Policy #:	03.95.000
Issued:	May 2011
Reviewed/ Revised:	2/2013, 5/2016, 3/2020, 6/2020, 10/2023
Section:	Clinical Care

Massive Transfusion Protocol (MTP)

Purpose:
To define the guidelines for activation of a Massive Transfusion Protocol (MTP) in patients who are actively bleeding.

Policy Statement:
Anytime a patient is actively bleeding and their transfusion requirement exceeds 3 units of packed red blood cells (PRBCs) in one hour a MTP activation should be considered. This policy outlines the criteria and method for activation in the Emergency Department (ED), Labor and Delivery (L&D), Operating Room (OR), and Surgical Intensive Care Unit (SICU)/ Medical Intensive Care Unit (MICU), as well as the criteria for deactivation, the appropriate clinical tests to monitor, and the process for review of an MTP.

Application:
This policy applies to patients 15 years or older that meet clinical criteria.

Exceptions:
Pediatric patients younger than 15 years old.
Any adult patient who does not meet clinical criteria.

Procedure:
The MTP may only be activated by an attending physician.

The criteria for activation of the MTP is severe, active, uncontrolled, life threatening hemorrhage.

a. Examples of clinical scenarios that increase risk of need for massive transfusion include: uncontrolled trauma, axillary, neck, or groin bleeding, uncontrolled bleeding secondary to large soft tissue injuries, proximal amputation or mangled extremity, clinical signs of coagulopathy, and obstetrical hemorrhage.
b. A number of risk factors for massive transfusion upon hospital admission have been identified. In patient with serious injuries, these include:
    1) Systolic blood pressure <90mm Hg
    2) Heart rate > 120 bpm
    3) pH < 7.25
    4) INR level > 1.4

The MTP may only be deactivated by an attending physician by calling the Blood Bank (4-4141) and should be deactivated if the patient expires, physiological criteria normalize or there is no evidence of surgical bleeding.

During the MTP, the following should be monitored immediately upon activation and every hour until the MTP is deactivated:

1. CBC
2. INR/PTT
3. Fibrinogen
4. ABG
5. Ionized calcium

Activation: No Type and Cross Sample in Blood Bank
For ER use of Haemobank Refrigerator, see section 2

1. All non-ER areas and Haemobank Downtime

a) Activation of MTP by attending physician.
b) Designee/recording nurse records time of activation on chart and notifies Blood Bank at **4-4141.**
    (1) Include patient name, MRN, birth sex and attending physician name
c) Tranexamic acid (TXA) can be ordered for trauma patients > 15 years of age, > 40 kg and < 8 hours from injury, and the pharmacy will provide.
d) Blood Bank calls designee/recording nurse when Box 1 is ready for pickup.
e) Designee picks up Box 1 from Blood Bank and delivers Emergency Release form signed by MTP activating physician.
    (1) All Boxes consist of:
        i. 4 units PRBC's (type O)
        ii. 4 units thawed plasma (type A)
        iii. 1 unit of single donor platelets
f) Specimen is drawn in pink top tube and delivered to Blood Bank (**Station: 211**) in separate bag.
    (1) Include patient name, MRN and two signatures
g) Blood Bank performs type and cross on pink top tube specimen.
h) Designee picks up Box 2 from Blood Bank.
    (1) If type and cross is complete, Box 2 is type-specific
    (2) If type and cross is incomplete, Box 2 is type O PRBC and A thawed plasma
i) Specimen is drawn in white top tube.
j) Designee sends white top tube to Blood Bank (**Station: 211**).
k) Blood Bank performs type on white top tube specimen.
l) When 1 box leaves the Blood Bank, they will immediately set up the next box. Units will be type specific or type compatible as testing allows.
m) Communication between Blood Bank and designee/recording nurse continues until patient is moved or MTP is deactivated by attending physician. Call deactivation to Blood Bank ASAP

2. HaemoBank Use: (Emergency Room Use Only)

a) Retrieving units for use:
    (1) Person retrieving unit(s) of blood will scan in Point of Care ID card
    (2) Select a Product – **click** one: "Red Cells" or "Whole Blood"
    (3) **Scan** the patient's MRN (EPIC facesheet label)

(4) Verify the patient information. If correct **click** "Yes" button.
(5) Select the patient's age and birth sex.
(6) The HaemoBank door will unlock and the correct tray will backlight.
   i. **Open** the HaemoBank door,
   ii. **Slide** the tray forward,
   iii. **Remove** the unit,
   iv. **Close** the tray,
   v. **Close** the HaemoBank door.
(7) **Scan** the unit barcode label under the kiosk.
(8) BloodTrack label will print. Affix the label to the unit.
(9) Click the "Yes" button if the label printed, otherwise click the "No" button.
(10) At "Do you want more emergency Red Cells" select "Yes" then it repeats at step #6.
(11) If Red Cells were removed, repeat steps 1-10 to retrieve 2 Plasma.

b) Returning Units: Units must be returned within 20 minutes
(1) At the HaemoBank kiosk, **scan** your barcoded user ID card.
(2) Select Action – **click** the "Putting In" button.
(3) **Scan** the unit barcode label (upper left hand quadrant, identifier starts with "W").
(4) The HaemoBank door will unlock and the correct tray will backlight.
   i. **Open** the HaemoBank door,
   ii. **Slide** the tray forward,
   iii. **Place** the unit in the tray
   iv. **Close** the tray.
   v. **Close** the HaemoBank door.
(5) If another unit will be returned, repeat from step #3.

c) USE OF FRIDGE
(1) When the door is opened and units removed (or returned) the blood bank is automatically notified by the system.
(2) Maximum of 1 Trauma Pack (2 RBC & 2 FFP) or 2 Whole bloods may be used per patient. If further units are required the ER MUST call the Blood Bank and order Emergency Release as described in number 1 of the Downtime section.
(3) In all cases, the ER should consider the use of the fridge as the first box of blood for any patient. They must CALL the blood bank for more units and come pick them up as described below AND follow all specimen requirements as listed in sections D-G in section 1 above.
(4) Returned blood will automatically be quarantined and cannot be used by nursing until a member of the blood bank staff reviews the unit.
(5) It is not possible for the Haemobank refrigerator to be resupplied 24/7. If too many units are used (or removed and returned) the ER will need to call the blood bank as described in the Downtime section for ALL emergency release units.
(6) A physician's order for Emergency Release must be placed in EPIC. This will be the electronic signature for the emergency release.

(7) All steps in the process must be followed for regulatory purposes. Failure to finish the complete removal and documentation of units on a regular basis, will require the Blood Bank to pull refrigerator access from offending users

NOTE:
(1) If the location of the patient changes, ED staff is responsible for communicating MTP status during verbal report. If the patient is moved to the OR, OR staff must contact the Blood Bank. If the patient is moved to the ICU, ICU staff must contact the Blood Bank.
(2) Per Blood Bank protocol, until the white top tube is received for type verification, non-type specific blood products will be released.

Activation: Type and Cross Complete

1. Activation of MTP by attending physician.
2. Designee from requesting service calls the Blood Bank at **4-4141** and records activation time in record.
    a. Include patient name, MRN, sex and attending physician name
3. For adult (> 15 years of age, > 40 kg) trauma patients < 8 hours from injury, tranexamic acid (TXA) can be ordered and the pharmacy will provide.
4. Runner from requesting area picks up Box 1 from Blood Bank and delivers Emergency Release form to be signed by MTP activating physician.
    a. All boxes consist of:
        i. 4 units PRBC's (type specific)
        ii. 4 units thawed plasma (type specific)
        iii. 1 unit of single donor platelets
5. All subsequent boxes will have the same contents and will be set up as soon as the previous box has left the blood bank. .
6. Communication between Blood Bank and requesting area continues until patient is moved or MTP is deactivated by attending physician. Call deactivation to the Blood Bank ASAP.

NOTE:
If the location of the patient changes, requesting area staff is responsible for communicating MTP status during verbal report. If the patient is moved to the ICU, ICU staff must contact the Blood Bank.

Responsibility:
Attending Physician, Anesthesia, Nursing, Blood Bank, ED, L&D and OR staff

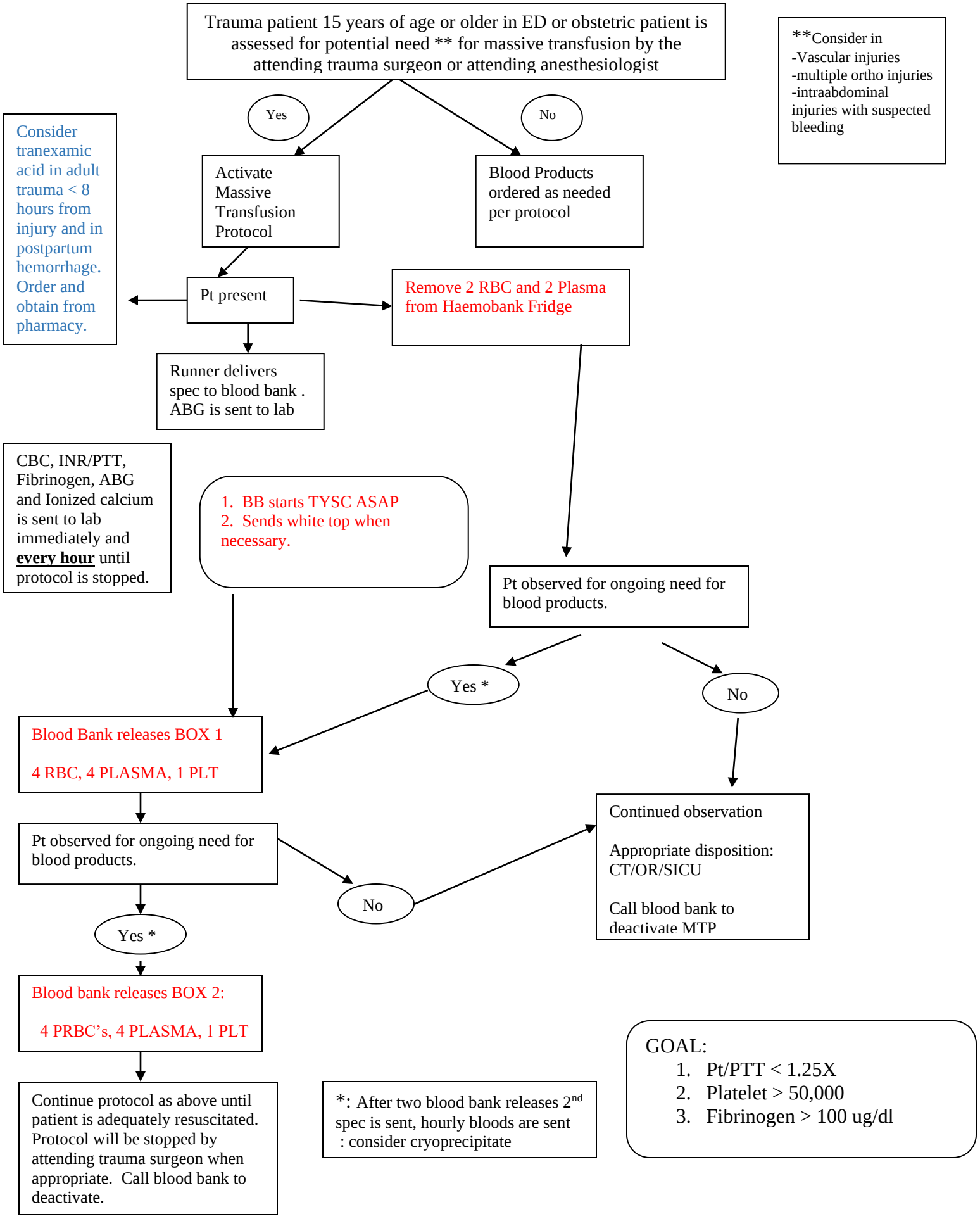
Other Related Policies:
None

References:
Relevant Contacts:
TRAUMA BAY 1: 4-4152 OR: 4-4116
TRAUMA BAY 2: 4-4148 **BLOOD BANK: 4-4141**
TRAUMA BAY 3 (PEDI): 4-7766 ED SATELLITE PHARMACY 4-5609
LABOR AND DELIVERY: 4-4364
MENINO PHARMACY 4-7687

Contributing Departments:

1. Anesthesiology
2. Operating Room
3. Surgical ICU
4. Obstetrics
5. Blood Bank
6. Nursing
7. Emergency Medicine
8. Pharmacy

Initiated by: Trauma Surgery, Obstetrics


Trauma patient 15 years of age or older in ED or obstetric patient is assessed for potential need ** for massive transfusion by the attending trauma surgeon or attending anesthesiologist
**Consider in -Vascular injuries -multiple ortho injuries -intraabdominal injuries with suspected bleeding
Yes
No
Activate Massive Transfusion Protocol
Blood Products ordered as needed per protocol
Consider tranexamic acid in adult trauma < 8 hours from injury and in postpartum hemorrhage. Order and obtain from pharmacy.
Pt present
Remove 2 RBC and 2 Plasma from Haemobank Fridge
Runner delivers spec to blood bank . ABG is sent to lab
CBC, INR/PTT, Fibrinogen, ABG and Ionized calcium is sent to lab immediately and every hour until protocol is stopped.
1. BB starts TYSC ASAP
2. Sends white top when necessary.
Pt observed for ongoing need for blood products.
Yes *
No
Blood Bank releases BOX 1
4 RBC, 4 PLASMA, 1 PLT
Pt observed for ongoing need for blood products.
No
Continued observation
Appropriate disposition: CT/OR/SICU
Call blood bank to deactivate MTP
Yes *
Blood bank releases BOX 2:
4 PRBC's, 4 PLASMA, 1 PLT
Continue protocol as above until patient is adequately resuscitated. Protocol will be stopped by attending trauma surgeon when appropriate. Call blood bank to deactivate.
*: After two blood bank releases 2nd spec is sent, hourly bloods are sent : consider cryoprecipitate
GOAL:
1. Pt/PTT < 1.25X
2. Platelet > 50,000
3. Fibrinogen > 100 ug/dl

OB Hemorrhage

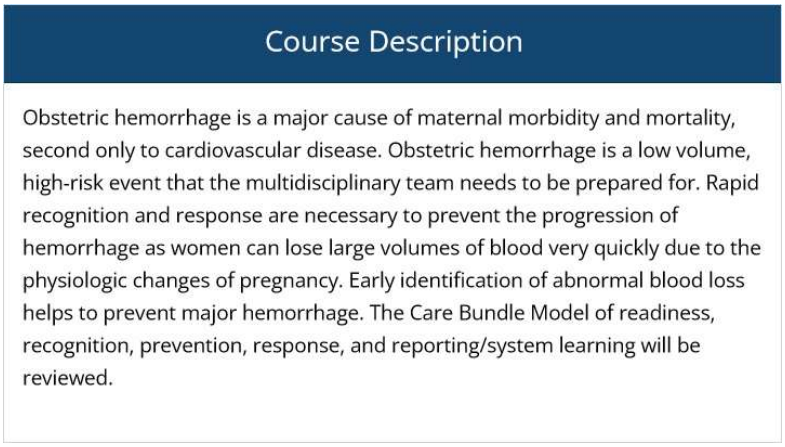
1. Home

1.1 Home



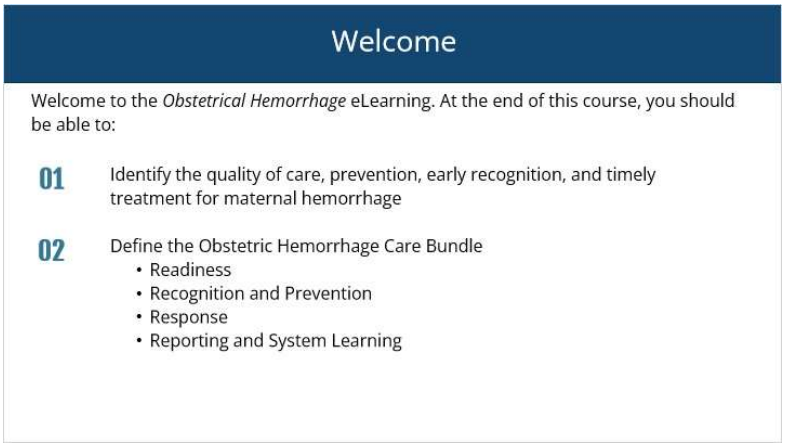
Notes:

1.2 Course Description



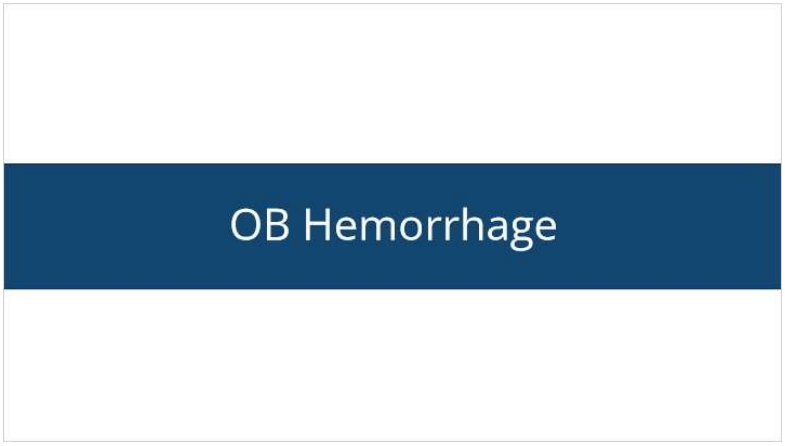
Notes:

1.3 Learning Objectives



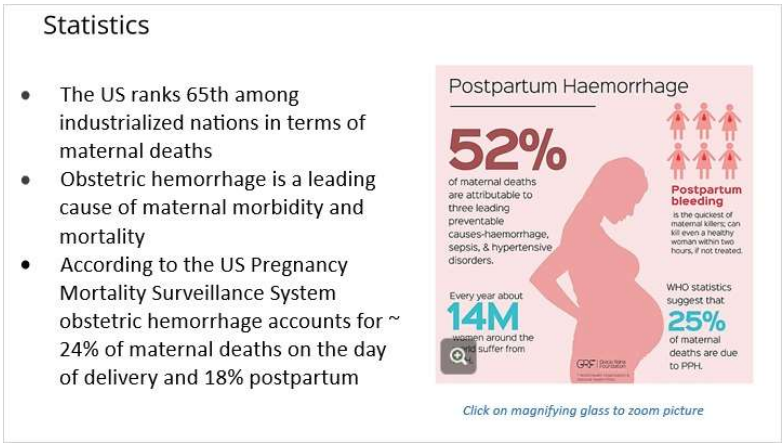
2. OB Hemorrhage

2.1 Introduction

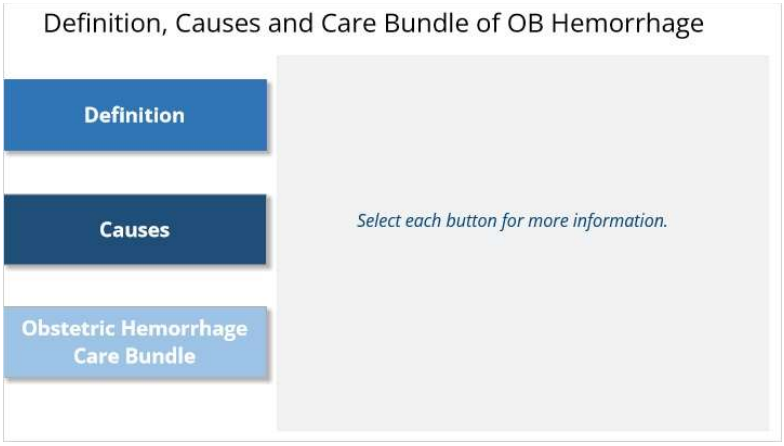


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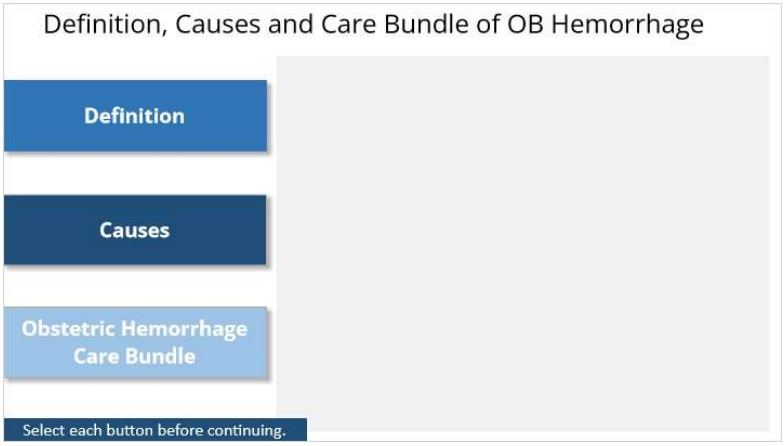
2.2 Statistics



