use of blood, blood products, and procoagulants
    d. Use of products based on lab results and available reserves.
3. Lab: confirm patient identification (ID) and medical record number (MR#) (actual or John Doe)
    a. Initial testing
        i. Type and cross (GTAB)
        ii. STAT coagulation profile: Prothrombin time (PT), partial thromboplastin time (PTT), fibrinogen, hemoglobin (HGB), platelet count
        iii. Basic metabolic panel (BMP), arterial blood gas (ABG), and lactate.
    b. Massive transfusion serial lab process.
        i. Repeat labs every 30 minutes until discontinued by clinical team.
        ii. Include complete blood count (CBC), PT/PTT, fibrinogen, lactate, BMP, and ionized calcium.
4. Blood bank:
    a. Prepares and releases
        i. First of five uncrossmatched PRBCs – O-negative or O-positive as indicated
        ii. 5 more units uncrossmatched, O-negative or O-positive PRBC as indicated (unless type specific available).
        iii. 5 single units of plasma
        iv. 5 units platelets
    b. Delivers the first trauma pack to the location of the MTP
    c. Prepares fresh frozen plasma (FFP) to stay 5 single units ahead.
    d. Prepares platelets to stay 5 units ahead.
    e. Ships components at temperatures appropriate for the product being

delivered. This should prevent inappropriate temperature storage of a blood product, such as refrigeration of platelets.

f. Prepares trauma packs (see attached schedule). Trauma packs should be ready to be delivered every 20 minutes.

g. Updates to appropriate type-specific or crossmatched components once available.

h. Tracks results of labs as they become available.

i. Communicates with clinical pathologist and designated clinical team leader (usually the trauma surgeon, anesthesiologist, or intensivist depending on clinical area).

j. Access and maintenance of services:

i. Notifies blood center and requests urgent delivery as needed.

ii. Communicates status of reserves to clinical pathologist.

5. ED RN/paramedic and ICU RN respond to all MTPs

a. Maternity Unit: ED Brings Belmont and Maternity provides the MTP Cart

b. ED MTP: ICU brings the Belmont only (not the MTP cart)

c. All Other Units: ICU Brings MTP Cart and Belmont. ED also brings Belmont for backup.

6. Vascular Access ensure patient has large bore IV (unless physician inserting Cordis)

B. Maintenance of MTP:

1. Charge nurse/Patient Care Coordinator:

a. Checks for accuracy of specimens and verification of patient identity.

b. Expedites transfer of patient within the institution.

c. Expedites transfer of lab specimens in timely fashion.

d. Communicates with and assists clinical team to maintain accuracy and timeliness.

2. Clinical team:

a. Draws, labels and maintains serial labs every 30 minutes during MTP or until discontinued by team leader (see heading III, below).

b. Transfuses shipped trauma packs at regular intervals as needed

c. Documents Input/Output (I/O) and medication administration record (MAR) during MTP.

d. Accompany the patient to the OR or ICU.

e. Remain with the patient until the MTP is terminated.

3. Team leader:

a. Ensures timeliness of serial blood draws.

b. Ensures timeliness of transfusions.

c. Supervises clinical team during the maintenance of MTP.

d. Designates alternate team leader when appropriate (e.g.: trauma surgeon designates anesthesiologist when operating).

e. Communicates with clinical pathologist regarding trend of lab results and transfusion needs.

i. Laboratory goals:

1. HGB 8-10 g/dL during the resuscitation and in the first 24 hours post stabilization. After 24 hour period of stabilization the HGB may be reduced to 7 g/dL if not actively bleeding.

2. Platelet count greater than 100,000 during resuscitation and in the first 24 hours post stabilization. After the 24 hour period of stabilization the goal is a platelet count greater than 50,000.

3. Coagulation testing goals: INR less than 2.0 and PTT less than 55 seconds. INR of 1.8 may be needed in TBI patients.

4. Fibrinogen greater than 150 mg/dL.

f. Terminates MTP (See heading III)

4. Clinical pathologist or designee:

a. Monitors coagulation and lab results

b. Advises team leader and clinical team of need for other blood components or specific alterations in transfusion needs (e.g. cryoprecipitate)

c. Notifies team leader of critical shortages in blood supply.

C. Termination of MTP:

1. Determined by team leader when either of the following are achieved

a. Achievement of endpoints of resuscitation ("stabilization").

i. Normalization of vital signs, including temperature.

ii. Normalization or improvement of coagulation parameters.

iii. Termination of bleeding/exsanguination.

b. Failure or Futility.

2. Call 55555 for switchboard to announce termination of MTP overhead.

3. Maintenance of hematologic function:

a. Serial hematologic assessments (CBC, PT/INR, PTT) every 6 hours for 24 hours, then twice daily (BID) or as needed.

b. Do not transfuse if there is no evidence of bleeding

c. Transfuse FFP if there is evidence of oozing until INR less than 2.0.

d. Transfuse platelets if platelets less than 50 k/dL.

e. Transfuse red blood cells (RBC) to maintain HGB 8-10 g/dL in first 24 hours post stabilization; transfuse for HGB less than 7 g/dL after 24 hours (restrictive transfusion trigger) unless evidence of new bleeding.

f. Transfuse cryoprecipitate if fibrinogen less than 150 g/dL.

D. Review of case and debriefing:

1. What went well.
2. What did not.
3. Product wasted.

E. *If rotational thromboelastometry (ROTEM) is available, the following cut-points for transfusion triggers may also be used:

1. Plasma for CT exTEM greater than 100 seconds and/or CT inTEM greater than 230 seconds.
2. Cryoprecipitate (fibrinogen concentrate) and/or plasma for MCF fibTEM less than 8 mm.
3. Platelets for MCF exTEMless than 45 mm and MCF fibTEM greater than 10 mm.
4. Anti-fibrinolytics for ML exTEM greater than 15 percent.

Document ID: 038.P003

Attachments

- ED Step-by-step instructions for using the Massive Transfusion Protocol Edits.doc
- Expected Response to Product
- MTP schedule.docx
- Step by step instructions for MTP in ICU 2019.pdf

Approval Signatures

Step Description	Approver	Date
System Policy Oversight Committee	Terri Fries: Document Mgmt Spec	5/15/2023

Mgr Trauma Program	Sarah Helveston: Mgr Trauma Program	5/15/2023
Document Owner	Kerry Kole: Medical Director	5/13/2023

Applicability

Munson Medical Center

Standards

No standards are associated with this document

Philips Monitoring System (MUNSON)

Philips Monitoring System (MUNSON)

Introduction

Central Monitoring System

The Philips Patient Information Center is a regulated medical IT system that:

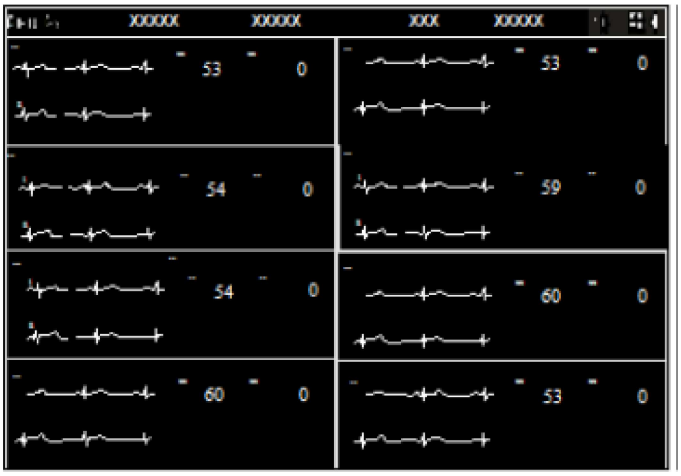
- Provides continuous monitoring of patient vital signs from admission to discharge.
- Consolidates and communicates vital signs data from monitors and third-party devices to caregivers and to the Electronic Medical Record (EMR) for a complete patient record.
- Supports industry standard interfaces to integrate into existing hospital IT infrastructure and EMR systems while meeting requirements for manageability, serviceability, and security.
- Meets the needs of caregivers on the go by means of remote access to patient vital signs for information anywhere.

Through a combination of advanced alarm management, mobility, and clinical decision support, Philips Patient Monitoring Systems enable reduction of non-actionable alarms, improve workflow efficiency, and facilitate early intervention of patient deterioration to improve patient care and outcomes.

The Information Center software runs on a PC workstation with one or two displays for viewing patient data and accessing clinical applications. A mouse and keyboard are provided for entering and changing patient data and other information. If you position the cursor on a labeled application button and click, the application is immediately displayed on the screen. Note that an on-screen keyboard is not available.

With a touchscreen, you can access patient data by either using the mouse or by touching the item on the screen with your finger or a stylus. The mouse is best for making precise selections and measurements, such as using calipers. The touchscreen is best for actions such as acknowledging alarms, accessing application windows, or recording strips. When using a touchscreen, keep the area free of items that can inadvertently touch the screen. If the touchscreen becomes unavailable for any reason, you can access patient data by using the mouse and keyboard.

The Main Screen displays real-time waves, numerics, and alarms from multiple patients. It can be configured to show up to 64 waves, and contains the following elements:



1 Caption Bar

2 Patient Sectors

 Select the Patient Window button to open the Patient window to Display a real-time view of the current patient's data. You also can choose to do an ECG analysis to view all available ECG leads. The Patient Window provides a real-time view of the patient's waves and numerics. You can view patient data and perform all tasks in the Patient Window. In addition to the waves and numerics, the Patient Window contains the following items:

- The Bed Label Pane - Displays the bed label and ID for the currently selected patient. Select the down arrow to select another patient to view.
- The Print Icon to start a printout of the Patient summary report.
- The Help Icon.
- Alarm message areas – All active alarms and technical alarms display on the top right of the patient window. Status messages are color-coded to indicate the message severity. Orange background indicates high severity. Black background indicates low severity. Select the status message to open System Help in the application window. The Help contains a list of status messages with the possible causes and recommended actions for each message.
- Patient Name - Displays the patient's name. Depending on the length of the complete string and the amount of available space, a minimum number of characters is shown, ending with an ellipsis (...). Three question marks (???) precede the patient's name when there is a problem identifying the patient. For example: Patient data between the Information Center and the bedside does not match. All required information was not entered when the patient was admitted.

Buttons in the sector become visible when you move the cursor into the sector or, if using a touch screen display, when you first touch the sector with a stylus or the tip of your finger. When you place the cursor inside a patient sector, the sector is outlined in an orange border. You can minimize the buttons by moving the cursor into the sector and holding down the **Ctrl** key. While the cursor is inside the sector, the buttons remain minimized until you press the **Ctrl** key again. If you move the cursor out of the active sector and move it back in, the buttons become visible.

 Select the Manage Patient icon, which will allow you to:

- Admit, discharge, and transfer patients.
- Enter or update patient demographic information.
- Manage the equipment associated with the patient.
- Temporarily place the bed in standby.
- Enter a temporary transport location, and/or select the patient's equipment to place in standby.
- Export ECG waveform data to a Philips Holter system for analysis.

To Admit a Patient: Use one of the following methods:

- Manually enter new patient information in the fields in the **Patient Demographics** section by typing a 1-30 character first and last name in the appropriate fields. You can use the TAB key to move from field to field. You can also admit a new patient by entering the MRN.
- Use the **Find Patient...** option to find a patient who is being monitored in another Information center or who has been recently discharged.

You can then choose the patient's gender from a drop-down list. It will default to Male while performing a 12-lead if not assigned. It will default to Female while measuring STE if not assigned. Specify the patients birth date by entering it on the calendar. This will update the age field. Enter the patient's height in the appropriate field. This can be in inches or centimeters according to your policy. Enter the Patient's weight using pounds or kilograms according to your policy. Select "Apply" after verifying all information is correct.

Read all confirmation messages and check patient alarms, settings, and paced status when automatic admission, discharge, or transfer is complete.

Viewing and Adjusting Waves:

When the ECG measurement is on, the first wave displayed is the primary ECG wave. The primary wave is always used for ECG analysis. A rhythm status message displays in the upper right corner of the wave, and an arrhythmia status message displays above and in the center of the wave.

Pleth waves on an Efficia monitor are labeled as SpO2.

Wave Adjustments

You can adjust waves in the patient sector or Patient Window layout by selecting a wave then selecting one or more options described below.

- Change Wave – Select a wave from the list. You cannot select the primary ECG wave.
- ECG Analysis – Available if you select an ECG wave. Select to access the ECG Analysis application.
- Primary Lead – Available if you select the primary ECG wave. Select the primary led from the list.
- Size up or Size down - Select to increase or decrease the size (gain) of the wave (if available).
- Set up ECG – Available if you select an ECG wave. Select to access the **Measurements** application ECG page, where you can change heart rate limits and asystole thresholds.

Manually Transferring a Patient to a New Bed: Transfer data for a patient by performing the following steps:

- Use one of the following methods to open the **Manage Patient** In the sector for the bed that you want to transfer, select the name field or select the **Manage Patient** shortcut button. In the application window task bar, select the **Manage Patient** button.
- Select the **..** button. The **Transfer Patient** dialog box displays a list of available beds in the institutions and units.
- To transfer this patient to another bed within this unit, select the bed from the list of beds in your unit. To transfer this patient to a bed in another unit, first select the unit name, then select a bed from the list.
- Specify whether to clear the sector (remove the bed from the sector) upon transfer by selecting or clearing the **Clear Sector** check box. The system can be configured so that the check box is selected by default. Depending on your unit practices, you may want to clear the check box so the sector is not cleared and the equipment remains assigned to the sector.
- Select "OK".
- Confirm the transfer by selecting the orange "TRANSFER" button.

To Discharge a Patient: Use one of the following methods to discharge a patient.

- Manually discharge a patient in the **Manage Patient** application.
- Discharge a patient directly from the hospital information system or bed management system.

Considerations

Before discharging a patient, note the following:

- Discharging the patient at the Information Center also discharges the patient from the bedside monitor. All monitor and MMS settings (including arrhythmia settings) reset to their defaults.
- When you discharge a patient, the Information Center saves the patient data for all admitted patients. The system stores seven days of data and purges the stored data seven days after discharge.

You can search discharged patient data without readmitting for up to seven days.

- If you readmit a patient, the discharge data is overwritten by new monitoring data as it occurs, and you will only see the full disclosure amount of data.
- Monitoring devices may be set up with predefined configurations called *profiles*. When you discharge a patient, the profile reverts to the default profile configured for the device. Refer to your monitoring device documentation for details. When

you discharge an admitted patient at the Patient Monitor, the Information Center discharges the patient and saves the data.

- *Important* — For MRx monitors, turning off the bedside monitor for more than 10 seconds discharges the patient at the MRx monitor and resets defaults, but it does not discharge the patient from the Information Center; the patient is still admitted at the Information Center. It is important to discharge the patient before turning the monitor off to avoid data being associated with the wrong patient.
- Patients that are discharged while the Information Center is in Local/Disconnected mode will be synchronized upon connection to the primary server.

Warning

Read all confirmation messages and check patient alarms, settings, and paced status when automatic admission, discharge, or transfer is complete.

Measuring ECG:

The electrocardiogram (ECG) measures the electrical activity of the heart and displays it on the

Information Center as a waveform and a numeric. In order to compare measured ECG signals, the electrodes are placed in standardized positions, forming "leads". To obtain ECG signals optimized for use in diagnosis and patient management in different care environments, different lead placements can be used.

Selecting the Primary and Secondary ECG Leads

The telemetry device or patient monitor uses the primary and secondary lead selected at the

Information Center to compute HR and to analyze and detect cardiac arrhythmias.

You should choose a primary and (if using multi-lead monitoring) secondary lead that have the

following characteristics:

- the QRS complex should be either completely above or below the baseline and it should not be biphasic
- the QRS complex should be tall and narrow
- the T-wave should be less than 1/3 the R-wave height
- the P-wave should be less than 1/5 the R-wave height

Documenting Patient Events

Documentation of patient events and procedures is a necessary element of patient care. You can print reports from the PIC iX to paper, electronically via PDF, or both.

Create a Saved Strip

You can create a saved strip with the PIC iX electronic caliper (eCaliper) measurements and comments in any strip tile in Alarm Review, General Review, or specialty review applications.

Note —You must have Full Permission Access to annotate and save a strip to the database.

- Select the strip that you want to annotate.
- Select the Annotate icon. The Saved strip dialog box opens. You can move the dialog box as needed.
- Select a label from the drop-down list to add labels. This field can be customized as needed in Alarm Review.
- Enter text in the second field, up to 30 characters. This value displays in the Comment field for the strip.
- Add eCaliper measurements. Consider changing the wave speed to 50 mm/sec. (Select the speed on the bottom right of the strip, then select a speed from the list.) Click and drag in the strip to and from the desired location in the wave. The measurement is displayed between the vertical lines. In the dialog box, click the measurement label to add the measured value. *Note* — Double-click the measurement to see the caliper bars at any time.
- Select another strip and repeat these steps as needed.
- When you are done, select Save. The measurements are saved to the strip.

Reviewing ECG Waves

Depending on the number of ECG leads and licensing, 3 to 12 waves are available for review. These waves can be reviewed with the other data tiles, such as with events and alarms.

Alarms:

Quickly Viewing Target Events - When reviewing patient data, it is often helpful to quickly view specific types of alarms or events.

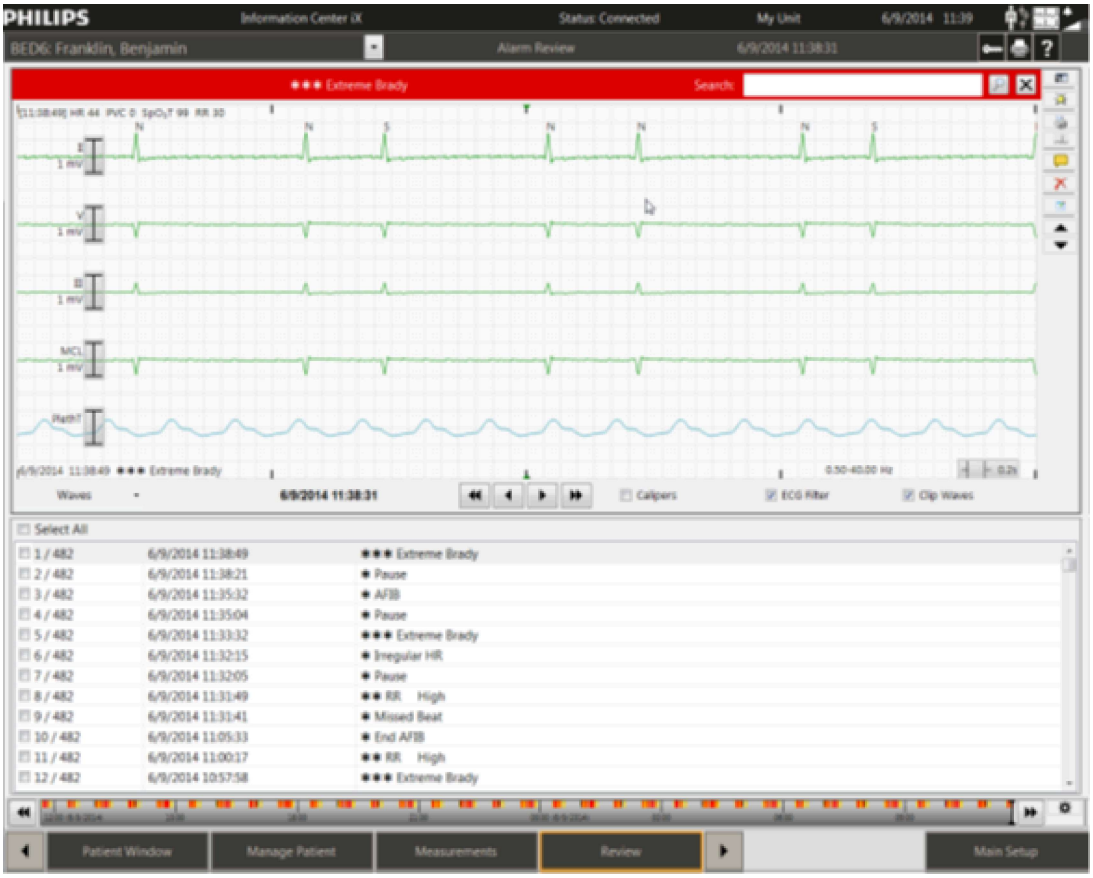
Fast Alarm Review - Select either the Acknowledge key, or the alarm banner in the sector to see alarming waves prior to being available in other applications. Alarm strips can be printed, annotated, or discarded. If you are using secondary notifications, such as with Philips CareEvent, you can manually page an alarm from this application.

Note — The Silence key is called the Acknowledge key.

Alarm Review

Alarm Review always opens with the most recent alarm strip. To review alarms, open Alarm Review from the Review sector button, if configured, or you can open Alarm Review from the main Setup menu or from the Review application menu in any open application. Use the toggle icon to switch between the three different tiles. The tile you prefer can be set up as a default on each host.

- **Tabular** tile – shows a detailed strip with multiple waves and a tabular list of alarms. Use the up and down arrow keys to quickly view alarm strips. This is the factory default tile.
- **Compressed** tile – shows 30 seconds of compressed waves for all strips.
- **Strip Window** tile – a combination of Compressed and Strip tiles.



Reviewing Alarms and Events in Other Applications

Within the factory default review applications (as well as custom applications that were created for your unit), there is a data type called the Event tile. You can use the Event tile to review alarms with other associated data, such as compressed wave storage or graphical trends. Arrhythmia events are also shown, even when a specific alarm is off, such as for yellow level ventricular alarms. The length of the colored box indicates the duration of the event.

- Open the review application. If opened from Alarm Review, the time focus is the selected alarm. If opened from another application, it opens at the current time minus the one minute for storage.
- The Event tile is highlighted below. Note the displayed number of events shown on the right. Alarms are shown with the corresponding color, and arrhythmia events are shown in cyan.

