

*Helping Mothers and Babies Survive*  
**Pre-Eclampsia & Eclampsia**

*Facilitator Flip Chart*



# What the facilitator needs to know and do

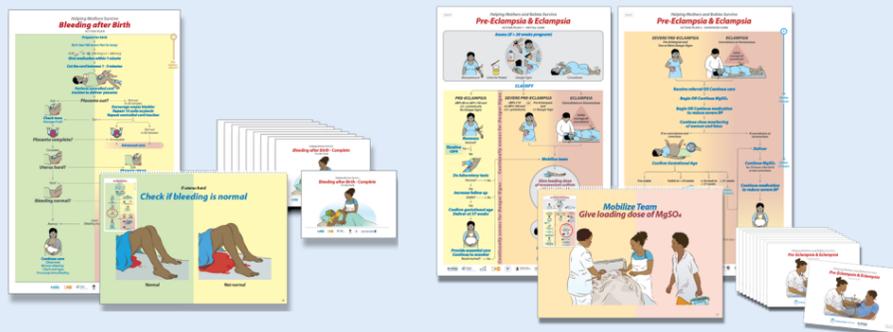
## BEFORE - DURING - AFTER training day

Use this section to prepare yourself as a facilitator and guide the development of a Helping Mothers Survive program before, during, and after the training day.  
As a facilitator, you are essential to achieving the goal of ensuring providers are skilled and equipped to deliver high quality, respectful care to women and their newborns.

### BEFORE

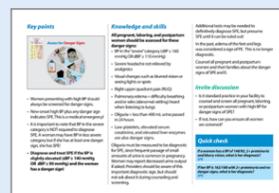
#### Begin planning with local leaders for Helping Mothers Survive training well in advance

- Visit [www.helpingmotherssurvive.org](http://www.helpingmotherssurvive.org) to find the tools you will need. You can download training modules, a training preparation checklist, sample agendas and other useful resources including how to order simulators when needed.
- Review service delivery data with facility management to consider strengths and gaps related to the clinical area.



#### Prepare yourself as a facilitator

- As a facilitator you will have experienced a Helping Mothers Survive course. Now it is important to carefully read the Provider's Guide and Flipbook.
- Read the "Invite Discussion", "Facilitation Notes", and "Quick Checks" so you can lead discussions, answer questions, and get teaching tips.
- Carefully review the role-plays and learning activities so you can engage participants.
- Arrange the space to facilitate learning with 1 facilitator for every 6 participants.



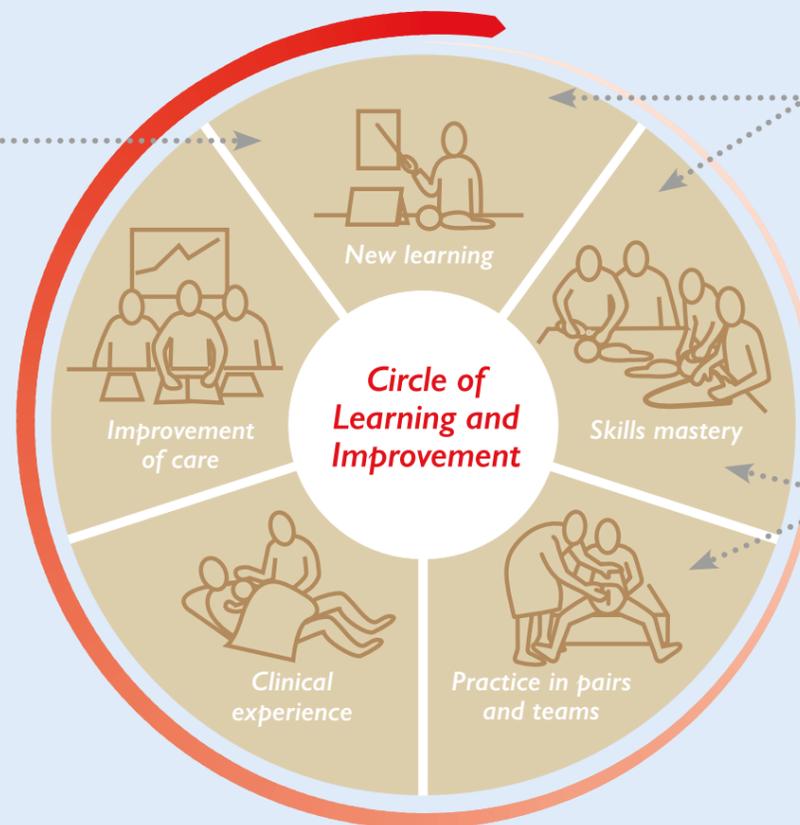
### DURING

#### Evaluate knowledge and skills

- Evaluate the participants in a way that encourages further learning.
- Use the knowledge test for each module as a pre-test and post-test.
- Use the OSCEs for each module to assess for transfer of skills at the end of the course.

#### Engage every participant in discussion and practice in pairs

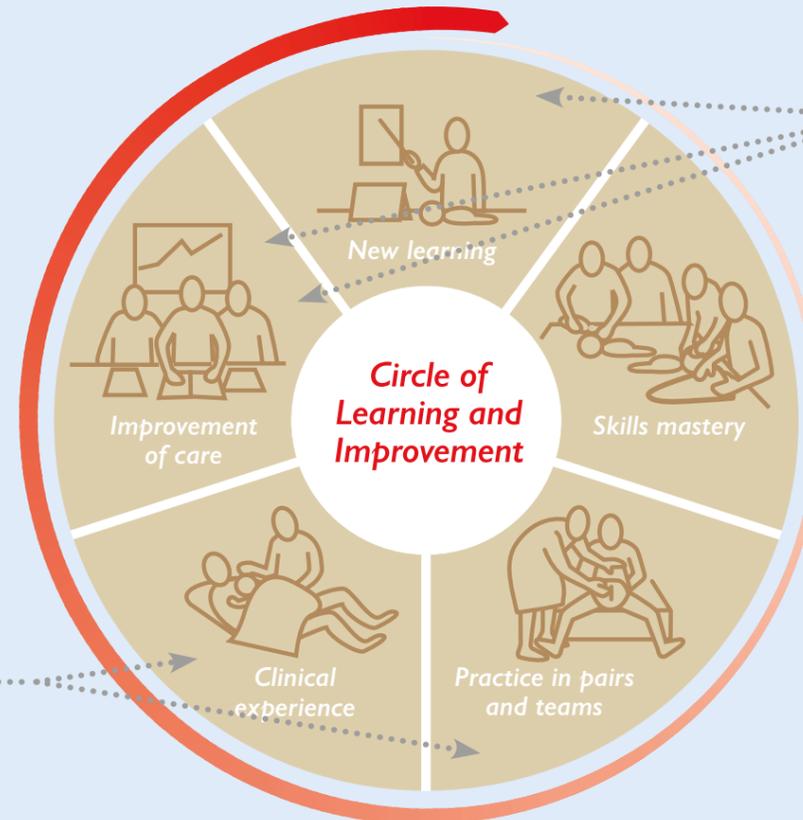
- Helping Mothers Survive modules are active, hands-on learning modules. As you teach and demonstrate, involve participants by "Inviting Discussion", and engaging them in practice and role-plays.
- Spend more time in learning activities than talking to ensure skills are mastered. Tell participants to expect to do some practice in the coming weeks following training to help improve their skills.
- During practice activities, encourage self-reflection, feedback, and review of actions to improve performance (debriefing).
- Always emphasize and role-model respectful care and good communication between the woman and provider, and also between providers.
- Use "Invite Discussion" questions to identify local problems and find solutions to overcome barriers to quality care.
- Identify 2 midwives or nurses at each facility to help their peers practice after training. You will orient them as Peer Practice Coordinators after the training day.



# AFTER

## Identify and support leaders and practice coordinators at each facility who promote ongoing practice

- Orient practice coordinators to their role of facilitating ongoing practice activities after the training day. These will be short weekly activities that providers will do in groups or alone with the coordinator.
- Encourage providers to continue to use self-reflection, feedback, and review of their actions during practice and after clinical situations.
- Promote collaboration with the local health system to collect clinical performance and outcome data, and to use that data for decision-making.
- Support improvement activities and share experiences among facilities.
- Become a member of HMS at <https://hms.jhpiego.org> and register your training information - what module, how many you trained, where and when.
- Resources at <https://hms.jhpiego.org>
  - [HMS Implementation Guide](#)
  - [Self-Certification](#)
  - [Improvement Guide: Improving Care of Mothers and Babies](#)
  - [Links to additional Helping Mothers Survive and Helping Babies Survive modules and other resources](#)



# DURING

## Engage participants in ongoing quality improvement

- Saving lives of women and their newborns lives after Helping Mothers Survive training requires ongoing low-dose, high-frequency practice and quality improvement activities in the facility in order to change clinical care.
- Reflect with the participants on
  - What are you going to do differently?
  - What will you no longer do?
  - What do you need to make these changes happen?
  - Who needs to be involved?
- Use the plan for weekly practice in the back of the Provider's Guide of each module.
- Help participants plan a change that will improve care in the facility.
- Resources:
  - [LDHF Activities in the Provider's Guide for each module](#)



# ***Saving lives at birth***



## Saving lives at birth



- The Helping Mothers Survive (HMS) and Helping Babies Survive (HBS) training programs build capacity of providers to give lifesaving care for women and babies.
- HMS and HBS target all levels of providers who attend births or who are called to manage complications.
- HMS and HBS equip providers to promptly detect and manage life-threatening complications.
- HMS and HBS use simulation and scenarios for learning and include hands-on practice and feedback.
- Training is followed by repeated practice at the worksite to strengthen and maintain skills.

## To those who care for women at birth

- HMS Pre-Eclampsia/Eclampsia (PE&E) helps learners master competencies needed to safely and effectively detect, classify, and manage PE&E.
- HMS PE&E is designed as a 1- or 2-day facility training depending on the level of care provided.
- After training, providers should continue to practice using new or refreshed skills with a designated peer mentor at their facility.

### Training materials:

- 1. Action Plan 1 and Action Plan 2** - graphic job aids to help identify and manage PE&E. Action Plan 1 is targeted to primary care facilities and includes initial assessment, diagnosis, and initiation of treatment. Action Plan 2 is intended for use in referral facilities that provide ongoing management.
- 2. This Flip Chart** - used for instruction.
- 3. The Provider's Guide** - contains detailed clinical information and support for ongoing practice. You will receive it at the end of training.

## Facilitation note

Open Flip Chart to this page at the start of Day 1. Have all supplies ready at each station.

## Supplies

- All items from PE&E Emergency Kit (pg. 19b)
- BP machine, stethoscope
- Fetoscope
- Urine dipsticks, reflex hammer
- Foley catheter, syringe, water for inflating
- Urine collection bag
- Gloves
- Magnesium sulfate, antihypertensive medication

After presenting this page, open with a role-play of a 1-day postpartum woman complaining of a severe headache who begins to convulse and loses consciousness. If you are facilitating alone, ask a learner in advance to play the woman. Ask for help, but do not interfere.

Afterward, guide discussion:

- Has anyone seen an eclamptic convulsion or a woman die from eclampsia?
- What happened?
- Was there anything that could have helped?

# *Provide respectful care to women and their families*



## Key points

### *Provide respectful care to women and their families*



- Every woman deserves respectful maternity care (RMC).
- Respectful care saves lives.
- Women have a right to privacy and confidentiality.

## Knowledge and skills

- Women are worthy of respect regardless of ethnic background, culture, social standing, religion, educational level, and marital or economic status.
- Respectful care saves lives; women may not seek care if they think they will not be treated well.
- Give age-appropriate care.
- Women have a right to privacy and confidentiality during counseling, physical exam, clinical procedures, or in the handling of records.
- Respect a woman's right to a companion. A companion improves outcomes and can shorten labor.
- Women have a right to refuse care or to seek care elsewhere.
- Always explain what is happening to the woman and why.
- Be gentle when giving hands-on care.
- Never leave women with severe PE&E alone. If you must leave, have someone else stay with her and be sure he or she knows how to get help if needed.

## Invite discussion

Ask learners, "What are ways that you can demonstrate respect for the women in your care?"

Appropriate responses include:

- Introduce yourself by name and smile.
- Look at women when speaking to them.
- Use simple, clear language.
- Speak calmly.
- Pay attention when women speak.
- Include women and families in discussions about care.
- Always explain any procedure and get her permission before you begin.

Ask learners, "Have you ever had a client who refused your care? Was this woman handled with respect? Would you do anything differently in a similar situation in the future?"

# ***Communicate effectively with the health care team***



## Key points

### *Communicate effectively with the health care team*



- Good communication saves lives.
- Know whom to call for help.
- Assign a role to each team member.
- Have an emergency plan in place.

## Knowledge and skills

- Team members include staff at your facility, staff at the referral site, and the woman and her family.
- Poor communication can result in bad outcomes.
- Know whom to call in an emergency.
- Anxiety and fear are normal in an emergency, but these emotions can block communication. You must stay calm to be the most effective.
- Quickly alert others on your team to an emergency so they can respond fast.
- Communicate confidently and clearly - do not assume that others know what you are thinking.
- Speak loudly enough to ensure that all actions have been delegated and are being done.
- Clearly establish roles for each person responding in an emergency. Address people by name and clarify who will do what. Have each person repeat the task she has been assigned - for example, "I will start an IV of normal saline" - to show that the instruction was heard and understood.

- Simulations give providers the chance to practice problem-solving, teamwork, communication, and decision-making during an emergency. Simulations also provide an opportunity to establish care-giving roles during an emergency.

## *Invite discussion*

Ask learners, "Have you ever seen poor communication result in a bad outcome?" Invite them to share their experiences.