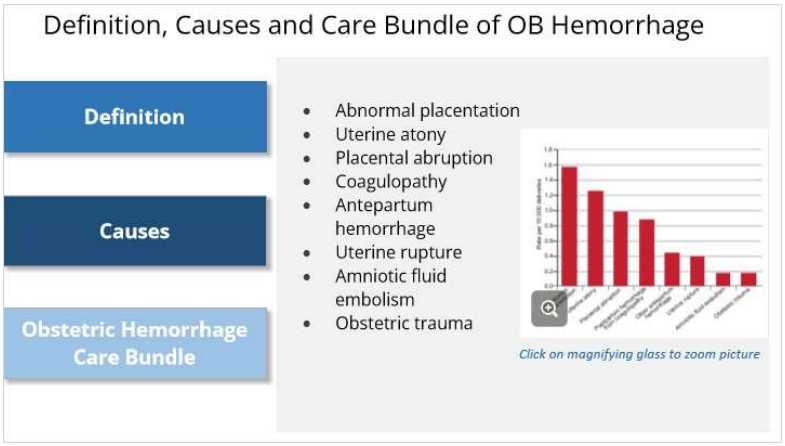
2.3 Definition, Causes and Care Bundle of OB Hemorrhage



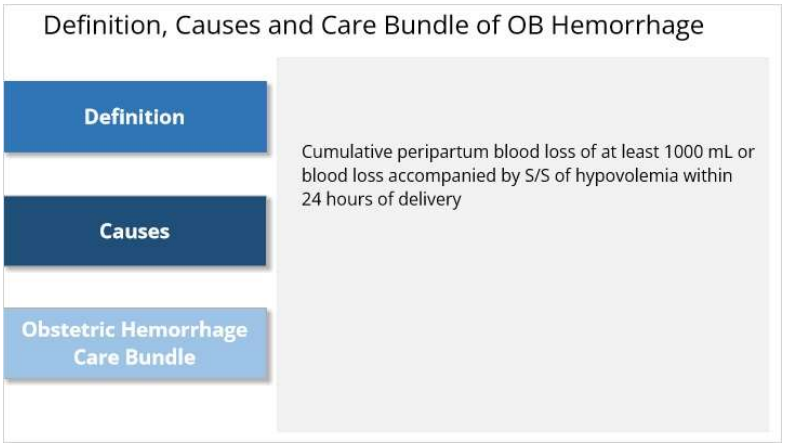
Reminder (Slide Layer)



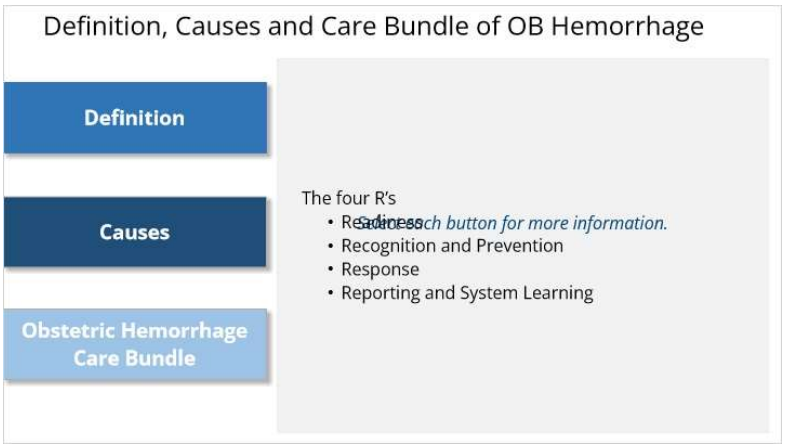
Causes (Slide Layer)



Definition (Slide Layer)



The four R's (Slide Layer)



3. Readiness

3.1 Readiness



Notes:

3.2 Hemorrhage Cart & Supplies

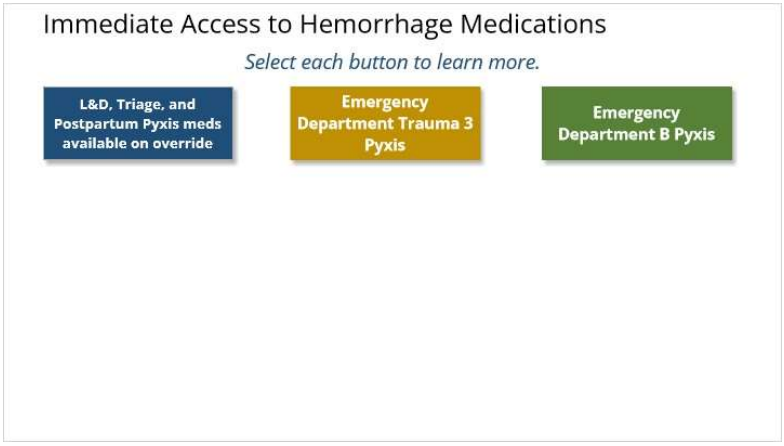


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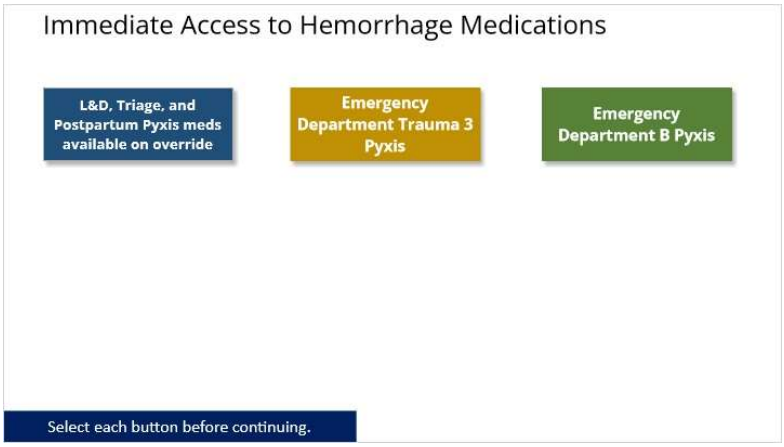


3.3 Hemorrhage Medications

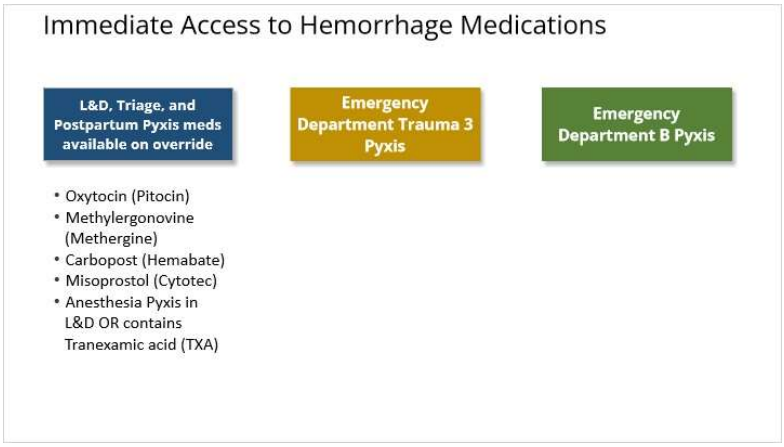


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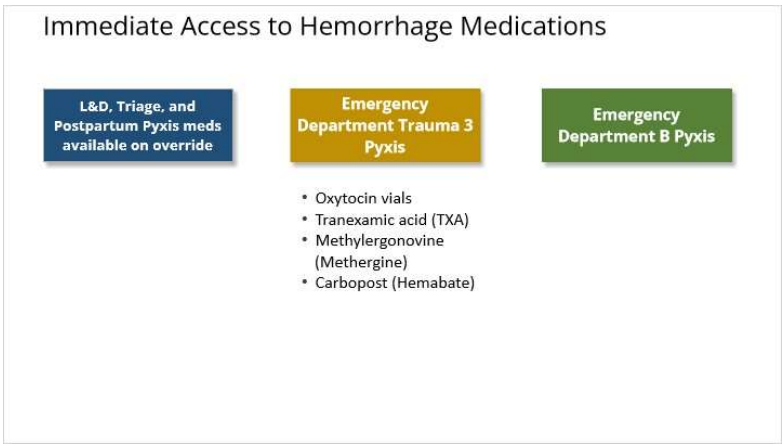
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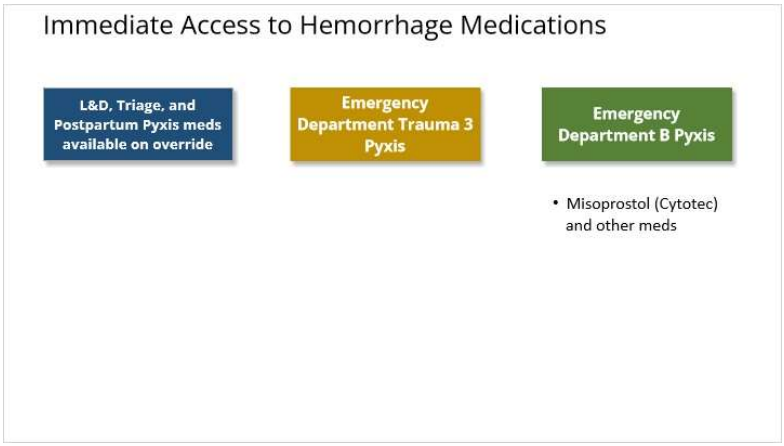
L&D, Triage & Postpartum pyxis meds (Slide Layer)



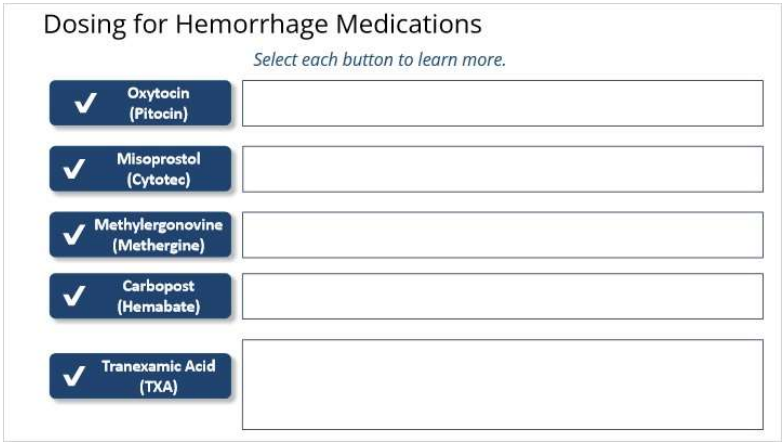
Emergency Department Trauma 3 Pyxis (Slide Layer)



Emergency Department B Pyxis (Slide Layer)

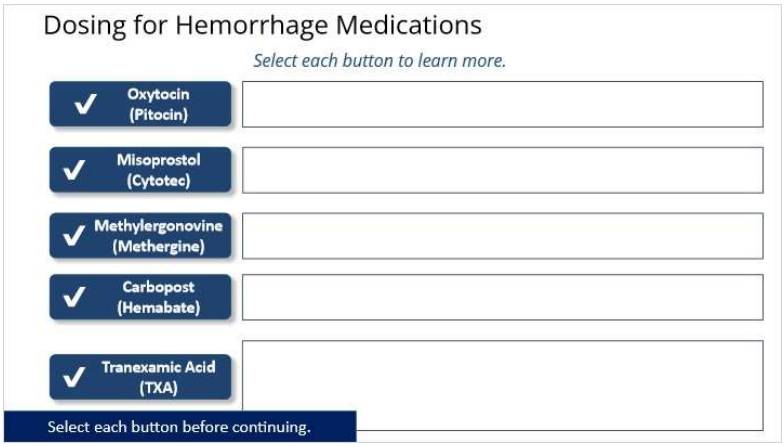


3.4 Dosing for Hemorrhage Medications

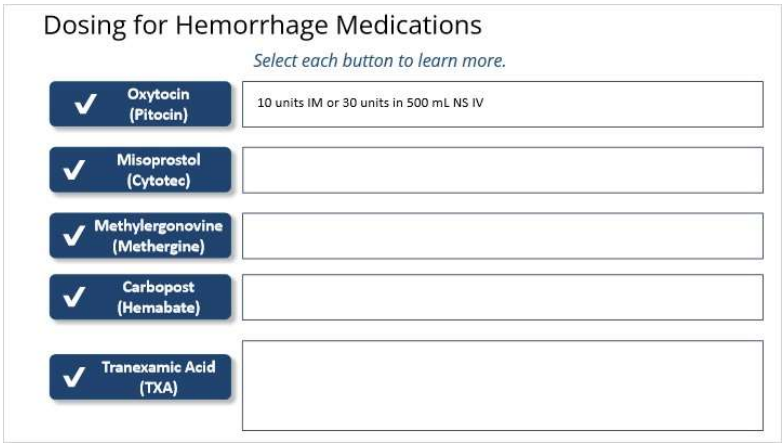


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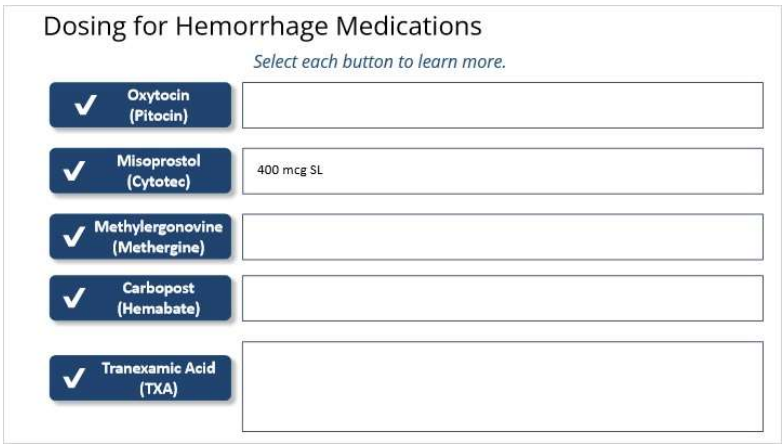
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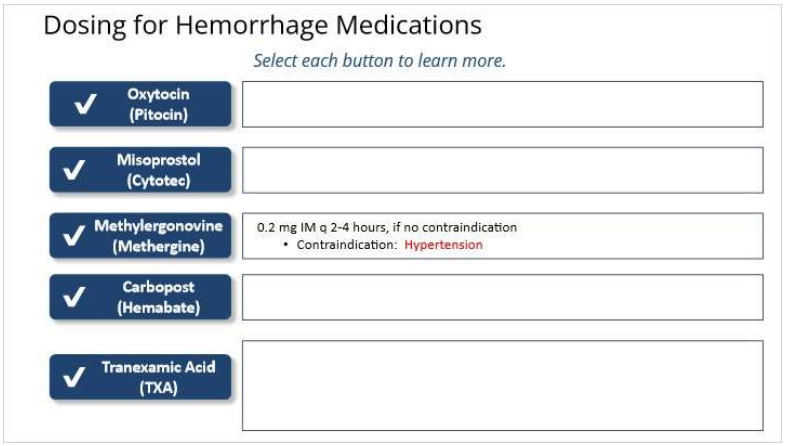
Oxytocin (Slide Layer)



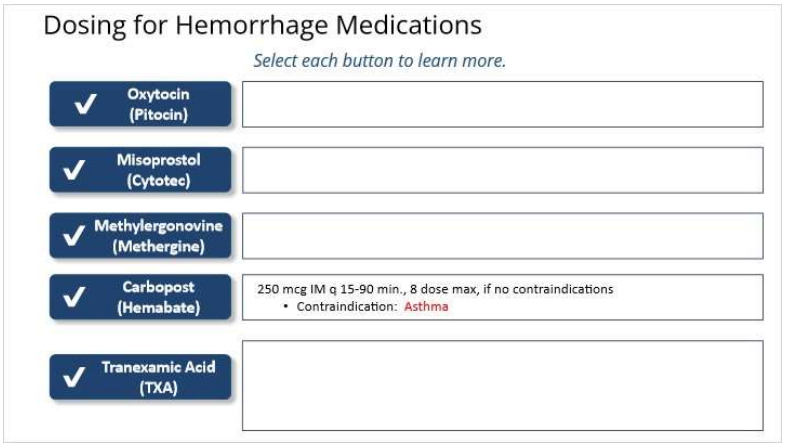
Misoprostol (Slide Layer)



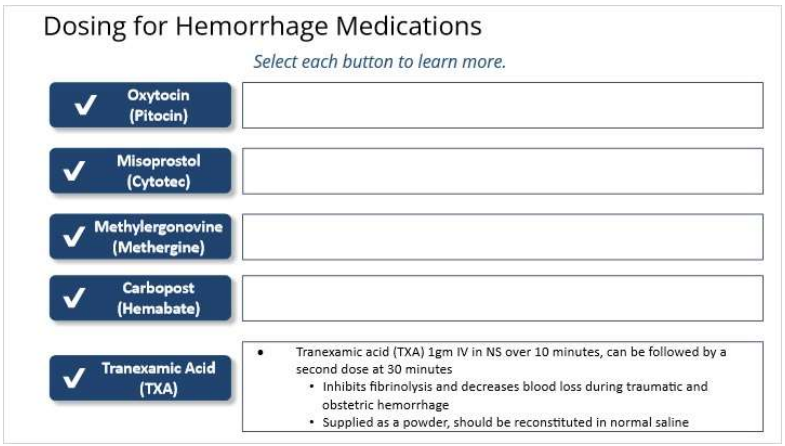
Methylergonovine (Slide Layer)



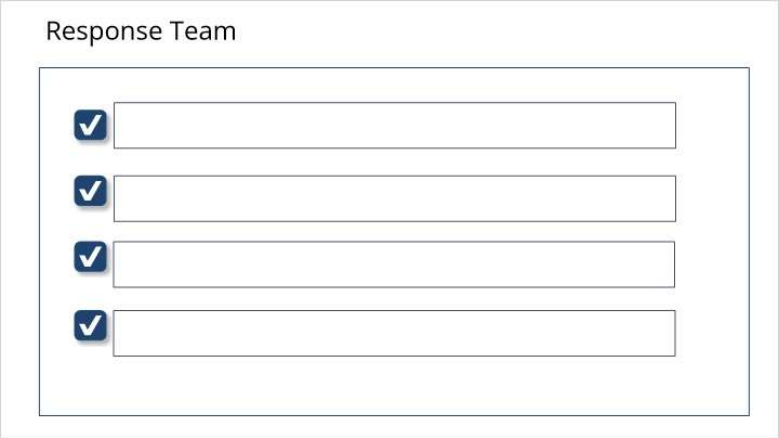
Carbopost (Slide Layer)