- Clear the check box next to the events you do not want to see. If licensed, specific events can be customized for each review application.
- Move the cursor over any alarm or event to see text that contains the details.
- Select the event to examine its associated waves, trends, and numerics.
- Use the arrow keys in the middle of the tile to quickly navigate to next or previous events.

 Alarms off. Displays next to the numeric when alarms are turned off for the numeric.

 Pause Alarms (Red and/or yellow). **PRESS THIS BUTTON AGAIN TO RESUME ALARMS!**

 Acknowledge/Review Button. Turns off the alarm sound and the sector background changes from blue to black.

 Volume icon. Select to adjust the alarm volume.

Physiological alarms are red and yellow alarms. A red alarm indicates a high priority patient alarm such as a potentially life-threatening situation (for example, asystole). A yellow alarm indicates a lower priority physiological alarm (for example, a respiration alarm limit violation). Additionally, there are short yellow alarms, most of which are specific to arrhythmia-related patient conditions (for example, ventricular bigeminy). Alarm message areas. All active alarms and technical alarms/INOPs display on the top right of the patient sector. A RED warning alerts you to a potential serious outcome, adverse event or safety hazard. Failure to observe a warning may result in death or serious injury to the user or patient. A YELLOW caution alerts you to where special care is necessary for the safe and effective use of the

product. Failure to observe a caution may result in minor or moderate personal injury or damage to the product or other property, and possibly in a remote risk of more serious injury. Technical alarms, or INOPs indicate that the monitoring device cannot measure or detect alarm conditions reliably. If a technical alarm interrupts monitoring and alarm detection (for example, LEADS OFF), the numeric is replaced by a question mark in the sector and Patient Window, and an audible indicator sounds. Technical alarms without this audible indicator indicate that there may be a problem with the reliability of the data, but that monitoring is not interrupted. Most technical alarms are light blue, however there are a small number of technical alarms that are always yellow or red to indicate a severity corresponding to red and yellow alarms.

There can be only one alarm sound annunciating at the Information Center at one time.

- If there is an unacknowledged red level alarm in the presence of any other level alarm, the sound for the red alarm annunciates.
- If there is no unacknowledged red level alarm condition and there is an unacknowledged long yellow alarm in the presence of any other yellow technical alarm (acknowledged or unacknowledged) the sound for the long yellow alarm annunciates.
- If there is no unacknowledged red level alarm or long yellow level alarm condition and there is an arrhythmia or nurse call event, the short yellow (*) alarm sound annunciates.
- If there are no unacknowledged red or long/short yellow alarm conditions and there is any bed with an unacknowledged technical alarm condition, the sound for the technical alarm annunciates.
- If multiple sectors are in alarm, once the highest level alarm is acknowledged in a sector the next highest alarm annunciates.
- An alarm tone indicates the alarm type. There is no sound for soft INOPs/technical alarms.

Other Buttons and Icons:

 **Battery icon.** If there is at least one battery-operated device assigned to this patient, the battery icon indicates the device with the least amount of battery strength. Move your cursor over the icon to view a list of equipment for this patient sorted from the lowest to highest battery charge. The battery icon has five levels: approximately 100% to 80%, 80% to 60%, 60% to 40%,40% to 20%, or -Replace Battery strength. The number of segments indicates the approximate power level.

 **Help icon**. Select to view the online Help application. The Help application is always available and provides context-specific information on using the Information Center applications.

 **Manage Patient icon**. Available in sectors not currently monitoring a patient. Select the icon to access the **Manage Patient** application where you can assign a monitoring device.

The Measurements Button: Provides access to the **Measurements** application, which allows you to:

- Change alarm limits for a patient.
- Turn specific alarms on or off for a patient.
- Adjust measurement settings within a profile.
- Set up telemetry devices.
- Designate which alarms will generate a recording or report or initiate a page.
- View or print an Alarm Summary.
- Configure criteria to trigger alarm advisor notifications.
- View active notifications.

Your choices in the application depend on how your unit is set up and the equipment assigned to the patient.

Paced Mode icon. Indicates the patient's current paced status.

-  On – The icon is white when **Paced Mode** is turned on.
-  Off – The icon is green with an X over it when **Paced Mode** is turned off.
-  Unconfirmed – A red question mark displays over the icon when the patient's paced mode is unknown or in conflict.

The pacer spike color is always white unless the ECG wave is white. If the ECG wave is white, then the pacer spike color is green. Pacer spikes may be configured to display with fixed amplitude for increased visibility.

Important — If **Paced Mode** is set to **Unconfirmed**, the ST/AR algorithm acts as though **Paced mode** is turned on. Select the icon to display a menu where you can turn **Paced Mode** on or off.

Warning - If the patient has a pacemaker, **Paced Mode** must be turned on, enabling the ST/AR algorithm to detect and reject pace pulses (spikes) from the HR count. Otherwise, pace pulses could be detected as beats and the monitor may not alarm for an asystole condition. If the patient does not have a pacemaker, turn **Paced Mode** off to allow the ST/AR algorithm to work most effectively.

 **Print/record Icon**. Depending on your system setup, select this icon to do the following:

- **Record All** — make a delayed recording for all sectors that currently have patient data.
- **Print All** — print a strip for all patients in the unit.
- **Save Strips —** create saved strips for all patients in the unit.

If you select this icon, a message asks you to confirm that you want to proceed with the action. Select **Yes** to confirm. Your system may be set up to just record, record and save a strip, or to just save a delayed strip.

Resuscitation Status Icons:

 Do Not Resuscitate. Resuscitation icon. Indicates the patient's current resuscitation status.

 Modified. The icon is solid white when the patient's resuscitation status is set to **DNR** (Do Not Resuscitate). The icon is a white outline when the patient's status is set to **Modified**. The icon does not display if the patient's resuscitation status is set to **Full**. Select the icon to access the **Manage Patient** application where you can change the resuscitation status.

<u>Prior Data:</u>

Patient data can be stored up to 7 days for each patient of Retrospective Review at Central Station. Data stored upon discharge, or from another unit with a transfer, will be shown separately from current data.

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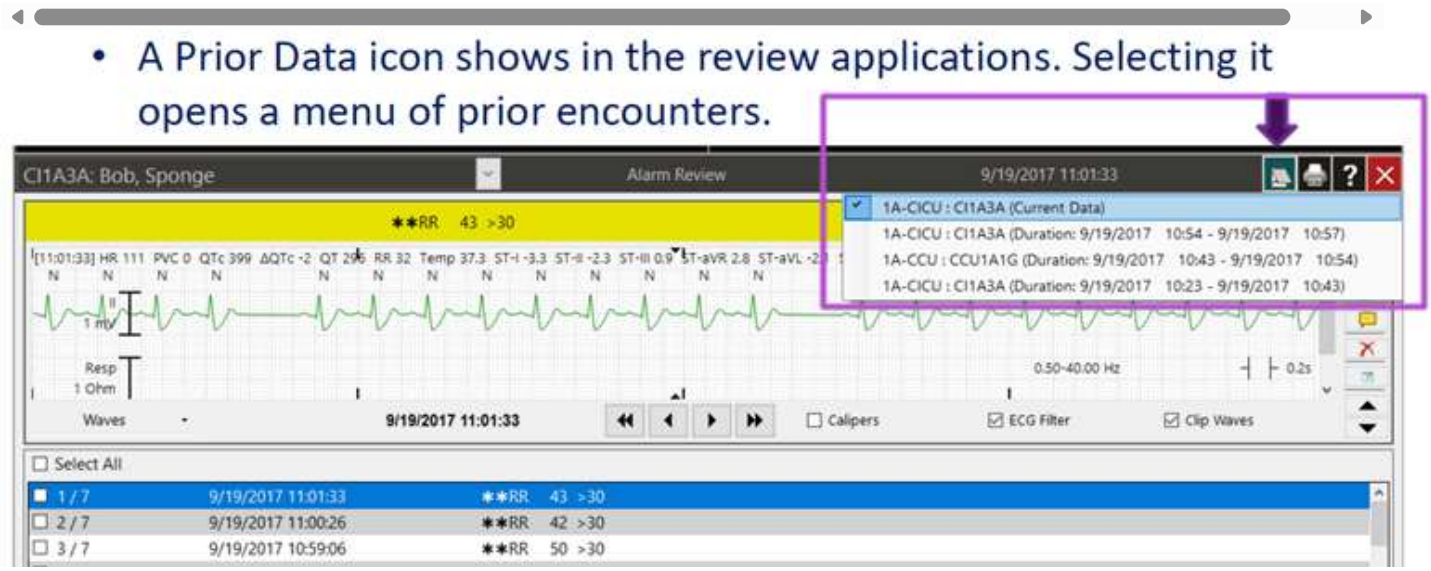


Once you are into this window –

- The Information Bar at the top turns teal green (states 'Prior Data')
- The only smart key on the bottom task bar will be 'Review'
- Main Screen button becomes 'Current Unit'
- To close the application, use the red X in the upper right or choose the Current Unit button

« SCROLL »

References:

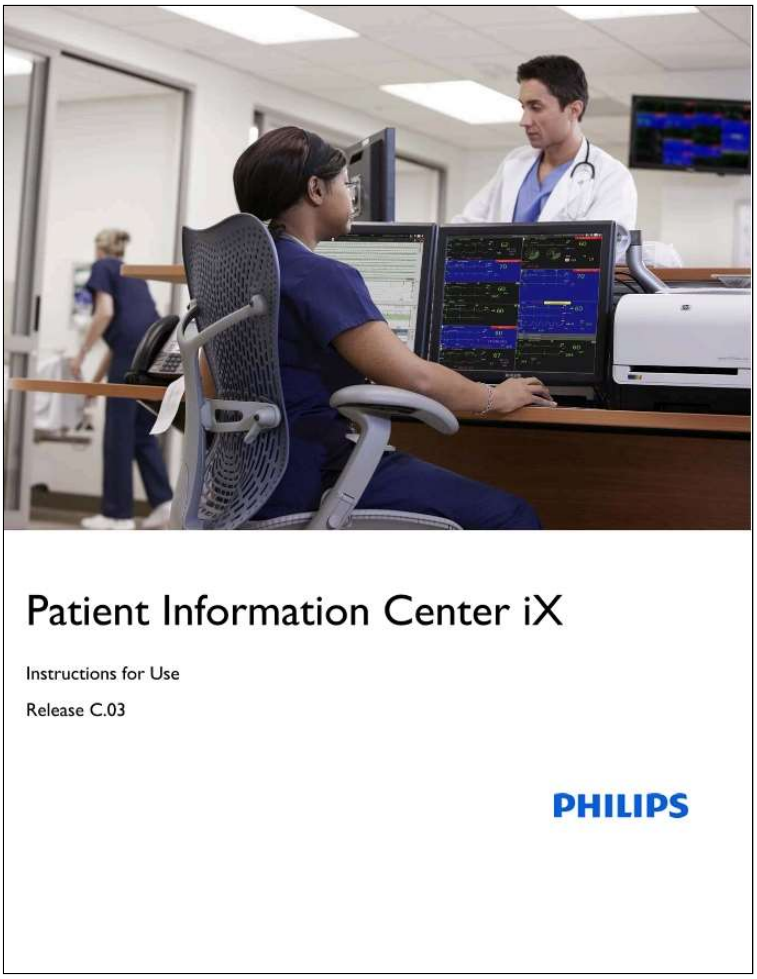
- MX Series QR Codes
- Central Monitoring Station PICiX
  - IFU_-_PIC_iX_Rel_C.03_-_English.pdf- Central station user manual
  - PIICiX Rev C.03 Patient Data Review
- MX40 Telemetry box
  - the MX40 IFU manual link
  - the MX40 quick card reference
- MX400 Large Mounted Monitor
  - IFU MX400-800_IVPM_N0x)Mar2019.pdf User manual
- Invasive pressure Guide
  - Invasive Pressure PDF
- Capnography
  - Capnography Application Guide

Notes

MX Series QR Codes

View image in PDF format.

Philips Monitoring System Manual



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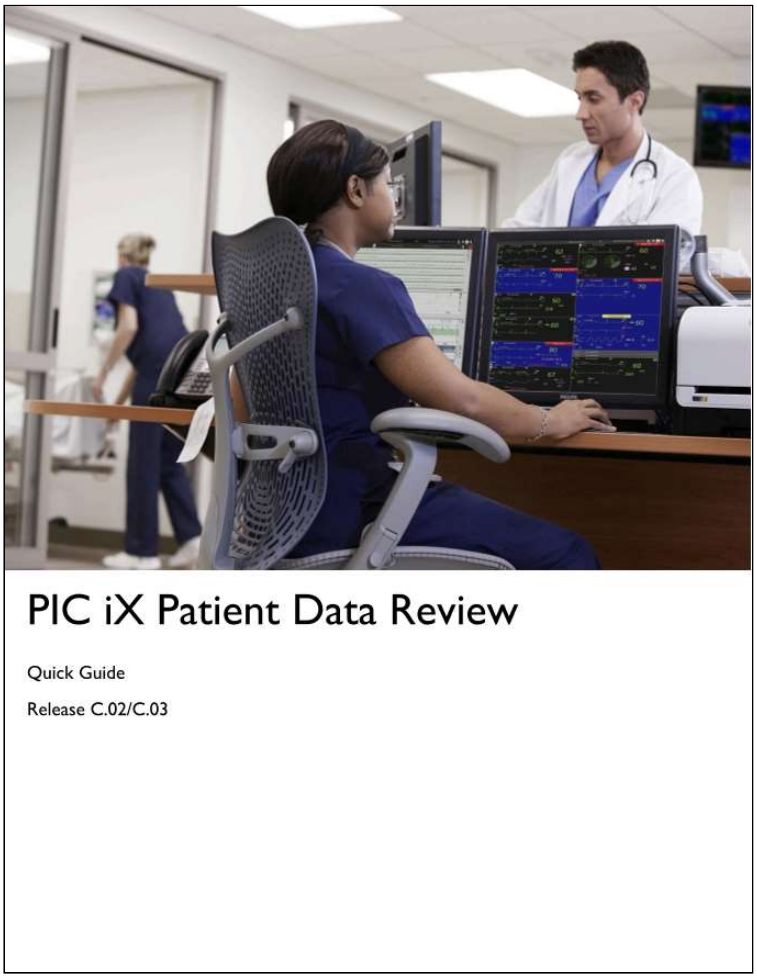

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Car Seat Quick Guide

Car Seat Assessment Record (CAR)
Quick Guide

1. Place baby in car seat.
2. Change Screen to **CAR SEAT TEST.**

3. Touch SmartKey – **START CAR.**
4. Select amount of time for Test Duration *(based on hospital protocol)*.

5. Touch **CONFIRM** key.

CAR is now in progress
Monitoring is continued during CAR.

6. If at any time during CAR you need to exit or stop – press the SmartKey **STOP CAR** and **CONFIRM**.

   At any time you can also switch back to your default monitoring screen by touching **Change Screen**, then touch the back arrow at the top of that menu. *CAR will continue to run in the back ground.*

7. When CAR is complete, the countdown timer (to the far right in the CAR Screen) will turn **RED**.

View image in PDF format.

MUNSON HEALTHCARE

Overview of Procedural Sedation

Amy Krug, BSN, RN, CGRN
Lisa Lord, MSN, RN, CNOR
Jeannette Reynolds, MSN, BBA, RN, CPAN

October 2023

Goal and Objective

Goal

This course will ensure standardized practice for delivering sedation/analgesia during diagnostic and therapeutic procedures performed outside of the operating room, according to MHC policy. The ultimate outcome is to provide for the safety of our patients during sedation.

Objective

After completing this course, the participant will be able to identify the four levels of sedation.

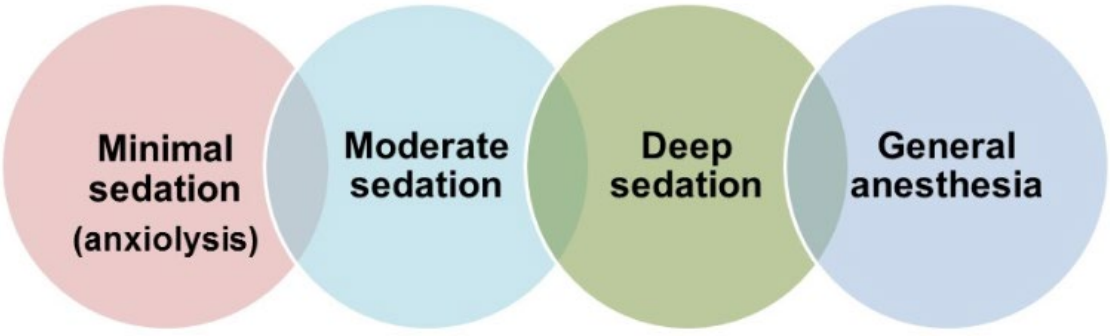
Exclusion List: Non-Procedural Sedation

The sedation policy and this education module **do not apply** when analgesics or sedative agents are given for the following:

- Pain management (analgesics given by **any** route).
- Minimal sedation (anxiolysis).
- Sedation during emergent medical care in an unstable patient.
- Sedation during ongoing ventilation therapy.
- Sedation for end of life/palliative care.
- Treatment of medical conditions such as delirium, alcohol withdrawal, traumatic brain injury, etc.

Four Levels of Sedation

In order to provide safe and effective care for patients receiving sedation, it is imperative that health care providers understand the four levels of sedation:



Minimal Sedation

This is a continuum. To understand, we will begin with minimal sedation, also known as anxiolysis.

Description	*Minimal Sedation*	*Moderate Sedation/Analgesia*	*Deep Sedation/Analgesia*	*General Anesthesia*
Responsiveness	Normal response to verbal stimulation	Purposeful response to verbal or tactile stimulation	Purposeful response following repeated or painful stimulation	Unarousable even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	Maybe inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

Minimal Sedation (Anxiolysis)

Key Points – Minimal Sedation

- Anxiolysis is medication therapy given to reduce anxiety and to help patients relax, e.g., diazepam (Valium) PO or midazolam (Versed) IVP prior to a procedure.
- The patient continues to respond normally to verbal commands.
- This level of sedation has no effect on airway, breathing, or the cardiovascular system.
- Cognitive function and physical coordination may be impaired.

Moderate Sedation/Analgesia

Description	Minimal Sedation	Moderate Sedation/Analgesia	Deep Sedation/Analgesia	General Anesthesia
Responsiveness	Normal response to verbal stimulation	Purposeful response to verbal or tactile stimulation	Purposeful response following repeated or painful stimulation	No response even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	Maybe inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

Moderate Sedation

During moderate sedation, the patient experiences a depressed level of consciousness during which they retain their ability to maintain a continuously patent airway. The patient will respond appropriately to physical stimulation and verbal commands, yet maintain partial amnesia.

The patient receives relief from anxiety and pain, allowing them to tolerate unpleasant procedures.

Moderate sedation/analgesia also expedites the course of procedures that are uncomfortable and require the patient to not move:

- Central line placements
- Scope procedures (endoscopy, bronchoscopy)
- Chest tube placement
- Painful wound debridements

Moderate Sedation *(cont.)*

Key Points – Moderate Sedation

- The patient is able to respond to verbal commands.
- No interventions are needed to protect the airway or maintain heart rate and blood pressure, but close monitoring is essential.
- Cardiac monitoring is required for a patient with cardiovascular disease or dysrhythmia.
- Consents need to be signed before sedation is administered.

Clinical Characteristics of Moderate Sedation

Clinical characteristics of moderate sedation include:

- Maintenance of protective reflexes, i.e., gag reflex, ability to swallow, and ability to breathe without assistance.
- Independent and continuous maintenance of a patent airway.
- Purposeful response to physical stimulation and/or verbal commands.
- Easily aroused, with the provider talking in a normal tone of voice.
- Minimally depressed level of consciousness.
- Slightly slurred speech.

Example:

In a normal tone of voice, the nurse asks the patient to take a deep breath and open their eyes. The patient should be able to follow this type of command at this level of sedation.

Clinical Characteristics of Moderate Sedation *(cont.)*

Key Points – Moderate Sedation

- Important: A reflex withdrawal from a painful stimulus is not considered a purposeful response and is a sign the patient is progressing to general anesthesia.
- All practitioners involved with moderate sedation must be prepared to "rescue" the patient from a deeper level of sedation than was intended.

Knowledge Check

During a procedure requiring moderate sedation, who is required to know how to rescue a patient from a deeper level of sedation than intended?
(Choose all that apply.)

- [x] The registered cardiovascular invasive specialists (RCIS) assisting with the procedure
- [x] The registered nurse (RN) assisting with the procedure
- [x] The provider performing the procedure

Deep Sedation/Analgesia

Description	Minimal Sedation	Moderate Sedation/Analgesia	Deep Sedation/Analgesia	General Anesthesia
Responsiveness	Normal response to verbal stimulation	Purposeful response to verbal or tactile stimulation	Purposeful response following repeated or painful stimulation	Unarousable even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	Maybe inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

Deep Sedation

Deep sedation is used for procedures such as cardioversions, closed reductions of joint dislocations, or fractures. Patients who are deeply sedated cannot be easily aroused, but they do respond purposefully to repeated or painful stimulation, such as a vigorous sternal rub.

Deep Sedation *(cont.)*

Key Point: A reflex withdrawal from a painful stimulus is **not** considered a purposeful response and is a sign the patient is progressing to general anesthesia.

The patient's respiratory status may be affected and spontaneous respirations may be inadequate.

- Assistance may be needed to maintain a patent airway.
- Ventilation assistance may be required.

Progression from Moderate to Deep Sedation

Clinical indications: Progression from moderate to deep sedation/anesthesia:

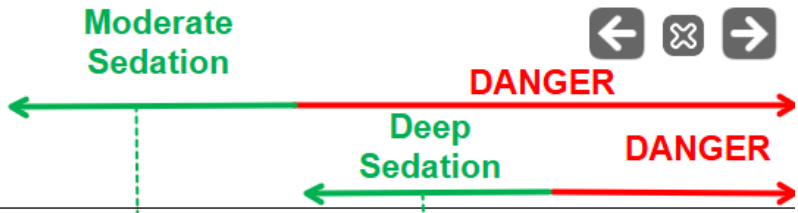
- Not easily aroused
- Partial or complete loss of protective reflexes
- Difficulty maintaining a patent airway independently
- Unable to respond to physical stimulation or verbal commands
- Severely slurred speech

Key Point:
ALL practitioners involved with deep sedation MUST be prepared to "rescue" the patient from deep sedation or general anesthesia.