# Hypertensive disorders of pregnancy



## **Normal**

sBP 90–140 mmHg

**AND**

dBP 60–90 mmHg

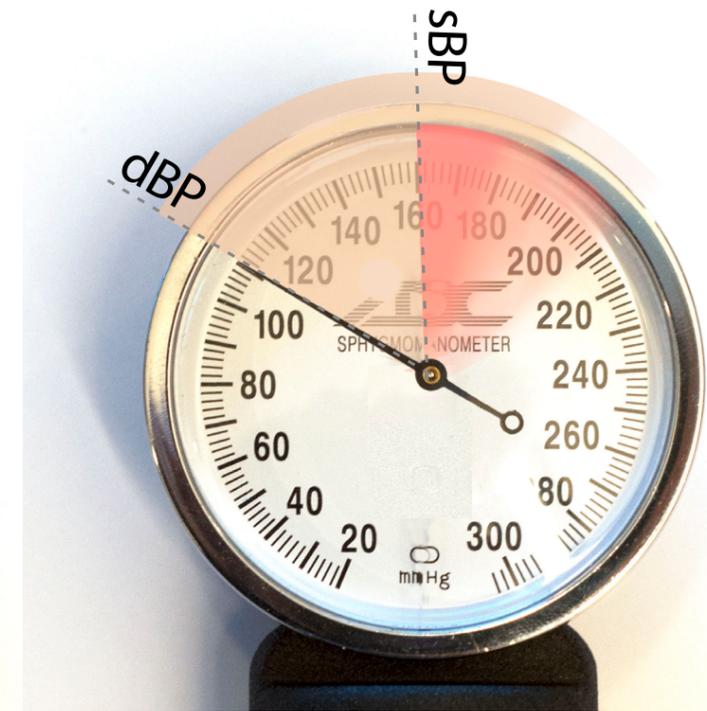


## **Pre-eclampsia (PE)**

sBP  $\geq$  140 mmHg

**OR**

dBP  $\geq$  90 mmHg



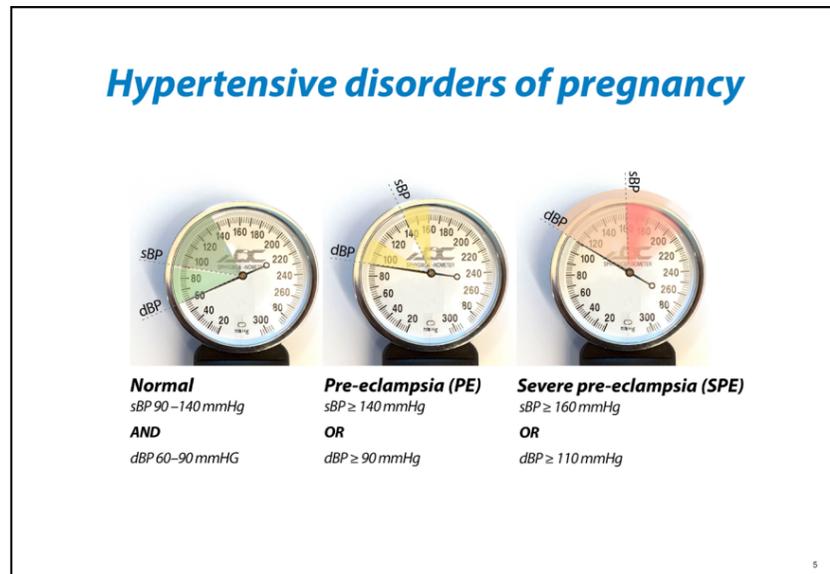
## **Severe pre-eclampsia (SPE)**

sBP  $\geq$  160 mmHg

**OR**

dBP  $\geq$  110 mmHg

## Key points



- PE&E are on a continuum of blood pressure (BP) disorders which include chronic and gestational hypertension, PE, and E. This module focuses on PE&E.
- PE&E are leading causes of death; **all** pregnant, laboring, and postpartum women are at risk.
- Progression to severe disease can occur quickly. SPE&E are life-threatening emergencies!
- BP should be checked at each antenatal visit, on admission for labor, during labor, after birth, at postpartum visits, and any time a pregnant/postpartum woman presents with a problem.

## Classification

After 20 weeks of pregnancy:

### Pre-eclampsia (PE)

New-onset high BP at 2 readings at least 4 hours apart:

- Systolic BP (sBP) ≥ 140 mmHg **or** diastolic BP (dBP) ≥ 90 mmHg **plus**
- Proteinuria ≥ 300 mg of protein in a 24-hour urine collection or 2+ on dipstick

### Severe pre-eclampsia (SPE)

1. New-onset high BP of systolic BP (sBP) ≥ 160 mmHg **or** diastolic BP (dBP) ≥ 110 mmHg **with** proteinuria as above **or**
2. PE as defined above **plus** any one of the following:
  - **Danger signs** reported by the woman
    - Severe headache unrelieved by analgesics
    - Visual changes
    - Right upper quadrant pain
    - Difficulty breathing
  - or**
  - **Danger signs** that can be measured:
    - Pulmonary edema
    - Oliguria < 400 mL of urine output in 24 hours

- Low platelets, elevated creatinine, or elevated liver enzymes

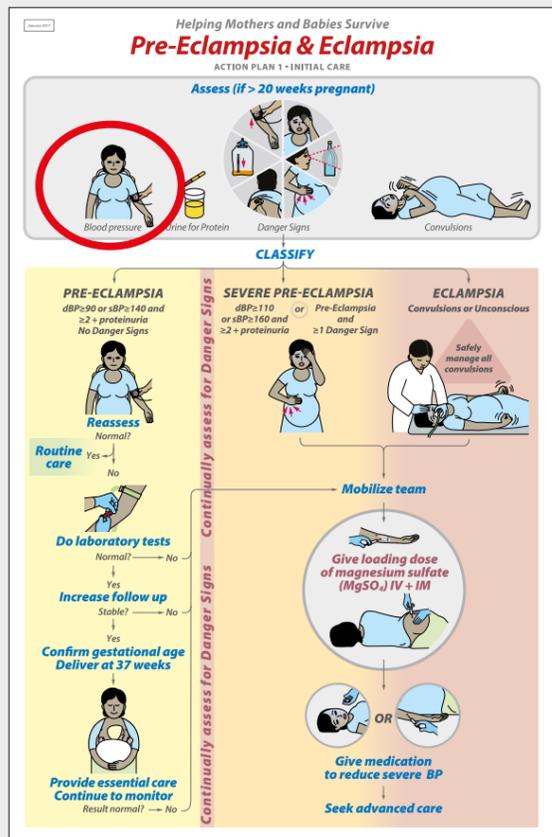
### Eclampsia (E)

- PE as defined above **plus** convulsions or unconsciousness

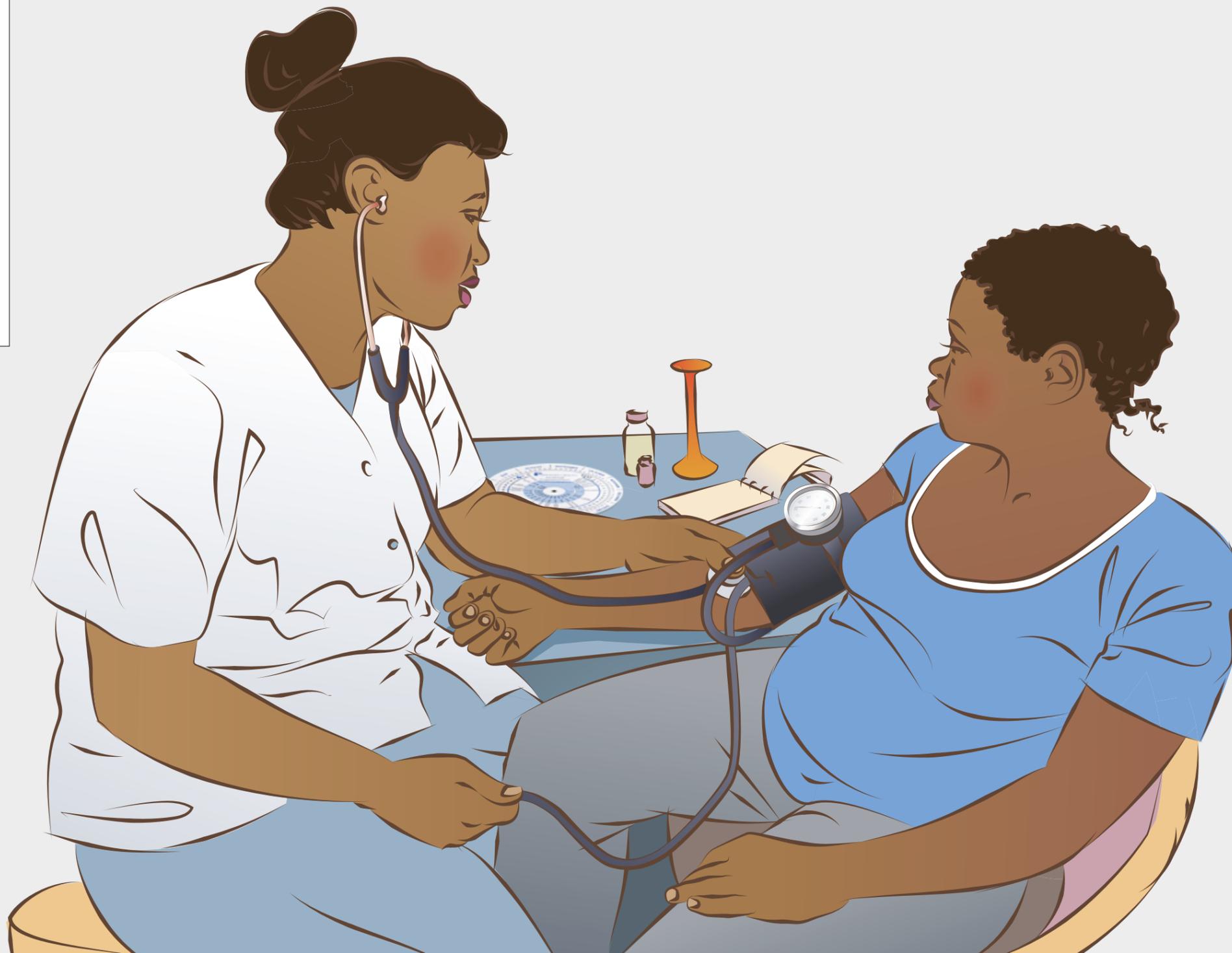
## Knowledge and skills

**Screen all women after 20 weeks and all postpartum women for PE&E:**

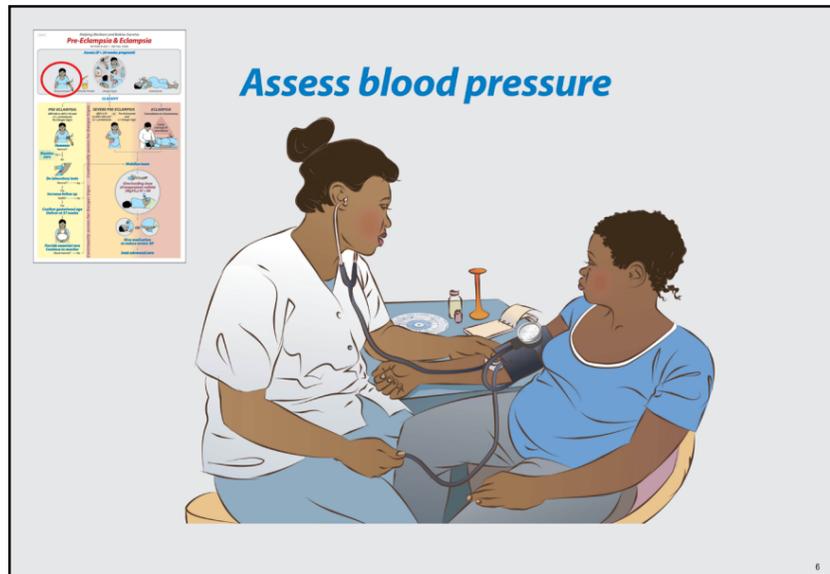
- Accurately take and record BP.
- If BP is elevated, check urine for protein.
- Assess all women for **danger signs** and do laboratory tests where feasible.
- **If SPE is suspected, do NOT wait 4 hours to repeat BP. Begin treatment now!**
- Educate women and families about the danger signs of PE&E. Note: some women develop E in the absence of hypertension or proteinuria.
  - Women with PE may develop life-threatening complications.
  - PE can progress rapidly, without warning, to E.



# Assess blood pressure



## Key points



- Accurate BP measurements are key for diagnosis!

## Knowledge and skills

- BP readings can be unreliable due to poor technique or a broken device.
- BP can be high due to chemical factors (tobacco or caffeine) or emotional factors (fear or stress).
- Diagnosis is made if BP is elevated on two consecutive readings taken at least 4 hours apart with woman at rest and with no prior history of high BP. **However, a sBP  $\geq$  160 OR dBP  $\geq$  110 is an emergency! Take immediate action!**

## Practice key skills: Assessing blood pressure facilitation note

Request a volunteer to have her BP taken. Demonstrate proper technique, pointing out key steps during the demonstration. Regardless of actual BP measured, state that the BP is 152/ 94. Demonstrate appropriate, respectful counseling about the need to re-take the BP in 4 hours. After demonstration, tell the volunteer their actual BP.

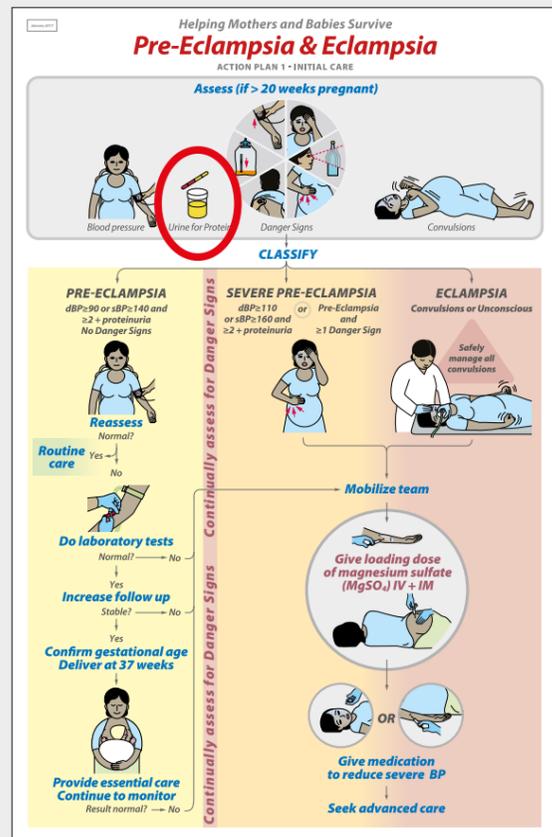
Ask learners: *“Do providers at your facility have problems with taking accurate BPs? What improvements can be made? Will women wait 4 hours for a repeat BP check?”*

Divide into groups with one facilitator per 6 learners. Have learners work in pairs to practice BP measurement. Make sure you have a stethoscope and BP machine for each pair. Pay attention to learners’ techniques. Provide supportive correction as needed.