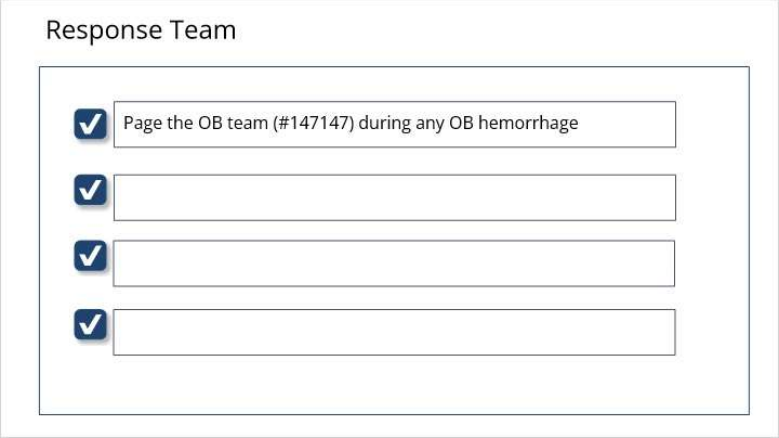
Tranexamic Acid (Slide Layer)



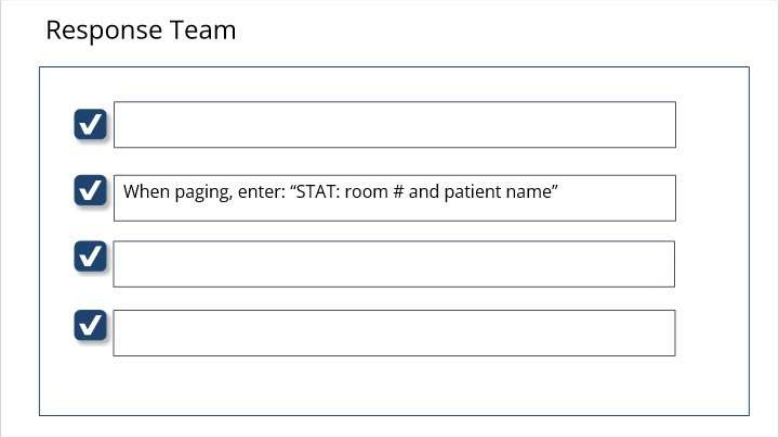
3.5 Response Team



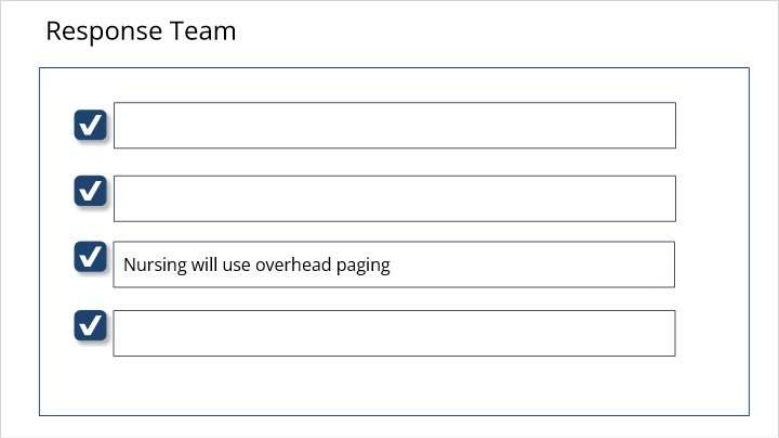
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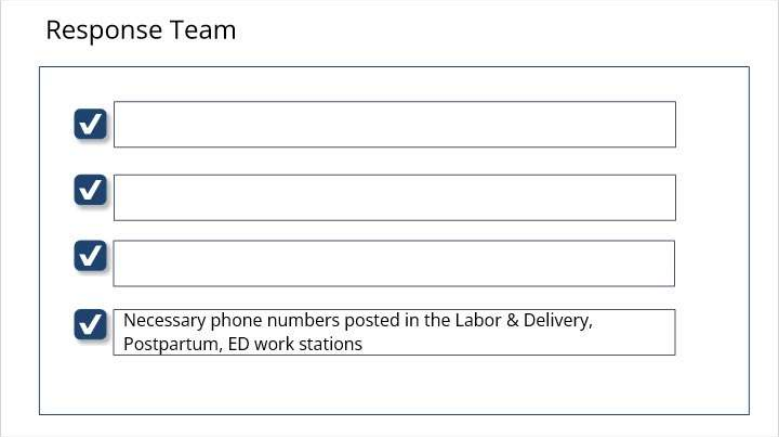
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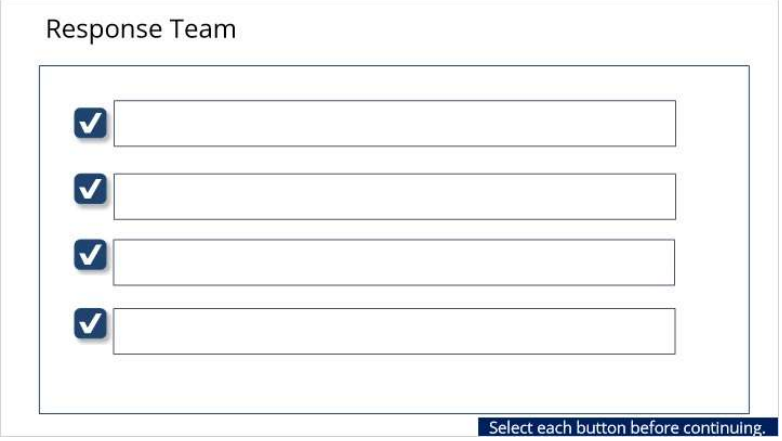
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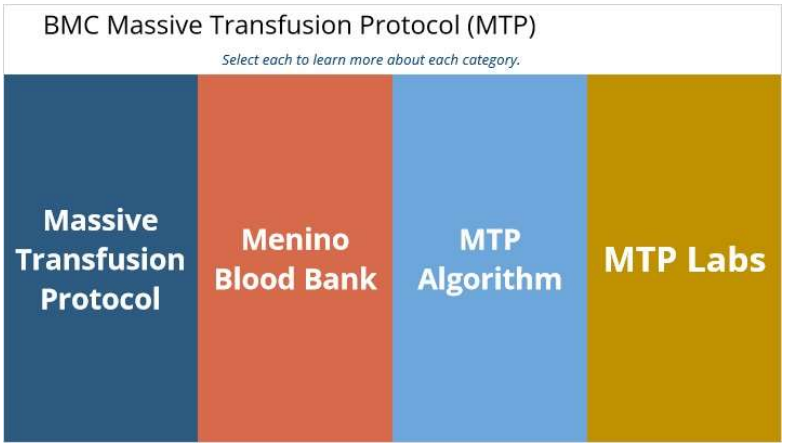
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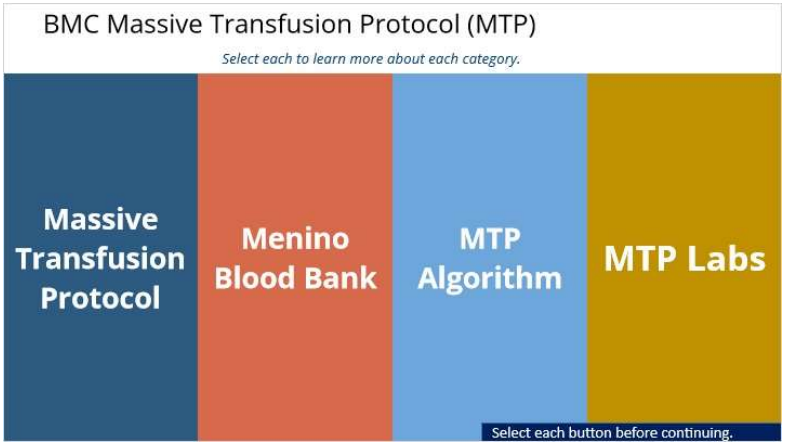
Reminder (Slide Layer)



3.6 Massive Transfusion Protocol (MTP)



Reminder (Slide Layer)

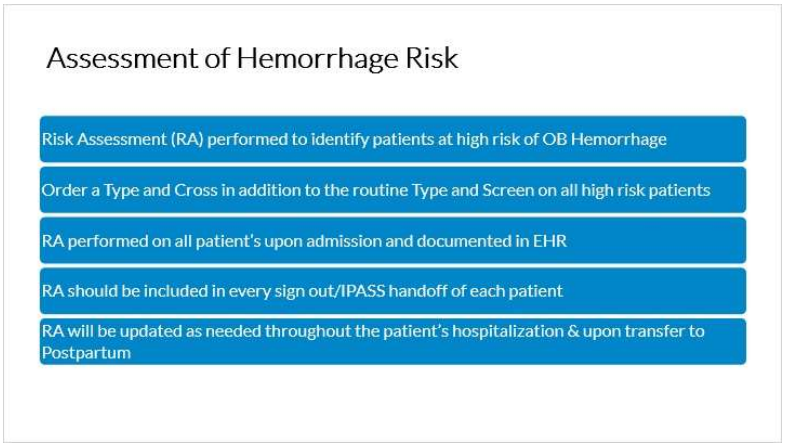


4. Recognition and Prevention

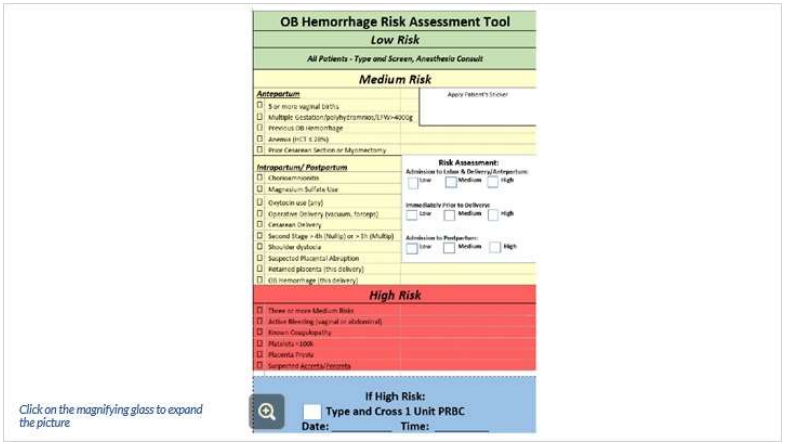
4.1 Recognition and Prevention



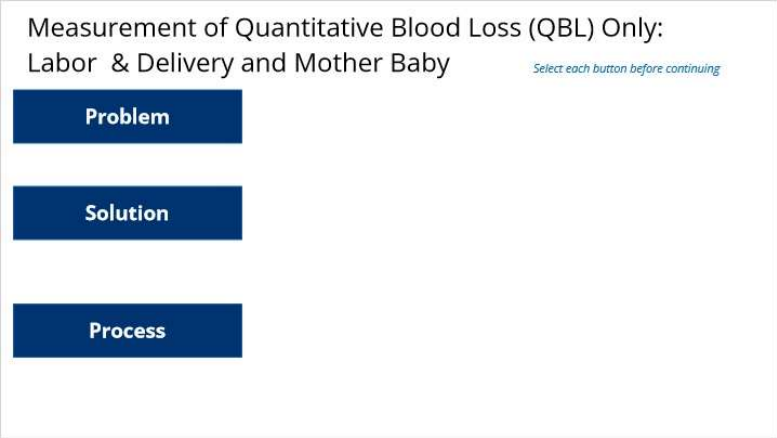
4.2 Assessment of Hemorrhage Risk



4.3 OB Hemorrhage Risk Assessment Tool



4.4 Measurement of Quantitative Blood Loss

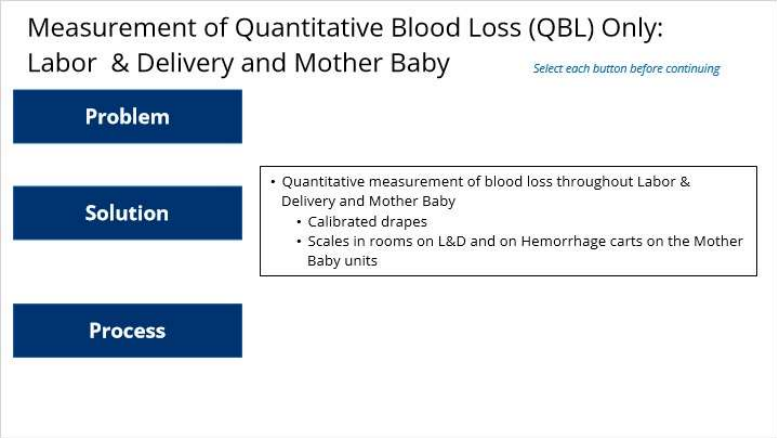


Notes:

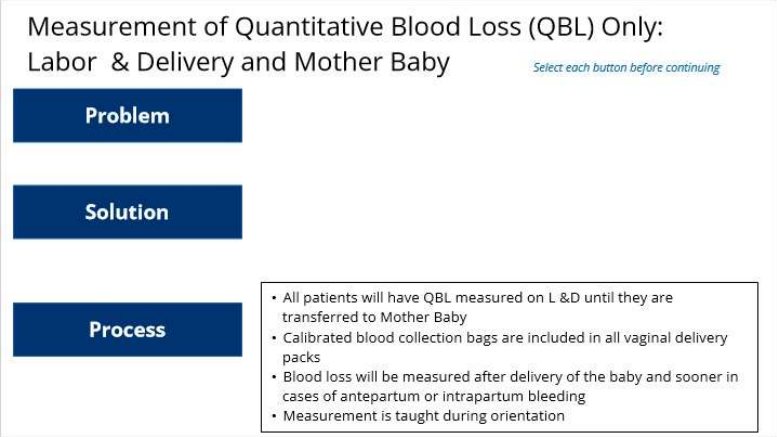
Problem (Slide Layer)



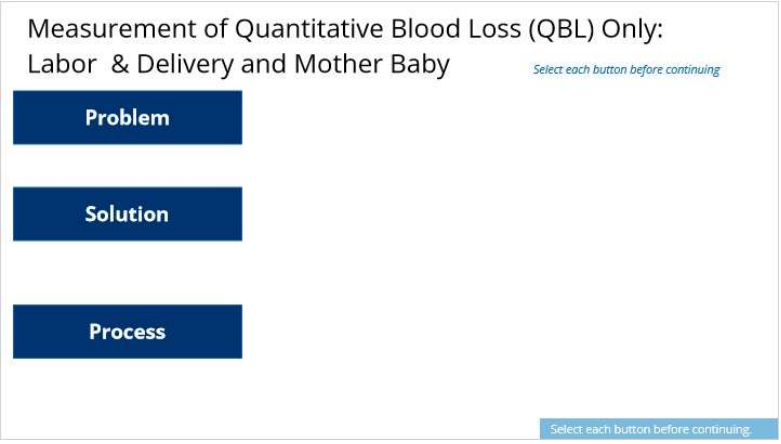
Solution (Slide Layer)



Process (Slide Layer)



Reminder (Slide Layer)



4.5 Scales and Weights

Scales and Weights

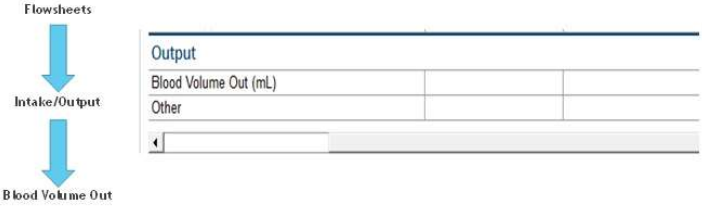
Example:
1 gram = 1 mL
Dry item weighs 20 grams
Bloody item weighs 400 grams
Bloody item 400 g – Dry item 20 g = 380 g= 380 mL



4.6 Epic Documentation

Epic Documentation

Extremely Important: Document Quantitative Blood Loss during delivery on Delivery Summary! Any additional bleeding post delivery is placed on the I&O Flowsheet in EPIC



4.7 Active Management of the Third Stage of Labor

Active Management of the Third Stage of Labor

- Oxytocin for active management of third stage labor, postpartum oxytocin
- Oxytocin 30mg/500 mL NS IV via Guardrails
- Dose/rate is the same if a patient is on Magnesium Sulfate. If there is concern regarding fluid overload discuss with provider.

5. Readiness Lightboxes

5.1 Hemorrhage Supplies L & D

Hemorrhage Cart Supplies Labor & Delivery

OB Hemorrhage Cart/Content Checklist located in the L&D OR Suite Sterile Supply Room





Drawer	Description	Contents	#	Checked	Expiration Date
Top of Cart	Instructions	Reference Binder	1		
		Map to Blood Bank	1		
		OB Hemorrhage Training Power Point	1		
Drawer 1					
4	IV Start Kits	18 gauge angio cath	1		
		20 gauge angio cath	1		
		Dressing/securing device	1		
		Saline Flush	1		
		Alcohol pads	2		
		Alligator connector	4		
		Saline lock	1		
		Roll of tape	1		
5	Blood Draw Supplies	Blue top 3ml tube	2		
		Purple top tube	2		
		Green top tube	1		
		Tourniquet	1		
		2X2 pads	1		
		Butterfly needle	1		
		Vacutainer	1		
Drawer 2					
2	Suction Supplies	Yankauer	2		
		Suction tubing	2		
1	BP Cuff	Manual BP Cuff	1		
2	Disposables	Light Covers	2		
Drawer 3					
2	Vaginal Dressings	Vaginal packing	2		
		X-ray Sponges	2		
		Vaginal Pray	2		
	Disposables	Lubricating Jelly	Bunch		
Drawer 4					
1	Bakri Balloon	Bakri balloon	1		
	Disposables	Sterile Gowns	4		
Drawer 5					
3	Solutions	Saline Bottle	3		
	Syringes	60 ML Syringe	2		
		10 ML Syringe	2		
	Sterile Bowl	Sterile Bowl	2		
	Urinary	Straight Cath	2		
Drawer 6					
	Instruments	D&E kit	1		
		Laceration kit	1		
	Urinary	Foley Catheter	1		
	Disposables	Lithotomy Pack	2		

Click magnifying class to enlarge image

5.2 Hemorrhage Cart Supplies Mother Baby

Hemorrhage Cart Supplies Mother Baby

OB Hemorrhage Carts/Content Checklist located on East & North Mother Baby Units





Click magnifying class to enlarge image

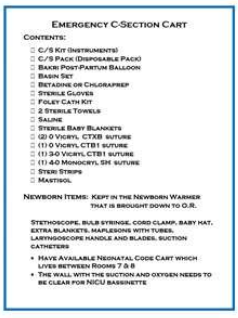
5.3 Hemorrhage Supplies Main OR

Hemorrhage Supplies Main OR

C/S Emergency Cart/Content List outside Core 2 in the alcove







EMERGENCY C-SECTION CART

CONTENTS:

- C/S KIT (INSTRUMENTS)
- C/S PACK (DISPOSABLE PACK)
- BAKRI POST-PARTUM BALLOON
- BASIN SET
- BETADINE OR CHLORAPREP
- STERILE GLOVES
- FOLEY CATH KIT
- 2 STERILE TOWELS
- SALINE
- STERILE BABY BLANKETS
- (2) 0 VICRYL, CT3X SUTURE
- (1) 0 VICRYL, CTB1 SUTURE
- (1) 3-0 VICRYL, CTB1 SUTURE
- (1) 4-0 MONOCRYL, SH SUTURE
- STERI STRIPS
- MAXITSOL

NEWBORN ITEMS: KEPT IN THE NEWBORN WARMER THAT IS BROUGHT DOWN TO O.R.