Progression from Moderate to Deep Sedation *(cont.)*

Clinical indications: Identifying a patient is in deep sedation:

- Similar to general anesthesia, the patient may be unable to maintain a patent airway.
- Loss of protective reflexes (unable to swallow, no cough, no gag reflex).
- The patient purposefully responds to repeated painful stimulation, such as a vigorous sternal rub.



	Minimal Sedation Anxiolysis	*Moderate Sedation/ Analgesia ("Conscious Sedation")*	*Deep Sedation/ Analgesia*	*General Anesthesia*
Responsiveness	Normal response to verbal stimulation	Purposeful** response to verbal or tactile stimulation	Purposeful** response following repeated or painful stimulation	Unarousable even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

Knowledge Check

Characteristics of anxiolysis include: (Choose all that apply.)

- [ ] Reflex withdrawal from a painful physical stimulus
- [x] Ability to respond normally to verbal commands
- [ ] Diminished respiratory rate or blood pressure
- [x] Ability to maintain a patent airway
- [x] Administering midazolam (Versed) to a stressed patient prior to a procedure

Knowledge Check *(cont.)*

Drag the type of sedation to the light blue box beside its description.

Type of Sedation	Description
Deep Sedation	The patient is unresponsive to verbal commands, but does purposefully resond to a sternal rub. Assistance may be needed to maintain a patent airway and adequate ventilation.
Minimal Sedation (Anxiolysis)	The patient continues to respond normally to verbal commands. This level of sedation has no effect on airway, breathing, or the cardiovascular system.
Moderate Sedation	The patient is able to open their eyes and raise their hand when asked.

References

American Society of Anesthesiologists. *Position on monitored anesthesia care*. Last amended on October 23, 2019.

Munson Healthcare Policies and Procedures. (2022, December 16). *Sedation*. PolicyStat.

MUNSON HEALTHCARE

Procedural Sedation: Roles and Responsibilities

Amy Krug, BSN, RN, CGRN
Lisa Lord, MSN, RN, CNOR
Jeannette Reynolds, MSN, BBA, RN, CPAN

October 2023

Goal and Objectives

Goal

This course will ensure standardized practice for delivering sedation/analgesia during diagnostic and therapeutic procedures performed outside of the operating room, according to MHC policy. The ultimate outcome is to provide for the safety of our patients during sedation.

Objectives

1. Identify who is qualified to order, administer, and monitor patients receiving moderate and deep sedation.
2. Describe the expected nursing care during procedural sedation.

Responsibilities

At MHC, Registered Nurses (RNs) and Registered Cardiovascular Invasive Specialists (RCIS) who will be monitoring sedated patients during procedures and administering moderate sedation are responsible for the following:

- Knowing the Sedation policy.
- Maintaining competence in sedation medication administration.
- Identifying when a patient has progressed to a deeper level of sedation than intended and intervening as needed.

NOTE: RNs and RCIS do not administer deep sedation for procedures.

Education Requirements

The education requirements for RNs and RCISs include:

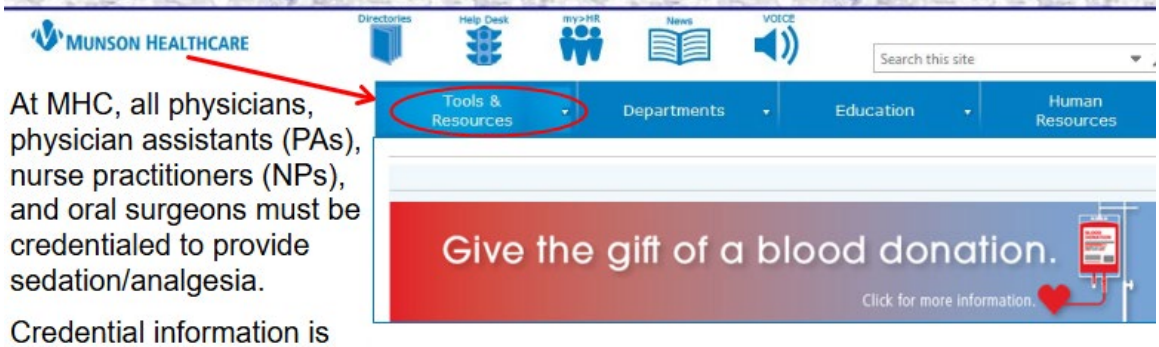
Upon hire:

- Current BLS certification.
- Completion of the online HealthStream assignment.
- Completion of the airway station during RN orientation.
- Completion of the cardiac rhythm competency, the Basic ECG interpretation exam, or current ACLS certification.

Periodically thereafter:

Completion of periodic sedation education and demonstration of competence.

Provider Credential Check

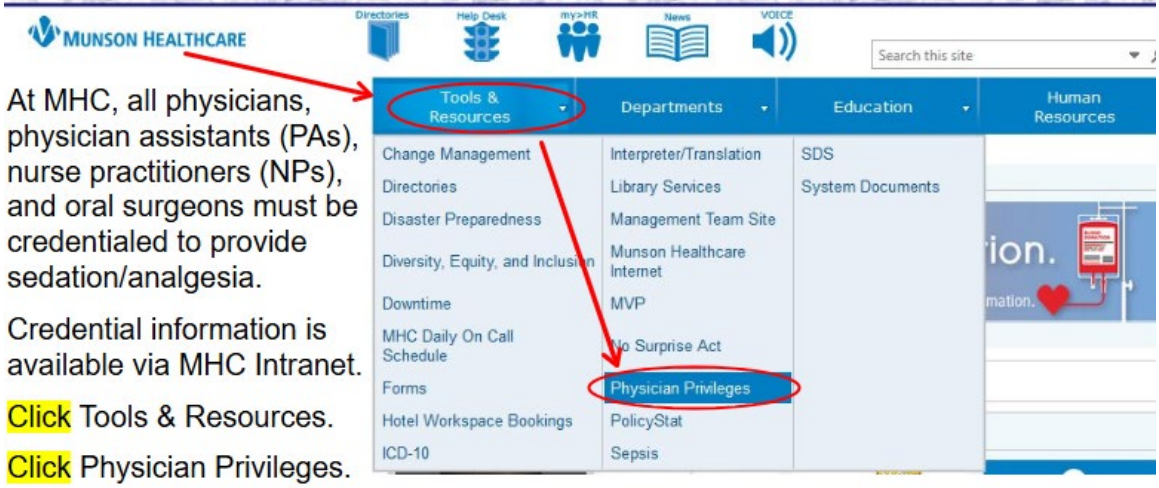


At MHC, all physicians, physician assistants (PAs), nurse practitioners (NPs), and oral surgeons must be credentialed to provide sedation/analgesia.

Credential information is available via MHC Intranet.

Click Tools & Resources.

Provider Credential Check



At MHC, all physicians, physician assistants (PAs), nurse practitioners (NPs), and oral surgeons must be credentialed to provide sedation/analgesia.

Credential information is available via MHC Intranet.

Click Tools & Resources.

Click Physician Privileges.

Provider Credential Check

At MHC, all physicians, physician assistants (PAs), nurse practitioners (NPs), and oral surgeons must be credentialed to provide sedation/analgesia.

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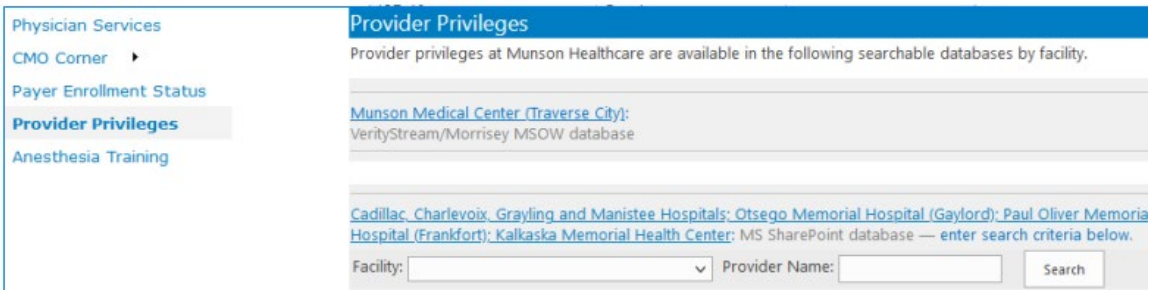


Knowledge Check

Who can administer moderate and deep sedation for procedural sedation (assuming they have the proper credentials and have completed the education)? (Choose all that apply.)

- [x] Oral Surgeon
- [ ] ICU RN who is ACLS-certified
- [x] Physician
- [x] Physician Assistant
- [x] Nurse Practitioner

Pre-procedure Responsibilities: Provider Assessment

The proceduralist/provider is required to complete a comprehensive assessment of the patient prior to performing the procedure. This includes:

- A determination of the patient's American Society of Anesthesiologists Classification (ASA Class).
  - This is used as a guideline for **NPO status**.
- An airway assessment.

Key Points:

- Anesthesiology can be consulted on any case, but consultation is **advisable** for patients with an ASA Class of IV or V.
  (See next page for description.)
- The pre-procedure assessment must be documented by the anesthesia provider.

Pre-procedure Responsibilities: ASA Classification

American Society of Anesthesiologists Classification ("ASA Class") [6]	
ASA I	A normal healthy patient
ASA II	A patient with mild systemic disease
ASA III	A patient with severe systemic disease that limits activity but is not incapacitating
ASA IV	A patient with severe systemic disease that is a constant threat to life
ASA V	A moribund patient who is not expected to survive without the operation or procedure
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes

= Anesthesia consultation advised.

Pre-procedure Responsibilities: RN/RCIS Role

The RN or RCIS assisting with a procedure requiring sedation must ensure the following documentation is complete:

- Patient/family education
- Patient monitoring during procedure
- Time-based documentation during procedure

Prior to the procedure, the RN/RCIS must ensure all necessary supplies and equipment are available.

Pre-procedure Responsibilities: Patient Preparation

Procedural sedation preparation is the same as any other procedure or surgery.

- Ensure all orders and diagnostic tests are complete, e.g., lab tests, x-rays, skin preps, etc.
- Verify the patient's NPO status. Follow orders based on ASA class.
- Educate the patient and family regarding the procedure scheduled and expectations of sedation; CONSENT SIGNED prior to any administration of sedation.

Pre-procedure Responsibilities: Patient Preparation *(cont.)*

Validate all required components are complete:

1. Valid H&P is less than 30-days old with reassessment of the patient documented within 24-hours of admission prior to the procedure.
2. Validation of the correct surgical/invasive procedure
3. Evaluation immediately prior to the procedure
4. Medications
5. Allergies and previous drug reactions
6. Patient's age
7. Patient's weight
8. Pre-procedure laboratory and other diagnostic testing
9. Consent

Pre-procedure Responsibilities: Patient Preparation *(cont.)*

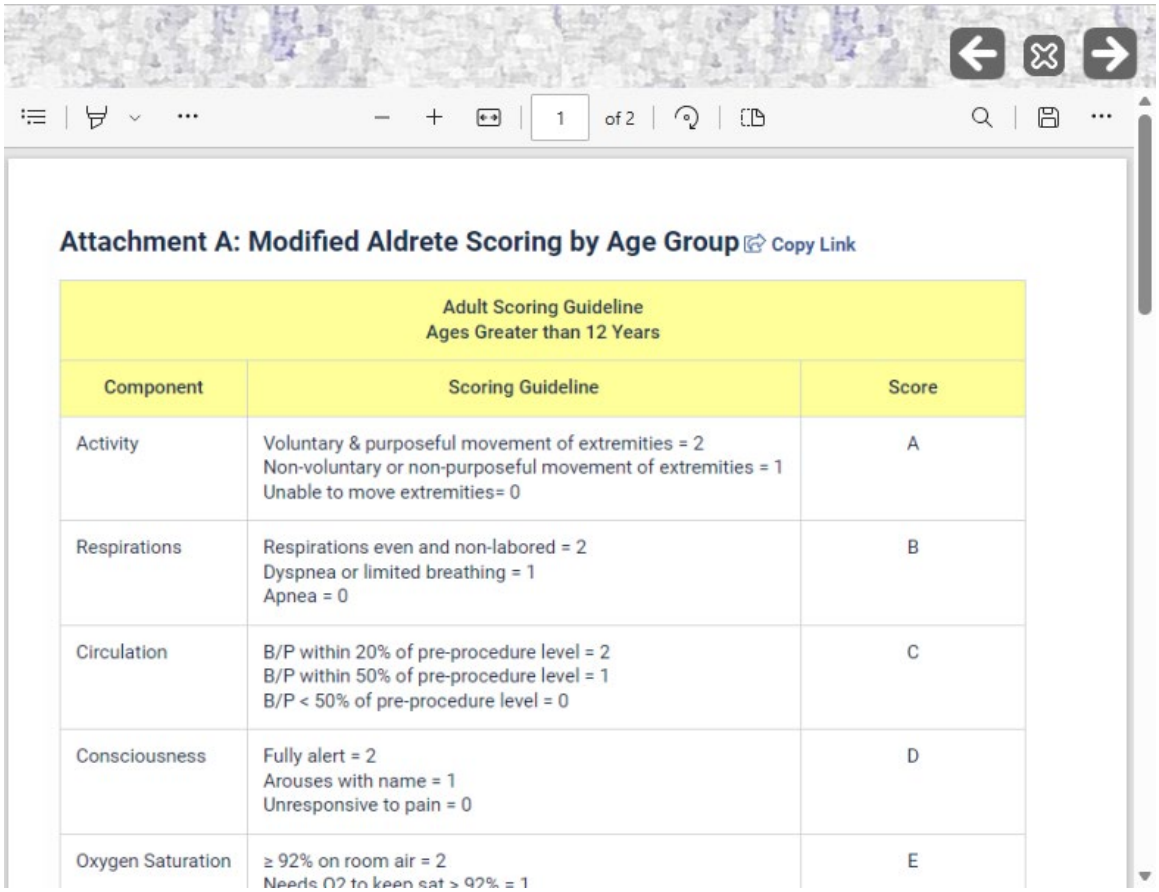
- Ensure a comprehensive assessment of the patient is completed.
- Perform a baseline pain assessment.
- Verify patent IV access.
- Pre-oxygenate the patient via nasal cannula at a flow rate of 2 L/m (unless medically contraindicated).
- Verify emergency equipment is available and in working condition.
- Identify the patient, using two identifiers. Validate the correct patient, procedure, and site.
- Perform a time-out prior to beginning the procedure.

Pre-procedure Responsibilities: The Modified Aldrete Score (or validated tool)

Modified Aldrete Scoring is a measurement tool rating post-procedure recovery of consciousness, activity, respirations, and blood pressure.

- A pre-procedural Aldrete score is necessary to establish an accurate baseline of the patient's status.
- Pre-existing conditions should be considered when evaluating the patient's score.
- A post-procedural score should equal the pre-procedural baseline score prior to discharge from the recovery area.

PRINT the Modified Aldrete Scoring document for use with answers on the quiz.



Attachment A: Modified Aldrete Scoring by Age Group Copy Link

Adult Scoring Guideline Ages Greater than 12 Years		
Component	**Scoring Guideline**	**Score**
Activity	Voluntary & purposeful movement of extremities = 2 Non-voluntary or non-purposeful movement of extremities = 1 Unable to move extremities= 0	A
Respirations	Respirations even and non-labored = 2 Dyspnea or limited breathing = 1 Apnea = 0	B
Circulation	B/P within 20% of pre-procedure level = 2 B/P within 50% of pre-procedure level = 1 B/P < 50% of pre-procedure level = 0	C
Consciousness	Fully alert = 2 Arouses with name = 1 Unresponsive to pain = 0	D
Oxygen Saturation	≥ 92% on room air = 2 Needs O2 to keep sat ≥ 92% = 1	E

Knowledge Check

The Modified Aldrete Scoring Guideline used to compare the patient's pre- and post-sedation status includes: (Choose all that apply.)

- [x] Activity
- [x] Respirations
- [ ] Pulse
- [ ] Cardiac rhythm
- [x] Blood pressure

Pre-procedure Responsibilities: Baseline Assessment

Immediately prior to medication administration, assess the following baseline parameters:

- Blood pressure
- Heart rate
- Respiratory rate
- Oxygen saturation
  - Maintain adult $SpO_2 \geq 92\%$ and pediatric $SpO_2 \geq 95\%$.
- End-tidal CO_2 level
  - Maintain CO_2 at 35 – 45 mmHg.
  - The CO_2 level will increase if the patient's ventilatory status is compromised.
- Level of consciousness
- Cardiac rhythm
  - Continuous ECG monitoring is required for **all** patients with a cardiac history or expected dysrhythmias, and for **all** deep sedation cases.
- Modified Aldrete score

Knowledge Check

Pre-oxygenation at 2 L/m via nasal cannula is required for all procedural sedation cases, unless medically contraindicated.

- (●) True
- ( ) False

Pre-procedure Responsibilities: Time-Out

Key Point: A "time-out" is **mandatory** prior to the start of the procedure.

During the time-out, the entire procedural team must pause, including the patient when possible, and verify the:

- Correct patient, using two patient identifiers
- Correct procedure
- Correct site (if applicable), including laterality

There must be **100% agreement** of the team **prior to starting** the procedure.

The time-out **must be documented** in the patient's medical record.

Intra-procedure Responsibilities: Monitoring

At a minimum, the following parameters should be monitored and documented **after every medication administration** and **every 5-10 minutes** during the procedure, following each additional dose of medication and more frequently as the patient's clinical needs dictate.

- Blood pressure
- Heart rate
- Respiratory rate
- Oxygen saturation
  - Maintain adult $SpO_2 \geq 92\%$
  - Maintain pediatric $SpO_2 \geq 95\%$.
- Identification and management of adverse events
- Level of consciousness
- Medication: dose, route, time
- Modified Aldrete score
- Pain level
- $EtCO_2$ level

Intra- & Post-procedure Assessment Considerations

Monitor the following to determine the patient's tolerance to the procedure:

- Significant variances in blood pressure, heart rate, respiratory rate and effort, SpO_2, and end-tidal CO_2.
- The patient's response **or** lack of response to verbal and physical stimuli.
- Facial grimacing and physical posturing, tensing, or flaccidity.

When observing the above, ask yourself:

- "Is the patient sedated enough?"
- "Is the patient experiencing pain?"
- "Is the patient over-sedated or at risk of being over-sedated?"

Post-procedure Monitoring

Post-procedure, the following page lists parameters which should be monitored continuously and documented **every 15 minutes**, depending on the patient's condition and the procedure performed.

Documentation will continue through the post-procedure period until the patient reaches 8 or greater on the Modified Aldrete score.

Post-procedure Responsibilities: Monitoring

At a minimum, the following parameters should be monitored and documented **after every medication administration** and **every 5-10 minutes** during the procedure, following each additional dose of medication and more frequently as the patient's clinical needs dictate.

- Blood pressure
- Heart rate
- Respiratory rate
- Oxygen saturation
  - Maintain adult $SpO_2 \geq 92\%$
  - Maintain pediatric $SpO_2 \geq 95\%$.
- Identification and management of adverse events
- Level of consciousness
- Medication: dose, route, time
- Modified Aldrete score
- Pain level
- $EtCO_2$ level

Post-procedure Responsibilities: Monitoring *(cont.)*

- Blood pressure
- Heart rate
- Respiratory rate
- Oxygen saturation
  - Maintain adult $SpO_2 \geq 92\%$
  - Maintain pediatric $SpO_2 \geq 95\%$.
- Identification and management of adverse events.
- Level of consciousness
- Medication: dose, route, time
- Modified Aldrete score
- Pain level
- Nausea
- End-tidal CO_2 level
  - Maintain CO_2 at 35 – 45 mmHg.
  - The CO_2 level will increase if the patient's ventilatory status is compromised.
- Cardiac rhythm
  - Continuous ECG monitoring is required for **all** patients with a cardiac history or expected dysrhythmias and for **all** deep sedation cases.

Post-procedure Assessment Considerations

- Patients may continue to be at significant risk for persistent/residual sedation effects or for developing complications after the procedure is completed.
- The reassessment and documentation of vital signs will revert to unit-specific standards of practice once the post-procedure monitoring criteria have been met.
- The patient's pain level may become more acute as the level of sedation decreases and will need to be treated accordingly.

Post-procedure and Over-Sedation

Over-sedated patients will require an extended recovery period.

Key Points:

- Monitor Patient - If the patient received a reversal agent due to over-sedation, they must be monitored for a minimum of two hours after the last dose of the reversal agent.
- Submit a VOICE File:
  - When a reversal agent is used to rescue a patient.
  - If there are any complications or adverse outcomes.

Discharge from Procedural Units

Patients are either discharged to their inpatient unit or discharged to home from the procedural unit.

Patients may be discharged when **at least** 30 minutes have elapsed since the last dose of sedation/analgesia was given.

Key Points:

If a reversal agent was administered, the patient must be monitored for at least 2 hours after the last dose of reversal agent was given.

Monitoring can continue on an inpatient unit.

Discharge Criteria

Prior to discharge, the following criteria must be met:

- Vital signs must be stable.
- Modified Aldrete score must be ≥ 8.
- None, or mild nausea with no active emesis.
- Patient is arousable with protective reflexes intact.
- Pain-free, mild discomfort, or controlled with analgesics.
- Mobility must be back to pre-procedure baseline.

Interpreting the Modified Aldrete Score

A patient requires either **a score ≥ 8** or **a proceduralist/provider's order** to be transferred or discharged from the procedural unit. Other department/ procedural-specific discharge criteria may also need to be applied.