Once the first half has taken BPs, ask each pair to share their measurements. Note if 120/80 or 130/80 or other numbers are overrepresented. If so, ask the learners if they note anything unusual about the BPs. Encourage them to become “expert” BP takers, then have them switch roles.

## Proper Blood Pressure Measurement Technique

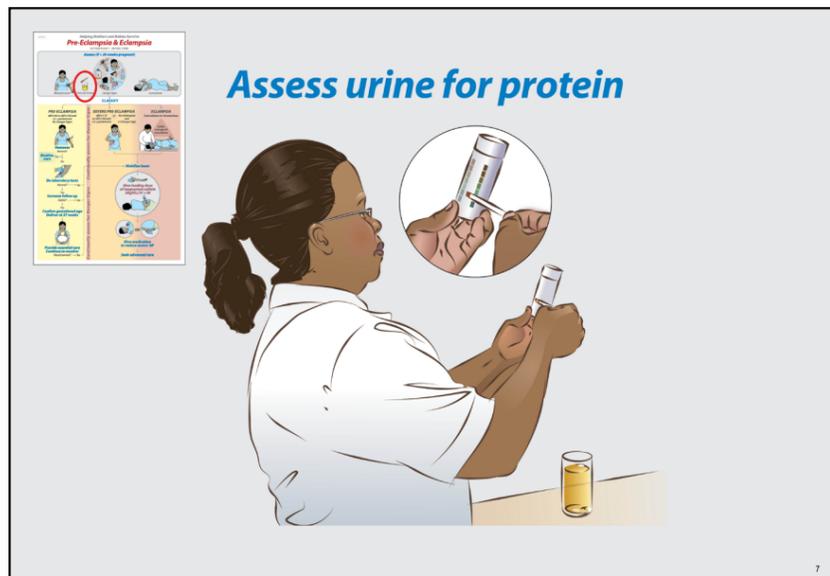
1. Ensure the woman is positioned properly-seated, both legs flat on the floor, with her arm at the level of her heart.
2. Wrap cuff firmly around upper arm with lower edge of cuff 2cm above the bend of the elbow.
3. Ensure that needle is at zero at the start and end of measurement. Use calibration key if needed to get needle to zero.
4. Put earpieces of stethoscope so they are pointing toward your nose.
5. Rapidly inflate cuff to 180mmHg, then release air at approximately 3mmHg/sec.
6. sBP is noted when the first beat is heard. dBP is noted when beats stop.
7. It is important to use what you hear and not what you see to note each measurement.
8. Do not round the number up or down but give the precise number. Note each bar on a manual BP machine is 2 mmHg.



# Assess urine for protein



## Key points



- Healthy pregnant women should not have more than 1+ protein in their urine.
- Proteinuria associated with PE is:
  - $\geq 300$  mg of protein in a 24-hour urine collection, or
  - urine protein: creatinine ratio of at least 0.3, or
  - $\geq 2+$  on urine dipstick.
- **Note: If you cannot check for protein, begin treatment immediately for women who otherwise meet the definition of SPE. Act now!**

## Knowledge and skills

- Check for proteinuria any time a pregnant woman over 20 weeks' gestation has an elevated BP.
- Urine dipstick should be used only if more reliable testing methods are unavailable (such as 24hr urine collection or urine protein: creatinine ratio).
- Proteinuria can indicate contamination by vaginal discharge, blood, or amniotic fluid. Proteinuria is also found with other clinical conditions. However, PE&E is the most common cause of proteinuria in pregnancy.
- If using dipstick, urine must be obtained by the "clean-catch" technique to avoid contamination: tell the woman to clean vulva with water, pass a small amount of urine, and then place a clean, dry cup under the stream.
- **If you use dipsticks to measure protein, and the protein is less than 2+ but the woman has danger signs or BP in the severe category, begin treatment at once!**
- Once proteinuria is detected and the diagnosis of PE or SPE is made, protein does not need to be rechecked.

## Invite discussion

What method does your facility use to assess for proteinuria?

When do you check urine?

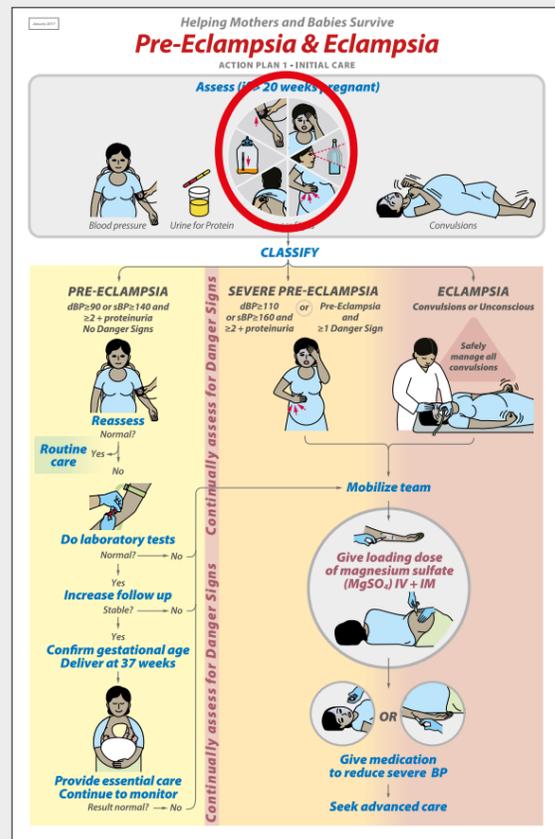
Are there any barriers to your ability to routinely assess urine?

What can be done to improve checking for proteinuria?

## Facilitation note

Use the white part of one egg, mixed with water, to make a liquid suitable for testing with dipstick. Demonstrate to learners how to dip and take the reading of the dipstick according to package directions.

In small groups of 1 facilitator to 6 learners, practice using dipstick.



# Assess for *Danger Signs*



## Key points



- Women presenting with high BP should always be screened for danger signs.
- New-onset high BP plus any danger sign indicates SPE. This is a medical emergency!
- It is important to note that BP in the severe category is NOT required to diagnose SPE. A woman may have BP in less severe category but if she has at least one danger sign, she has SPE!
- **Diagnose and treat SPE if the BP is slightly elevated (sBP  $\geq$  140 mmHg OR dBP  $\geq$  90 mmHg) and the woman has a danger sign!**

## Knowledge and skills

**All pregnant, laboring, and postpartum women should be assessed for these danger signs:**

- BP in the “severe” category (sBP  $\geq$  160 mmHg OR dBP  $\geq$  110 mmHg)
- Severe headache not relieved by analgesics
- Visual changes such as blurred vision or seeing lights or spots
- Right upper quadrant pain (RUQ)
- Pulmonary edema = difficulty breathing and/or rales (abnormal rattling) heard when listening to lungs
- Oliguria = less than 400 mL urine passed in 24 hours
- Low platelets, elevated serum creatinine, and elevated liver enzymes are also danger signs.

Oliguria must be measured to be diagnostic for SPE, since frequent passage of small amounts of urine is common in pregnancy. Women may report decreased urine output if asked. Providers should be aware of this important diagnostic sign, but should not ask about it during counseling and screening.

Additional tests may be needed to definitively diagnose SPE, but presume SPE until it can be ruled out!

In the past, edema of the feet and legs was considered a sign of PE. This is no longer diagnostic.

Counsel all pregnant and postpartum women and their families about the danger signs of SPE&E.

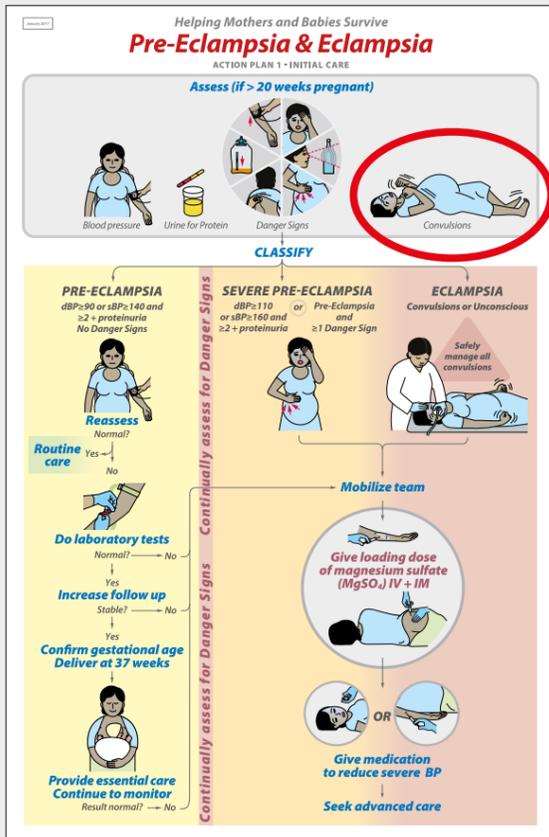
## Invite discussion

- Is it standard practice in your facility to counsel and screen all pregnant, laboring, or postpartum women with high BP for danger signs of SPE?
- If not, how can you ensure all women are screened?

## Quick check

**If a woman has a BP of 148/92, 2+ proteinuria and blurry vision, what is her diagnosis?**  
SPE

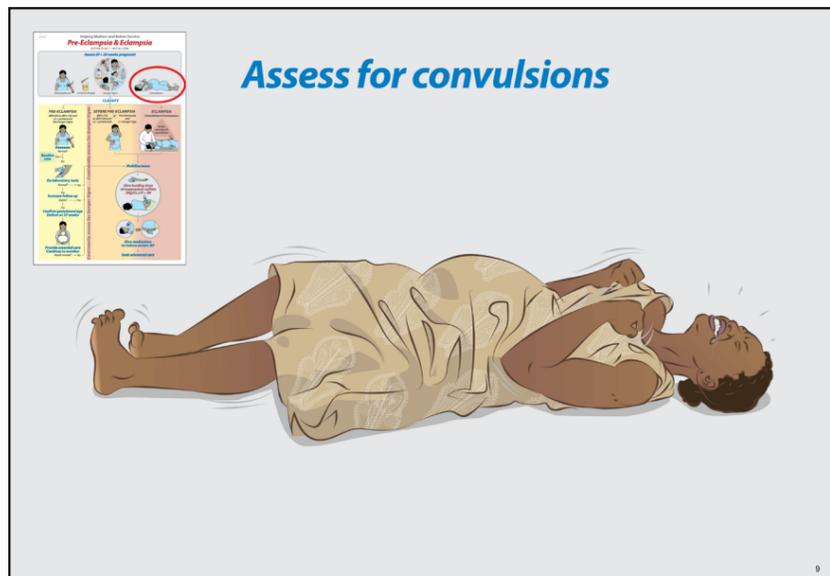
**If her BP is 162/108 with 2+ proteinuria and no danger signs, what is her diagnosis?**  
SPE



# Assess for convulsions



## Key points



**Convulsions are a life-threatening emergency! Mobilize your team now!**

## Knowledge and skills

- If a pregnant, laboring, or recently postpartum woman is unconscious, experiencing a convulsion, or reports a recent convulsion, eclampsia should be suspected and immediately treated! Once treatment has begun, other causes— such as malaria, meningitis, seizure disorder— may be ruled out.
- Women may lose consciousness after convulsions.

- Convulsions may recur in rapid sequence and a woman may die after only one or two convulsions.
- Eclamptic convulsions are difficult to predict and:
  - Can occur regardless of how high the BP
  - May occur in women with normal BP
  - May occur without headache or visual changes

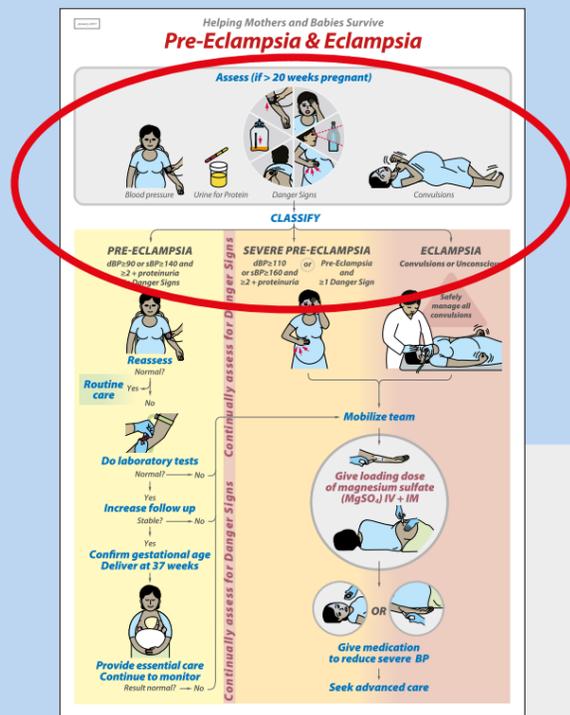
### When a woman experiences a convulsion:

1. **SHOUT FOR HELP!**  
Call for emergency equipment.
2. Airway: Turn woman onto her side to prevent aspiration. Ensure her airway is open.
3. If available, give oxygen at 4–6 L per minute by mask or cannula.
4. Breathing: If the woman is not breathing, begin ventilation with bag and mask and ensure help is coming.
5. Circulation: If pulse is absent, begin cardiac massage.
6. Protect from injury, but do not actively restrain her.
7. Do not place anything in her mouth.

8. Take vital signs. If BP is elevated, assume eclampsia and begin treatment.
9. Never leave the woman alone.
10. While giving care, ask the family about the woman's medical history and recent signs of illness including fever, chills, headache, neck stiffness.

### Care after the convulsion:

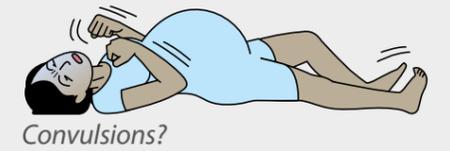
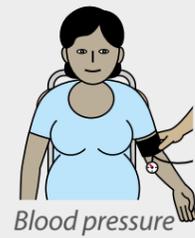
- Continue to check airway and breathing; suction secretions if needed.
- Observe woman's color and assess need to continue oxygen at 4–6 L per minute if available.
- Always listen to lungs after convulsions to see if she has aspirated fluid.
- Recheck vital signs and fetal heart rate (FHR) if baby not yet born.
- Even if eclampsia has not yet been diagnosed, treat immediately as eclampsia while you confirm diagnosis!