STETHOSCOPE, BULB SYRINGE, CORD CLAMP, BABY HAT, EXTRA BLANKETS, MAPLESONS WITH TUBES, LARYNGOSCOPE HANDLE AND BLADES, SUCTION CATHETERS

- HAVE AVAILABLE NEONATAL CODE CART WHICH LIVES BETWEEN ROOMS 7 & 8
- THE WALL WITH THE SUCTION AND OXYGEN NEEDS TO BE CLEAR FOR NICU BASSINETTE

Click magnifying class to enlarge image

5.4 Hemorrhage Supplies ED

Hemorrhage Supplies ED

L & D shelf with a Vaginal Delivery Kit & ER Emergency C/S kit located in Trauma 1

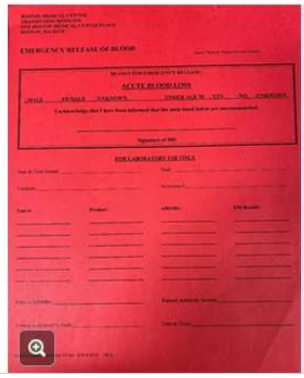


Click magnifying class to enlarge image

5.5 Massive Transfusion Protocol

- The BMC Massive Transfusion Protocol (MTP) on the BMC website includes OB Hemorrhage
- A copy of the MTP protocol is included in the OB Hemorrhage Carts & red forms which are needed to send for initial blood for patients without a current T&S, signature from MD request makes for smoother process
- Once the MTP is activated, the Unit Charge Nurse will assign a runner to get blood from the blood bank

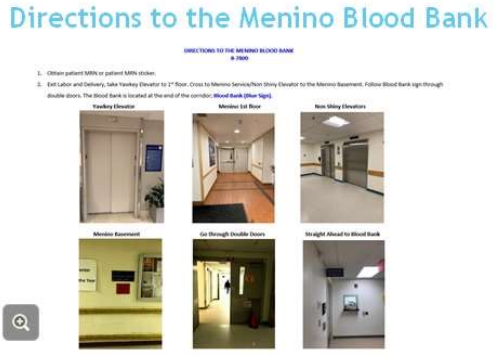
Click on magnifying glass to zoom picture



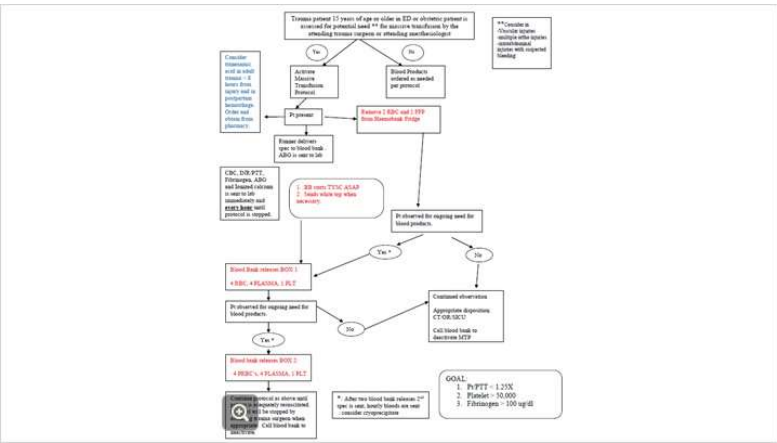
5.6 Menino Blood Bank

- The blood bank is located in the Menino basement
- Review map for blood bank location, including directions and photos. The map is in the OB hemorrhage cart

Click on magnifying glass to zoom picture



5.7 MTP Algorithm



5.8 MTP

- Regular evaluation of coagulation factors and systemic perfusion is a key part of the MTP
- Send the following labs hourly once the MTP is activated:
    - CBC (purple top tube), 1 mL
    - PT/PTT, Fibrinogen (light blue tube), 2.7 mL
        - Send both to main lab, 670 Albany: 4-4060. P-tube 675
    - Blood gas, lactate, Ca++ (heparinized syringe), 1 mL, send to Menino Blood Gas Lab: 4-4069 P-tube 68

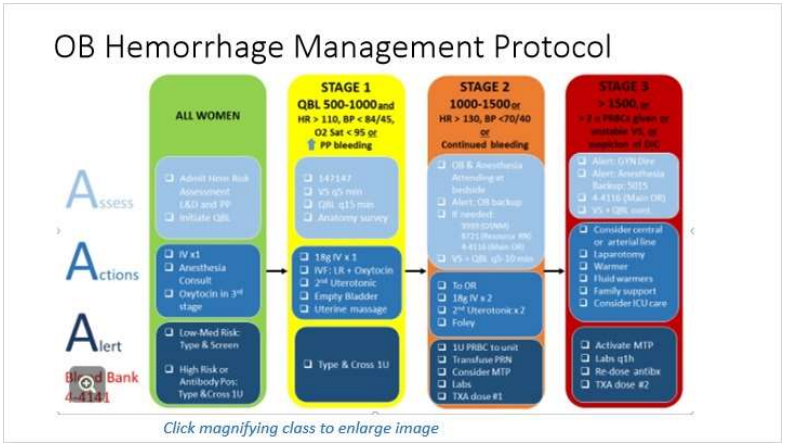
6. Response

6.1 Response



Notes:

6.2 OB Hemorrhage Management Protocol



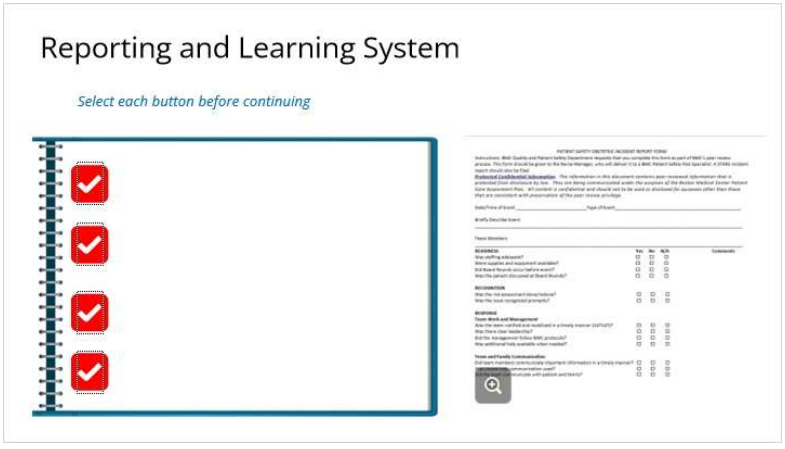
7. Support & Learning System

7.1 Support & Learning System



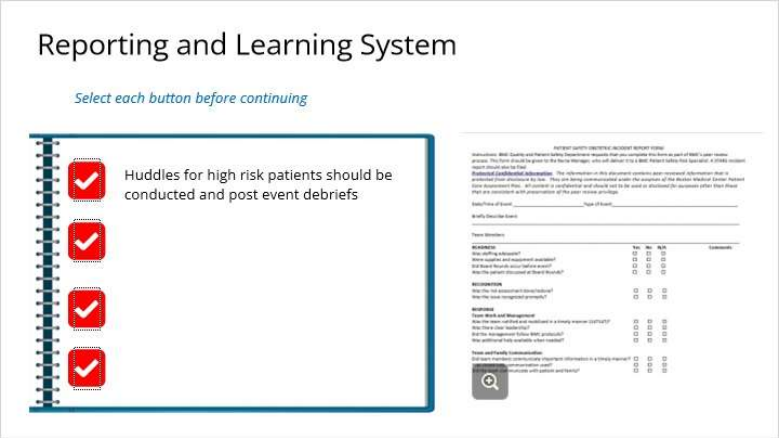
Notes:

7.2 Reporting and Learning System

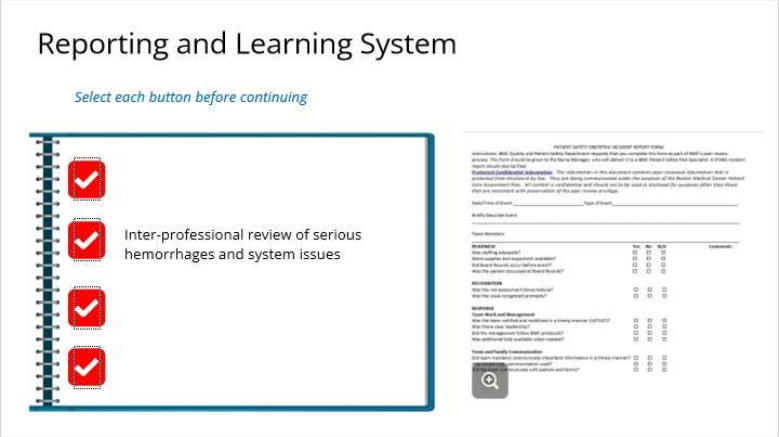


Notes:

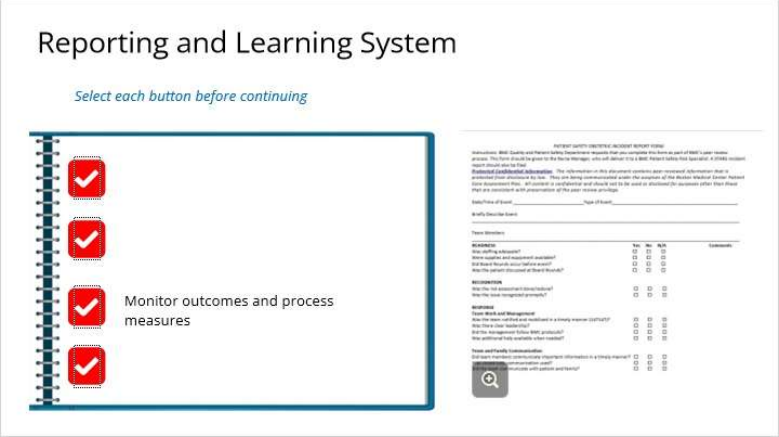
Button 1 (Slide Layer)



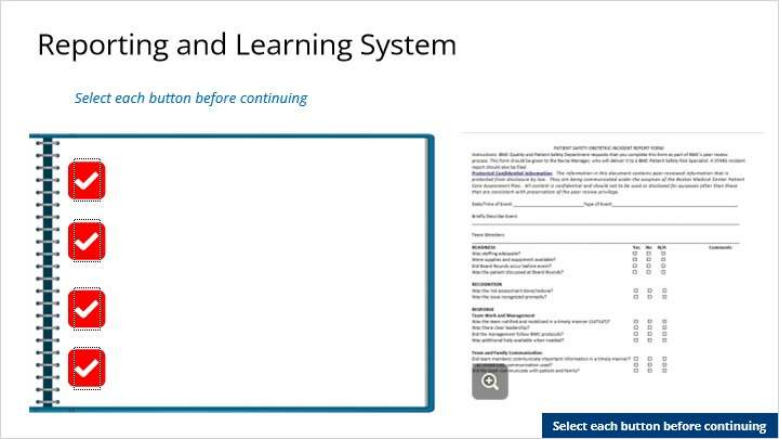
Button 2 (Slide Layer)



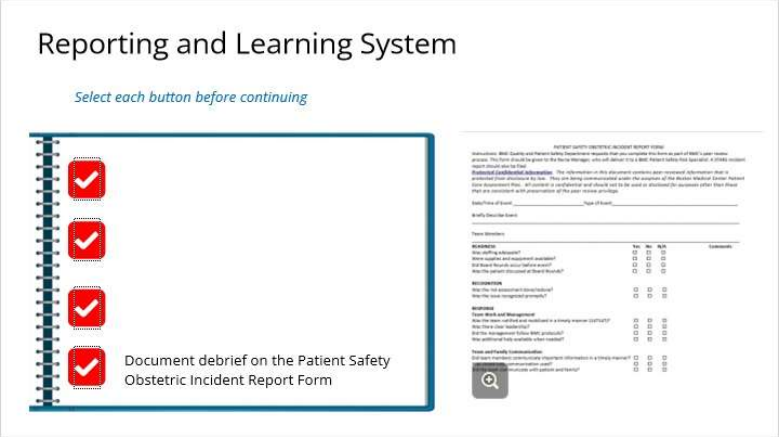
Button 3 (Slide Layer)



Reminder (Slide Layer)

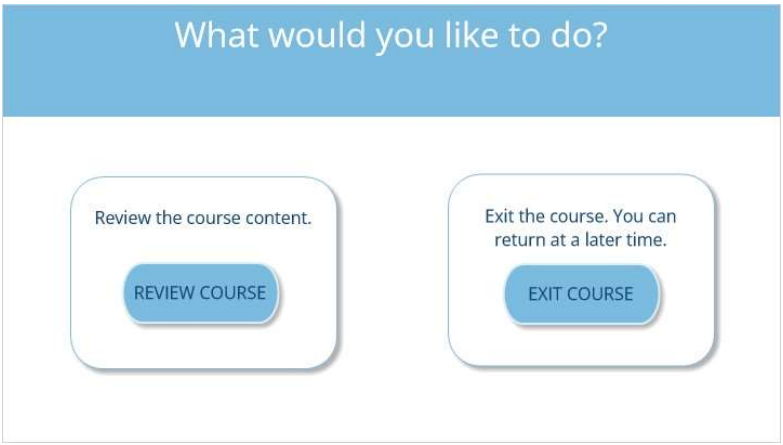


Button 4 (Slide Layer)



8. Thank You

8.1 Thank you



Hypertension in Pregnancy

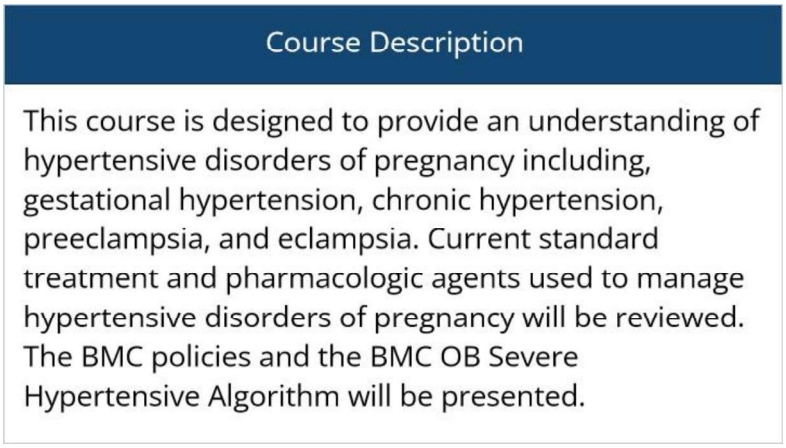
1. Home

1.1 Home



Notes:

1.2 Course Description



Notes:

1.3 Learning Objectives



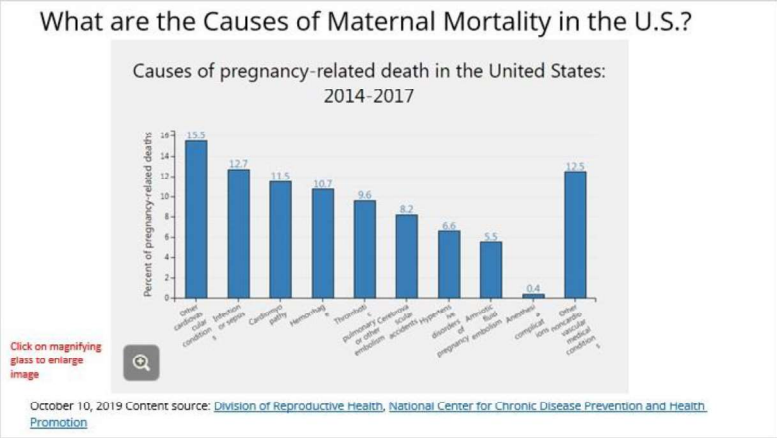
2. Hypertension in Pregnancy

2.1 Introduction



Notes:

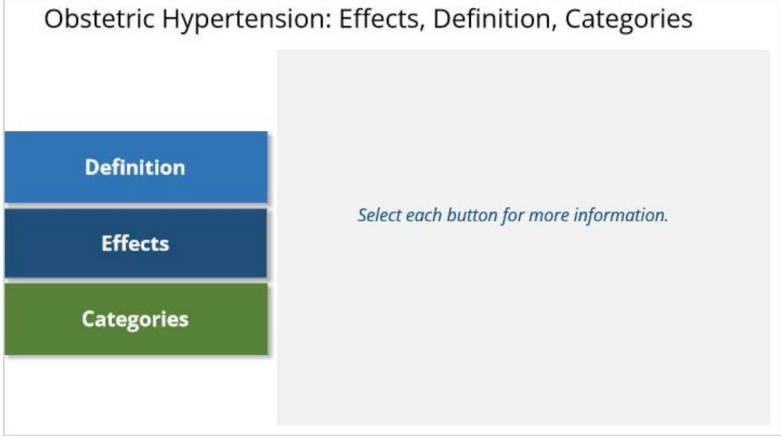
2.2 What are the Causes of Maternal Mortality in the U.S.?



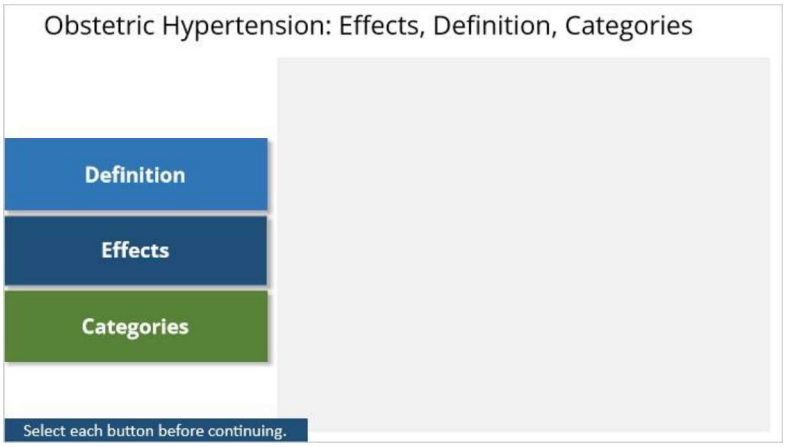
2.3 What are 3 Potential Delays in Medical Care?