Key Point:

A score < 8 indicates the patient should be closely monitored with interventions applied as indicated.

Discharging Inpatients vs. Outpatients

Inpatients:

- A full hand-off report must be given to the next provider of care.

Outpatients:

- Written discharge instructions must be reviewed with the patient and responsible party.
- Discharge instructions include the hospital- and department-specific instructions and the 24-hour minimum restrictions mandated for patients who have received pain or sedative agents, including an emergency phone number.

Key Point:

A responsible individual **must** be available to transport the patient home.

Knowledge Check

You are caring for a patient immediately post-bronchoscopy. She is very groggy, but arouses when you call her name. She can move her extremities when asked, but she keeps falling back to sleep. Her respirations are non-labored, but her respiratory rate is 9-10. Her blood pressure is 108/68 (baseline was 124/78). She needs O_2 at 2 L/m via nasal cannula to keep her oxygen saturation at 93%.

What is her Modified Aldrete Score?

- ○ 4
- ○ 5
- ○ 6
- ◉ 7
- ○ 8

Knowledge Check *(cont.)*

Continuing with the same patient in the previous question, what does her score need to be for her to be discharged from the procedural area?

- ○ Greater than or equal to 4
- ○ Greater than or equal to 6
- ◉ Greater than or equal to 8
- ○ Greater than or equal to 10

Reference

Munson Healthcare Policies and Procedures. (2022, December 16). *Sedation*. PolicyStat.

Symptom Management for Procedural Sedation

Amy Krug, BSN, RN, CGRN
Lisa Lord, MSN, RN, CNOR
Jeannette Reynolds, MSN, BBA, RN, CPAN

October 2023

Goal and Objectives

Goal

This course will increase the participant's knowledge of managing potential symptoms associated with patients receiving procedural sedation.

Objectives

1. Identify when a patient has progressed to a deeper level of sedation.
2. Identify nursing interventions appropriate to the patient's rescue needs.

Common Side Effects of Sedation

The most common side effects of sedation administration are:

- Respiratory depression
- Hypotension
- Nausea and vomiting
- Paradoxical response

The most common adverse effect of opioids, especially when combined with sedatives, is respiratory depression.

If left untreated, respiratory depression can progress to apnea, followed by cardiac arrest.

$EtCO_2$ and pulse oximetry may show early signs of respiratory distress.

Treatment of Respiratory Depression

- **Stop all administration of opioids and sedatives!**
  - The duration of these medications depends on the drug, dose, route of administration, and the patient's condition.
- Maintain an open airway:
  1. Reposition the head/neck using the chin-lift or jaw-thrust.
  2. Provide oxygen therapy. Be prepared to use an ambu bag if necessary.
  3. Insert a nasal or oropharyngeal airway as necessary.
- If airway management is not effective, administer the appropriate reversal agent:
  - Flumazenil (Romazicon) for benzodiazepines.
  - Naloxone (Narcan) for opioids.
- Call MRT as appropriate.

If the patient does not respond to airway management maneuvers and the reversal agent, call a Code Blue (5-5555)!

Knowledge Check

The most common side effect of sedation administration is:

- (●) Respiratory Depression
- ( ) Paradoxical Response
- ( ) Nausea and Vomiting
- ( ) Hypotension

Knowledge Check *(cont.)*

If respiratory depression occurs while I am assisting with a procedure that requires sedation, I should do all of the following: (Choose all that apply.)

- [ ] Reposition the head/neck by tucking the chin to the chest.
- [x] Provide oxygen therapy, assisting with ventilation, if necessary.
- [x] Insert an oropharyngeal airway, if needed.
- [x] Administer the appropriate reversal agent.

Hypotension

Hypotension is most likely caused by vasodilation, blood loss during the procedure, or a pre-existing condition, but could also be caused by sedation. The cause of the hypotension determines the treatment.

Possible treatments:

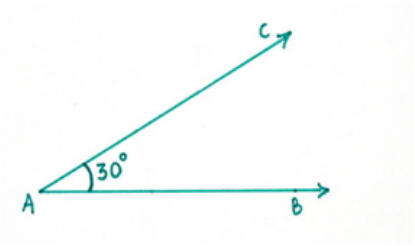
- IV fluid replacement
- Vasopressors
- Blood transfusion
- If you suspect the cause is over-sedation, administer reversal agents per protocol:
  - Flumazenil (Romazicon) for benzodiazepines.
  - Naloxone (Narcan) for opioids.

Nausea and Vomiting

Aspiration is a major concern with the patient receiving sedation.

Treatment for nausea and vomiting:

- Position the patient to prevent aspiration. The preferred position is Semi-Fowlers with the head of the bed at 30 degrees and the patient on his/her side.
- Suction as necessary to maintain a patent airway.
- Administer an antiemetic.
- Patient to remain NPO until awake and alert.



Paradoxical Responses

The desired effect of moderate sedation or analgesia is a relaxed and cooperative patient. The patient is sedated but can be aroused and is able to follow simple commands.

If a patient has a sensitivity to a specific drug, a paradoxical response can occur. Consider a paradoxical response if the patient becomes any of these:

- Agitated
- Uncooperative
- Combative
- Disoriented

Paradoxical Responses *(cont.)*

A thorough patient assessment is imperative to determine the actual cause of the patient's symptoms.

Paradoxical responses are seen more often in patients with a history of alcohol or IV drug abuse (most frequent).

Other causes to consider include:

- Hypoventilation due to hypoxia.
- Inadequate dosing of pain medication during a painful procedure.

Over-sedation

Symptoms:

- Decreased respiratory function (hypoventilation, decreased respiratory rate, or apnea)
- Decreased cardiovascular function (hypotension or dysrhythmias)
- Confusion
- Decreased level of consciousness that can progress to coma
- Depressed/absent cough and gag reflex
- Decreased response to physical/verbal stimuli

Treatment of Over Sedation

Treatment:

- Ensure an open airway.
- Encourage or stimulate the patient to breathe.
- Administer supplemental oxygen to increase or maintain oxygen saturation greater than or equal to 92%.
- Ventilate with ambu bag if spontaneous ventilation is inadequate.
- Administer reversal agents per protocol:
  - flumazenil (Romazicon) for benzodiazepines.
  - naloxone (Narcan) for opioids or narcotics.
- If hypotensive, infuse IV fluids or consider vasopressors.
- Reposition patient to semi-fowlers.
- Consider MRT or RT evaluation, if approriate.
- If patient uses home CPAP/BiPAP, also use it post-procedure.

If the patient does not respond to airway management maneuvers and the reversal agent, call a Code Blue (5-5555)!

Knowledge Check

Symptoms of over-sedation include: (Choose all that apply.)

- [x] Decreased response to stimuli
- [x] Decreased respiratory rate
- [ ] Agitation
- [x] Hypotension

Knowledge Check *(cont.)*

If a patient is in respiratory arrest and does not respond to airway management and reversal agents, I should:

- (●) Call a Code Blue.
- ( ) Call and MRT.
- ( ) Call the provider.

Reporting Requirements

Whenever it is necessary to administer a reversal agent, a VOICE file must be completed. Access the form from the MHC Intranet.

Other complications related to sedation to be reported include:

- Incidents in which the patient slips into a level of sedation that is greater than intended, e.g., moderate to deep sedation.
- Profound hypotension (50% decrease from pre-procedure mean blood pressure)
- Cardiac arrest
- Defibrillation
- Respiratory arrest
- Seizures
- Aspiration
- Medication errors
- Vomiting

Knowledge Check

I must fill out a VOICE file for the following situations: (Choose all that apply.)

- [x] If a patient slips into a deeper level of sedation than intended.
- [x] Profound hypotension
- [x] Medication errors
- [x] If a reversal agent is required to control an adverse reaction, such as respiratory depression.

References

Munson Healthcare Policies and Procedures. (2022, December 16). *Sedation.* PolicyStat.

Munson Healthcare Policies and Procedures. (2021, April 20). *Flumazenil Protocol*. PolicyStat.

Munson Healthcare Policies and Procedures. (2022, February 21). *Standing Order/Protocol for Adult Naloxone (Narcan)*. PolicyStat

Procedural Sedation Medication Guidelines

Lauren Wolf, PharmD, BCPS, BCCCP

December 2025

Goal and Objectives

Goal

This course will increase the participant's knowledge of administering medications for procedural sedation.

Objectives

1. Identify staff who can administer sedation.
2. Select the appropriate medication and dose for reversing over sedation.

Introduction

Dosage guidelines for procedural sedation and reversal agents are approved by the Pharmacy and Therapeutics (P & T) Committee at Munson Medical Center.

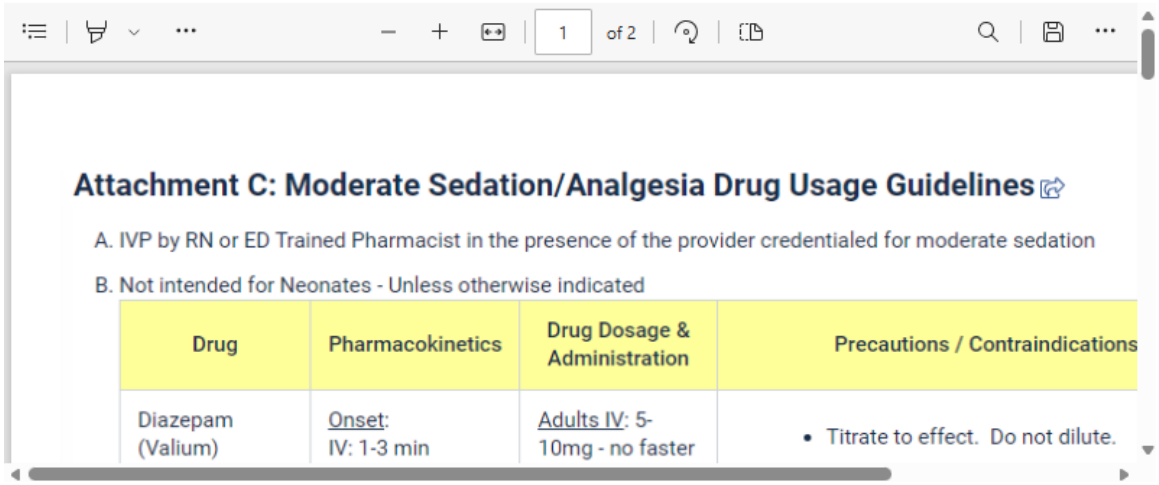
These guidelines are intended for initial doses and may be exceeded or decreased according to the patient's history, previous response to sedatives or other clinical circumstances.

Prior to administration, the P & T Committee must review and approve the use of all medications not listed in the approved guidelines.

Guidelines Location

Nurses and Registered Cardiovascular Invasive Specialists (RCIS) should be familiar with medication guidelines before administering sedation. The medication guidelines are attached to the Sedation policy.

Moderate & Deep Sedation/Analgesia Drug Usage Guidelines are listed below. **Print** the document to use as a reference for upcoming questions.



Facility-specific IV Push and Infusion Guidelines

Munson Healthcare has an IV Push/Infusion Chart to assist staff with decisions regarding the administration of medications. This chart can be found on the Intranet on the Pharmacy Department site.

The chart contains various topics, including:

- Medications administered by IV push or by infusion.
- Approved medications per department.
- Medications a nurse can give during a Code Blue.
- Medications requiring a physician be present during administration.

NOTE: See the IV Push Chart on the next slide.

MMC IV Push Chart

MUNSON HEALTHCARE

IV MEDICATION ADMINISTRATION GUIDELINES

Definitions	
Level 1	Units with general nursing and monitoring capabilities (ex. med-surg).
Level 2	Intermediate and telemetry units. RNs working on these units have more advanced training and advanced monitc telemetry) are present. Level 2 may be further divided into level 2a (telemetry units) or level 2b (step-down units)
Level 3	Critical and emergency care units (including operating rooms). Licensed clinicians working on these units are trai emergencies and manage critically ill patients. Advance monitoring and treatment resources are readily available.
OB	Birthing units and units dedicated to the care of antepartum and postpartum patients. OB units follow level 1 crite noted.
PEDS	Any unit caring for patients 18 years of age or less. Peds may be further subdivided as **level 1, level 2, and level** criteria above.

Exclusions

- Chemotherapy/antineoplastic agents
- Biologics and immune therapies typically restricted to outpatient administration (ex. Infliximab, vedolizumab)
- Basic IV hydration fluids (ex. 0.9% normal Normosol, lactated ringers)
- Non-intravenous parenterally administere

Who Can Administer Sedation?

Medications for **moderate** sedation may be given by a registered nurse (RN) or registered cardiovascular invasive specialist (RCIS) in the presence of the physician, physician assistant (PA), nurse practitioner (NP), or oral surgeon credentialed in moderate sedation and in advanced airway management.

Who Can Administer Sedation? *(cont.)*

Medications for **deep** sedation, can **ONLY** be administered by a provider credentialed in deep sedation.

- **Exception: Propofol** - a critical care RN may give propofol (Diprivan) IVP for an emergent intubation while a physician is present and performing the intubation.
  - Critical care is defined by the IV Push/Infusion Chart to include these units:
    - ✓ ICU
    - ✓ ED
    - ✓ PACU
    - ✓ OR
    - ✓ A2 (critical)
    - ✓ A3 (critical)
    - ✓ IR

Knowledge Check

A patient is scheduled for a wound debridement at the bedside. The physician orders hydromorphone (Dilaudid) 0.1-0.5mg IV titrated over 1 minute for moderate sedation.

This is an approved dose according to the MMC Moderate Sedation Guidelines.

- (●) True
- ( ) False

Knowledge Check *(cont.)*

A patient is scheduled for a synchronized cardioversion. The physician orders propofol (Diprivan) at 1mg/kg per minute over 60 seconds.

How long do the effects of propofol (Diprivan) last?

- ( ) 1-2 minutes
- (●) 3-10 minutes
- ( ) 12-20 minutes
- ( ) 25-30 minutes

Knowledge Check *(cont.)*

A registered nurse from the ICU can give propofol (Diprivan) IV push with a physician order, if the physician is present in the room, but is not intubating the patient.

- ○ True
- ◉ False

Reversal Agents

- Reversal agents may be indicated when:
  - ➢ The level of sedation is deeper than desired.
  - ➢ The patient's responsiveness or cardio-respiratory status is compromised.
  - ➢ An idiosyncratic reaction occurs.
- If a reversal agent is administered for the undesired effects, a **VOICE** file is required.
- A patient should be monitored for a minimum of two hours after giving a reversal agent.

Commonly Used Opioids

If a patient becomes difficult to arouse with verbal or physical stimuli related to sedation from an opioid, follow the Standing Order/Protocol for Adult Naloxone (Narcan) Protocol. The naloxone (Narcan) protocol can be located:

- Policy website on the Intranet
- Pharmacy website on the Intranet
- Side of the crash cart

Examples of commonly used opioids include:

Codeine	Morphine
Demerol (meperidine)	Norco (hydrocodone + acetaminophen)
Dilaudid (hydromorphone)	Oxycontin (oxycodone)
Dolophine (methadone)	Percocet (oxycodone + acetaminophen)
Duragesic (fentanyl patch)	Sublimaze (fentanyl injection)

naloxone (Narcan) Protocol

The naloxone protocol allows the registered nurse or RCIS to:

- Titrate oxygen to maintain an oxygen saturation of at least 92%.
- Perform further interventions, including the administration of naloxone depending on the patient's mental status and O_2 saturation.
- For patients with oxygen saturations ≥ to 80%, dilute the naloxone 0.4 mg in 9 ml of normal saline and administer in small, 1mL doses following the protocol. This allows for better titration of the dosing [so the patient doesn't over respond to the naloxone and end up in severe pain].
- Give naloxone 0.4 mg **undiluted** for an O_2 saturation below 80% or respiratory arrest.

NOTE: Click the button.

Review the naloxone (Narcan) Protocol

Show Changes

Tag Policy

Standing Order/Protocol for Adult Naloxone (Narcan)

Purpose

To provide a policy for Adult Naloxone (Narcan) standing orders/protocols.

Policy

A. The Protocol for Adult Naloxone (Narcan) shown below, is approved as a standing order and may be initiated by a Registered Nurse (RN) or Licensed Practical Nurse (LPN) without a provider order for any patient if:

1. Patient is difficult to arouse with verbal/physical stimuli **~AND~**
2. Patient is on, or recently was on, opioids or suspected that the patient has consumed opioids

. This protocol is not applicable for end of life/palliative or comfort care/hospice patients. Call provider to clarify if any questions.

C. If criteria above are met then the initiating [illegible] would enter by Physician Order Entry (POE) using

naloxone (Narcan) Points to Remember

- The onset of action for naloxone is within 2 minutes.
- The half-life of naloxone is 30-90 minutes.
- Many opioids have a longer half-life than naloxone, so it is important to monitor your patients closely. A repeat dose of naloxone may be required.

Knowledge Check

A 52-year-old female was admitted post-intervention to her right coronary artery. She received an initial dose of morphine sulfate 2 mg IV push prior to her sheath pull. She continued to complain of discomfort @ 8/10. An additional morphine sulfate 4 mg IV push was administered for discomfort. Respirations are now 5/minute; oxygen saturation is 82%. The patient is not arousable to verbal stimuli, but is arousable to a sternal rub.

Which dose of reversal agent should be initiated?

- (●) naloxone 0.4 mg diluted in 9 mL of normal saline, and give 1 mL IV push
- ( ) naloxone 0.4 mg diluted in 9 mL of nomal saline, and give IV push
- ( ) naloxone 0.4 mg IV push (undiluted)
- ( ) naloxone 0.4 mg diluted in 9 mL of normal saline, and give 2 mL IV push

Treating Over Sedation from a Benzodiazepine

If a patient becomes difficult to arouse with verbal or physical stimuli related to sedation from a benzodiazepine, follow the flumazenil (Romazicon) protocol.

The flumazenil protocol can be located:

- Policy website on Intranet
- Pharmacy website on Intranet
- Side of the crash cart

Commonly Used Benzodiazepines

The most commonly used benzodiazepines are:

alprazolam (Xanax) ★	flurazepam (Dalmane)
chlordiazepoxide (Librium)	**lorazepam (Ativan)** ★
clonazepam (Klonopin)	**midazolam (Versed)** ★
clorazepate (Tranxene)	oxazepam (Serax)
diazepam (Valium) ★	**temazepam (Restoril)** ★
estazolam (Prosom)	triazolam (Halcion)

★ = MMC formulary benzodiazepines

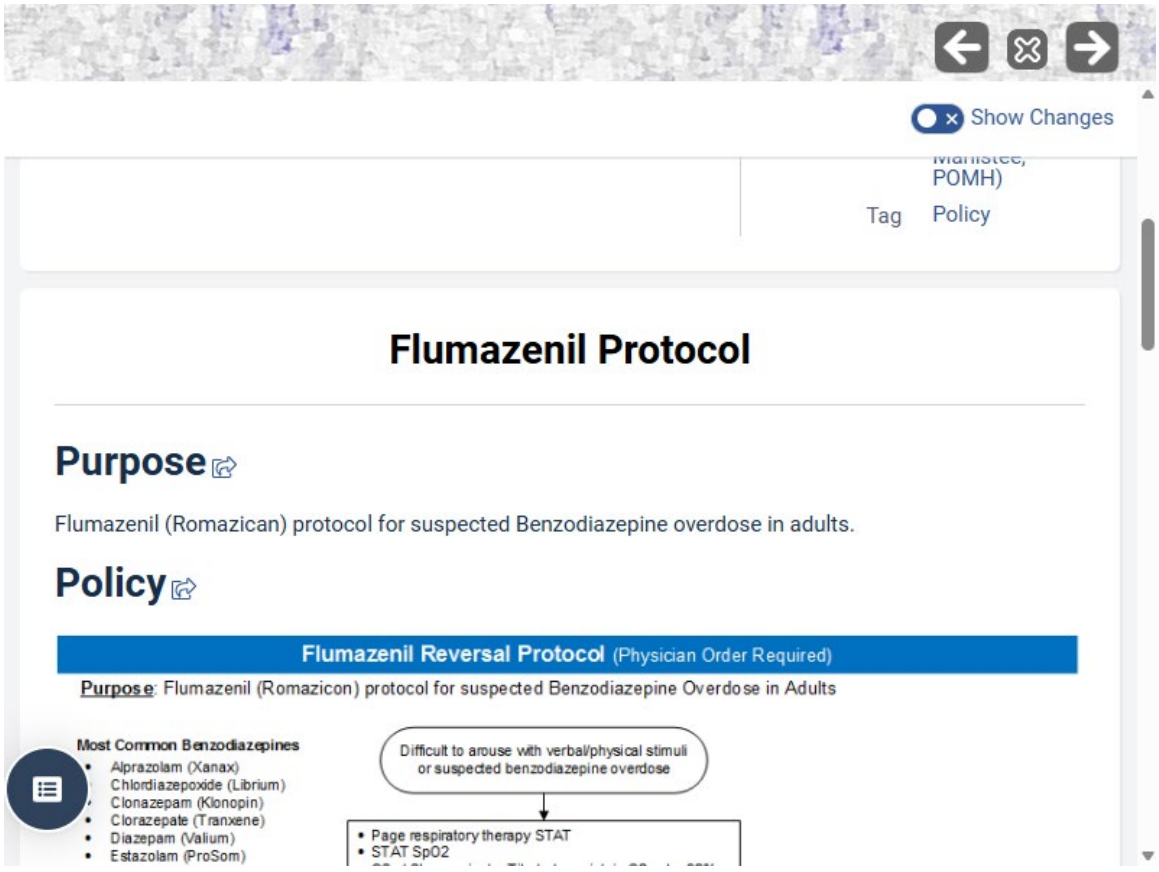
flumazenil (Romazicon) Protocol

The flumazenil Protocol allows the registered nurse or RCIS to:

- Titrate oxygen to maintain an oxygen saturation of at least 92%.
- Perform interventions, including administering flumazenil if the patient is unarousable AND:
  - Oxygen saturation is less than 89% **OR**
  - Respiratory rate is less than 6.
- Initial dose: flumazenil 0.2 mg IV push over 30 seconds

NOTE: Click the button to review the flumazenil protocol; check for repeat dosing and the complete intervention sequence.