# Learning activity

## Classify role-play

### CLASSIFICATION



### Pre-eclampsia (PE)

$sBP \geq 140$  mmHg  
OR  
 $dBP$   $sBP \geq 90$  mmHg  
  
(At 2 readings at least  
4 hours apart)

2+ on urine dipstick  
OR  
 $\geq 300$  mg protein in a  
24-hour urine collection  
OR  
Urine protein: creatinine ratio  
of at least 0.3

NONE

NONE

### Severe pre-eclampsia (SPE)

BP as listed above PLUS at least  
one danger sign  
OR  
 $sBP \geq 160$   
OR  
 $dBP \geq 110$

Usually has:  
Proteinuria associated  
with PE (above)

At least one of the following:  
1. Right upper quadrant pain  
2. Severe headache  
3. Blurred vision  
4. Pulmonary edema  
5. Oliguria  
6. Abnormal platelets, serum  
creatinine, or liver enzymes

NONE

### Eclampsia (E)

Usually has:  
 $sBP \geq 140$  OR  
 $dBP \geq 90$

Usually has:  
Proteinuria associated  
with PE (above)

May have at least one of the  
above danger signs, or may  
not have any

Has had at least one  
convulsion or is unconscious

**Learning activity**  
**Classify role-play**

CLASSIFICATION	Blood pressure	Urine for Protein	Convulsions?	Other
<b>Pre-eclampsia (PE)</b>	sBP ≥ 140 mmHg OR dBP ≥ 90 mmHg (At 2 readings at least 4 hours apart)	2+ on urine dipstick OR ≥ 300 mg protein in a 24-hour urine collection OR Urine protein: creatinine ratio of at least 0.3	NONE	NONE
<b>Severe pre-eclampsia (SPE)</b>	BP as listed above PLUS at least one danger sign OR sBP ≥ 160 OR dBP ≥ 110	Usually has: Proteinuria associated with PE (above)	At least one of the following: 1. Right upper quadrant pain 2. Severe headache 3. Blurred vision 4. Pulmonary edema 5. Oliguria 6. Abnormal platelets, serum creatinine, or liver enzymes	NONE
<b>Eclampsia (E)</b>	Usually has: sBP ≥ 140 OR dBP ≥ 90	Usually has: Proteinuria associated with PE (above)	May have at least one of the above danger signs, or may not have any	Has had at least one convulsion or is unconscious

## Facilitation note

**Divide the group into pairs. Ask one learner to play the role of the woman. Ask the other learner to play the role of the provider. Have the “women” come to one side of the room to receive instructions privately. Ask them to bring paper and pencil to record their measurements.**

**Give the “women” this information privately:**

- 25-year-old G1P0 at 33 wks
- BP is 144/88
- urine 2+ protein
- danger signs: no headache, no visual changes, no right upper quadrant pain, no difficulty breathing, and no rales.

Tell them only to provide this information in response to measurements taken by “providers.” Tell “providers” they must take the actual measurements during the role-play, not simply talk about what they would do. Send “women” back to their stations where they will present for an antenatal care (ANC) visit.

**Read the following paragraph to participants before they begin.**

*“Mrs. M is presenting to you for her third ANC visit. Please interview her and proceed normally for a routine ANC visit at 35 weeks. If you are taking her BP or listening to her lungs, or measuring her urine for protein, do so. Your client will tell you the measurement.”*

Observe the role-plays. Ensure that participants stay on track, but do not correct or interrupt the role-play.

**Debrief:** Remember that learning comes from all participants through good discussion. Learning does not come only from the facilitator.

**When all the teams are done with the assessment, ask the “providers,”**  
*“What is your most likely diagnosis? Why?”*

**Correct answer is PE because BP is in the nonsevere category and she has 2+ protein.**

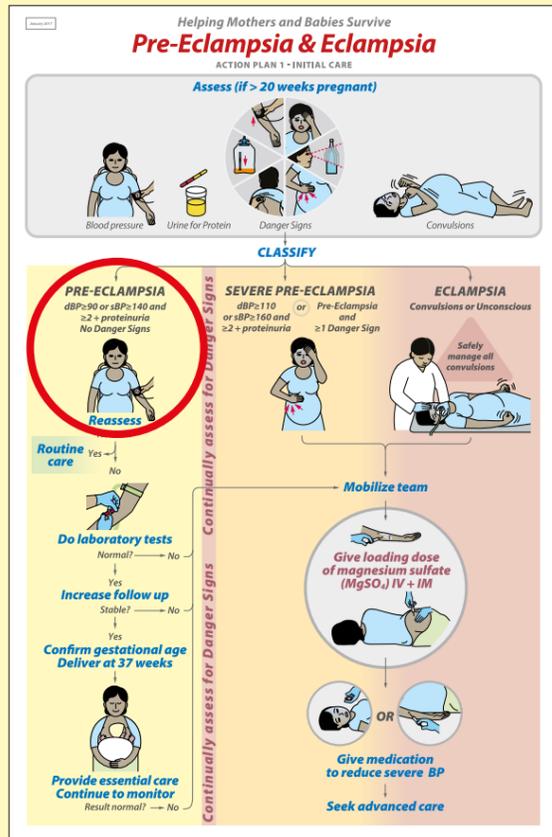
**Ask, “Did you remember to ask for all danger signs? Did you listen to her lungs?”**

**Then ask: “What will you do next?”**

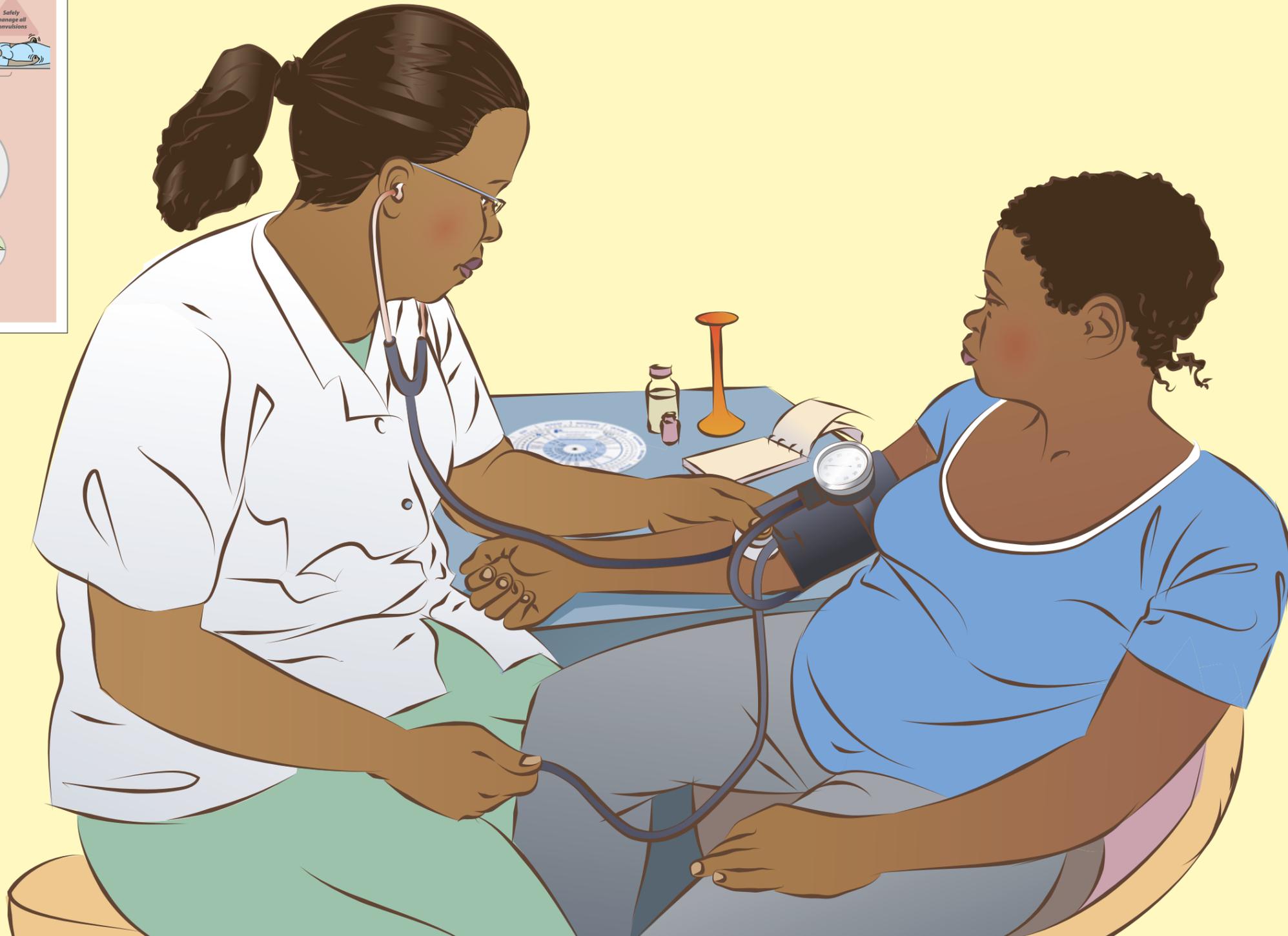
**Correct answer: “Ask Mrs. M to wait for 4 hours to recheck her BP.”**

*When done with the discussion, ask, “From this exercise, what will you remember to do when caring for a woman during a routine visit when you find an abnormal BP?”*

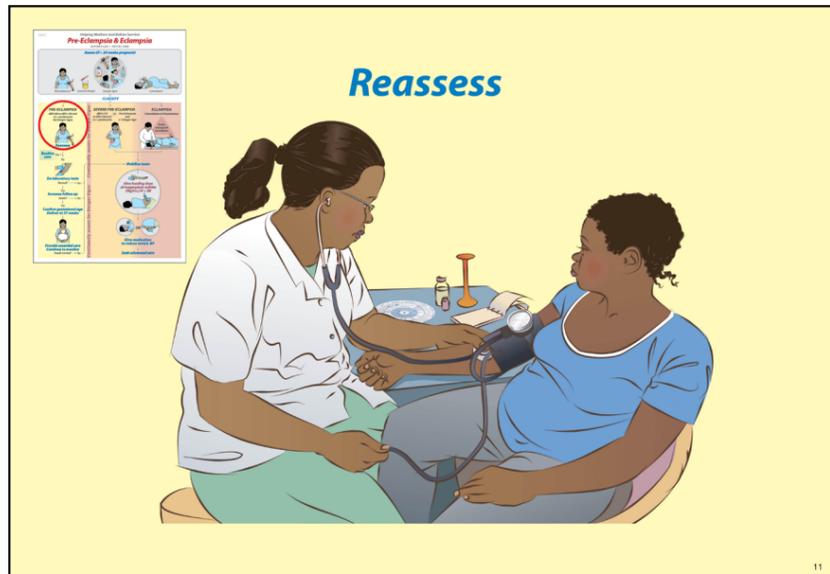
*Encourage responses: ask a woman about all danger signs, check her urine for protein, listen to her lungs, and then ask her to wait 4 hours for a recheck.*



# Reassess



## Key points



- When you reassess the woman in 4 hours after initial elevated BP, or when you receive a woman referred with suspected PE, you should:
  - Repeat BP
  - Test urine for protein if not done or if done elsewhere
  - Screen for danger signs and convulsions
- **If SPE is suspected, you should not wait 4 hours to repeat BP. Begin treatment now!**

## Knowledge and skills

- If a woman with suspected PE is referred to you, quickly ensure she is stable and conduct routine assessment.
- Women may be referred to you with incomplete or unreliable information such as a single or inaccurate BP reading, a protein test from contaminated urine, or lack of screening for severe symptoms. Always gather information to confirm diagnosis yourself.
- If she DOES NOT meet criteria for PE, rule out other problems, teach her about pregnancy danger signs, ensure birth and complication readiness plan, and confirm next ANC visit.
- If the woman DOES meet diagnostic criteria for PE:
  - Conduct laboratory tests.
  - Increase frequency of ANC visits.
  - Teach her the danger signs of SPE&E.
  - Ensure she has a birth plan including a plan for complications.
- Advise her to report for care immediately for:
  1. Severe headache
  2. Visual changes
  3. Severe right upper quadrant pain

4. Difficulty breathing
  5. Convulsions
- Ensure that partners and family also know the danger signs, the need for immediate follow-up, and where to go for care.
  - Also review signs of labor, ruptured membranes, and decreased fetal movement. Tell the woman to come for care if she experiences any of these.