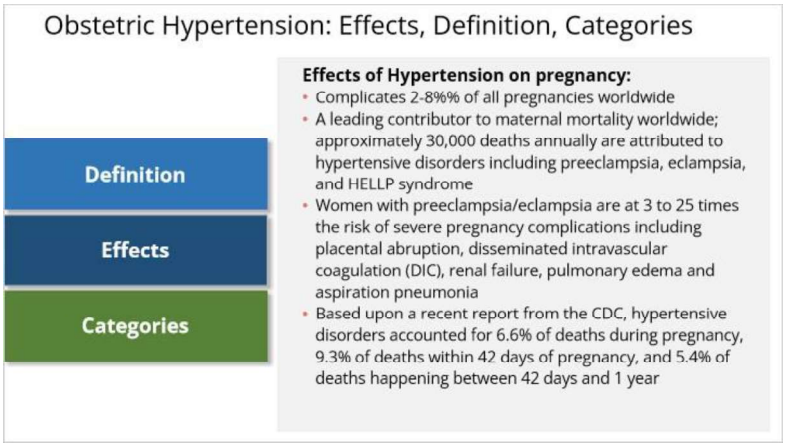
2.4 Obstetric Hypertension: Effects, Definition, Categories



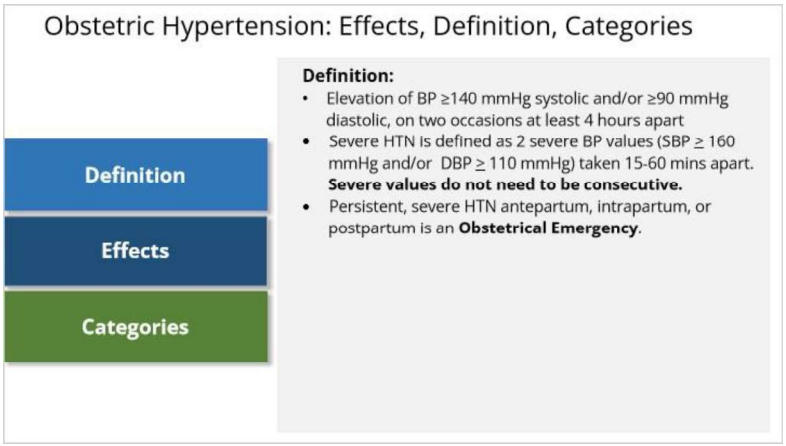
Reminder (Slide Layer)



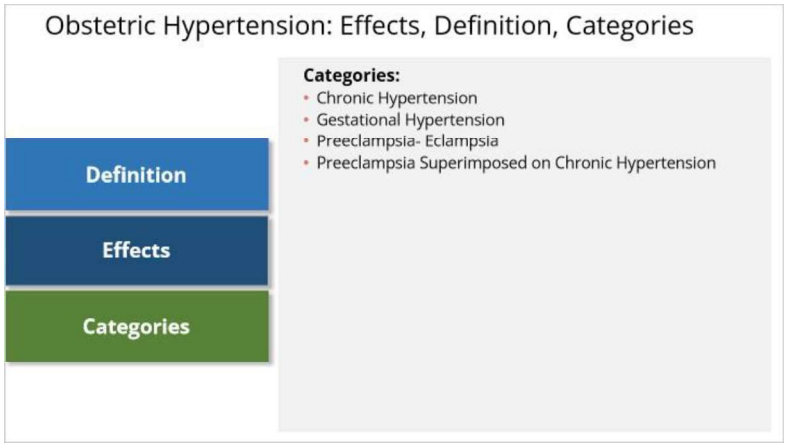
Effects (Slide Layer)



Definition (Slide Layer)



Categories (Slide Layer)



2.5 Procedure and Policies



Notes:

2.6 Proper Evidence Based Procedure for Performing an Accurate Blood Pressure

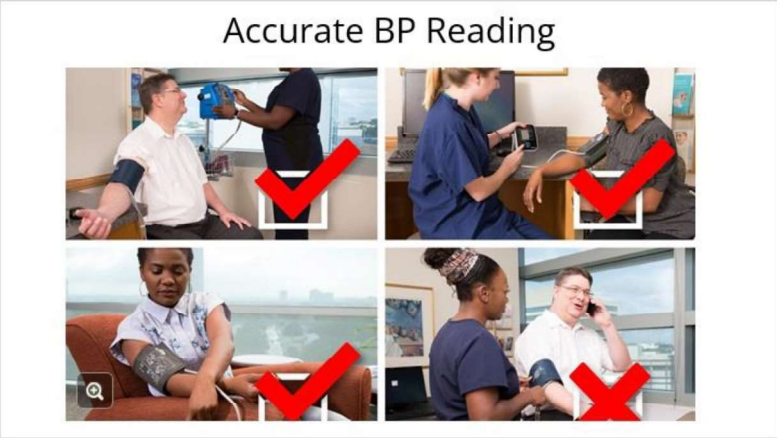


Notes:

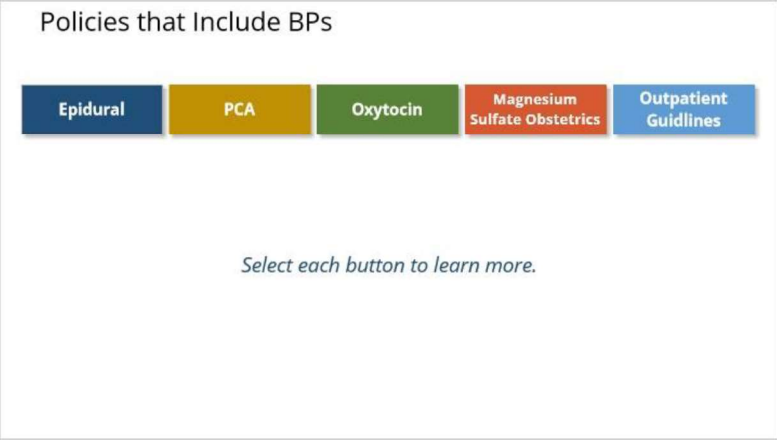
Reminder (Slide Layer)



2.7 Accurate BP Reading

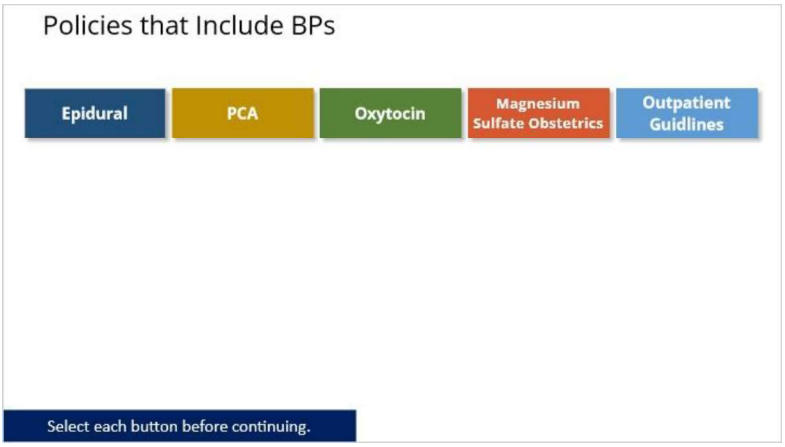


2.8 Policies that Include BPs

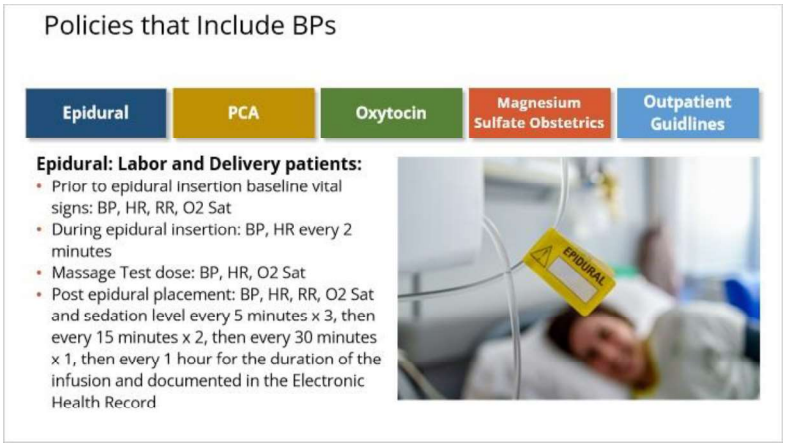


Notes:

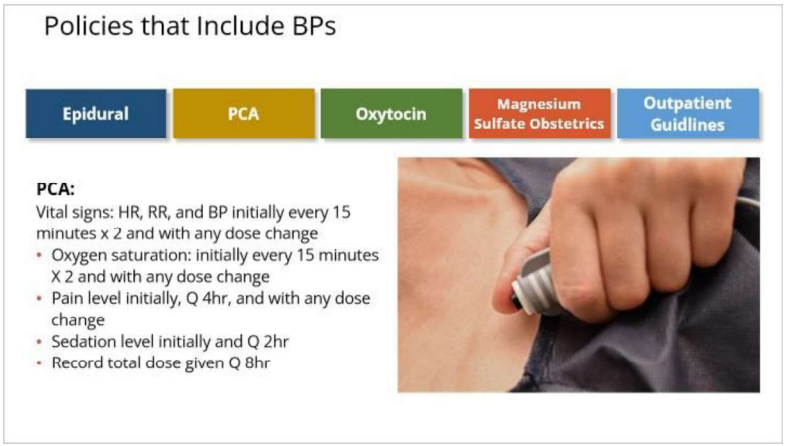
Reminder (Slide Layer)



Epidural (Slide Layer)



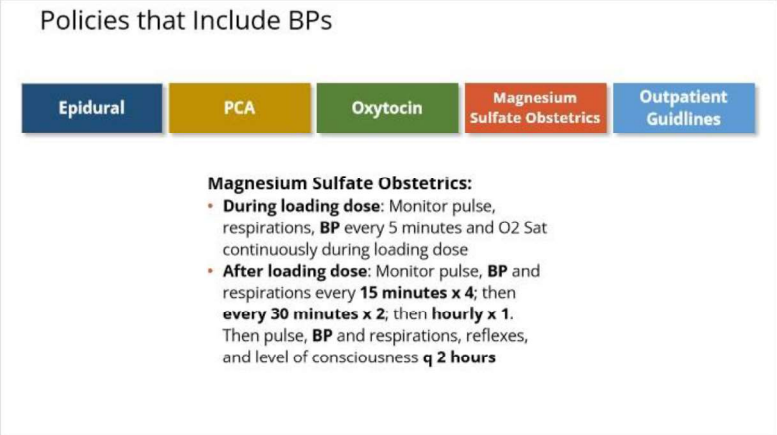
PCA (Slide Layer)



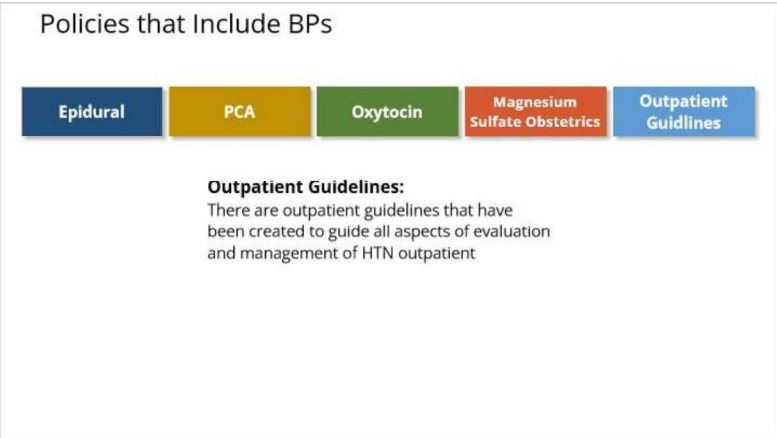
Oxytocin (Slide Layer)



Magnesium Sulfate (Slide Layer)



Outpatient (Slide Layer)

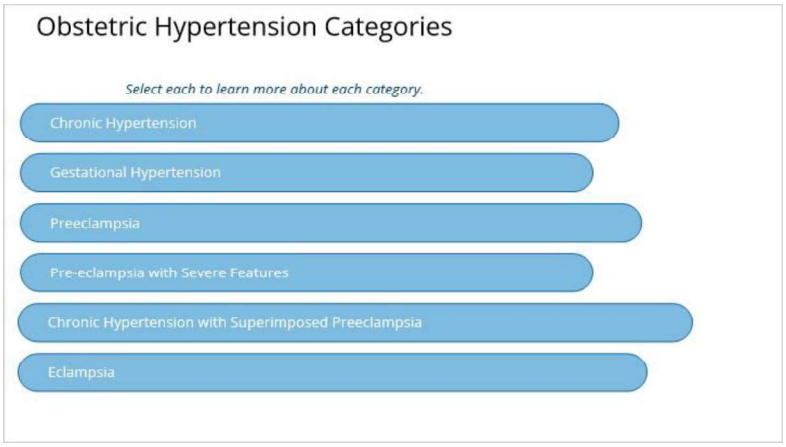


2.9 Categories, Complications, Evaluation, and Prevention



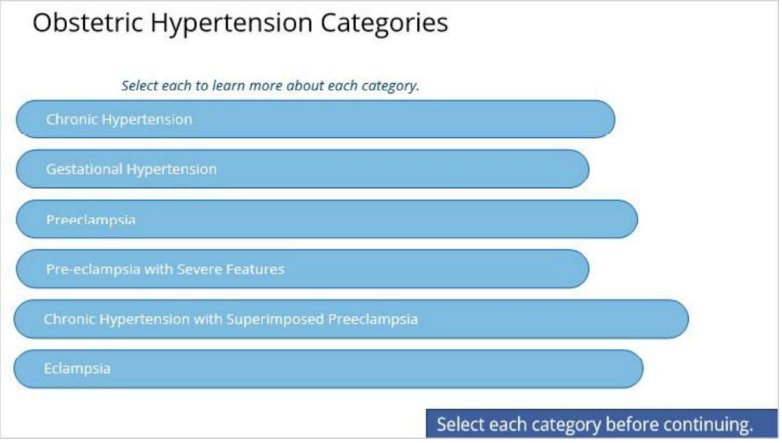
Notes:

2.10 Obstetric Hypertension Categories



Notes:

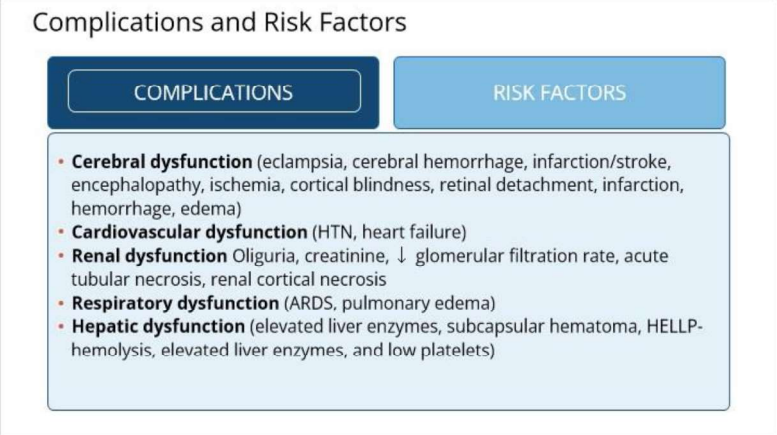
Reminder (Slide Layer)



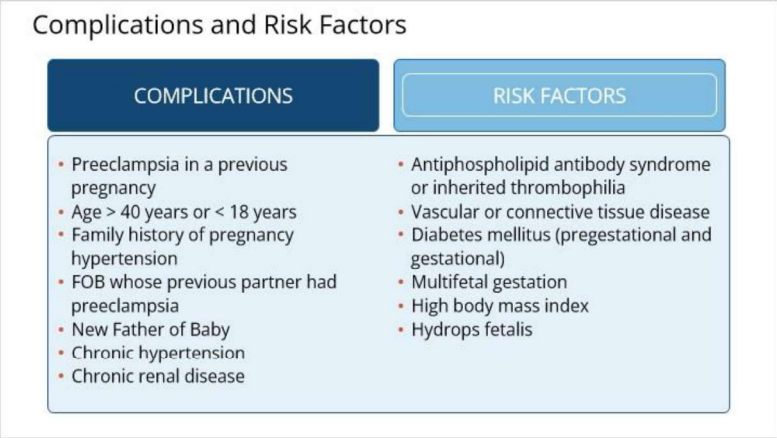
2.11 Complications and Risk Factors



Complications (Slide Layer)



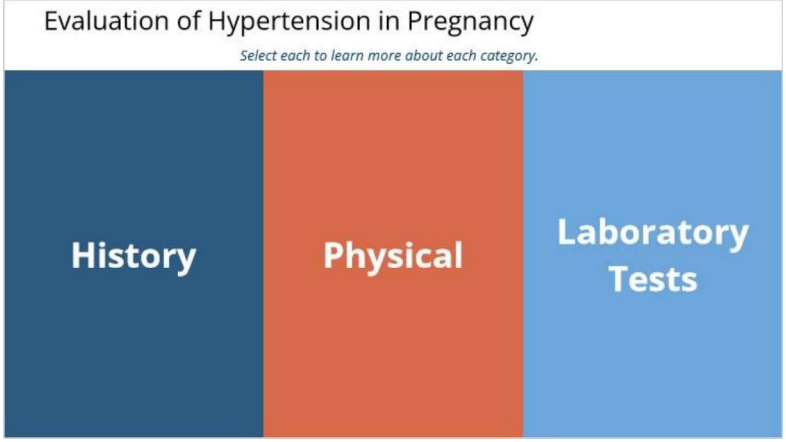
Risk Factors (Slide Layer)



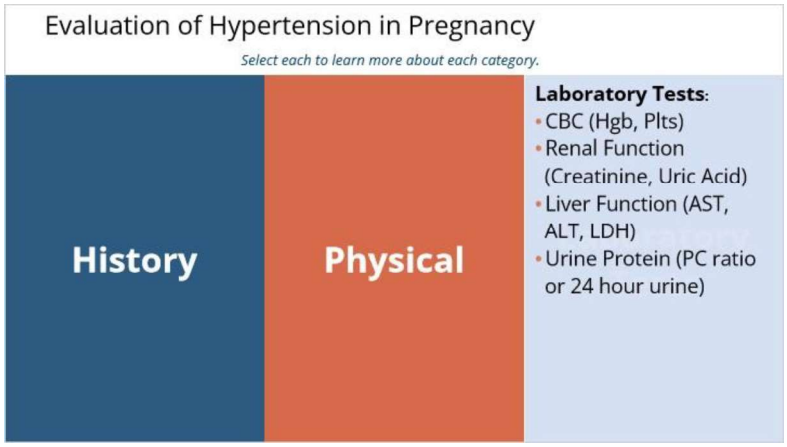
Reminder (Slide Layer)



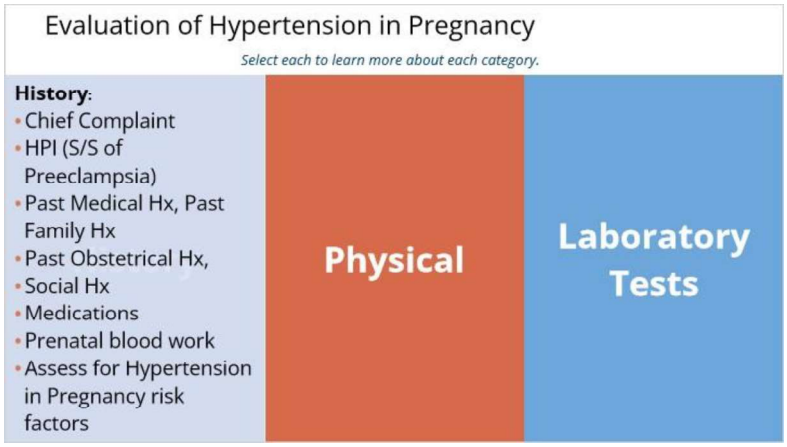
2.12 Evaluation of Hypertension in Pregnancy



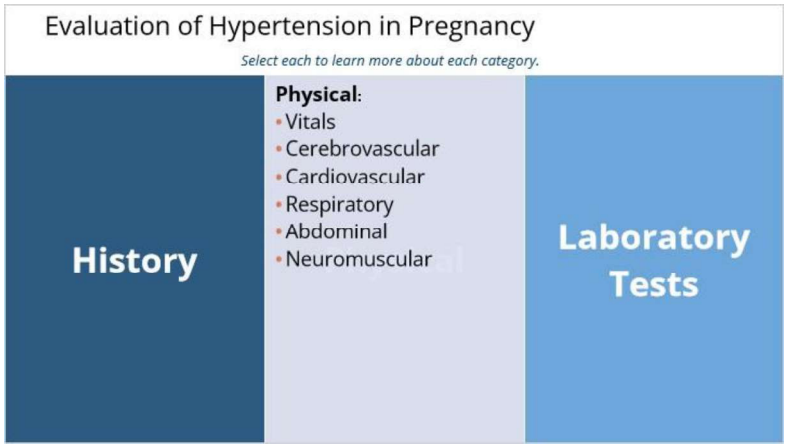
Laboratory Tests (Slide Layer)