Review the flumazenil (Romazicon) Protocol



- The onset of action is 1-2 minutes.
- Duration:
  - ➢ Re-sedation occurs after approximately 1 hour (range: 19-50 minutes).
- Many benzodiazepines have a longer half-life than flumazenil, so it is important to monitor your patients closely. A repeat dose may be required.
- Avoid use of flumazenil in patients with chronic benzodiazepine use. Its use may precipitate seizures.

Knowledge Check

You are assigned to an 88-year-old man who arose from a sitting position and had a syncopal episode. He was placed on the stroke unit for telemetry monitoring. At the start of your evening shift, he becomes very agitated. An order is obtained to give him lorazepam (Ativan). He finally falls asleep after 0300. At the end of the shift (0700), you find him difficult to arouse to both verbal and physical stimuli. His respirations are 5/minute and his oxygen saturation is 86%.

Which reversal dosing agent is appropriate for this patient?

- ○ Undiluted naloxone (Narcan) 0.4 mg IV push STAT
- ○ Diluted naloxone (Narcan) 0.4 mg in 9 mL normal saline
- ◉ flumazenil (Romazicon) 0.2 mg IV push over 30 seconds
- ○ flumazenil (Romazicon) 0.4 mg IV push over 30 seconds

Selecting naloxone (Narcan) vs. flumazenil (Romazicon)

When a patient has received/taken both a benzodiazepine and an opioid, and a reversal agent is needed, **give the naloxone first**.

Reasons:

- Opioids are more likely to cause respiratory depression and other adverse effects, such as hypotension.
- flumazenil can cause seizures in patients with a history of long-term use of benzodiazepines.

Knowledge Check

A 21-year-old female patient has returned following endoscopy in the Medical Procedure Room. She received Demerol 75 mg and Versed 7.5 mg during the procedure.

She has a history of taking Xanax 0.25 mg three times per day for anxiety and Vicodin PRN for pain. She was discharged to B2 following an uneventful recovery with an Aldrete score of 8. Respirations are now 5/minute with an oxygen saturation of 85%. The patient is not arousable to verbal stimuli, but does arouse to a sternal rub.

Which reversal agent protocol should be used first?

- (●) naloxone (Narcan) Protocol
- ( ) flumazenil (Romazicon) Protocol

Knowledge Check *(cont.)*

A 21-year-old female patient has returned following endoscopy in the Medical Procedure Room. She received Demerol 75 mg and Versed 7.5 mg during the procedure.

She has a history of taking Xanax 0.25 mg three times per day for anxiety and Vicodin PRN for pain. She was discharged to B2 following an uneventful recovery with an Aldrete score of 8. Respirations are now 5 minute with an oxygen saturation of 85%. The patient is not arousable to verbal stimuli, but does arouse to a sternal rub.

Which dose of Narcan (naloxone) should be administered?

- ( ) naloxone 0.4 mg IV push (undiluted)
- ( ) naloxone 0.4 mg diluted in 9 mL of nomal saline, and give IV push
- ( ) naloxone 0.4 mg diluted in 9 mL of normal saline, and give 2 mL IV push
- (●) naloxone 0.4 mg diluted in 9 mL of normal saline, and give 1 mL IV push

Treating Patients Who Revert to a Deeper Level of Sedation

- Remember, the effects of opioids and benzodiazepines last longer than the effects of the reversal agents.
- Continue to monitor the patient for signs of progression to a deeper level of sedation for a minimum of 2 hours.
- Repeated dosing of the reversal agents may be needed.
- Create and submit a **VOICE** file.

Dissociative Sedation

Dissociative sedation is a trance state where the patient remains awake, but is unaware of pain and will have no memory of the event.

- In comparison to deep sedation, which causes the patient to:
  - Be unarousable, except with repeated or painful stimuli
  - Experience respiratory depression

Ketamine for Dissociative Sedation

Ketamine will be administered by providers credentialed for deep sedation.

1. A pharmacist, nurse, or non-credentialed provider may administer medications for dissociative sedation in the Emergency Department, as long as a provider credentialed for deep sedation, an RN, and a respiratory therapist are ***ALL*** present.
2. Respiratory adverse events, such as apnea or laryngospasm (although uncommon), may still occur, and providers must always be prepared to rescue the patient from a deep sedation state anytime ketamine is administered.
3. Ketamine (IM/IV) is used for dossociative sedation in both children and adults (including the mentally disabled) for medical procedures such as, but not limited to: fracture reduction, laceration repair, abscess drainage, foreign body removal.
4. If Ketamine is administered IM, IV access should be immediately available.

References

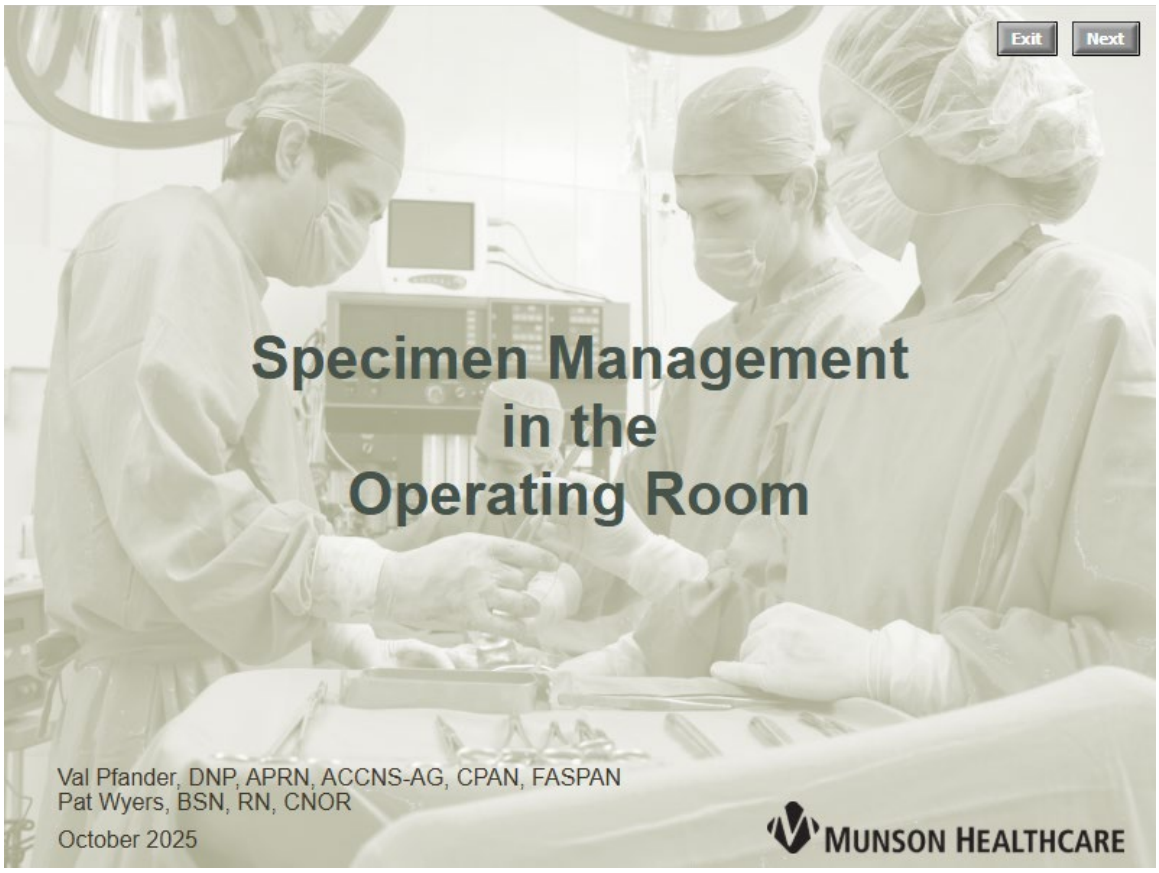
Lexicomp. (2023, November 29). *Flumazenil*. Retrieved December 5, 2023.

Munson Healthcare Policies and Procedures. (2021, April 20). *Flumazenil Protocol*. PolicyStat.

Munson Healthcare Policies and Procedures. (2022, February 21). *Standing Order/Protocol for Adult naloxone (Narcan)*. PolicyStat.

Munson Medical Center. (2023, October). *IV push/infusion chart - adult*.

Munson Medical Center Policies and Procedures. (2022, December 16). *Sedation*. PolicyStat.



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Goal & Objectives

Goal

This course provides information on the process for specimen handling, labeling, and handoff in the Operating Room at Munson Medical Center.

Objectives

1. Define the five rights of specimen handling.
2. Identify the preparation required for various specimens.
3. Explain the guidelines for labeling surgical specimens.
4. Describe the roles for specimen handoffs through all phases.
5. Identify the process for documenting surgical specimens.

Importance of Surgical Specimens

Specimens are sent to pathology for a variety of reasons:

- Identification and documentation of the specimen
- Histological or other examinations
- Proof of surgical procedure
- Diagnosis and potential treatment and/or therapy

It is the responsibility of the perioperative nurse to correctly identify, label, preserve, and document the removal and transportation of specimens.

Specimen Management

Incorrect management of specimens can lead to suboptimal patient outcomes:

- Misdiagnosis
- Delayed treatment
- Incorrect treatment
- Additional surgical interventions

Incorrect management includes:

- Mislabeled containers
- Improper preparation resulting in crushed or dried-out specimens
- Incorrect documentation of the surgical site or description of the specimen

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Test Your Knowledge

Improper management of specimens can lead to harm to the patient by:
(Choose all that apply.)

- [x] Inaccurate or incomplete patient diagnosis
- [x] Delayed treatment
- [x] Incorrect treatment
- [x] Additional surgical interventions

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The Five Rights of Specimen Handling

Right Patient
- Confirmation of patient name and date of birth

Right Specimen
- Especially important when multiple specimens are procured
- Each specimen must go into separate containers unless directed otherwise by the surgeon

Right Date and Time
- Date and time of collection can be critical depending on the test ordered

Right Surgeon
- Provides a point of contact for lab or pathology reports

Right Laboratory Test
- Each test requires specific handling, such as need of a fixative solution or delivery to a specific area in the lab by a specific time

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Test Your Knowledge

The Five Rights of Specimen Handling include:
(Choose all that apply.)

- [x] Right Patient
- [x] Right Laboratory Test
- [x] Right Specimen
- [x] Right Surgeon
- [x] Right Date and Time

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Surgical Specimen Preparation

Routine Specimens

- Do not require immediate processing by the pathologist.
- Should be placed in a preservative fluid and sent to Pathology, non-urgently.

Frozen Section Specimens

- Should be sent immediately to the lab.
- Should not be placed in preservative fluid.

Surgical Specimen Preparation *(cont.)*

Culture Specimens

- Swabbed tissue specimens are obtained at the sterile field and are placed immediately in a transport medium in a sterile tube (aerobic and anaerobic).
- Tissue excision obtained at the sterile field is placed on a small piece of non-adherent dressing and put in a sterile container.
- Cultures are transported to the laboratory **as soon as possible**.

Cytology Specimens

- Can be tissue or bodily fluid.
- Specimen is placed in a sterile container.
- May be obtained as "washings." Washing is the process of injecting saline by the surgeon, and either followed by aspiration of the fluid and placement into a sterile container, or followed by swabbing the fluid and smearing onto a glass slide.

Surgical Specimen Preparation *(cont.)*

Forensic Specimens

- Physical evidence taken from a victim or suspect in a crime.
- Can include patient belongings, body tissue, fluids, or foreign bodies.
- Most common types are bullets, pieces of glass, wood, paint, or bloodstained clothing.
- Require secure processing and documentation following Security Guideline: Evidence Disposition.

Explanted Medical Devices

- No explants will be released to the patient, vendor, or surgeon.
- Explants in which the surgeon orders pathology testing will be sent to the lab and the disposition of the explanted device documented on the OR Record.
- If explant needs to be disposed of, follow MHC Hazardous Materials and Waste Management Plan for proper disposal.

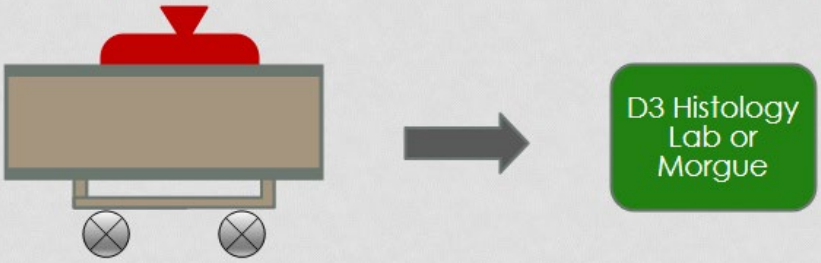
Surgical Specimen Preparation *(cont.)*

Stones, Calculi, or Foreign Bodies

- Placed in a dry container and sent to Pathology for gross examination and chemical analysis.

Amputated Limbs or Extremities

- Double bagged and contained in a impervious biohazard bag or wrapper.



Surgical Specimens

- All surgical specimens are considered to be a biohazard.
- Personal protective equipment (gloves, mask, and eye protection) must be worn when handling or transporting the specimens to their containers.
- Protective attire recommended to be worn while dispensing formalin includes chemical goggles, gloves, and a plastic apron over a long-sleeved warm-up jacket or a fluid-resistant cover gown.

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Test Your Knowledge

Which specimens do not require immediate processing by the pathologist?

- (●) Routine
- ( ) Frozen section
- ( ) Anaerobic culture
- ( ) Aerobic culture

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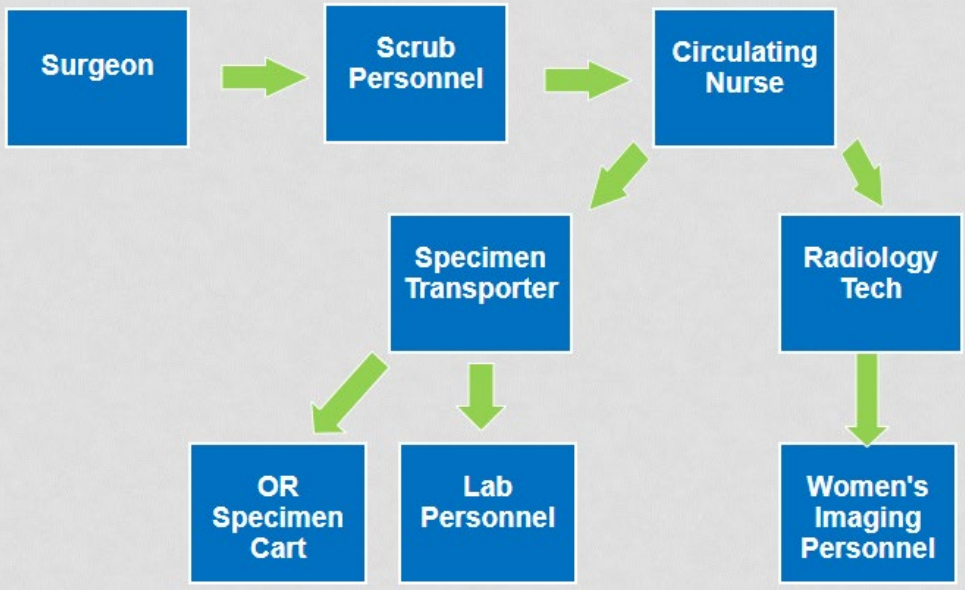
Specimen Handoff Sequence



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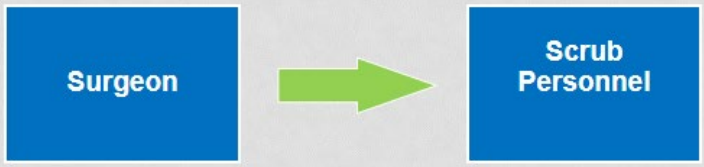
Handoff Between Surgeon and Scrub

The surgeon will **verbally state**:

- Specimen type and source
- The intended laboratory test(s)
- Any special laboratory instructions



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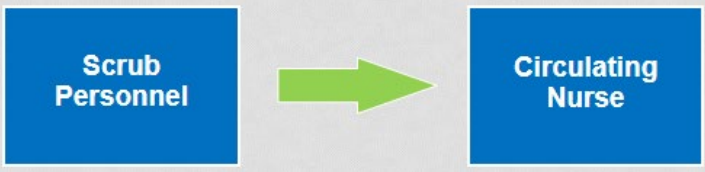
Handoff Between Scrub and Circulating Nurse

Handoff includes **verbal validation** of the following:

- Patient's name and date-of-birth
- Specimen source
- Specimen type
- Specimen preparation



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Circulator Roles

1. Completes the **Lab Requisition**.
2. Confirm the information auto-filled correctly and printed from Surginet.
3. Affix printed specimen label to the specimen container.
    i. **Important**: Add the time of tissue/tumor removal on breast specimens.

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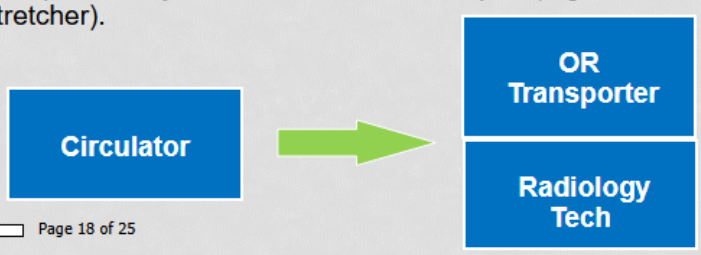
Handoff - Circulator to OR Transporter or Radiology Tech

Handoff includes **verbal validation** of the following:

- Patient's name and date-of-birth
- Specimen source and type
- Fixative agent (e.g., formalin) if required
- Delivery location (e.g., Women's Imaging, Histology, Microbiology, Cytology, OR Specimen Cart, Morgue, or D2 Lab drop-off station)

After the handoff has been completed, the specimen must be **immediately delivered** to the set destination. The specimen **cannot be handed off** to another staff member or placed anywhere else to await transport (e.g., on a cart, laundry hamper, or stretcher).



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Test Your Knowledge

Select the statement that correctly describes the specimen transport process.

- ○ After the specimen has been handed off to the specimen tranporter, it is ok to hand it off to another OR staff member so you can go on break.
- ◉ After the specimen has been handed off to the specimen transporter, it cannot be handed off to another staff member or set down to await transport.
- ○ After the specimen has been handed off to the specimen transporter, it is ok to set it down for a brief moment to complete a task.

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Specimen Log Documentation

The specimen transporter places a patient sticker on the **OR Specimen Log** (located on the OR specimen cart) and completes the required components circled below in red.

SPECIMEN LOG

Complete for every requisition slip				(x) Select only one specimen type Enter time to Lab in shaded section								To be completed by Lab Staff		
Patient Sticker	Initials	Log Date	# Containers	Formalin	Fresh	Frozen	Culture	Cytology	Calculi	Woman's Imaging	Morgue	Lab Init.	P/ U Date	Number of Containers

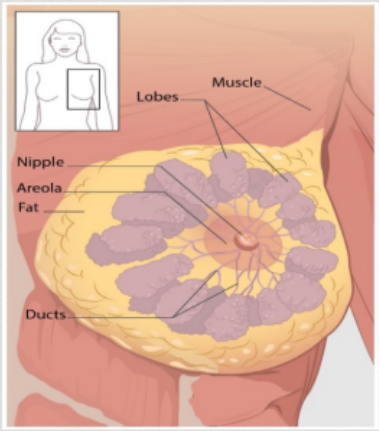
Breast Tissue and Lymph Node Specimen Specifics

Like healthy breast cells, most breast cancer cells - but not all - have hormone receptors and respond to the signals coming from these hormones.

Knowing whether or not breast cancer cells have hormone receptors is an important piece of information for making treatment decisions.

For hormone-receptor-positive breast cancer cells, hormonal therapy can be used to interrupt the influence of hormones on the cells' growth and overall functioning. If you take the hormone away or block it, as these medications do, the cancer cells are less likely to survive.

Source: www.breastcancer.org

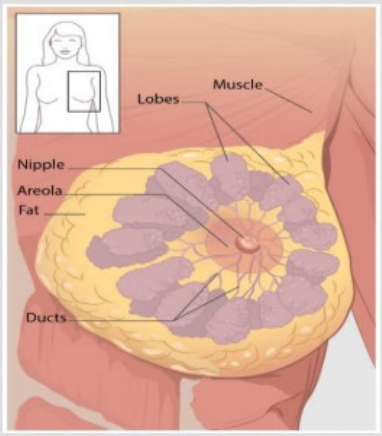


Back Exit Next

Breast Tissue and Lymph Node Specimen Specifics

- Careful collection and handling of breast specimens and lymph nodes will protect and preserve the molecular and genetic signatures of the specimen.
- Transport these specimens from the Operating Room to the Pathology Lab **as soon as possible** for immediate examination.
- The time from tumor/tissue removal, to examination by a pathologist, should be kept to less than or equal to one hour to meet regulatory compliance.
- These guidelines guarantee accurate ER/PR/HER2 biomarkers, which are used to determine the most appropriate type of treatment.

Please click the graphic, to learn more about breast cancer tissue.