## Quick check

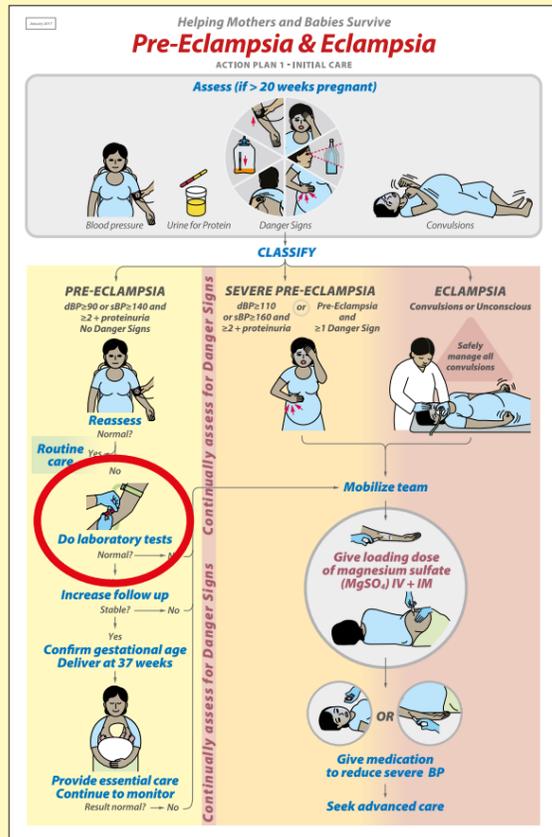
### **When should you always check a woman's BP?**

1. During ANC visits
2. On admission and during labor
3. During the immediate postpartum period
4. During all postpartum visits
5. If the woman complains of a SPE danger sign

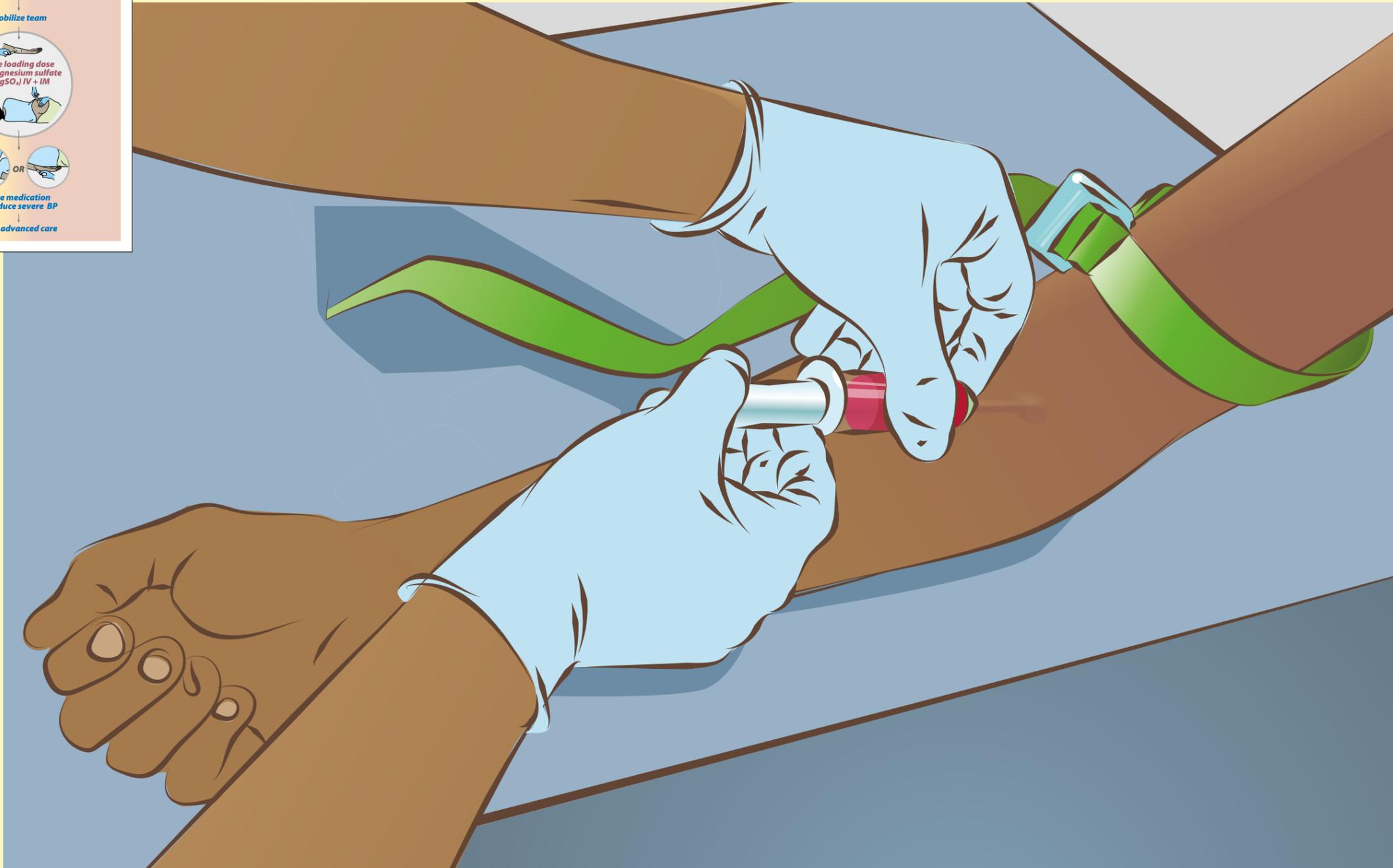
## Invite discussion

Ask, "How do you currently counsel women to be ready if they have complications?"

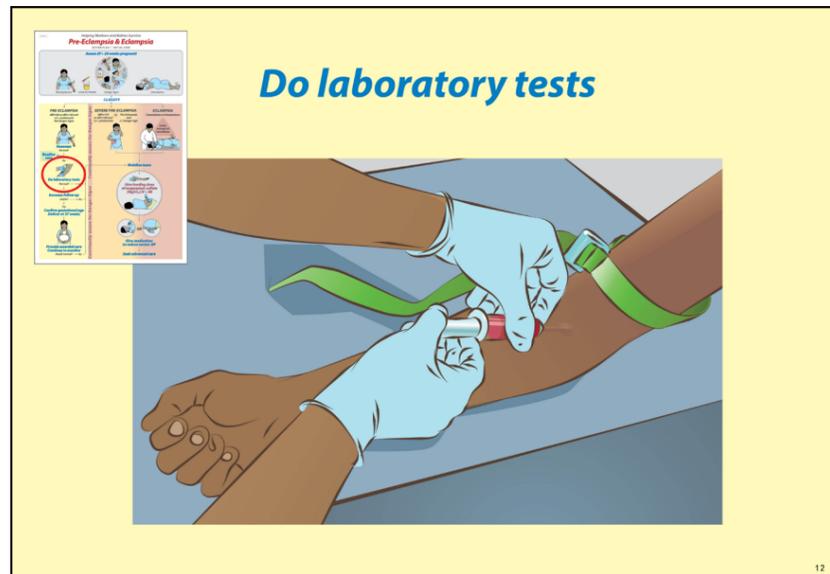
Review with learners to be sure women and their families have emergency contact numbers, emergency transport plans, someone to manage children and responsibilities at home, and funds in case of emergency.



# Do laboratory tests



## Key points



- Normal laboratory values in the absence of danger signs are reassuring and indicate it is safe to monitor women with PE outside a facility.
- Laboratory results that are not normal require advanced care.
- If you are an advanced care facility, your protocol for managing PE may have you do laboratory tests when PE or SPE is first suspected.

## Knowledge and skills

- Laboratory tests help detect worsening disease. Where available, they support clinical decision-making and prompt referral.
- Perform these tests if you suspect PE or SPE and a laboratory is available:
  - CBC with platelet count:** platelet count of  $< 100,000$  is a danger sign!
  - Serum creatinine :**  $\geq 1.1$  mg/dL or 2x baseline suggests poor kidney function
  - Liver enzymes:** AST/ALT: 2x normal suggests poor liver function
- Testing is recommended weekly although you may test more often based on clinical judgment.
- If her test results are not normal or getting worse and she is not already at an advanced care facility, refer promptly.
- Follow universal precautions and infection prevention measures when drawing or handling blood and disposing of collection supplies and waste.
- Explain to the woman why the tests are important; share the results and what they mean.

## Invite discussion

Ask learners, “Do you have a laboratory in this facility? If so, can they do these tests?”

If not, ask, “What do you do? Do women have to travel long distances in order to reach a laboratory?”

## Quick check

### When would you diagnose SPE?

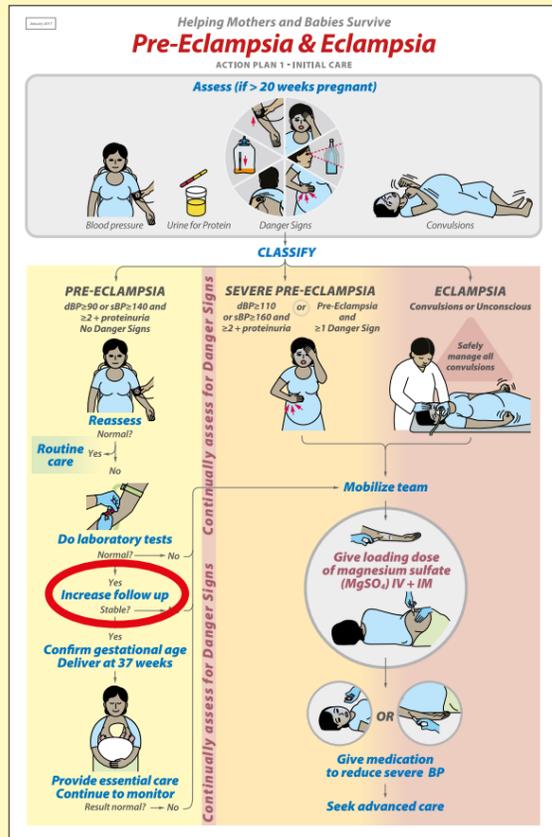
- $sBP \geq 160$  mmHg OR  $dBp \geq 110$  mmHg
- 2+ proteinuria

### OR

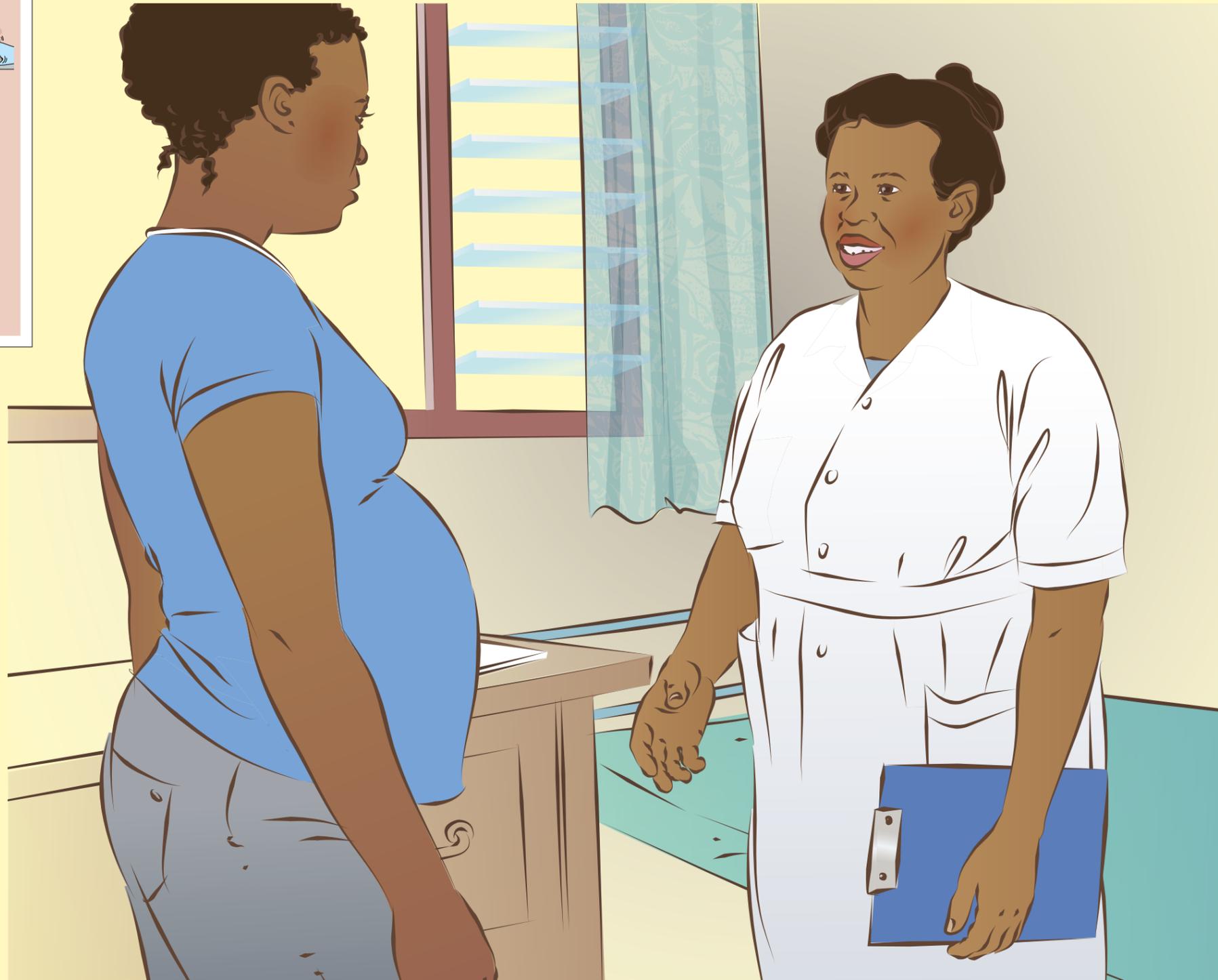
- $sBP \geq 140$  mmHg OR  $dBp \geq 90$  mmHg
- 2+ proteinuria

### AND ANY ONE OF:

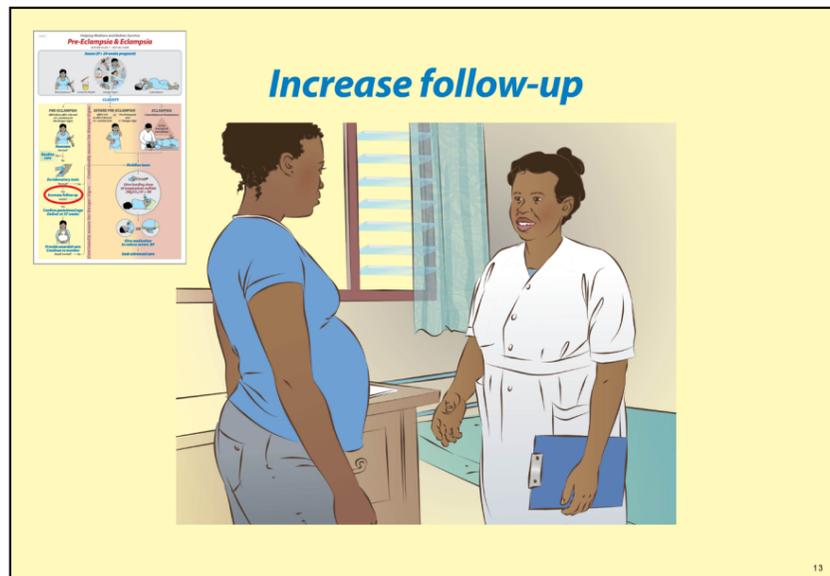
- Severe headache not relieved by analgesics
- Blurred vision or seeing bright lights/spots
- Right upper quadrant pain
- Pulmonary edema = difficulty breathing and/or rales
- $< 400$  mL urine passed in 24 hours
- $< 100,000$  platelets,  $\geq 1.1$  mg/dL serum creatinine, or 2x normal LFT (AST, ALT)



# Increase follow-up



## Key points



- Women with PE - meaning no danger signs! - should be seen twice a week until 37 weeks. At each visit:
  - Check BP
  - Monitor the fetus
  - Assess for SPE danger signs
  - Listen to lungs
  - Check reflexes
- Check laboratory tests weekly
- Any woman with PE who cannot return for visits twice a week must be admitted or transferred for advanced care.