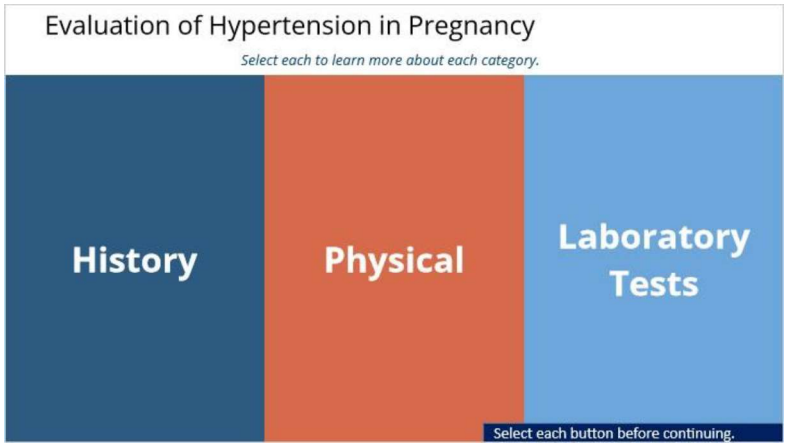
History (Slide Layer)



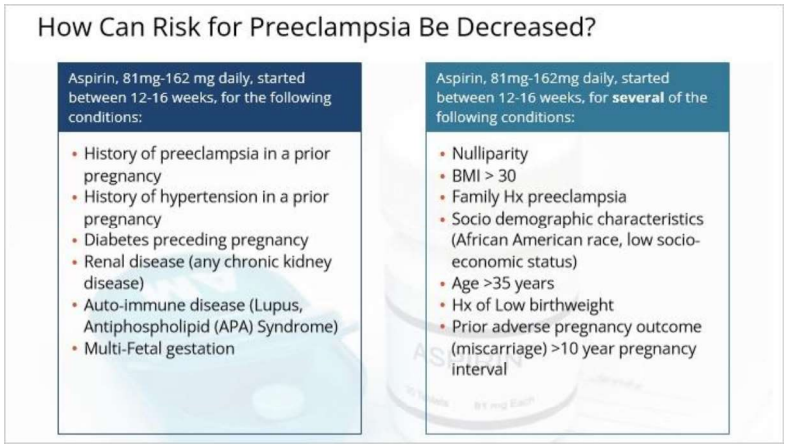
Physical (Slide Layer)



Reminder (Slide Layer)



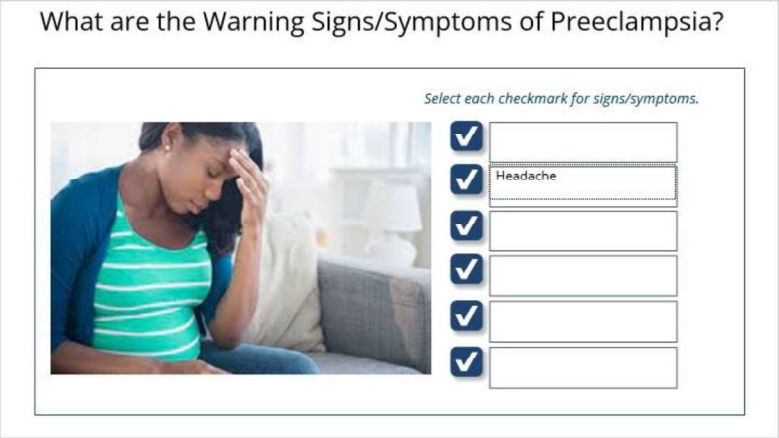
2.13 How Can Risk for Preeclampsia Be Decreased?



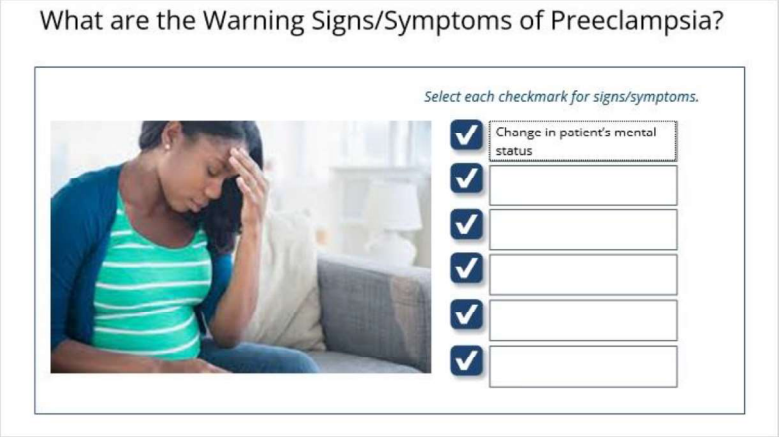
2.14 What are the Warning Signs/Symptoms of Preeclampsia?



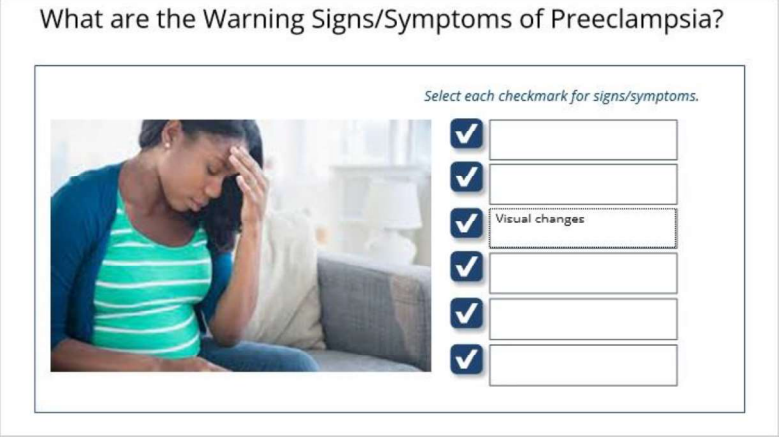
2 (Slide Layer)



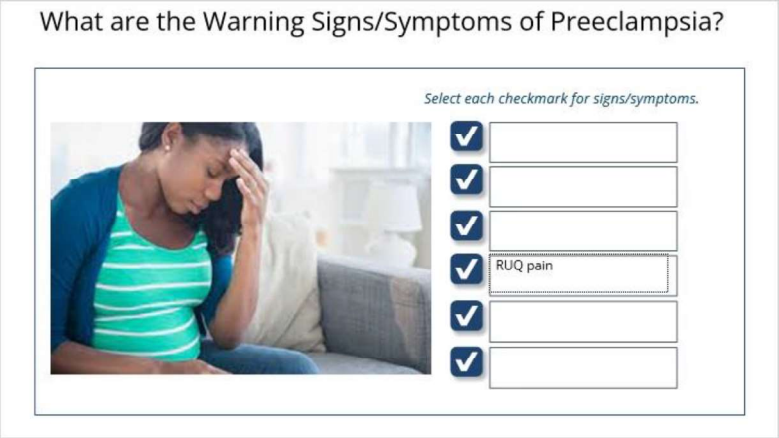
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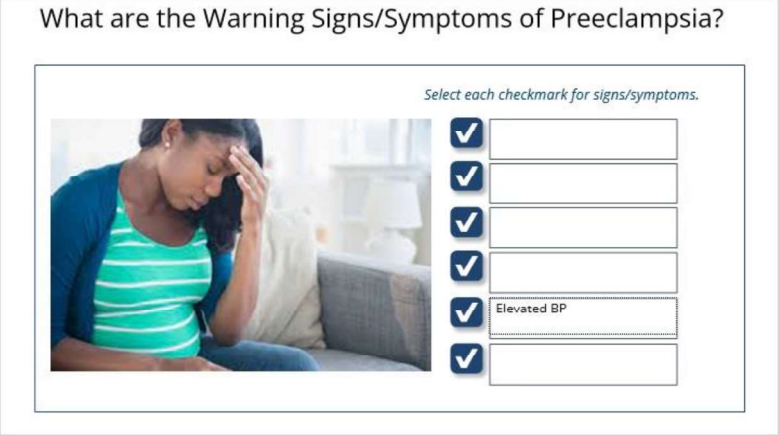
3 (Slide Layer)



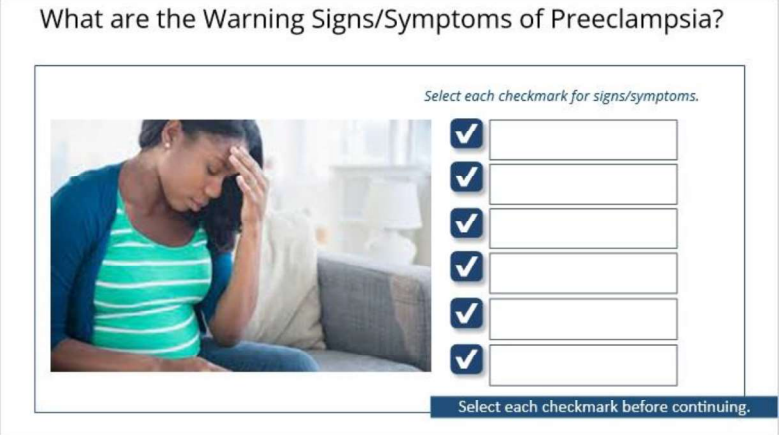
4 (Slide Layer)



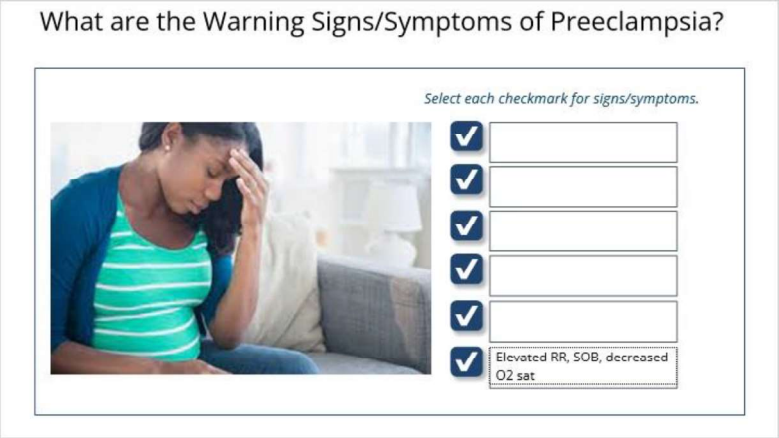
5 (Slide Layer)



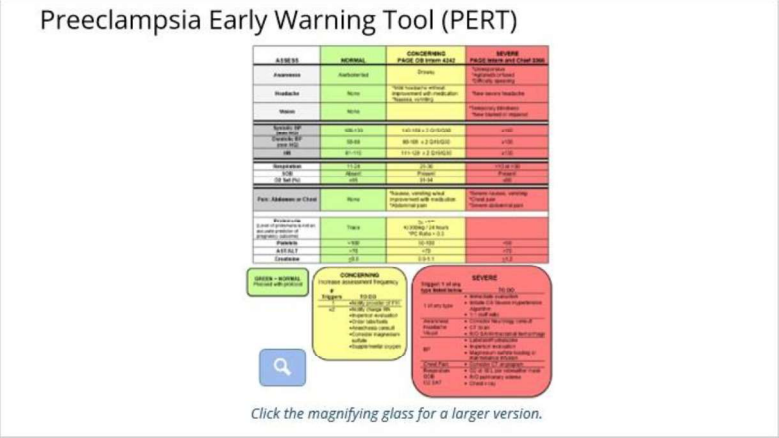
Reminder (Slide Layer)



6 (Slide Layer)



2.15 Preeclampsia Early Warning Tool (PERT)



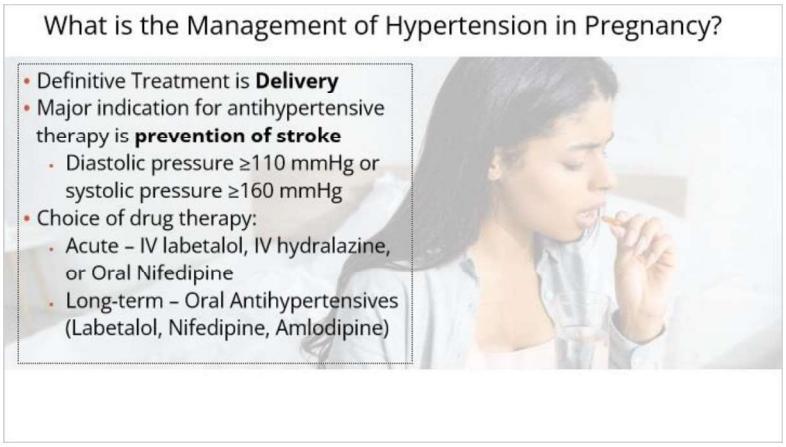
Notes:

2.16 Management

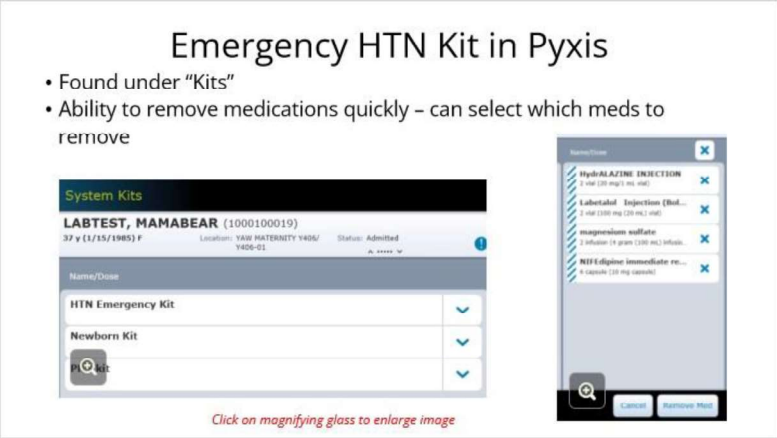


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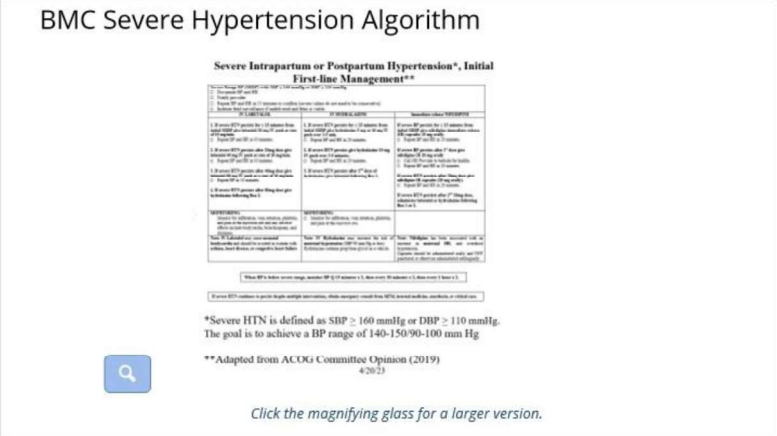
2.17 What is the Management of Hypertension in Pregnancy?



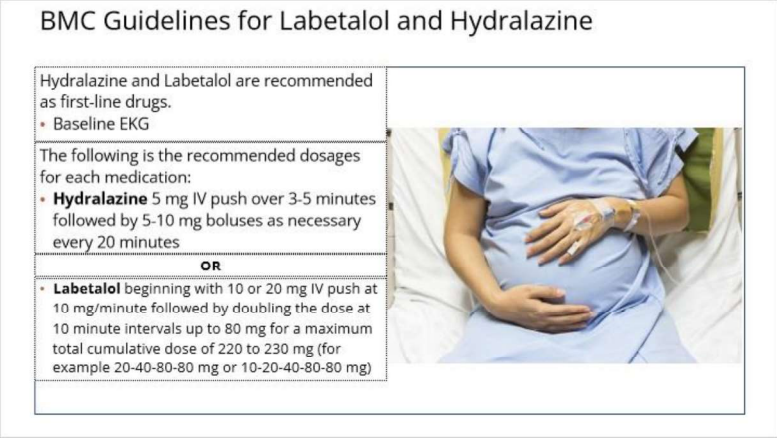
2.18 Emergency HTN Kit in Pyxis



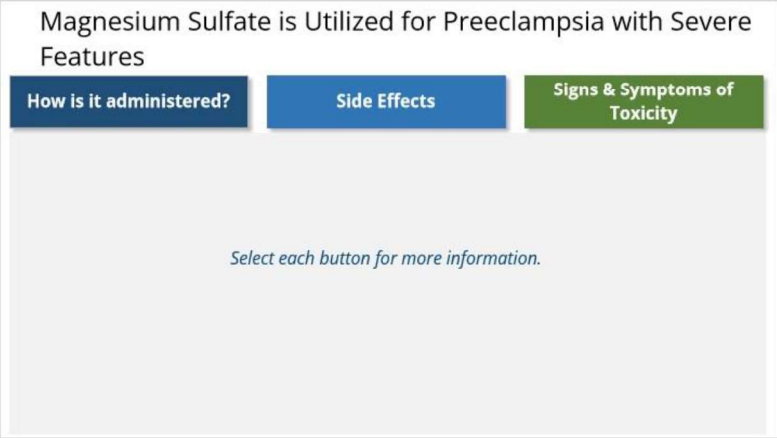
2.19 BMC Severe Hypertension Algorithm (continued)



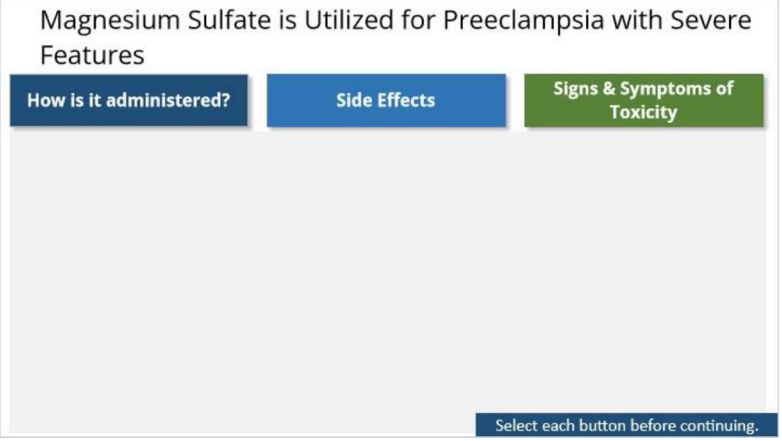
2.20 BMC Guidelines for Labetalol and Hydralazine



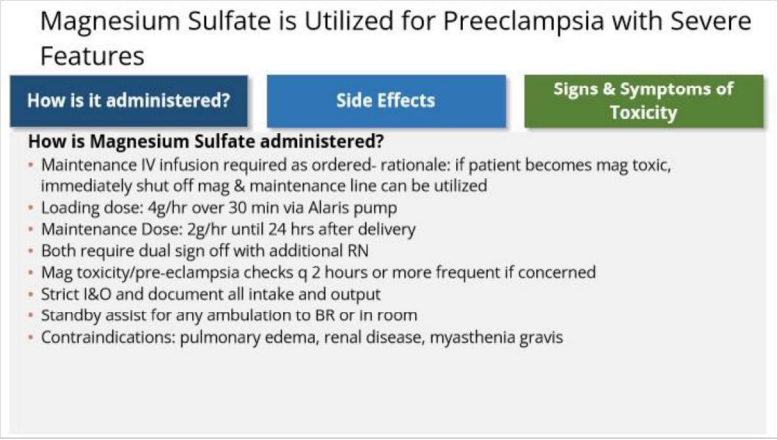
2.21 Magnesium Sulfate is Utilized for Preeclampsia with Severe Features