Back Exit Next

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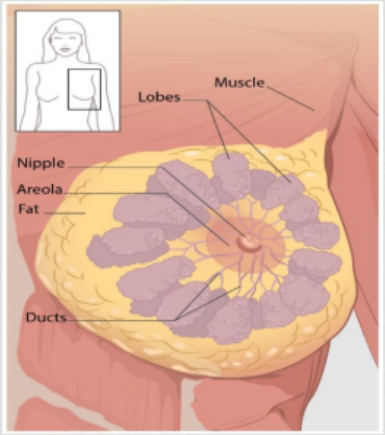

Breast Tissue and Lymph Node Lab Requisition

The following information must be addressed when completing the *Breast Tissue and Lymph Node* Lab Requisition:

- Surgeon name
- First and last name of primary care provider
- Date
- Circulating nurse's initials
- OR Room and phone number
- Clinical History/Pre-Op Diagnosis
- Specimen Description
  - Breast tissue
  - Nodes (Sentinel – Hot, Blue, Hot and Blue)
- Time specimen removed from patient
- Receiving area (per surgeon order):
  - Women's Imaging/Radiology
  - Histology/D3 Lab
  - OR Specimen Cart
- Handoff signatures

Test Your Knowledge

To comply with regulatory requirements and policy, specimens from breast tissue or surrounding lymph nodes should be examined by a pathologist within:

- (●) 1 hour
- ( ) 6 hours
- ( ) 12 hours
- ( ) 24 hours

Documentation

Each specimen must be documented in these places:

- OR Specimen Log
- Intraoperative Record

The Intraoperative Record:

- Is the legal record of activities that took place in the OR.
- Accounts for each and every specimen and/or culture obtained during the surgical procedure.
- Is the individual record of each specimen.

Important!
Each specimen container should contain only one specimen, unless directed otherwise by the surgeon.

References

Association of PeriOperative Registered Nurses. (2025). *Guidelines for perioperative practice*.

College of American Pathologists (2023). *Practical guide to specimen handling in surgical pathology.* Retrieved from https://cap.objects.frb.io/documents/practical-guide-specimen-handling.pdf

Breast Cancer Organization. [Breast image]. Retrieved from https://www.breastcancer.org/

Status Active PolicyStat ID 14167370

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Last Approved	8/14/2024
Effective	8/14/2024
Last Revised	8/14/2024
Next Review	8/14/2027

Owner	Joseph Santangelo: Chief Medical Quality & Safety Officer
Area/ Department	Medical Staff
Applicability	Munson Healthcare Systemwide
Tags	Policy

Universal Protocol: For Surgical and Non-Surgical Invasive Procedures

Purpose

To provide a policy for surgical and non-surgical invasive procedures.

Policy

A. The Universal Protocol is a multi-disciplinary process encompassing the multiple phases of pre-surgical/procedural preparation to improve patient safety and prevent procedural errors.

B. The Universal Protocol consists of three components, a pre-procedure verification process, marking of the surgical/procedural site and the time out just before starting the procedure.

C. The protocol applies to all surgical and non-surgical invasive procedures. These procedures may occur in settings other than the Operating Room (OR), i.e. medical procedure room (MPR), emergency department (ED), radiology, cardiac diagnostic unit, nursing units, or ambulatory setting. Invasive procedures are procedures involving a puncture or incision to the skin, insertion of an instrument, or insertion of foreign material into the body. PICC lines, central line insertions, chest tube insertion, and other similar procedures are within the scope of the protocol.

D. Refer to Addendum A for invasive procedures specific to the protocol. Minimal risk procedures such as venipuncture, peripheral line placement, NG tube insertions, or urinary bladder catheters are not part of the protocol.

Pre-Procedure Verification Process

A. **Purpose**

1. To ensure that all of the relevant documents, related information and/or equipment are:
    a. Available prior to the start of the procedure
    b. Have been correctly identified, labeled, and matched to the patient's identifiers
    c. Have been reviewed and are consistent with the patient's expectations and with the team's understanding of the intended patient, procedure, and site. The patient (or guardian if the patient is a minor or incompetent) is involved in the verification process when possible.

B. **Process**

1. An ongoing process of information gathering and verification, beginning with the decision to perform a procedure, continuing through all settings and interventions involved in the pre-procedure preparation of the patient, up to and including the "**time out**" just before starting the procedure. Missing information or discrepancies are addressed before starting the procedure. Pre-procedure verification is required for elective and emergent cases.

Detailed Requirements

A. Verification of the correct person, procedure, and site occurs:
    1. At the time the procedure is scheduled.
    2. At the time of preadmission testing and assessment.
    3. At the time of admission or entry into the facility for a procedure whether elective or emergent.
    4. Before the patient leaves the pre-procedure area or enters the procedure room.
    5. Anytime the responsibility of care is transferred to another member of the procedural care team, (including the anesthesia providers) at the time of and during the procedure.

B. Verification of the correct person, procedure, and site should occur as the final step in preparing the patient for an invasive procedure, prior to when the time-out occurs. When possible, the patient (or guardian if the patient is a minor or incompetent) should be involved in the process. Each department will determine the location where the verification process will occur (i.e., prior to the patient leaving the pre-procedure area or entering the procedure room).

C. A standardized list will be used in the verification process to validate the correct patient, procedure, and site and to ensure all relevant items are available for the procedure.
    1. At minimum, the list must include:
        a. Patient identified using 2 patient identifiers
        b. Validation of the correct procedure(s)

c. Validation of the correct site(s)

d. Validation of the physicians order(s)

e. A valid consent form(s) that has been signed by the patient (or guardian if the patient is a minor or incompetent) and witnessed.

f. Relevant documentation, (i.e. a valid, relevant, updated H&P, consultation, or handwritten progress notes; nursing and pre-anesthesia/sedation assessment).

g. Correct diagnostic and radiology test results that are properly labeled, if applicable.

h. Require d blood products, implants, devices, and/or special equipment available prior to start of the procedure, if applicable.

2. Each area may add additional items to the list, as applicable.
3. Each area will be responsible to ensure the list is available and consistently used as a reference during the verification process.
4. It is not necessary to document that a standardized list was used for each patient.

Marking the Operative/Procedure Site

A. For patient safety, regulations require uniformity in site marking practices to prevent errors. The method of marking the site and the type of mark is to be unambiguous and be used consistently throughout the organization. **The approved site marking is the initials of the person performing the procedure.**

1. ***The person performing the procedure must do the site marking, this cannot be delegated. This individual must be directly involved and present at the time the procedure is performed.***
2. Marking should take place with the patient involved, awake and aware, if possible.
3. The mark is made at or near the procedure or the incision site. Do **NOT** mark any non-procedure site(s) unless necessary for some other aspect of care.

    a. The mark must be visible after the patient's skin is prepped, the patient is in their final position and sterile draping is completed.

    b. The mark must be made using a marker that is sufficiently permanent to remain visible after completion of the skin prep and sterile draping. Adhesive site markers are not used as the sole means of marking the site.

    c. The procedural physician may elect to write certain aspects of the procedure with the site marking, such as the vertebral level.?

4. Site marking is required for the following procedures involving incisions or percutaneous puncture or insertion of foreign material into the body.

    a. Marking includes laterality, surface (flexor, extensor), the level (spine), specific lesion or digit to be treated.

    b. For midline incision approach for organs of laterality, the site is still

marked and the laterality noted.

c. A wrist/ankle band labeled "Operative or Procedural Side" (written with an indelible marker) will be placed on the limb of the correct side for identifying laterality for a natural orifice or perineum approach.?

d. Spinal procedures require a two stage marking process, marking of the site and identification of the vertebral level(s).

    i. Marking of the skin at the general spinal region.

    ii. The use of radiographic intraoperative techniques is required to mark the exact vertebral level.

e. Interventional radiology cases where the side or individual structure is identified by imaging guidance during the procedure.

5. For cases involving more than one procedure and different providers who are not involved in the previous procedure, site marking will occur when he/she enters the case, whether the patient is re-draped or not.
6. Final verification of the site mark should take place during the "time out".

Exemptions from Site Marking

A. Interventional procedure cases in which the catheter/instrument insertion site is not predetermined (i.e. pacemaker insertions and cardiac catheterizations).

B. Midline, single organ procedures and endoscopies without intended laterality.

C. Interventional radiology cases where

1. The site has been identified during intra-procedural imaging
2. Routine nephrostomy tube exchange

Alternate Marking Conditions

A. An alternate marking process will be used for cases in which it is technically or anatomically impossible or impractical to mark the site (mucosal surfaces, perineum, premature infants) or for patients who refuse site marking.

1. Premature infants for whom the mark may cause a permanent tattoo. For side identification, a wrist/ankle band labeled "Operative or Procedural Side" (written with an indelible marker) will be placed on the limb of the correct side.
2. Minimal access procedures: Minimal access procedures intended to treat a lateralization of an internal organ (percutaneous approach or through a natural orifice), initial the intended site at or near the insertion site. The marked site must remain visible after completion of the skin prep and sterile draping.
3. Teeth: Indicate the operative tooth name(s) and number on documentation **or** mark the operative tooth (teeth) on the dental radiographs or dental diagram. The documentation, images, and or diagrams are available in the procedure room before the start of the procedure.

4. Lesions and wounds: Site marking is not required if there is an obvious wound or lesion that is the site of the intended procedure. However, if there are multiple wounds or lesions and only some of them are to be treated, and the decision and direction for which ones are to be treated is determined prior to the procedure itself, then the sites to be treated should be marked as soon as possible after the decision is made.

Site Marking Refusal by the Patient

A. If a patient refuses the surgical/procedural site marking, the proceduralist will provide the patient with information on why site marking is appropriate and desirable for his/her safety. This allows the patient to make an informed decision.
    1. The proceduralist will validate the surgical/procedural site with the patient and another member of the surgical/procedural team
        a. For side identification, a wrist/ankle band labeled "Operative or Procedural Side" (written with an indelible marker) will be placed on the limb of the correct side.
    2. The proceduralist will document in the patient's medical record the intended site and the reason why the patient refused site marking.

Time Out Process

A. **Purpose**
    1. To conduct a final assessment validating the correct patient, correct procedure, and correct procedural or operative site immediately before starting the invasive procedure or making an incision.

B. **Process**
    1. Active communication among all relevant members of the surgical/procedure team during the time out. The process is consistently initiated by a designated member of the team and the procedure is not started until all questions or concerns are resolved. See Attachment 1. AORN Comprehensive Surgical Checklist.

Detailed Requirements

A. *During the time out, the operative or procedural team must agree, at a minimum, the correct patient, correct procedure, and correct site. Areas may elect to add more elements to the time-out as deemed appropriate by that unit.*

B. The time-out process will be standardized throughout the organization and will be conducted prior to starting the procedure or making an incision.

C. The time-out applies to all procedural cases, including cases where the procedural physician is present at the time of the decision to perform the procedure and remains with the patient to the start of the procedure.

D. There will be a separate time out performed prior to any regional anesthetic involving laterality.

E. When more than one consent form is completed for more than one procedure being performed on the same patient, a time out will be completed to confirm each subsequent procedure before it is initiated.

F. For cases involving more than one procedure and different providers, who are not involved in the previous procedure, site marking will occur when he/she enters the case, whether the patient is re-draped or not.

G. All activities will be suspended (an actual pause), to the extent possible without compromising patient safety, allowing all members to focus on active confirmation of the correct patient, procedure, site, and other critical elements.

H. A pre-designated member of the team will initiate the time out.

    1. All immediate members of the team who will be participating in the procedure at its inception will participate in the time-out (i.e. physicians, anesthesia providers, nurses, technicians, etc.).

    2. Interactive verbal communication is expected of all team members. All team members will be allowed to express concerns about the procedure. Concerns will be addressed prior to proceeding with the procedure.

I. Completion of the time-out must be documented in the patient record validating the correct patient, procedure, and site.

Compliance Monitoring

A. All hospital staff and physicians involved in the validation process have the responsibility to ensure patient safety. Failure to follow the Universal Protocol or to resolve issues regarding the performance of the verification, site marking, and the time out must be reported using the appropriate chain of command.

B. Physicians and hospital staff should follow the department and/or Medical Staff Section chain-of-command for assistance in resolving discrepancies. Refer to the Chain of Command: Paging Response Time and Resolving Questions of Care and or Safety policy.

C. Non-compliance or resistance to this policy will be reported through the electronic occurrence reporting system for review. All actual and "near miss" situations, where any of the steps of this procedure is not followed or is performed incorrectly, should be reported.

D. Individual occurrences and aggregate occurrence data will be reviewed by Risk Management and referred to the appropriate Medical Staff and/or Nursing Administration leadership and peer review committee.

References

1. Joint Commission. (2019). *Hospital Accreditation Program. Chapter: National Patient Safety Goals.* Effective January 2019.? Retrieved from the Joint Commission Website https://www.jointcommission.org/hap_2017_npsgs

Addendum A

Invasive Procedures Specific to the Universal Protocol

A. The Universal Protocol applies to the following invasive procedures according to the Universal Protocol: For Surgical and Non-surgical Invasive Procedures policy.

B. **This list is not all-inclusive:**

1. All taps (i.e., thoracentesis, amniocentesis, paracentesis, pericardiocentesis, pleuracentesis, arthrocentesis, and lumbar puncture).
2. Invasive pain control procedures (i.e., diagnostic or therapeutic blocks, epidural analgesia).
3. Invasive radiological procedures (i.e., angiography, arthrogram, biopsy, lymphangiogram, myelogram, splenogram, ventriculogram, Whitaker test).
4. Endoscopy procedures (i.e., bronchoscopy, colonoscopy, gastroscopy, sigmoidoscopy bronchoscopy, colonoscopy, gastroscopy, sigmoidoscopy, esophageal dilation, ERCP).
5. Invasive cardio/thoracic procedures. (i.e., angioplasty, cardiac catheterization, implantation of pacer or cardioverter, intra-aortic balloon pump, stent placement, intravascular ultrasound, athrectomy).
6. Biopsy/excision and drainage or aspiration (i.e., bone marrow, cisternal puncture, breast biopsy).
7. Chest tube insertions
8. Central line placement (i.e., CVP, Swan-Ganz).
9. Peritoneal dialysis catheter insertion
10. Percutaneous nephrostomy.
11. IVC (inferior vena cava) filter placement.
12. Embolization.

Document ID: 019.066

Attachments

AORN-Comprehensive-Surgical-Check-2019.pdf

Approval Signatures

Step Description	Approver	Date

System Policy Overnight Committee	Terri Fries: Document Mgmt Spec	8/14/2024
PLC	Joseph Santangelo: Chief Medical, Quality & Safety Officer [AM]	8/2/2024
Med Staff Leads (MEC)	Heather Flint: Sr Spec Lead, Med Staff Services SNE - South Regio	12/28/2023
Med Staff Leads (MEC)	Katryna Glettler: Sr Spec Lead, Med Staff Services SNE - Central Reg	10/6/2023
Med Staff Leads (MEC)	Angela Gee: Sr Spec Lead, Med Staff Services SNE - East Region	10/5/2023
Med Staff Leads (MEC)	Teresa Smith: Executive Office Coordinator	9/26/2023
Document Owner	Joseph Santangelo: Chief Medical, Quality & Safety Officer [AM]	9/26/2023

Applicability

Cadillac Hospital, Charlevoix Hospital, Grayling Hospital, Kalkaska Memorial Health Center, MHC Corporate (Home Health, Dialysis, NMSA, etc.), Manistee Hospital, Munson Medical Center, Otsego Memorial Hospital, Paul Oliver Memorial Hospital

Standards

No standards are associated with this document

Status Active PolicyStat ID 17948440

MUNSON MEDICAL CENTER
MUNSON HEALTHCARE

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Last Approved	6/3/2025
Effective	6/3/2025
Last Revised	6/3/2025
Next Review	6/2/2028
Owner	Jennifer Standfest: CNO
Area/ Department	Nursing
Applicability	MMC, Cadillac, Charlevoix, Grayling, Otsego

Cardiac Telemetry Monitoring

Purpose

To enhance patient safety and clinical consistency by outlining continuous cardiac monitoring guidelines, arrhythmia detections and overall alarm management.

Definitions

1. **Cardiac Monitoring/Telemetry Monitoring:** Continuous cardiac rhythm display at the bedside and/or transmitted to a central monitoring console that can provide alarms or print/save rhythm strips.
2. **Telemetry Technician:** Licensed or unlicensed staff member with training and competency in electrocardiogram (ECG) rhythm interpretation.
3. **Telemetry Observer:** An individual assigned to listen for and/or observe specific visual cues with the intention of escalating information to a resource trained to assess and/or intervene in a specific situation.

Policy

A. An order is needed to initiate and discontinue cardiac monitoring. Orders should specify any parameters and any circumstances in which the patient can be temporarily or permanently removed from monitoring.

B. When initiating cardiac monitoring, the following identifiers are used:
    1. 10-digit account number
    2. Last Name, First Name (NOTE: This will automatically pull through ADT feed if 10-digit account number is entered correctly)

C. The Registered Nurse (RN) is responsible to:

1. Initiate and maintain continuous monitoring and to perform initial review and adjustment of settings and alarm parameters.
2. Regularly review and interpret cardiac rhythm and document findings in the chart.
3. Assess need for continued cardiac monitoring daily, using provider orders or protocol, where applicable.
4. Report clinically relevant abnormalities identified on review or by alarm/event review to the provider. Abnormalities include but are not limited to:
    a. Any new dysrhythmia (i.e., tachy or brady arrhythmia exceeding alarm)
    b. Heart block
    c. New atrial fibrillation or flutter or inadequate rate control of these rhythms
    d. Ventricular tachycardia/fibrillation
    e. Supra-ventricular tachycardia
    f. Any symptomatic patient with a dysrhythmia
    g. Any dysrhythmia requiring immediate treatment
5. Initiate code response or other facility specific rapid response protocols or appropriate emergency interventions
6. The RN may delegate tasks to appropriately trained support personnel. These may include, but are not limited to: equipment preparation, skin preparation, electrode application/reapplication, application of monitoring equipment.

D. Where present, telemetry technicians may review and adjust specific settings and alarm parameters and may interpret cardiac rhythms, complete specific documentation, and shall report abnormalities to the RN.

1. The technician will monitor each telemetry unit for ventricular tachycardia, ventricular fibrillation, asystole, tachycardia and bradycardia, low battery and lack of rhythm. The telemetry technician will contact the nurse with findings.
2. A telemetry log may be kept on each unit with pertinent info such as the patient's name, dominant rhythm, assigned nurse and the direct phone number(s) for the assigned care team.

E. A telemetry technician and/or any RN not directly responsible for the patient's care who observes events or responds to alarms at the bedside or central monitoring station will notify the primary nurse of any changes in the patient's condition, monitor settings, or alarm parameters.

F. Where present, telemetry observers are identified 24 hours a day. The telemetry observer may perform other clerical duties that do not remove them from direct view or audio of the monitor. The observer will arrange for another trained observer or nurse to fill the role temporarily if needed for breaks or to perform other job duties away from the area.

G. Any support personnel should consult with/notify the appropriate individual (eg., telemetry observer or technician, RN, etc.) prior to removing a patient from monitoring for showering,

procedures/testing or discharge.

Electrode and Lead Placement, Battery Replacement

A. Electrodes are applied according to Lippincott Procedures - Cardiac monitoring (lww.com) instructions found online. Electrodes shall be changed daily and as needed (PRN) or in accordance with manufacturer recommendations.

B. Lead placement should be confirmed at the beginning of each shift, along with verification the monitor / transmitter is functioning properly and that suitable battery life remains.

C. Battery change should occur minimally when “low battery” signal appears, or with approximately 25% battery life remaining.

Lead Selection

A. Lead II is generally selected as the standard monitoring lead.

B. For a standard 5 lead system, V1 is commonly selected as the second lead. An alternate lead may be selected based on which provides a clearer trace, more prominent or upright waves, or by which a particular area of the heart can be better monitored.

Cleaning

A. Upon discontinuation of telemetry monitoring, the telemetry unit and electrodes are cleaned per manufacturer instructions.

Cardiac Rhythm Waveforms and Documentation

A. A rhythm strip will be measured, interpreted, and documented per the following guidelines:

1. Rhythm interpretation is ongoing and documented as part of the nursing assessment
2. Inpatient care (critical, intermediate, or telemetry care departments) at admission, each shift with initial RN assessment, and with any significant change in rhythm or significant symptoms
3. Emergency Department (ED) at admission and with any life-threatening rhythms or significant changes in patient condition
4. Rhythm waveform documentation should include the name of identified rhythm, heart rate, PR/QRS/QT intervals where applicable, and the name of the RN or Telemetry Technician performing the documentation.

Monitoring Guidelines

A. HR alarms will be set appropriately to the patient's baseline HR, rhythm, clinical condition or treatment plan by an RN or Telemetry Technician.

B. If a monitored patient has a pacemaker, the pacemaker detection function of the cardiac monitor must be turned ON

Refer to Munson Healthcare (MHC) entity specific intravenous (IV) Medication Guidelines and/or consult with pharmacy for information related to risk of prolonged QT interval and for IV medication administration and required monitoring.

C. QT interval monitoring functions of the cardiac monitors may be utilized by the RN/Tele Tech as an adjunct to patient / rhythm assessment. A patient with a baseline prolonged QT or on a medication that has the potential of prolonging the QT interval may have orders for more frequent QT measurements.

D. ST segment monitoring and ST mapping functions of the cardiac monitors may be utilized by the RN/Tele Tech as an adjunct to patient assessment. (Note: some clinical conditions make it difficult to achieve accurate ST monitoring i.e., atrial fib or flutter with an irregular baseline, ventricular pacing, left bundle branch block. Consider turning ST monitoring off in these conditions).

E. Silencing Alarms:

    1. A trained telemetry observer or technician or a registered nurse may silence clearly erratic/false alarms such as those caused by motion or artifact while requesting evaluation by clinical personnel.

    2. A lethal rhythm alarm may be silenced by a Telemetry Technician or RN after the RN evaluates the rhythm and/or patient condition.

Alarm Settings and Clinical Management

A. The Clinical Engineering department has oversight for the testing and maintenance of clinical devices to ensure accurate settings, proper operation, and detectability of alarms.

B. Monitor settings are configured according to manufacturer recommendations to enhance patient safety. A copy of all configuration settings is maintained by the Clinical Engineering department. These settings may only be changed with approval of the Cardiac Monitoring Steering Committee or the Cardiac Monitoring Alarm Committee, with the endorsement of the Clinical Leadership Council.