**If at any time SPE develops, act quickly!**

## Knowledge and skills

- Women diagnosed with PE who are not in labor whose lab values are normal do not need to be admitted if they can come in twice weekly for checks and if they can get care immediately if they experience any danger signs.
- For these women at each visit:
  - Measure BP.
  - Monitor fetal growth, fetal movement, and fetal heart rate. If there is evidence of fetal compromise, seek advanced care.
  - **Assess for danger signs of SPE at every visit!**
  - Listen to lungs.
  - Check reflexes.
- Continue weekly laboratory tests if possible.
- Ensure women can get care immediately if they have any danger signs.
- Seek advanced care for all women with SPE.

## Quick check

**How often should you see a woman with PE?**

*Twice weekly*

**What must you check at each visit?**

- BP
- Fetus (FHR, movement, growth)
- If she has any danger signs for SPE or any other danger signs of pregnancy

**What must you check once a week?**

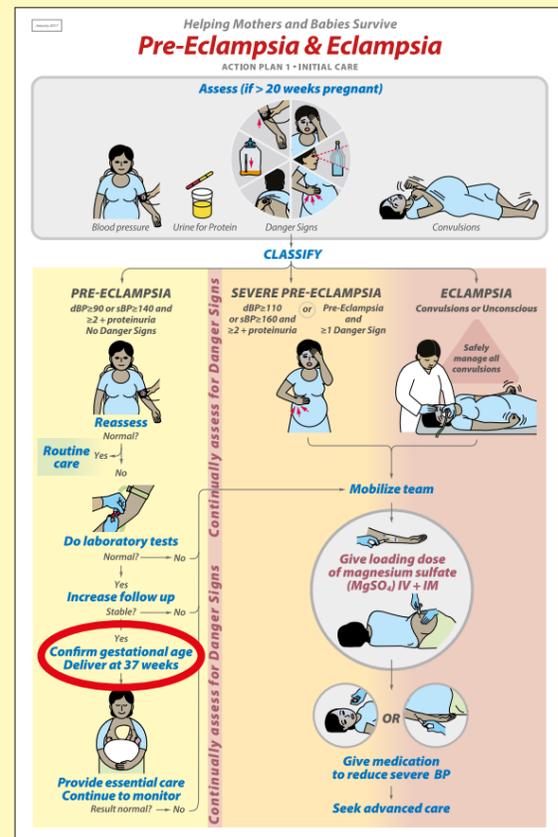
*Laboratory tests  
(CBC w/platelets, LFTs, creatinine)*

## Practice key skills

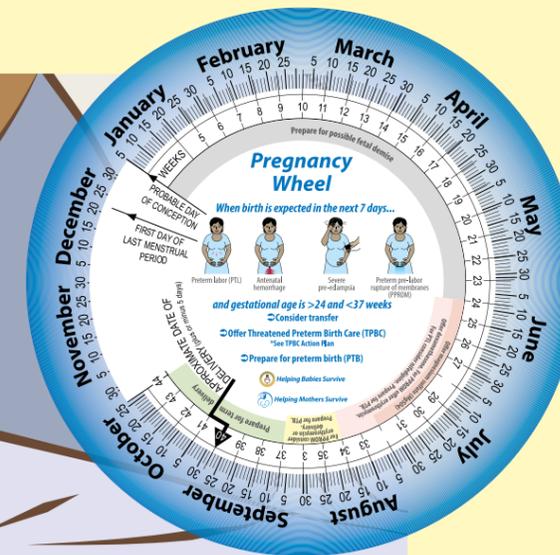
### Testing Reflexes

Request a learner to demonstrate testing reflexes with a reflex hammer:

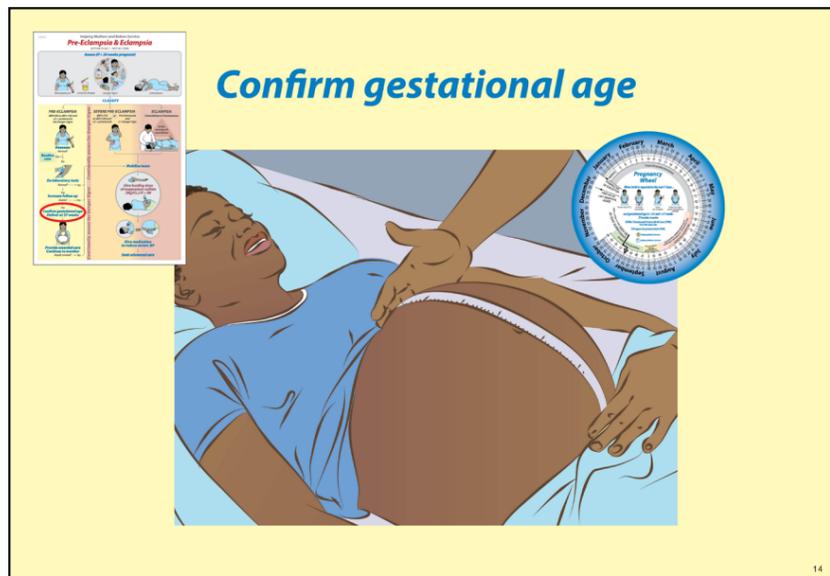
1. Ask volunteer to sit with legs hanging freely.
2. Feel for tendon just below kneecap.
3. Bring the wide edge of a reflex hammer, the edge of a stethoscope, or the side of your hand down onto the tendon in a rapid, smooth movement.
4. Tapping the tendon should make the lower leg jerk. Watch for how fast you see a response. It is the speed of the response, not how far the limb moves, that tells you if reflexes are normal.



# Confirm gestational age



## Key points



- Accurate gestational age (GA) is important to decide:
  - If a pregnancy is >20 weeks for diagnosis.
  - If fetal growth is acceptable.
  - If the fetus is preterm, needing special care.
  - If it is time for delivery.

## Knowledge and skills

- Accurate GA helps us decide if we can monitor a woman with PE or if it is time for her to deliver.
- In PE, accurate GA allows her to give birth at 37 weeks.
- In SPE&E, accurate GA lets us decide if corticosteroids are needed to help fetal

lungs and blood vessels mature and when to time delivery.

- Check the woman's record for her expected date of delivery (EDD) and note the method used:
  - (1) Last menstrual period (LMP),
  - (2) Measurement of fundal height from top of symphysis pubis to top of fundus, and/or
  - (3) Ultrasonography—review the GA from the scan
- From this EDD you will calculate her GA: Use a pregnancy wheel or verified mobile app if available OR
  - Count the number of weeks on a calendar that have passed since the LMP OR the number of weeks between today's date and the EDD:  $GA = 40 - (\text{number of weeks between today and the EDD})$
- If no EDD is documented, calculate using a pregnancy wheel or the calendar method using "Naegele's rule":
  - (First day of LMP) + (7 days) – (3 months), OR (First day of LMP) + (7 days) + (9 months)
- From here, calculate GA as above and confirm GA with fundal height:
  - At 20 weeks the uterus is at umbilicus.

- After 20 weeks measure from top of pubic bone to fundus. Centimeters = weeks gestation.
- If the LMP is not known, the woman was breastfeeding at the start of pregnancy, or if she used hormonal contraception in the 3 months prior to pregnancy, use fundal height.

## Invite discussion

Ask learners, "How do you determine GA? Do you use wheels? Calendars? What landmarks do you use for fundal measurement? Do you have tape measures?"

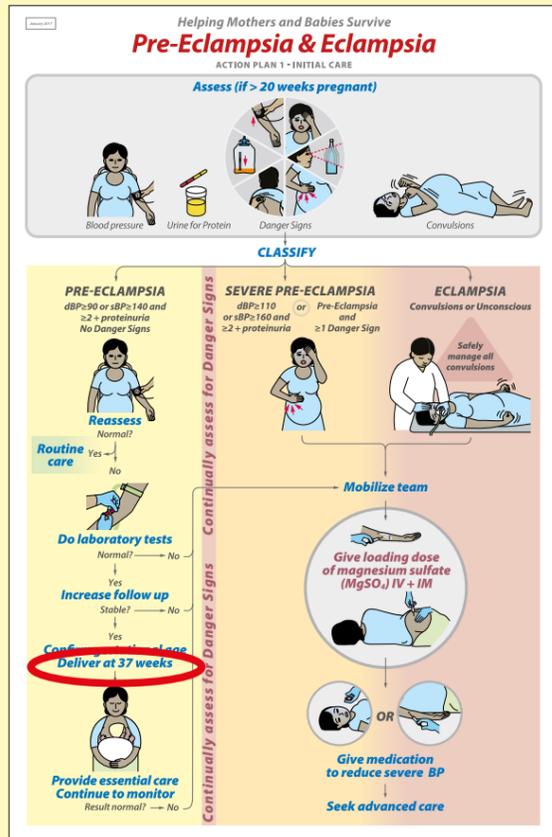
## Practice key skills

### Estimating Gestational Age

Supplies needed for practice:

- Pregnancy wheels
- Calendars
- Paper and pencils

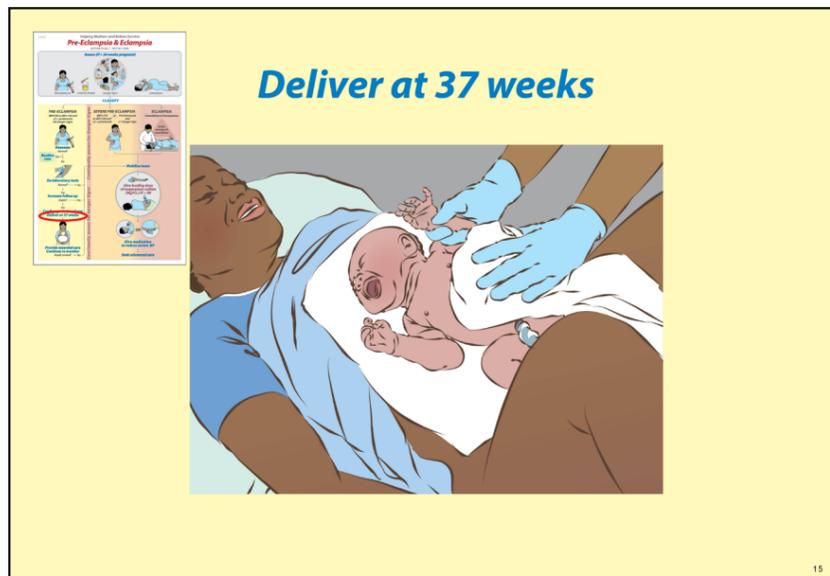
In groups of 6 or less, have facilitators ask learners to share their birthdays. The facilitator will then select the most recent one and have everyone use this to be a woman's LMP. Have them calculate both the EDD and the GA today. If this is a challenge, do the first calculations as a group. Continue using others' birthdays to practice obtaining both EDD and GA.



# Deliver at 37 weeks



## Key points



- The cure for PE is delivery!
- A woman with PE and a **reliable** GA should deliver within 24–48 hours after reaching 37wks and 0 days. But if a woman does not know her LMP or have a reliable first trimester ultrasound, and maternal and fetal status are reassuring, labor should not be induced.
- If labor must be induced, transfer women to advanced care.
- Women with PE are at risk for progressing to SPE or E during labor, birth, and postpartum. Continue close monitoring!
- Follow WHO guidelines for labor monitoring and best practice for clean and safe birth.

## Knowledge and skills

- For women with PE, continuing pregnancy after 37 weeks puts both woman and fetus at risk.
- Counsel women and families that birth is recommended at 37 weeks.
- If the woman does not have reliable dates:
  - See if further questioning helps to establish LMP.
  - Refer woman for dating ultrasound.
  - If no other information is available, use the best clinical estimate with fundal height.
- Labor induction and birth should take place at facilities with the ability for cesarean delivery.
- Using the partograph, monitor women with PE as you would any woman in labor according to WHO guidelines.
- Assess regularly for danger signs.
- Check BP at least every 4 hours.
- Continue to listen to lungs for pulmonary edema.
- Perform active management of the third stage of labor (AMTSL). Give all women 10 IU oxytocin IM OR 600 mcg misoprostol by mouth within one minute of birth.

## Do not give ergometrine!

- If PE is first diagnosed during labor, draw blood for initial laboratory tests if available.
- If at any time women develop danger signs, diagnose SPE, call for help, and initiate treatment.

## Invite discussion

What is the current practice here for women at 37 weeks with PE? Can you induce labor? Provide cesarean delivery?

Are there any challenges to delivering these women at 37 weeks?

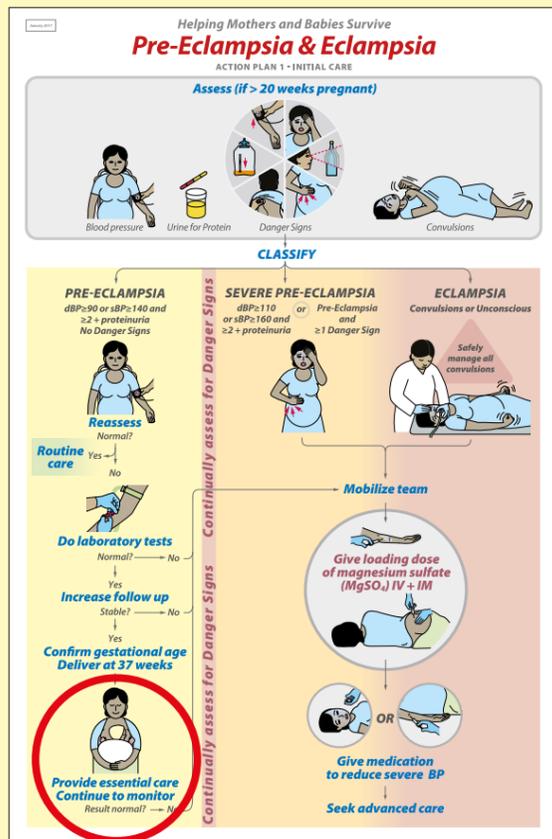
## Quick check

**What labs would you draw if diagnosis is first made while in labor?**

*CBC with platelet count, serum creatinine, and LFTs*

**If a woman's BP is 148/94, what danger signs would make you diagnose SPE?**

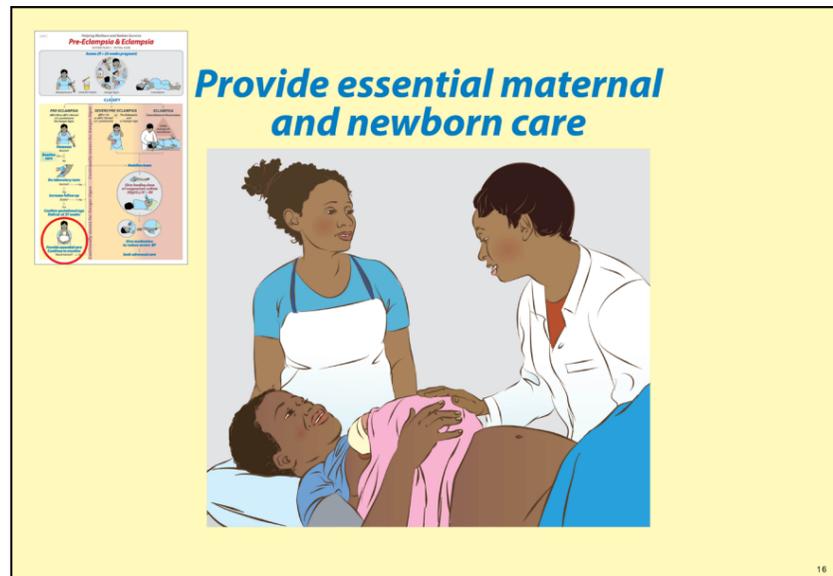
*Severe headache, visual changes, right upper quadrant pain, pulmonary edema, or oliguria*



# Provide essential maternal and newborn care



## Key points



- Women with PE are at risk for developing SPE or E after birth and should be monitored for at least 72 hours. As much as 40% of E begins in the postpartum period.
- All women should receive essential postpartum care.
- All babies should receive essential newborn care.
- Follow up in 1 week to check BP, assess for danger signs, and provide routine care for both mother and newborn.