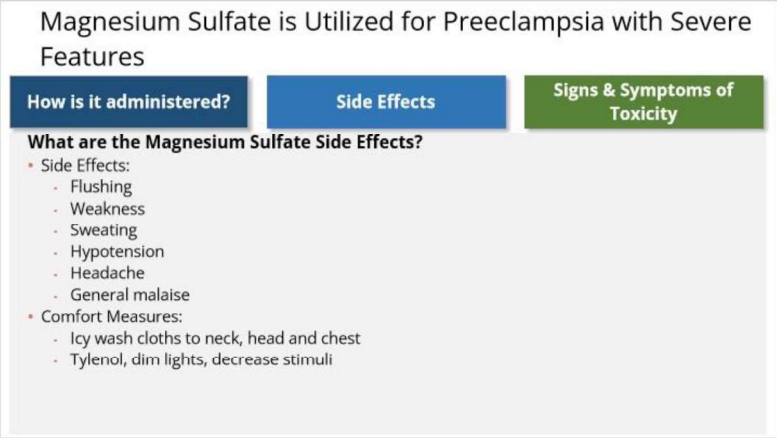
Reminder (Slide Layer)



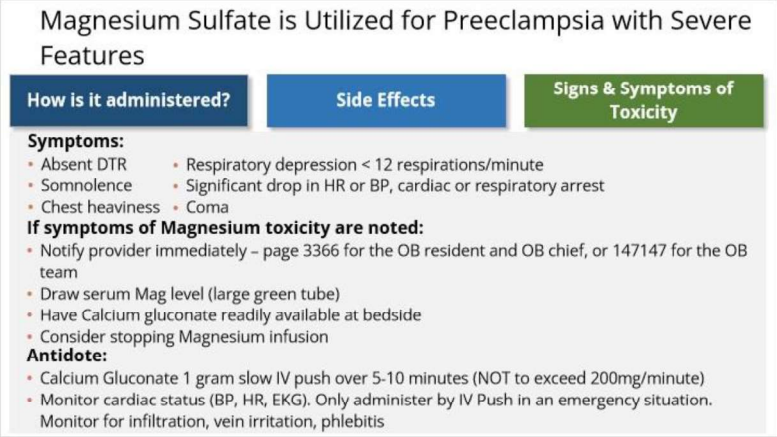
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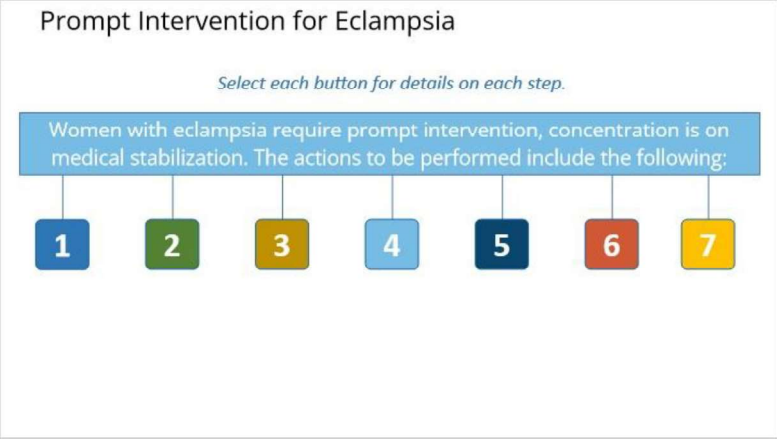
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Signs & Syptoms (Slide Layer)

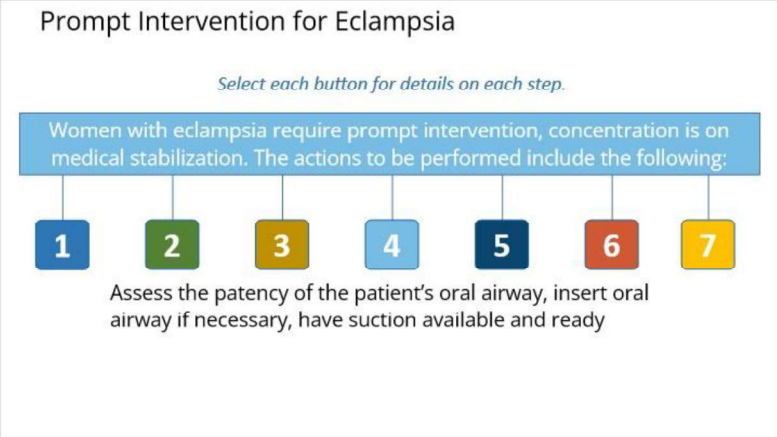


2.22 Prompt Intervention for Eclampsia

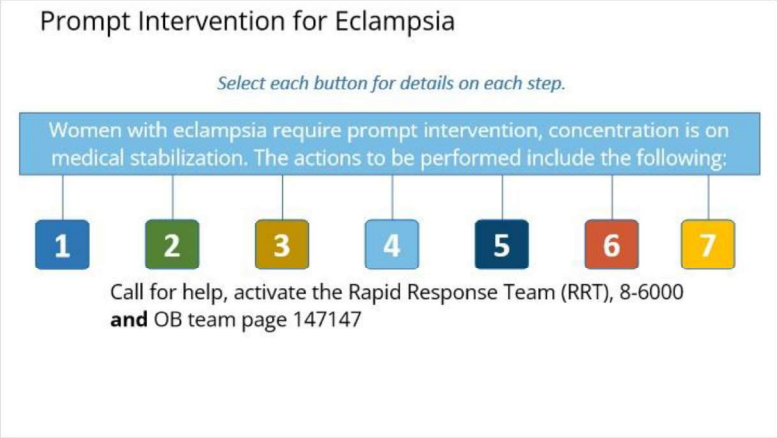


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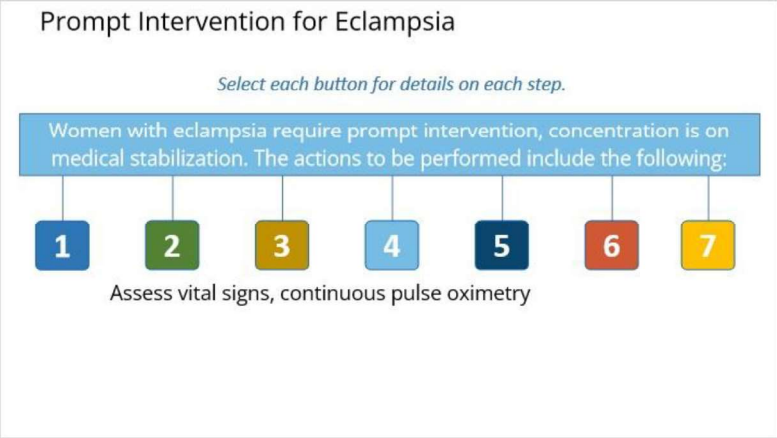
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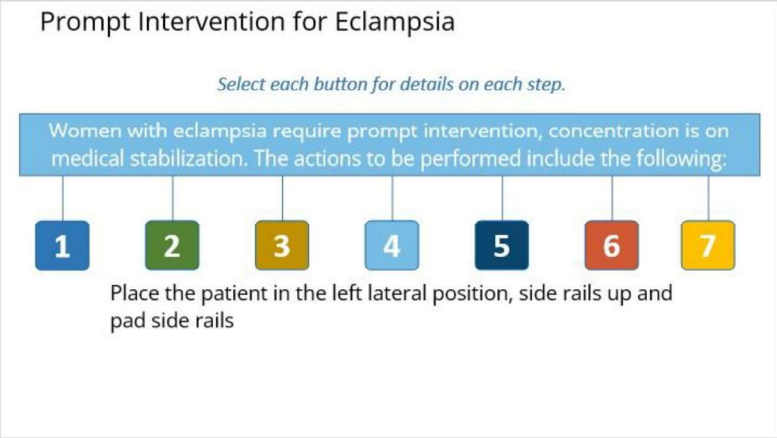
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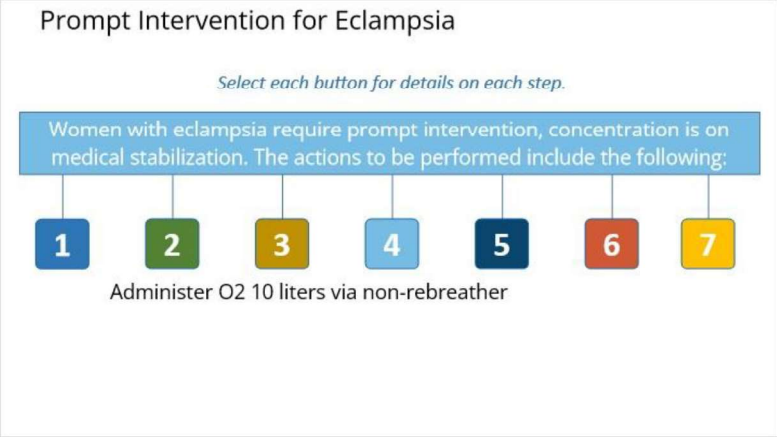
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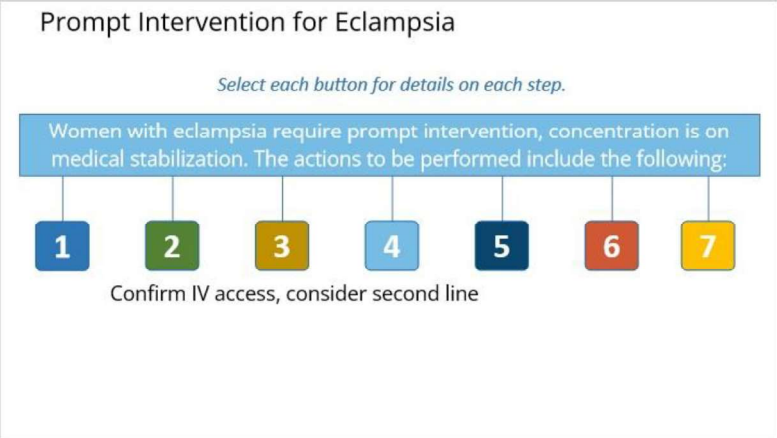
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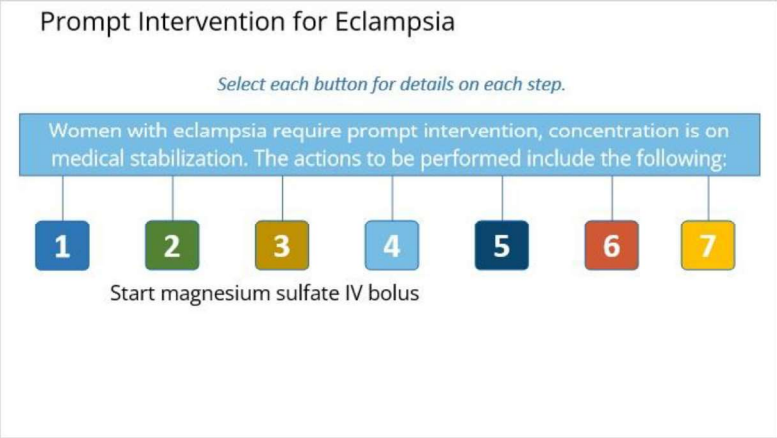
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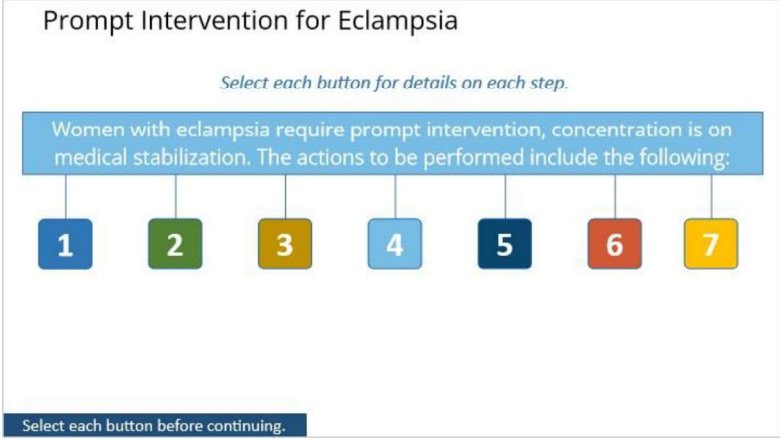
6 (Slide Layer)



7 (Slide Layer)



Reminder (Slide Layer)



2.23 What is the Management of Eclampsia?



Notes:

Reminder (Slide Layer)



2.24 After Delivery and AVS



Notes:

2.25 BP Management After Delivery



2.26 Long Term Risk of HTN in Pregnancy



2 (Slide Layer)



1 (Slide Layer)



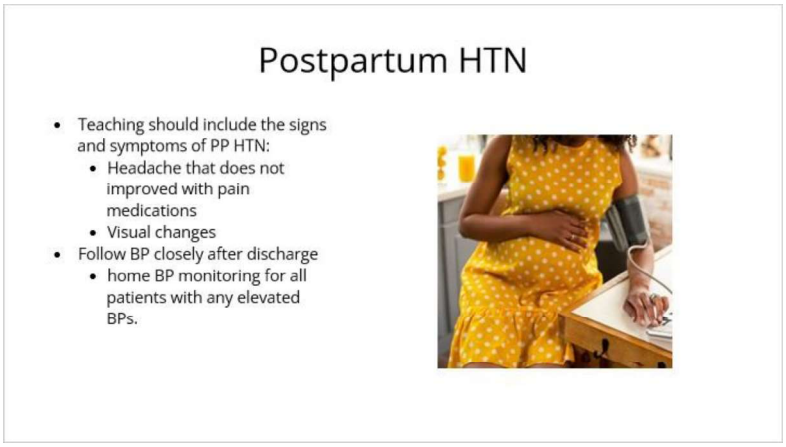
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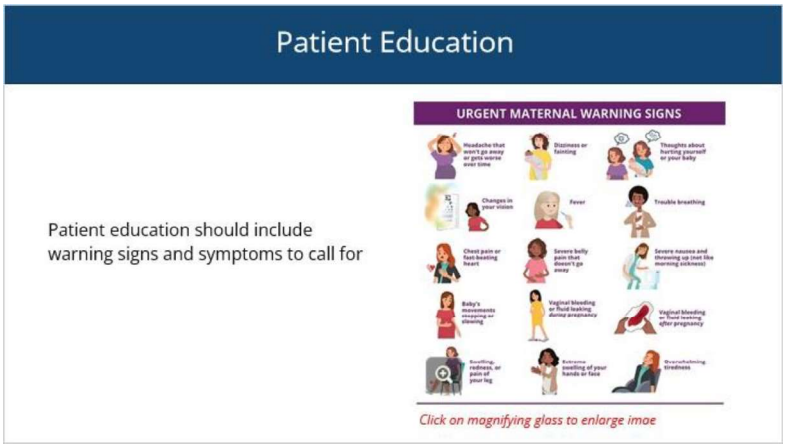
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2.27 Postpartum HTN



2.28 Patient Education

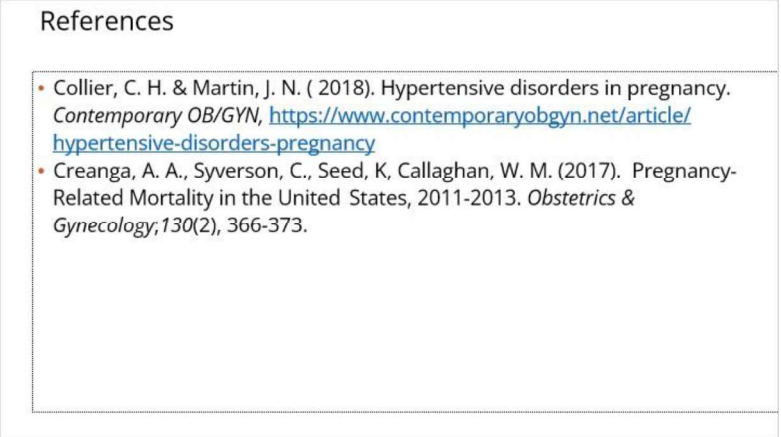


2.29 References



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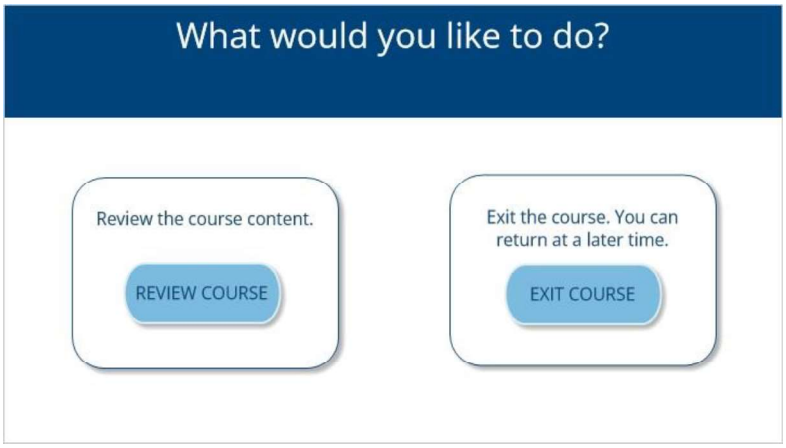
2.30 References



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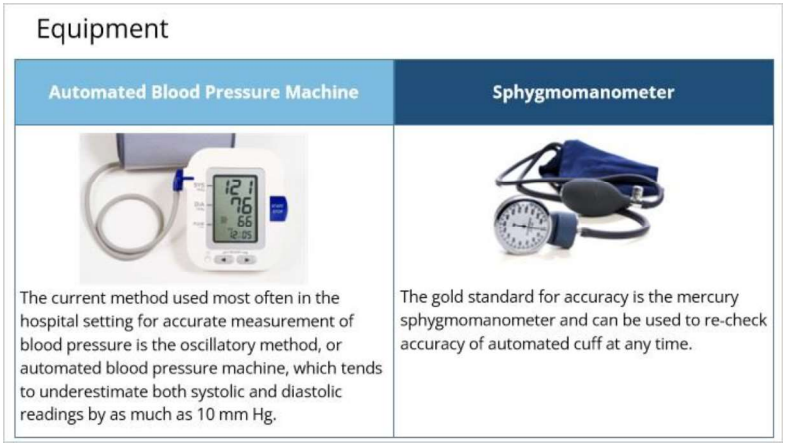
3. Thank you