C. Arrhythmia monitoring will be on and audible for all monitored patients, with the exception of patients who are receiving end of life care, where death is anticipated and an order for comfort care is present.

D. Alarm volume should be set audibly so that nursing staff is able to hear and respond appropriately to non-critical and critical alarms. It is the responsibility of the bedside nurses, the unit coordinator, and other clinical staff to maintain the appropriate alarm volume which decreases noise pollution for patients and visitors, while ensuring prompt staff notification of alarm situations.

E. Select alarm parameters are unlocked and able to be adjusted on an individual basis by the RN, Telemetry Technician, or other licensed clinician within their scope of service.

F. All monitor alarm settings should be adjusted to reflect patient or condition specific values and should be reviewed and adjusted (if indicated) at admission, each shift, and as needed by the RN and/or Telemetry Technician.

    1. The nursing staff member will determine the appropriate response to the alarm; however, the nurse is responsible to confirm findings, verify patterns, and evaluate

interpretations through patient assessment. The response to an alarm may include but is not limited to silencing the alarm, recording the strip, and/or initiating emergency interventions.

2. In the event of a Code Blue or Cardioversion, an event strip will be documented containing the initiation of the event and documentation of changes in rhythm continuing through termination of efforts. As an alternative, a strip from the defibrillator may be used to record the events of the Code Blue.

G. Patient care staff are familiar with alarm settings, policies and procedures.

Transfer/Discharge Procedure

A. At the time of transfer/discharge, the patient MUST be discharged from the bedside and/or central monitoring console, and when applicable, have their encounter be dissociated from the electronic health record (EHR).

B. Refer to manufacturer instructions for use for specific steps to transfer or discharge patient.

Transport Monitoring

A. An RN (or in some cases, a paramedic) shall accompany the patient for transport if the patient is in critical condition, hemodynamically unstable and/or on continuous vasoactive infusions.

B. Other monitored patients transported by unlicensed staff will be monitored remotely by the telemetry technician, telemetry observer, or RN. A portable phone will be assigned and in the possession of the staff member closest to/responsible for the patient at all times. Monitoring staff will use this phone to communicate emergency conditions and request immediate assistance for the patient.

Reference

1. Wiegand, D. L. (Ed.). (2017). AACN Procedure Manual for High Acuity, Progressive, and Critical Care (7th ed., pp. 467-476). St. Louis, MO: Elsevier.

Keywords

Cardiac, Telemetry, Monitoring, Tele Tech

Approval Signatures

Step Description	Approver	Date
System Policy Oversight Committee	Terri Fries: Document Mgmt Spec	6/3/2025
CNO Council	Jennifer Standfest: CNO [AM]	6/2/2025

Document Owner	Jennifer Standfest: CNO [AM]	6/2/2025

Applicability

Cadillac Hospital, Charlevoix Hospital, Grayling Hospital, Munson Medical Center, Otsego Memorial Hospital

Standards

No standards are associated with this document

Status Active PolicyStat ID 15460185

MUNSON MEDICAL CENTER
MUNSON HEALTHCARE

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Effective	11/7/2025
Last Revised	11/7/2025
Next Review	11/6/2028

Owner	Brendan Franklin: Dir Nursing Critical Care & Stroke
Area/ Department	Nursing
Applicability	MMC
Tags	Policy

Critical Care Standards

Purpose

To provide a standard for nursing care in the critical care patient population and enhance coordination of care among the healthcare team.

Scope

Critically ill patients receiving care in A2, A3, and the Intensive Care Unit (ICU).

Policy

A. All Registered Nurses (RN) are prepared to:
   1. Utilize corresponding policies and procedures to implement nursing process for patient care.
   2. Respond to urgent and emergent situations.
   3. Perform specialized nursing procedures specific to critically ill patient needs.
   4. Administer care and specialized interventions in the critically ill patient population.
   5. Document care and specialized interventions.

B. Nursing care of critically ill patients in critical care units includes:
   1. Systems Assessments:
      a. Perform and document head-to-toe assessment every 4 hours, unless the patient's condition or physician order indicates alternative frequency.
      b. Including the following:

i. Recent and relevant events and patient outcomes.

ii. Device use, care and management and patient tolerance.

iii. Wound/skin care and management.

iv. Pain assessment and documentation unless patient condition requires a greater frequency. Pain reassessment will occur after treatment (per the Pain Management policy).

v. All individualized care needs for the critically ill patient.

2. Lines/Tubes/Devices
    a. Assessment is completed and documented every four hours including type, station, and status.

3. Vital signs:
    a. Blood pressure, heart rate, respiratory rate, and pulse oximetry with oxygen delivery method are monitored and recorded hourly, unless otherwise ordered or the patient's condition indicates alternative frequency.
    b. When titrating medications, vital signs are documented according to medication order titration guidelines.
    c. Temperatures are recorded at a minimum of every 4 hours unless otherwise ordered or the patient's condition indicates alternative frequency. Temperatures are recorded hourly when warming or cooling measures are used.
        i. All patients with abnormal temperatures are assessed for potential complications related to hypothermia or hyperthermia.
        ii. RN may initiate warm blankets, commercial warming devices, and/or fluid warmer on any patient with a rectal or core temperature of less than 35.6°C. Provider must be notified.
        iii. RN may initiate cooling blankets on any patient with a rectal or core temperature of greater than 38°C if antipyretics and other means of external cooling have been ineffective. Provider must be notified.
        iv. The fluid warmer may be used for any patient with a rectal or core temperature of less than 35.6°C.

4. Hemodynamic monitoring:
    a. Electrocardiogram (ECG) monitoring is established upon arrival and maintained throughout hospitalization.
    b. Invasive line pressures are documented every hour unless otherwise ordered or the patient's condition indicates alternative frequency. This includes but is not limited to: arterial blood pressure (ABP), central venous pressure (CVP), pulmonary artery pressure (PAP), pulmonary capillary wedge pressure (PCWP), Intracranial pressure (ICP), cerebral perfusion pressure (CPP).

c. Arterial lines and pulmonary artery catheters must always be transduced. Exception: during magnetic resonance imaging (MRI) testing.

d. Transport monitoring: Minimum transport monitoring of critical care patients will include continuous ECG, blood pressure, and oxygen saturation monitoring. Arterial lines and pulmonary artery catheters must always be transduced, even during transport. Additional monitoring may be held or continued during transport.

5. Respiratory:
    a. Airway or endotracheal tube (ETT) station is documented every four hours.
    b. ETT is repositioned every four hours and prn in collaboration with Respiratory Therapy (RT).
    c. An RN may extubate a patient upon a physician's order or per protocol, with RT at the bedside.
6. Fluid volume status and intake & output (I&O):
    a. Patients require strict hourly I&O with daily weights unless otherwise ordered or the patient's condition indicates alternative frequency.
7. Nutrition:
    a. The goal is to start nutrition within 24 hours of admission, based on patient condition. Diet/nutrition is monitored daily, including type of nutrition, source and patient tolerance. RN may initiate dietary consult as needed.

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Approval Signatures

Step Description	Approver	Date
System Policy Oversight Committee	Terri Fries: Document Mgmt Spec	11/7/2025
CNO	Tamara Putney: VP and CNO Patient Care Services	11/7/2025
Mgr Nursing Services	Amber Bowers: Mgr Nursing Services	11/5/2025
Document Owner	Brendan Franklin: Dir Nursing Critical Care & Stroke	11/5/2025

Applicability

Munson Medical Center

Standards

No standards are associated with this document

MUNSON HEALTHCARE

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Fire Safety in Anesthetizing/ Procedural Areas

Jeannette Reynolds, MSN, BBA, RN, CPAN
Kathy Sahs, BS, CHSP
Sam Smith, MSN, RN, CCRN, SANE
Magdalena Stewart, DNP, CNS
Pat Wyers, BSN, RN, CNOR

July 2024

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Goal and Objectives

Goal:

To educate anesthetizing/procedural area staff about the recommended actions for fire prevention and fire response.

Objectives:

After completing this activity, the participant will be able to:

1. Identify the three components of the fire triangle.
2. Identify steps for fire prevention interventions.
3. Describe the staff's role in fire safety.
4. Discuss the steps to extinguish a fire.

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Procedural Fire Facts

According to The Joint Commission (TJC)

- 90-100 surgical fires occur yearly.
- 70% involve use of an electrosurgical device (ESU), also known as a Bovie.
- 15% are related to use of a light source.
- Other contributing factors include:
  - Inadequate orientation, understanding and/or communication of fire risk in procedural areas
  - Insufficient time-out procedures
  - Overconfidence, distraction, or loss of situational awareness
  - Equipment malfunction

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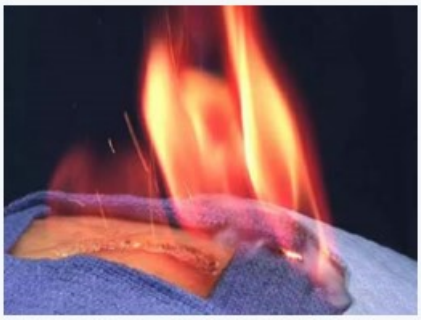
It Happens Here!

In the first quarter of 2022, an MHC OR had two fire/unintentional smoke events from equipment (laser and surgical drill). No patient or staff injury occurred.

Also in April 2022, a fire occurred when a patient applied petroleum jelly to their lips while on high-flow oxygen. The patient sustained first- and second-degree burns.



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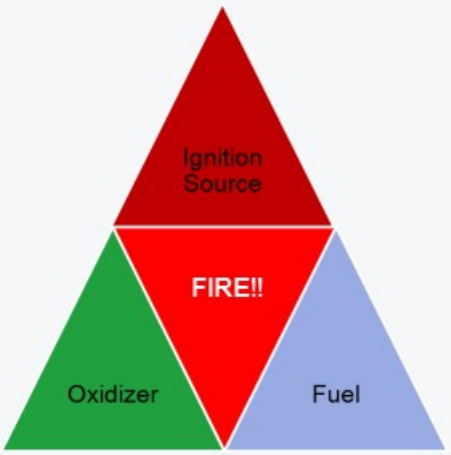
Fire Triangle

There are three elements necessary for a fire:

- Ignition source
- Fuel
- Oxidizer



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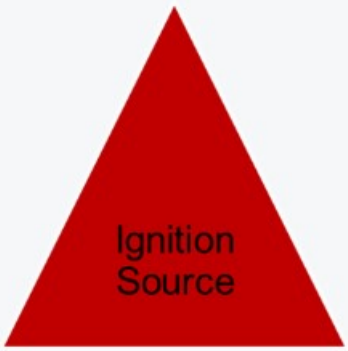
Common Ignition Sources

An ignition source is anything providing enough energy to start a fire:

- ESU/Bovie
- Argon beam coagulator
- Power tools (e.g., drills, burrs)
- Laser
- Fiber Optic light cords
- Defibrillator
- Electrical equipment



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Common Fuels

A fuel is anything that will burn:

- Alcohol-based skin antiseptic agents (preps)
- Drapes
- Gowns
- Endotracheal tubes
- Skin degreasers/tinctures/aerosols
- Body tissues and hair
- Intestinal gases
- Petroleum-based products

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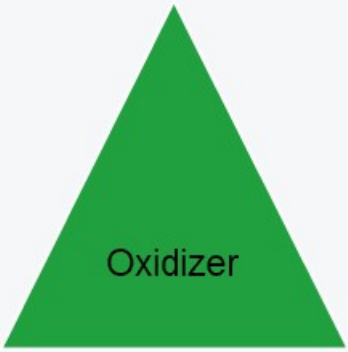
Common Oxidizers

An oxidizer is a gas which supports combustion:

- Oxygen
- Nitrous oxide



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Fire Risk Assessment

Fire risk assessment is a team effort.

As part of the preprocedural briefing process, the proecdural team should initiate a fire risk assessment to assess for the presence of the three elements of the fire triangle (AORN).

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Fire Risk Assessment *(cont.)*

Before each procedure, evaluate the following:

- Are there alcohol-based prep agents or other flammable solutions being used?
- Is the procedure being performed above the xiphoid process?
- Is there open oxygen or nitrous oxide being administered?
- Is an ESU, laser, fiber-optic light cord, defibrillator, drill, or saw being used?
- Are there other possible contributors?

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You must complete the activity.

Controlling Ignition Sources

Click each arrow:

Fiber-Optic Light Source:

- Place the light source in standby mode or turn it off when not in use.
- Inspect light cables before use. Remove from service if broken light bundles are visible.
- Place the scope and light source on a designated heat-resistant surface when not in use.

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Controlling Fuels

Surgical Skin Prep:

- Prevent pooling of skin prep solutions.
- Remove and discard prep-soaked materials, ensuring they are at least 3 feet from an ignition source.
- Skin prep dry time should follow manufacturer instructions for use to allow fumes to dissipate before draping.
- Allow chemicals to dry (e.g., alcohol, collodion, tinctures).
- Use water-soluble gel to cover facial hair.

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Controlling Oxidizers

Considerations for oxygen/flammable gas administration:

- Check the anesthesia circuits for possible leaks prior to the start of the procedure.
- Tent the surgical drapes to allow for free air flow.
- Keep the oxygen percentage as low as possible on non-intubated patients.
- Inform the surgeon when an open oxygen source is being used.
- Turn off oxygen or nitrous for 1 minute prior to use of an ignition source in head, neck, or upper chest procedures.

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Controlling Oxidizers *(cont.)*

Oropharynx Procedures

- Inflate the endotracheal tube cuff with tinted saline.
- Evacuate intended surgical smoke from small or enclosed spaces.
- Pack wet sponges around the back of the patient's throat.
- Document placement and removal of throat sponges.
- If oxygen is being used, suction the patient's oropharynx deeply before using the ignition source.

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See Unintended Smoke or Flames?

Pull the fire alarm!

All team members should be alerted to the presence of a fire or unintended smoke, no matter how small. Alerting other team members decreases the risk of injury to the patient and personnel.

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Fire Pull Station Locations and Responders

- It is the responsibility of each team member to be aware of the locations for fire pulls in his/her areas.
- When a fire pull is activated, the facility response team and the fire department will respond to the alarm.
- Assign a staff member to assist responders with donning disposable coveralls and lead them to the location of the fire.

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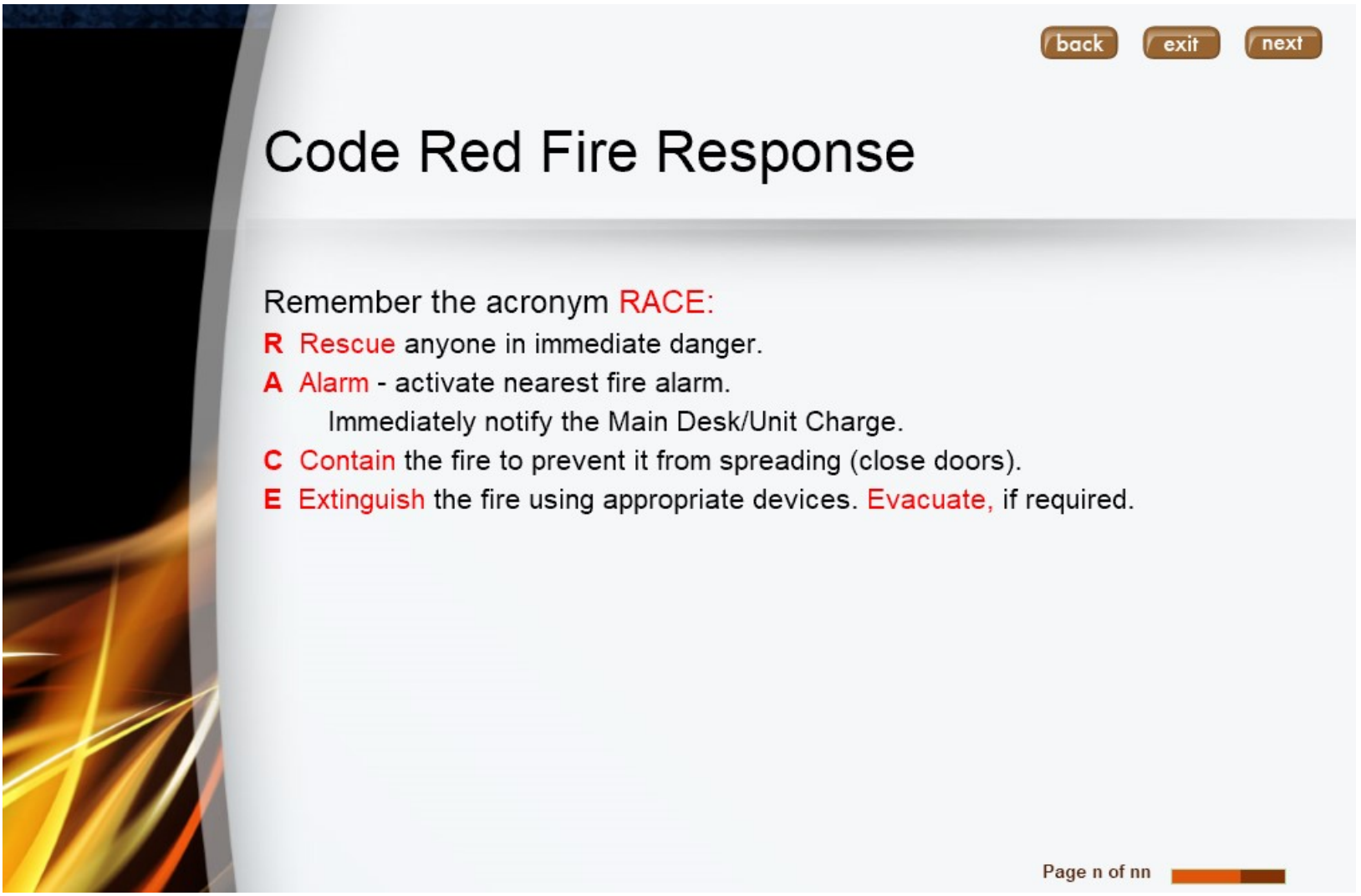
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Code Red Fire Response
Remember the acronym RACE:
R Rescue anyone in immediate danger.
A Alarm - activate nearest fire alarm.
Immediately notify the Main Desk/Unit Charge.
C Contain the fire to prevent it from spreading (close doors).
E Extinguish the fire using appropriate devices. Evacuate, if required.
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Medical Gas Shut-off

Be aware of the medical gas shut-off valve locations in your area. They are typically located outside the procedural suite and labeled.

In the event of a fire, the team should critically evaluate medical gas shut off for that specific area, then communicate medical gases have been emergently shut off in your location.

The decision to further shut off medical gases is made upon mutual consent among Nursing Administration, Respiratory Therapy, Facilities services, and anesthesia providers (if present).

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Extinguish a Fire Using Solution

- Douse the base of the fire with a nonflammable liquid (saline or water) if readily available.
- Impermeable drapes must be removed to effectively extinguish the fire.

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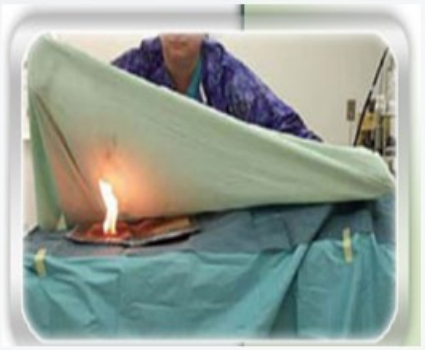
Extinguish a Fire by Smothering

- Keep your body away from fire.
- Hold towel between fire and patient's airway.
- Drop the end of towel closest to the head.
- Drop the other end of towel over the fire.
- Sweep hand over towel from head toward feet. DO NOT PAT the fire! This fans the flames and expands the fire.
- Lift the towel carefully to determine if flames are extinguished.
- Remove drapes or burned material from patient and inspect for injury.



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Extinguish a Fire Using a Fire Extinguisher

Remember the acronym PASS:

P Pull the pin.

A Aim nozzle at the base of the fire.

S Squeeze the handle to release the extinguishing agent.

S Sweep the stream over the base of the fire.

If possible, spray extinguisher away from the patient or other people.

http://www.dol.gov

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Fire Extinguisher Types

Most patient care areas have ABC multipurpose fire extinguishers available for use.

A. Fires involving wood, paper, cloth, and post plastics.
B. Fires involving flammable liquids or grease.
C. Fires involving energized electric equipment.

Some areas (OR, Sterile Processing, and MRI suites) may also have specialty extinguishers such as BC, CO_2, or water mist (non-magnetic) available for use.

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Airway Fire Management

Assist the anesthesia provider to:

1. Stop the medical gas flow.
2. Disconnect the breathing circuit.
3. Pour normal saline or water directly into the airway, if directed.
4. Remove the endotracheal tube, saving any burned segments.
5. Examine the airway.
6. Re-establish airway support.

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After a Fire is Extinguished

1. Inspect the area for a secondary fire on the underlying drapes or towels.
2. Assess the patient for injury.
3. Determine what needs to be done to complete the case (new room, tear down, supplies, instruments, etc.).
4. Complete an incident report using VOICE.
5. Notify nursing administration and the administrator on call.
6. Save all materials from the fire for inspection by facility specialists and the fire department.

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Fire Evacuation

Depending on the severity of the fire, evacuation may be limited to the immediate area followed by partial or total department evacuation.

Unless the patient and staff are in immediate danger, the decision to evacuate and the safest route to go occurs in conjunction with unit/facility leadership.