## Knowledge and skills

### For the mother:

- Monitor her closely for at least 72 hours postpartum.
- Continue to listen to lungs daily for evidence of pulmonary edema.
- Continue to assess for danger signs.
- Counsel about danger signs and how to respond.
- Provide routine postpartum care and monitoring per national guidelines.
- Counsel women that they are at significant risk for having PE&E in future pregnancies and should begin ANC as soon as they think they are pregnant. Women are also at risk for developing hypertension later in life.

### For the newborn:

- Provide skin-to-skin care for at least an hour after birth and encourage breastfeeding within the first hour.
- Provide essential newborn care. Refer learners to Provider's Guide pg. 25 for refresher.
- Women with PE and SPE are at increased risk for preterm birth and babies who are

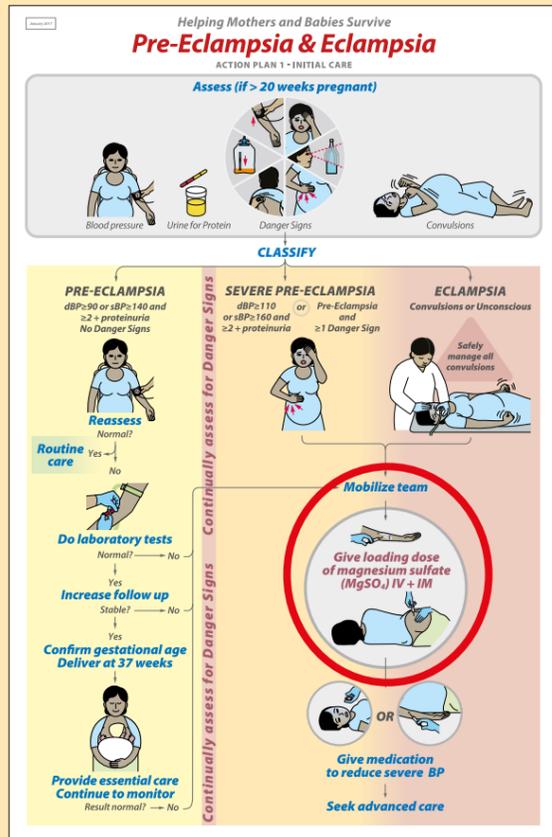
small for gestational age. Be prepared to provide additional care for early or small babies.

- Weigh the baby.
  - Babies under 2500 grams may need special care.
  - Babies under 2000 grams should receive prolonged skin-to-skin care.
  - Babies under 1500 grams should receive advanced care.

## Invite discussion

What counseling do you give women with PE about future pregnancies?

What do you tell them about their risk for high BP in later life?



# Mobilize Team

## Give loading dose of MgSO<sub>4</sub>



## Key points



- Respond to SPE&E as an emergency and move quickly to work as a team. Act fast!
- Magnesium sulfate ( $\text{MgSO}_4$ ) is the best anticonvulsant for SPE&E.
- The preferred loading dose includes both:
  - 4g  $\text{MgSO}_4$  20% solution IV **AND**
  - 10g  $\text{MgSO}_4$  50% solution IM (5g in each buttock)
- Prepare and maintain a PE&E Emergency Kit with all supplies needed for SPE&E.

## Knowledge and skills

$\text{MgSO}_4$  saves lives: If given properly, serious side effects are rare.

- Use the correct preparations of  $\text{MgSO}_4$  (50% or 20%) to ensure maximum effect

and reduce the risk of toxicity.

- WHO prefers IV/IM regimen (Pritchard) where IV flow rates cannot be monitored precisely.
- $\text{MgSO}_4$  causes sweating and flushing. Rarely, a woman may have nausea, vomiting, weakness, and palpitations. The IM injections are painful. Explain what to expect and offer reassurance.
- Prepare a PE&E Emergency Kit with drugs and supplies; see pg. 18b. Ensure everyone knows where it is and has access.

## Invite discussion

How is  $\text{MgSO}_4$  supplied here? Do you have more than one concentration? Do you have single or multiuse sources to dilute  $\text{MgSO}_4$  when needed?

**If multiuse, draw up dilution first.**

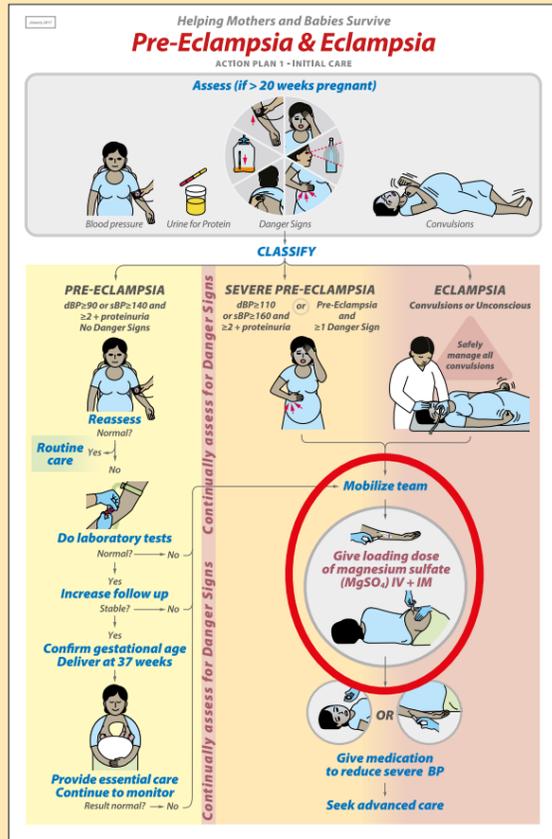
**To administer the  $\text{MgSO}_4$  loading dose:  
Using  $\text{MgSO}_4$ , 1g in 2 mL**

1. Give 4g  $\text{MgSO}_4$  20% solution IV:
  - Draw 8 mL (4g)  $\text{MgSO}_4$  50% in 20 mL sterile syringe.
  - Add 12 mL sterile water in same syringe = 20 mL of 20% solution or 4g  $\text{MgSO}_4$ .
  - Give IV over 5–20 minutes.

2. Give 5g  $\text{MgSO}_4$  50% solution IM in each buttock:

- Draw 10 mL (5g)  $\text{MgSO}_4$  50% in each of two 20 mL sterile syringes.
  - Add 1 mL 2% lignocaine in each syringe.
  - Give deep IM injection in upper, outer quadrant of each buttock.
- If convulsions recur after 15 minutes, give 2g  $\text{MgSO}_4$  20% IV.
    - Draw 4 mL (2g) of  $\text{MgSO}_4$  50% into 10 mL sterile syringe.
    - Add 6 mL sterile water in same syringe = 10 mL of 20% solution or 2g  $\text{MgSO}_4$ .
    - Give IV over 5 minutes.
  - Record information on the  $\text{MgSO}_4$  Monitoring Sheet. See resources.
  - If advanced care will not be reached within 4 hours, administer first maintenance dose (5g  $\text{MgSO}_4$  50% solution + 1 mL lignocaine 2% IM injection in single buttock) 4 hours after loading dose. Withhold dose if any of the 3 signs of toxicity are present:
    - Respiratory rate < 16 breaths per minute
    - Patellar reflexes are absent
    - Urine output < 30 mL per hour over preceding 4 hours

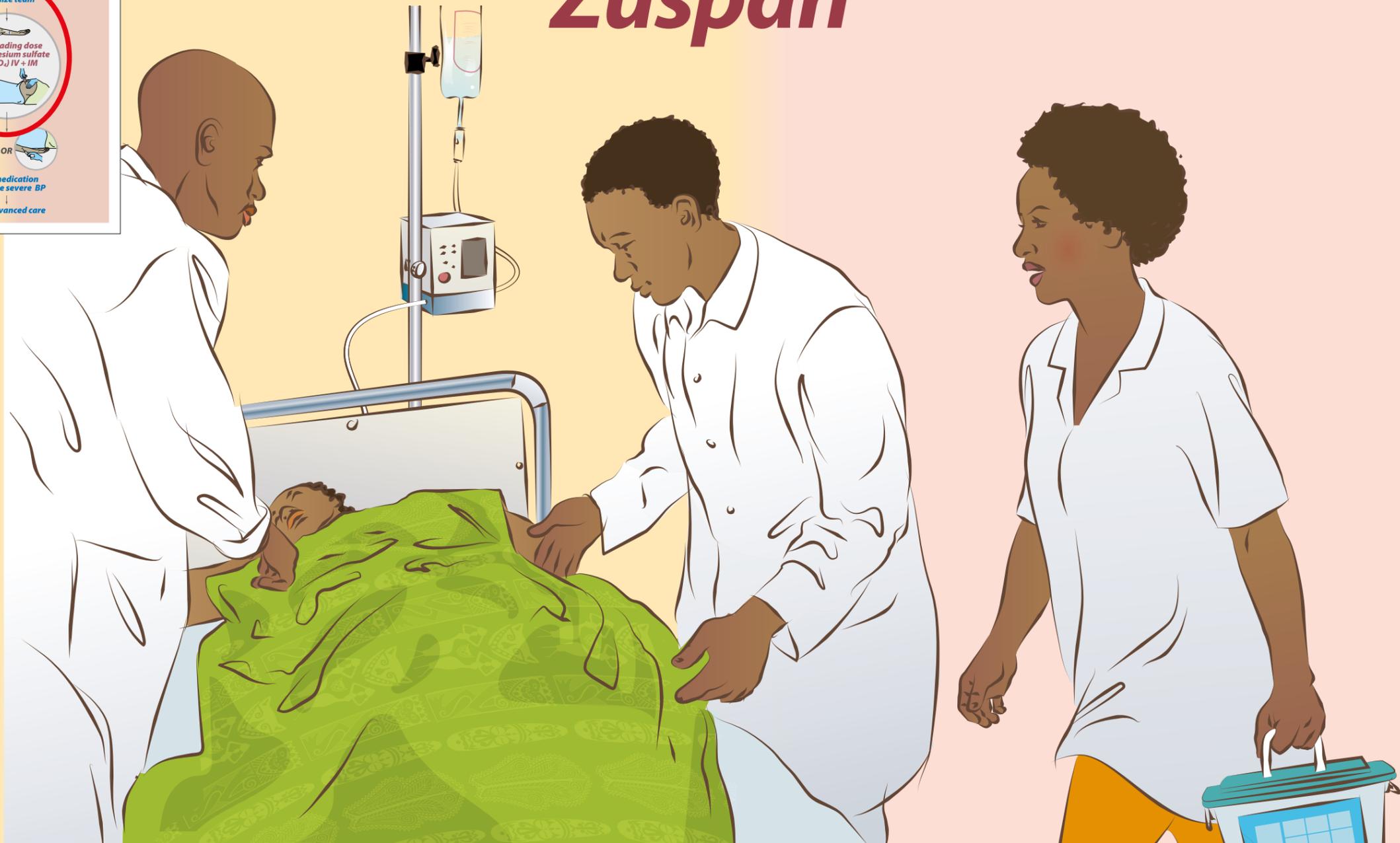
*Refer to Provider's Guide pg. 33 for instruction about monitoring women on  $\text{MgSO}_4$ .*



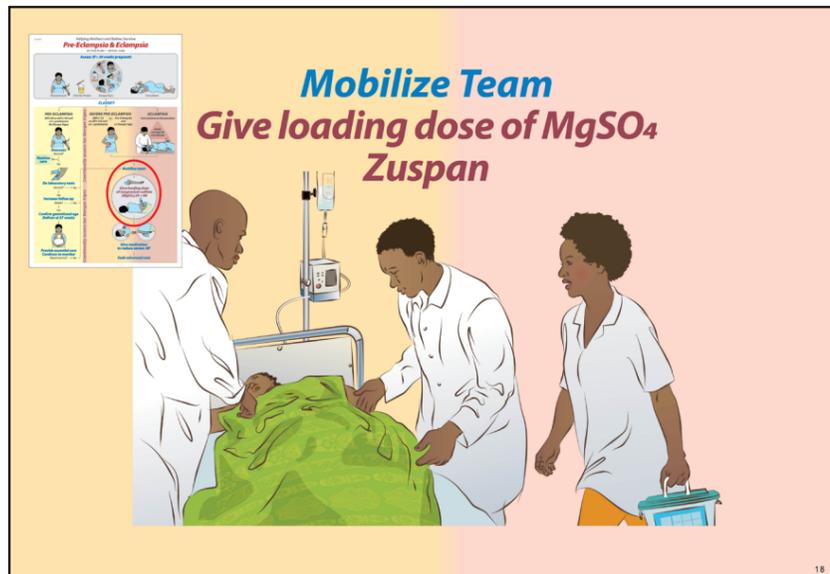
# Mobilize Team

## Give loading dose of MgSO<sub>4</sub>

### Zuspan



## Facilitation note



Prior to training day, assess if precise monitoring of IV flow rates with infusion pumps or gravity infusion is feasible in this facility and if providers have the skills and staff needed for this level of precision.