3.1 Thank you

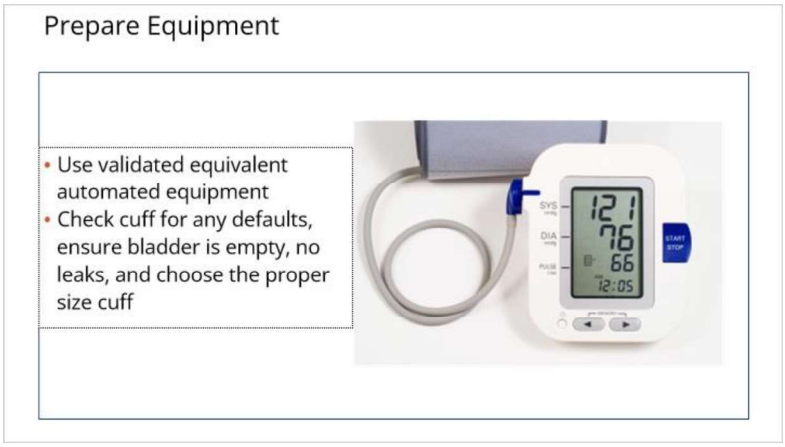


4. Procedure Lightboxes

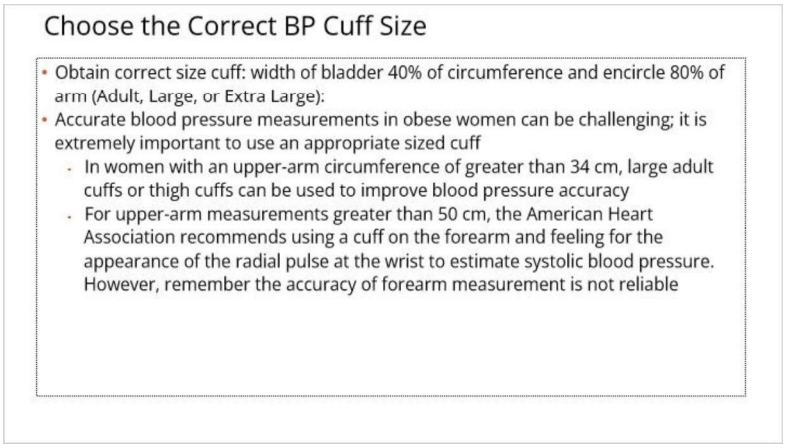
4.1 Equipment



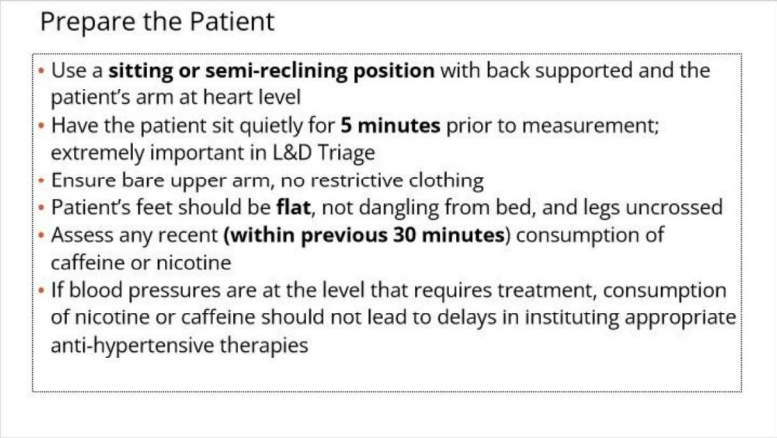
4.2 Prepare Equipment



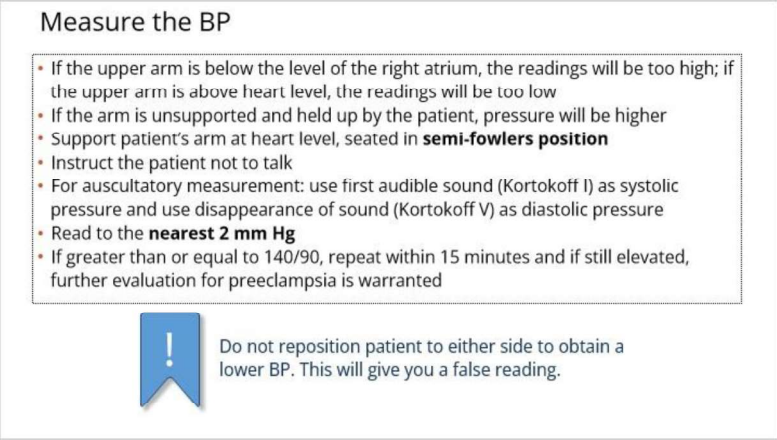
4.3 Choose the Correct BP Cuff Size



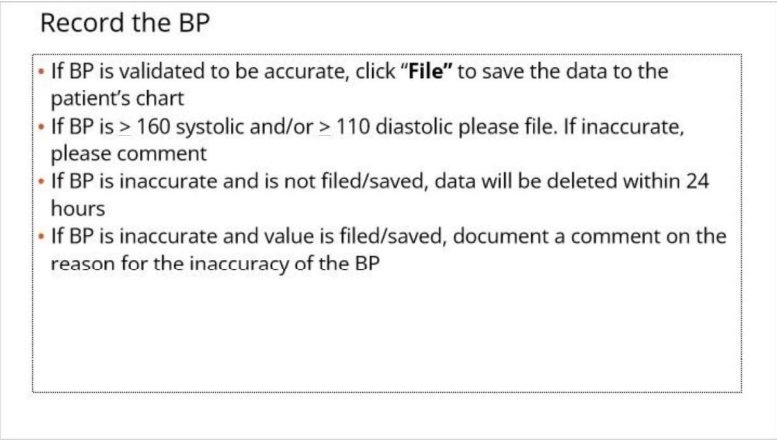
4.4 Prepare the Patient



4.5 Measure the BP

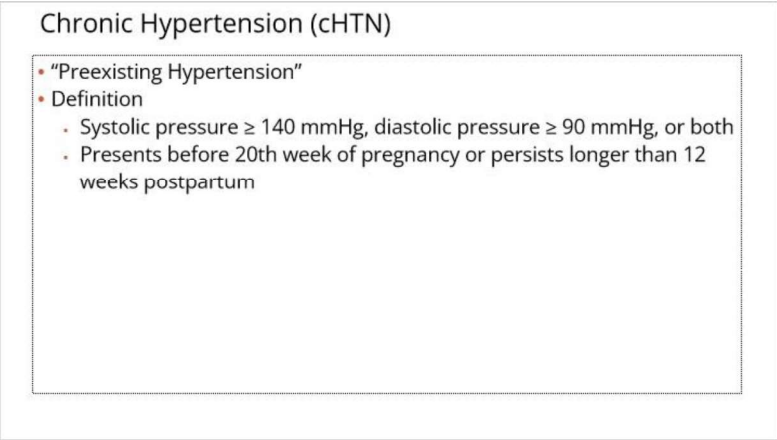


4.6 Record the BP

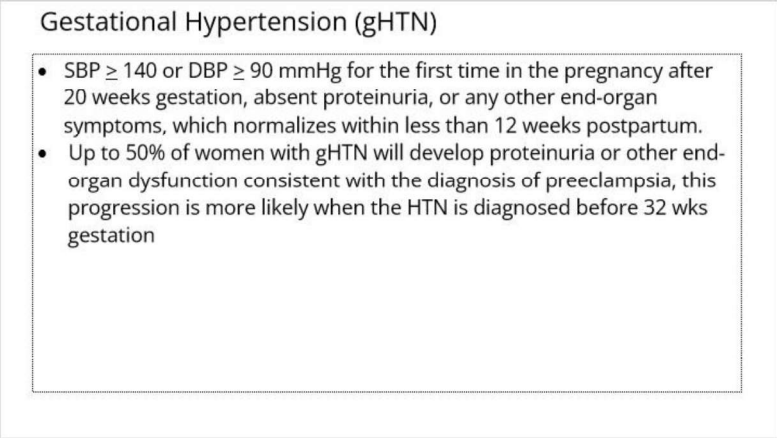


5. Herpertension Categories Lightboxes

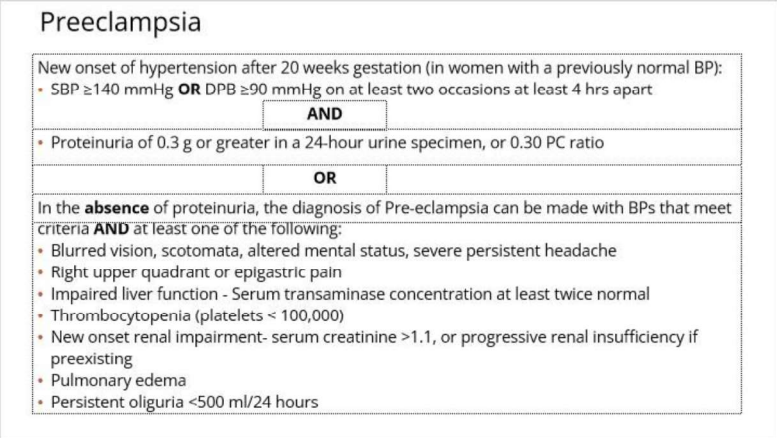
5.1 Chronic Hypertension (cHTN)



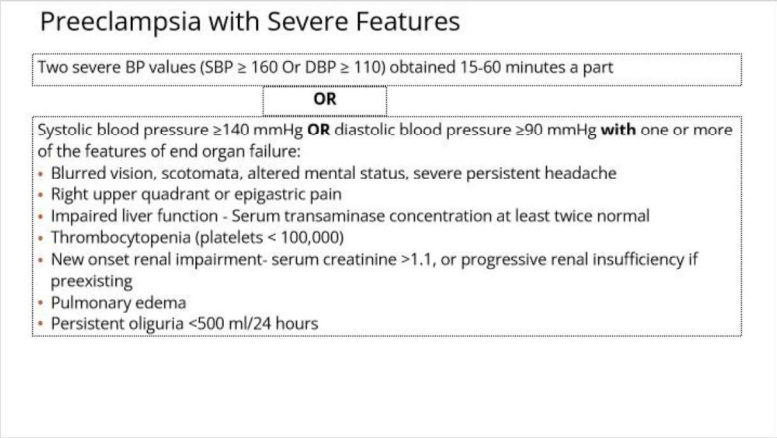
5.2 Gestational Hypertension (gHTN)



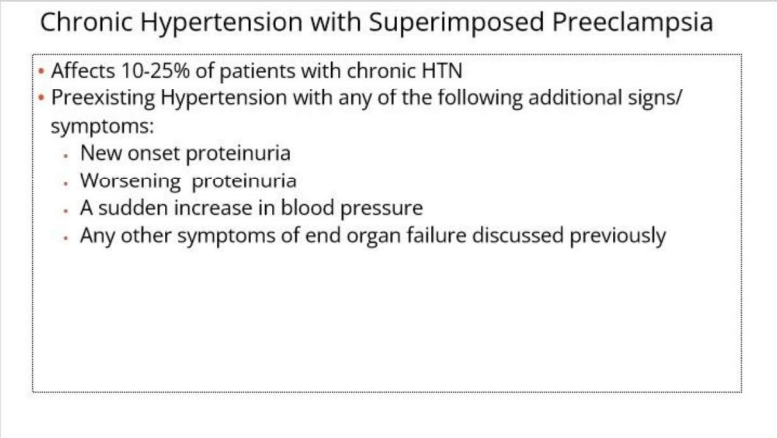
5.3 Preeclampsia



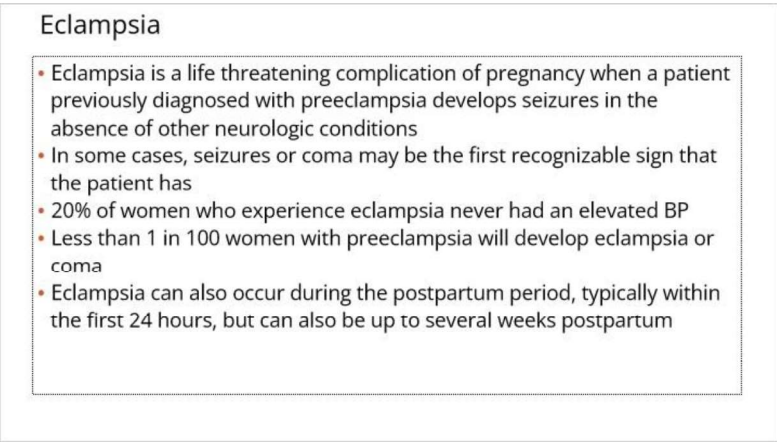
5.4 Preeclampsia with Severe Features



5.5 Preeclampsia Superimposed on Chronic Hypertension

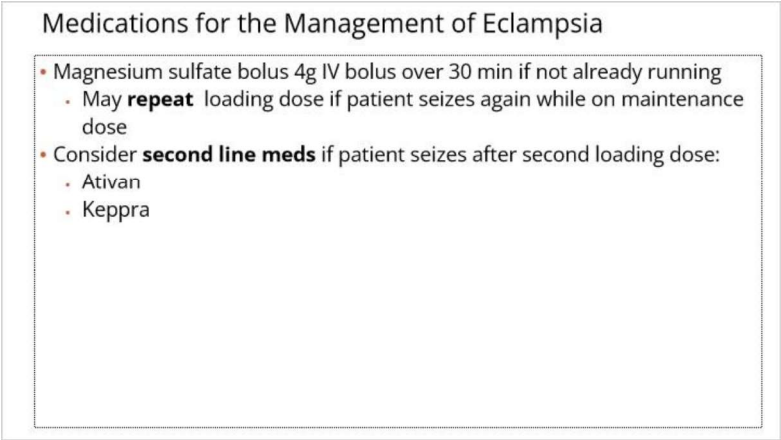


5.6 Eclampsia

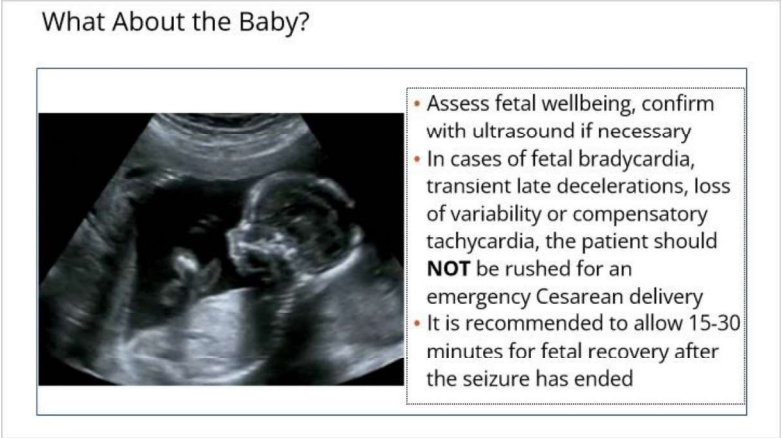


6. Eclampsia

6.1 Medications for the Management of Eclampsia



6.2 What About the Baby?

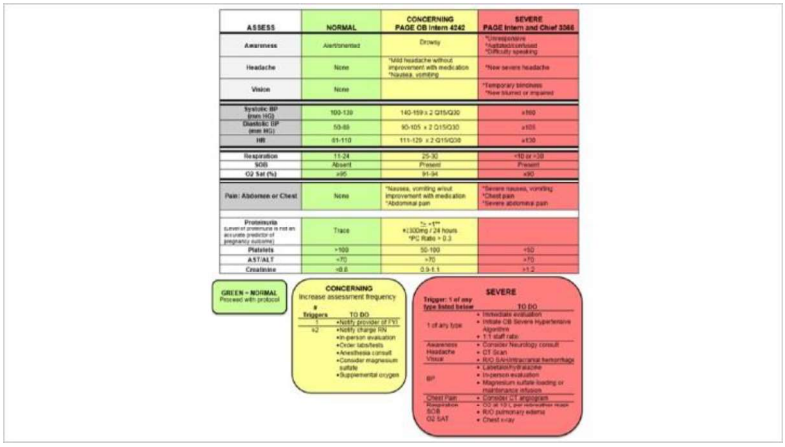


6.3 When to Proceed with Delivery?

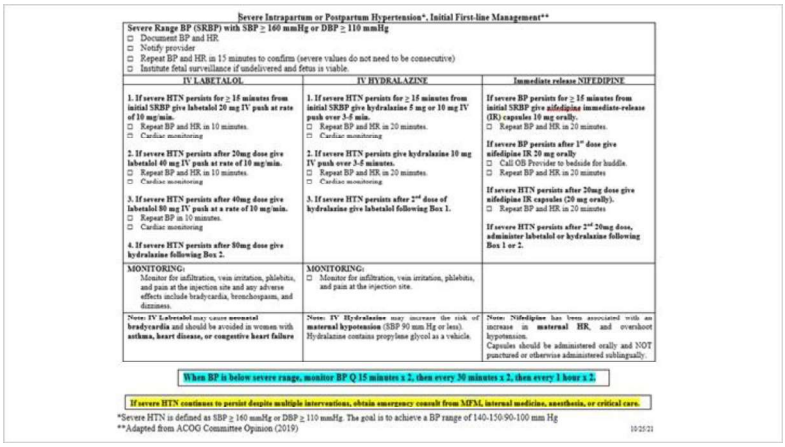


7. Lighboxes

7.1 PERT TOOL



7.2 Algorithm 2



Severe Intrapartum or Postpartum Hypertension*. Initial First-line Management**

Severe Range BP (SRBP) with SBP ≥ 160 mmHg or DBP ≥ 110 mmHg

- ☐ Document BP and HR
- ☐ Notify provider
- ☐ Repeat BP and HR in 15 minutes to confirm (severe values do not need to be consecutive)
- ☐ Institute fetal surveillance if undelivered and fetus is viable.

IV LABETALOL	IV HYDRALAZINE	Immediate release NIFEDIPINE
1. If severe HTN persists for ≥ 15 minutes from initial SRBP give labetalol 20 mg IV push at rate of 10 mg/min. ☐ Repeat BP and HR in 10 minutes. ☐ Cardiac monitoring **2. If severe HTN persists after 20mg dose give labetalol 40 mg IV push at rate of 10 mg/min.** ☐ Repeat BP and HR in 10 minutes. ☐ Cardiac monitoring **3. If severe HTN persists after 40mg dose give labetalol 80 mg IV push at a rate of 10 mg/min.** ☐ Repeat BP in 10 minutes. ☐ Cardiac monitoring **4. If severe HTN persists after 80mg dose give hydralazine following Box 2.**	**1. If severe HTN persists for ≥ 15 minutes from initial SRBP give hydralazine 5 mg or 10 mg IV push over 3-5 min.** ☐ Repeat BP and HR in 20 minutes. ☐ Cardiac monitoring **2. If severe HTN persists give hydralazine 10 mg IV push over 3-5 minutes.** ☐ Repeat BP and HR in 20 minutes. ☐ Cardiac monitoring **3. If severe HTN persists after 2nd dose of hydralazine give labetalol following Box 1.**	**If severe BP persists for ≥ 15 minutes from initial SRBP give nifedipine immediate-release (IR) capsules 10 mg orally.** ☐ Repeat BP and HR in 20 minutes. **If severe BP persists after 1st dose give nifedipine IR 20 mg orally** ☐ Call OB Provider to bedside for huddle. ☐ Repeat BP and HR in 20 minutes **If severe HTN persists after 20mg dose give nifedipine IR capsules (20 mg orally).** ☐ Repeat BP and HR in 20 minutes **If severe HTN persists after 2nd 20mg dose, administer labetalol or hydralazine following Box 1 or 2.**
MONITORING: Monitor for infiltration, vein irritation, phlebitis, and pain at the injection site and any adverse effects include bradycardia, bronchospasm, and dizziness.	**MONITORING:** ☐ Monitor for infiltration, vein irritation, phlebitis, and pain at the injection site.	
Note: IV Labetalol may cause neonatal bradycardia and should be avoided in women with **asthma, heart disease, or congestive heart failure**	**Note: IV Hydralazine** may increase the risk of **maternal hypotension** (SBP 90 mm Hg or less). Hydralazine contains propylene glycol as a vehicle.	**Note: Nifedipine** has been associated with an increase in **maternal HR**, and overshoot hypotension. Capsules should be administered orally and NOT punctured or otherwise administered sublingually.

When BP is below severe range, monitor BP Q 15 minutes x 2, then every 30 minutes x 2, then every 1 hour x 2.

If severe HTN continues to persist despite multiple interventions, obtain emergency consult from MFM, internal medicine, anesthesia, or critical care.

*Severe HTN is defined as SBP ≥ 160 mmHg or DBP ≥ 110 mmHg. The goal is to achieve a BP range of 140-150/90-100 mm Hg

**Adapted from ACOG Committee Opinion (2019)

10/25/21