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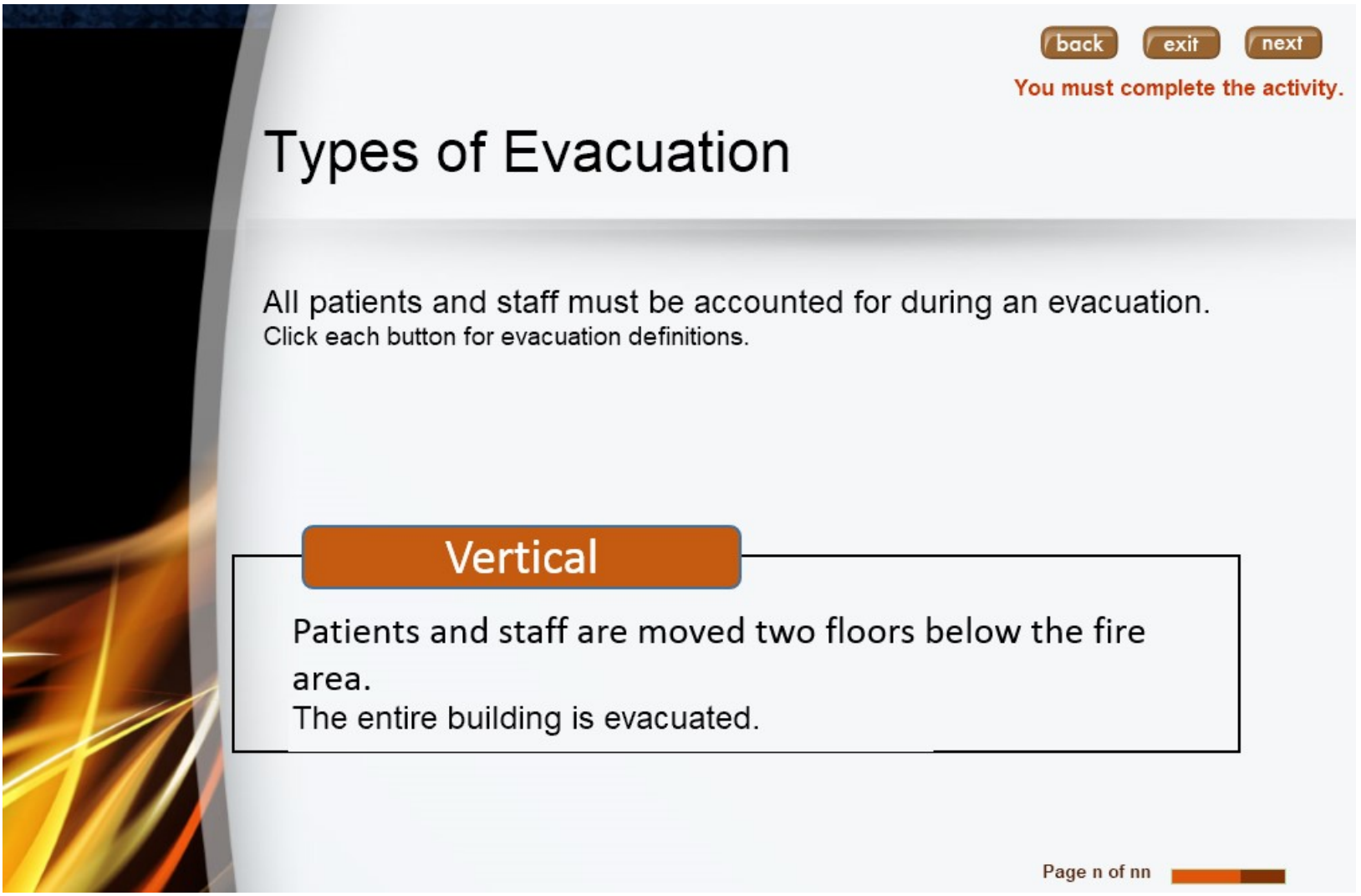
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You must complete the activity.
Types of Evacuation
All patients and staff must be accounted for during an evacuation.
Click each button for evacuation definitions.
Vertical
Patients and staff are moved two floors below the fire area.
The entire building is evacuated.
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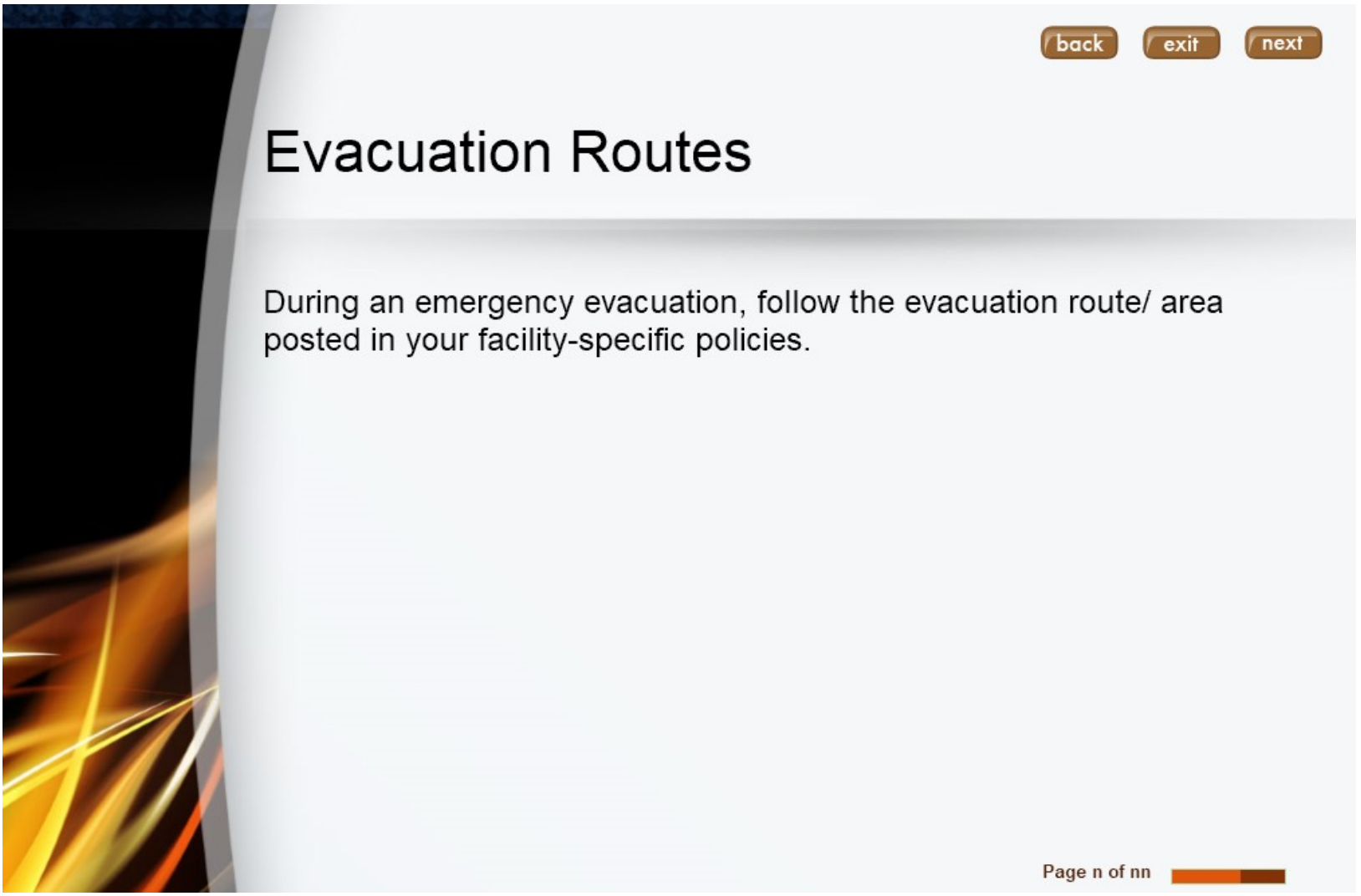
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Evacuation Routes
During an emergency evacuation, follow the evacuation route/ area posted in your facility-specific policies.
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Teamwork

Fire prevention and fire control takes a **critically-thinking team**.
Keep in mind the following:

- Location of the fire alarms, extinguishers, and gas shut-offs.
- Closest evacuation route.
- Cases that are at risk for fires.
- Steps to take to prevent fires.
- Steps to take when there is a fire.
- Who to contact STAT.

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References

Association of PeriOperative Registered Nurses Guidelines for Perioperative Practice. (2022). *Environment of Care* *http://online.statref.com/document/zCT1HcgrG7DjzPC-uTPnBj*

Association of PeriOperative Registered Nurses. (2022). *Fire safety toolkit.* *https://test.aorn.org/guidelines/clinical-resources/tool-kits/fire-safety-tool-kit*

MHC PolicyStat Evacuation Plan

MHC PolicyStat Munson Medical Center Fire Plan

MHC PolicyStat Operating Room Fire Plan

Pfander, Valerie (2017-2022). Fire Safety in the Operating Room. Munson Medical Center

MUNSON HEALTHCARE

Malignant Hyperthermia

Bradley Beaman, PharmD, BCPS
Megan Greenway, MSN, RN, CNOR
Aaron Kurjan, DO, Medical Director MMG Anesthesia
Jeannette Reynolds, MSN, RN, CPAN
Pat Wyers, BSN, RN, CNOR

April 2025

Goals and Objectives

Goals

To assist staff in recognizing signs and symptoms of malignant hyperthermia (MH) to be able to implement treatment options.

To increase awareness of the Malignant Hyperthermia Association of United States (MHAUS).

Objectives

1. List the signs of malignant hyperthermia (MH).
2. State which patients are more conducive to the development of this crisis.
3. Demonstrate knowledge and understanding of administering dantrolene sodium (Ryanodex).
4. Describe management of an MH crisis to include cooling measures, electrolyte imbalances, and dysrhythmias.

Course contains videos - use  or 

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What is Malignant Hyperthermia?

MH is a genetically inherited disorder of skeletal muscle that predisposes susceptible individuals to a life-threatening adverse reaction upon exposure to some anesthetic agents.

It leads to a hypermetabolic crisis manifesting as metabolic and respiratory acidosis, tachycardia, cardiac arrhythmias, skeletal muscle rigidity, and heat production.

Although the occurrence of an MH crisis is rare, incidence varies per geographic location which includes Michigan.

Malignant Hyperthermia

While most cases of MH occur during general anesthesia, the one-hour period immediately following surgery (including the recovery room) is also a critical time.

In addition, MH can occur if trigger anesthetics and/or succinylcholine are used in any location, such as EDs, dental surgeries, surgeon's offices, or ICUs.

Malignant Hyperthermia *(cont.)*

Triggers for MH include:

- Inhaled general anesthetics (e.g. desflurane, enflurane, halothane, isoflurane, sevoflurane)
- Succinylcholine
- Exertional heat or exercise (rare)

MH Susceptible Patients

Currently, no simple diagnostic test is available for screening the general public.

Patients with a history of MH, family history, or even possible history are treated as though they are MH susceptible.

Screening:

- Scheduled cases will be screened prior to surgery.
- Emergent cases will be screened prior to induction when patient condition or family presence allows.
- Screening should include family or personal history of MH and/or complications from anesthesia.

Pre-Procedure Prep

During the preprocedural screening, if a patient has been identified as MH susceptible, the following preparation is needed:

- Anesthesia/providers create a detailed plan considering alternative anesthetic agents.
- When possible, schedule the patient as a first case.
- Notify all post-procedure destinations.
- Place the MH cart outside of the procedure room.

Clinical Features

The sequence and timing of clinical manifestations may vary from patient to patient.

- Unexplained tachycardia or arrhythmias (usually ventricular tachycardia and premature ventricular contractions) - **Early Sign**
- Unexplained increase in end-tital carbon dioxide ($EtCO_2$) - **Early Sign**
- Tachypnea or breathing over the ventilator - **Early Sign**
- Sinus tachycardia - **Early Sign**
- Masseter muscle or generalized muscle rigidity - **Early Sign**
- Hyperkalemia - mixed metabolic/respiratory acidosis - **Early Sign**
- Rapidly rising body temperature (hyperthermia) - **Late Sign**
- Myoglobinuria - **Late Sign**
- Rhabdomyolysis - **Late Sign**
- Disseminated intravascular coagulation (DIC) - **Late Sign**

Pediatric patients

- Sinus tachycardia, hypercarbia, rapid temperature increase, and skin mottling; may not see muscle rigidity in pediatrics

Response to an MH Crisis

Please complete the activity before moving on.

If a MH crisis is suspected, immediately take the following steps:
(Click each arrow to view the information.)

- Call/page anesthesia provider STAT if not present.
- Discontinue volatile agents (inhaled general anesthetics and/or Succinylcholine).
- Obtain the MH Cart/Bag and dantrolene (Ryanodex or Dantrium).
- Obtain MH Crisis Checklist from MH Cart/Bag and follow the guidelines on the checklist.
  1. Master copies of hospital specific MH crisis checklists are attached to the MHC PolicyStat - Malignant Hyperthermia Guidelines.
- Contact the Malignant Hyperthermia Association of the United States (MHAUS) for additional support.
- Contact Pharmacy & Phlebotomy to assist, as needed.

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MH Initial Treatment

- Hyperventilate with 100% oxygen at flows of 10ml/min.
  - If available, insert activated charcoal filters into the anesthesia breathing circuit.
- Administer initial dose of dantrolene (Ryanodex or Dantrium) 2.5 mg/kg IVP
- Establish large bore IV access (avoid hands), infuse Dextrose 5% (D5W) or 0.9% sodium chloride.
  - Avoid Lactated Ringer's and Normasol, which contain calcium.
- Continue patient monitoring of ECG, pulse oximetry, capnometry, and core body temperature.

MH Crisis Medications

- Dantrolene sodium IV (Ryanodex, Dantrium)
- Preservative-free sterile water for injection (in vials)
- 8.4% sodium bicarbonate
- 10% calcium chloride
- 50% dextrose
- 2% lidocaine (amiodarone is also acceptable)
- Regular insulin, 100 unit/mL (refrigerated)
- Normal saline solution (at least 3,000 mL, refrigerated)
- D5W

Dantrolene Sodium

Dantrolene sodium is available as a solution (Dantrium), or as a suspension (Ryanodex) once reconstituted, for treatment of MH.

Product Comparison

	Dantrium	Ryanodex
Vial strength	Each vial 20 mg	Each vial 250 mg
Reconstitution per vial	60 ml of sterile water preservative free yields 0.33 mg/ml	5 ml of sterile water preservative free yields 50 mg/ml
Time to reconstitute	15-20 minutes for 13 vials	<1 minute for 1 vial
# Vials/per dose	13-18 vials	1-2 vials
Color	**Shaken until solution is clear**	**Uniform orange color**
Dose	**2.5 mg/kg**	**2.5 mg/kg**

You must watch the video to advance.

Dantrolene Sodium (Ryanodex)

Mixing and Administration Instructions:

- Each vial is to be reconstituted with 5 mL of sterile water (NO preservative/NO bacteriostatic agent).
- Mix thoroughly.
- Draw up patient-specific, weight-based dose (2.5 mg/kg).
- Administer IVP into a large bore IV (avoid hand) of 0.9% normal saline or D5W solution; flush line after dose is given.
- Has potential for tissue necrosis with extravasation.

Ryanodex Video

Click here to watch a 4½ minute video on how to mix and administer Ryanodex.

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Dantrolene Sodium (Ryanodex) *(cont.)*

Dosing chart is on the MH cart, and also comes with the vial of Ryanodex.

Maximum cumulative dose is 10 mg/kg

DOSAGE SCHEDULE TO TREAT MH

- Based on recommended loading dose of 2.5 mg per kg[1]
- Chart calculated using 250 mg vials of RYANODEX® (dantrolene sodium) for injectable suspension reconstituted with 5 mL of sterile water for injection USP (without a bacteriostatic agent)[3]
- In case of emergency, contact the 24-hour MHAUS Hotline at 800.644.9737

RYANODEX® DOSAGE CHART[3]

Patient's weight in kg	Patient's weight in pounds	Number of 250 mg vials to open	mg dosage needed	mL of reconstituted RYANODEX® to administer
5	11	1	12.5 mg	0.25 mL
10	22	1	25.0 mg	0.50 mL
15	33	1	37.5 mg	0.75 mL
20	44	1	50.0 mg	1.00 mL
25	55	1	62.5 mg	1.25 mL
30	66	1	75.0 mg	1.50 mL
35	77	1	87.5 mg	1.75 mL
40	88	1	100.0 mg	2.00 mL
45	99	1	112.5 mg	2.25 mL
50	110	1	125.0 mg	2.50 mL
55	121	1	137.5 mg	2.75 mL
60	132	1	150.0 mg	3.00 mL
65	143	1	162.5 mg	3.25 mL
70	154	1	175.0 mg	3.50 mL
75	165	1	187.5 mg	3.75 mL
80	176	1	200.0 mg	4.00 mL
85	187	1	212.5 mg	4.25 mL
90	198	1	225.0 mg	4.50 mL
95	209	1	237.5 mg	4.75 mL
100	220	1	250.0 mg	5.00 mL
105	231	2	262.5 mg	5.25 mL
110	242	2	275.0 mg	5.50 mL
115	253	2	287.5 mg	5.75 mL
120	264	2	300.0 mg	6.00 mL
125	275	2	312.5 mg	6.25 mL
130	286	2	325.0 mg	6.50 mL
135	297	2	337.5 mg	6.75 mL
140	308	2	350.0 mg	7.00 mL
145	319	2	362.5 mg	7.25 mL
150	330	2	375.0 mg	7.50 mL

Labeled dose range of 1 to 10 mg/kg with a maximum cumulative dose of 10 mg/kg. If the physiologic and metabolic abnormalities of MH continue, administer additional doses.[1]

Dantrolene Sodium (Ryanodex) Locations

Cadillac
MH Cart

Charlevoix
- MH Cart
- Pharmacy

Grayling
MH Cart

Manistee
MH Cart

Otsego Memorial Hospital
- Anesthesia Pyxis
- ICU Pyxis

Paul Oliver Memorial Hospital
MH Cart

MMC
- 2 vials: OR 2nd floor in the MH Cart
- 2 vials: OB (Recovery Room) Pyxis
- 2 vials: Basement Pharmacy

MH Crisis Checklist

Please refer to your facility-specific MH Crisis Checklist and policy for Malignant Hyperthermia treatment and management.

Web Window

https://mobile.mhc.net/Malignant Hyperthermia Crisis Checklist 2022.pdf

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Recommended MH Supplies

Important - Know the location of your hospital's MH supplies.

- Charcoal filters
- Variety of syringes, including (3) 5mL syringes and (3) 60 mL syringes
- IV catheter supplies (large bore)
- Central venous access catheter kits (appropriate sizes for patient population)
- Transducer kits for arterial and central venous catheters
- Arterial blood gas (ABG) kits and syringes (3 mL) for blood gas analysis or point of care monitors
- Pressure bag
- Core temperature probes
- Bucket for ice and cold packs
- Large Steri-Drape™ to cover surgical wound
- Urinary catheter kit
- Urine collection container for myoglobin level
- Small and large plastic bags
- Test strips for urine hemoglobin
- Variety of blood collection tubes

Additional Equipment

- Capnography
- Cooling blanket
- Emergency equipment:
  - Crash cart
  - Defibrillator
  - Intubation supplies
  - Mechanical ventilator
  - Handheld resuscitation bag with mask

MH Supportive Therapy

- Cool patient, as needed, based on body temperature using ice packs to neck, axilla or groin, cooling blankets, chilled intravenous solution, or lavage.
- Obtain lab work, including blood gas.
- Re-dose dantrolene based on patient response.
- Treat respiratory and metabolic acidosis, hyperkalemia, and dysrhythmias, as needed (avoid calcium channel blockers).
- Monitor renal function and treat myoglobinuria, if needed.
- Provider should consider insertion of an arterial line, central venous catheter, and/or a pulmonary artery catheter.

Transferring a MH Suspected or Confirmed Patient

- The anesthesia provider will determine the location to best manage patient care during the acute phase (e.g., inpatient facility Post Anesthesia Care Unit (PACU) or critical care unit).
- Notify house supervisor/admitting for bed placement needs, as applicable.
- The anesthesia provider will arrange the transfer and accompany the patient, as needed.

Post-MH Crisis

- Observe the patient for at least 24 hours on a critical care unit.
- Monitor ABGs, electrolytes, calcium, clotting studies, myoglobin, urine output and color, and other studies as ordered.
- Key indicators of stability include:
  - $EtCO_2$ is declining or normal
  - Heart rate is stable
  - Hyperthermia is resolving
  - Generalized muscle rigidity has resolved
  - Restock MH cart or bag
- Ensure additional vials of dantrolene (Ryanodex or Dantrium) are readily available.

Post-MH Crisis Complications

- Dantrolene sodium (Ryanodex) is associated with flushing, drowsiness, voice disorders, dysphagia, and nausea.
  - Symptoms may persist up to 48 hours post-dose.
- Rhabdomyolysis
  - Urine becomes cola-colored (dark red or brown).
  - Patient may c/o muscle pain.
  - **Immediately** notify attending provider and anesthesia provider.
- Paralysis, blindness, renal failure, reoccurrence of syndrome, muscle weakness, multi-organ failure, and/or death
  - Patients should not ambulate without assistance until normal strength and balance has returned.
- Obstetrical cases
  - Dantrolene sodium (Ryanodex) readily crosses placenta - may lead to side effects in unborn child.
  - Notify the obstetrician and pediatrician of dantrolene sodium (Ryanodex) administration.

Documentation and Reporting

A. Notify the unit manager and director of the event.
B. Document event on unit-based patient care records (EMR).
C. Complete a facility occurrence report (e.g., VOICE) under "adverse medication event".
D. Anesthesia Services should review each case and consider contributing information to the MHAUS.

MH Guidelines

Web Window

https://munsonhealthcare-all.policystat.com/policy/14063752/latest

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Malignant Hyperthermia Association of the United States (MHAUS)

Mission: To promote optimum care and scientific understanding of MH and related disorders.

The MHAUS Association provides:

- Resources for healthcare professionals
  - Education and research
- Patient/family teaching re: MH precautions, susceptibility, and testing centers

Visit **http://www.mhaus.org** for healthcare provider and public education materials.

For support during an MH crisis,

call the 24-hour **MH Hotline**

1-800-644-9737

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