**If these criteria are not met, move to the next page.**

## Key points

Both the IV only (Zuspan) and IV plus IM (Pritchard) regimens effectively prevent convulsions in women with SPE.

- The Zuspan regimen should only be considered if precise monitoring of IV flow rates is feasible. Infusion pumps are the best method. Where there is extensive

experience and adequate nursing staff, gravity infusion can be used. The Zuspan regimen should never be used in facilities that can only initiate treatment for SPE&E before transferring for ongoing management.

## Knowledge and skills

There is no evidence that one regimen is more clinically effective than the other.

- The Zuspan regimen should be provided only in settings where:
  - Women do not need to be transferred between facilities.
  - There are enough staff to continuously monitor the woman and the IV infusion.
  - Providers use automated infusion pumps or are very skilled in calculating drip rates and using gravity infusion.
- Benefits of the Zuspan regimen include:-
  - A faster onset of therapeutic effect.
  - No need for IM injections, which can be painful and cause inflammation at the injection site.
- The loading dose for the Zuspan regimen is 4 g MgSO<sub>4</sub> in 20 mL (20% solution) administered by IV infusion over 5–20 minutes.

- The continuation dose is 1 g MgSO<sub>4</sub> per hour by IV infusion. Prepare:
- 500 mL IV bag or bottle of saline or lactated Ringer solution + 10 g 50% MgSO<sub>4</sub> and infuse at 50 mL / hour **by gravity infusion or infusion pump.**  
OR
- 1000 mL IV bag or bottle of saline or lactated Ringer (LR) solution + 20 g 50% MgSO<sub>4</sub> and infuse at 50 mL / hour **by infusion pump only.**
- Always check hourly to ensure that there are no signs of toxicity (see page 17b). If signs of toxicity are present, discontinue IV infusion.

## Quick check

**What is the loading dose of the WHO-preferred regimen using IM and IV?**

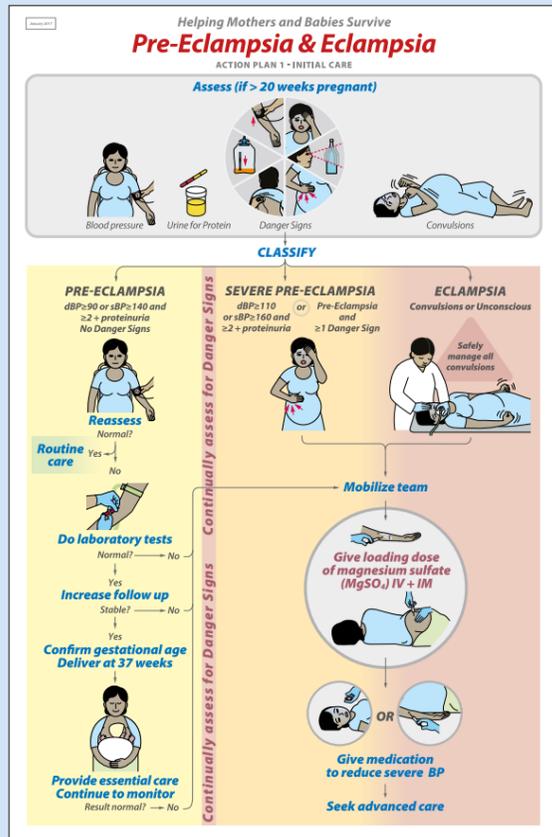
*MgSO<sub>4</sub> 20% solution 4g IV AND*

*MgSO<sub>4</sub> 50% solution 10g IM (5g in each buttock)*

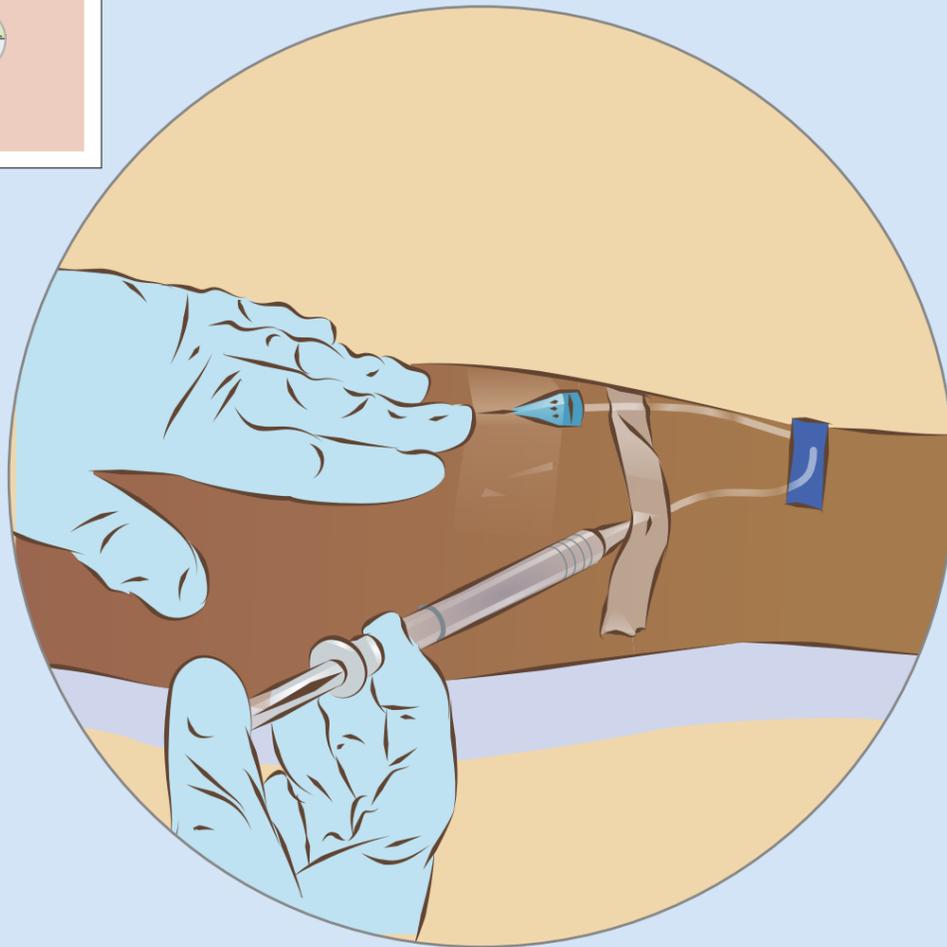
**What is the loading dose and immediate continuation dose for the Zuspan regimen?**

*MgSO<sub>4</sub> 20% solution 4g IV followed by*

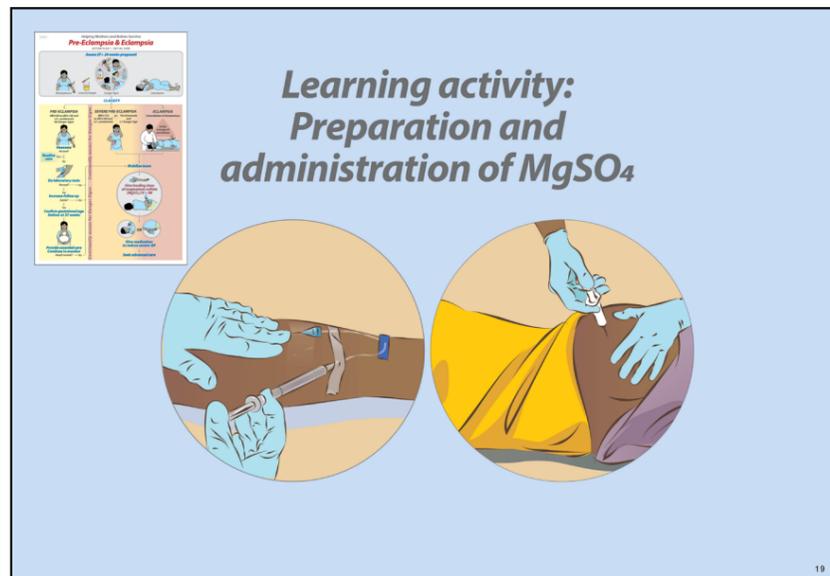
*MgSO<sub>4</sub> 1g per hour IV infusion*



# Learning activity: Preparation and administration of MgSO<sub>4</sub>



## Facilitation note



**Assess whether dilution comes from a multiuse source such as an IV bag/bottle that will be used for other patients or if dilution comes in single use. If multiuse, ensure providers draw up dilution first to avoid contamination with MgSO<sub>4</sub> and that they use clean technique to decrease risk of contamination.**

Demonstrate preparing and administering MgSO<sub>4</sub>. Explain each step and answer any questions learners may have.

Under your guidance, have learners work in pairs to practice preparing the complete MgSO<sub>4</sub> loading dose using mock drugs. Have them verbalize slow IV injection and

demonstrate IM injection in a melon or similar object. If using a melon, it helps to hollow it out in advance.

## Resources and supplies

- Contents of the **PE&E Emergency Kit**
- Local syringes with IM needles; 20mL preferred
- Mock MgSO<sub>4</sub>, represented in local concentration; use sterile water vials and label with concentration
- Mock lignocaine 2%; as for mock MgSO<sub>4</sub>
- Puncture-proof container for sharps
- Melon or similar fruit/vegetable for IM injections

## Invite discussion

**Ask learners, “Do you have a PE&E emergency kit in your facility?”**

- *Who maintains it?*
- *Is it restocked immediately after use?*
- *Is it checked weekly for completeness and to ensure drugs are not expired?”*

If they do not have a kit, do they have the materials necessary to prepare one?

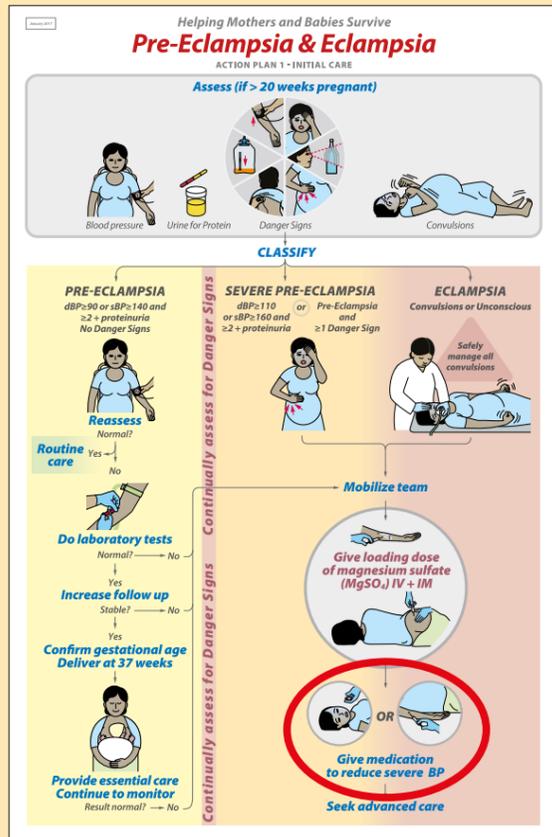
- Have the team choose who will gather supplies for this kit.
- Who will check it regularly to be sure it is complete and that fluids and medications are not expired?

Stress the importance of restocking the kit completely after each use.

### PE&E Emergency Kit

Place all supplies below in a box labeled “PE&E Emergency Kit”:

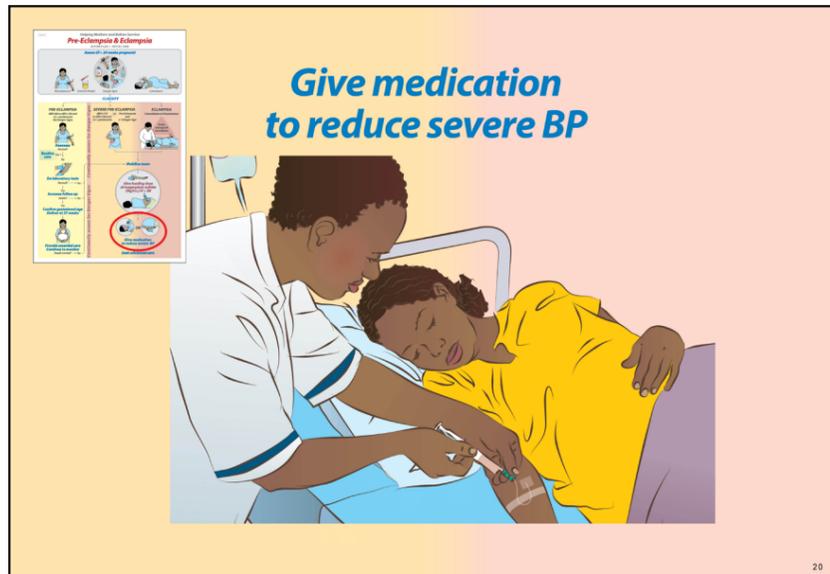
- MgSO<sub>4</sub>: at least 14g
- Lignocaine 2%
- Sterile water/IV for dilution
- 20cc syringes: at least 3
- IM needles: at least 3
- IV normal saline or lactated Ringer solution
- IV giving set and IV needles
- Alcohol swabs, tourniquet, gloves
- Calcium gluconate 10%



# Give medication to reduce severe BP



## Key points



- All women with severe hypertension should be treated with antihypertensive medication.
- Selection of medication should be based on local availability, provider experience, adverse effects, and contraindications.

## Facilitation note

Before training, understand what antihypertensive medications are used at this facility. Provide teaching and emphasis on those medications.

## Knowledge and skills

- A woman with sBP  $\geq$  160 mmHg OR dBP  $\geq$  110 mmHg urgently needs antihypertensive medication to control her BP.
- MgSO<sub>4</sub> may lower BP slightly, but it should never be used alone to treat hypertension. **Use diagnostic BP to determine need for antihypertensive.**
- **Target BP: 140–155mmHg/90–100mmHg; achieve in 1–2 hours**
  - Lower than the target may decrease blood to the fetus, causing distress.
  - Higher than the target may cause a stroke.
- Selection of antihypertensive is based on local availability. The following are recommended for acute management of severe hypertension in pregnancy and postpartum:
  - **Nifedipine immediate-release only:** 5–10mg PO or bitten then swallowed, repeat q 30 min until goal achieved. Maximum initial dose 30mg. *Note: Nifedipine is available in more than one formulation (immediate-release, intermediate-release, sustained-release). Only immediate-release is included on WHO's Essential Medicines List 2015. Also, other antihypertensives should be used if target BP is not reached in 90 min using 30 mg immediate-release nifedipine.*

- **Hydralazine:** 5mg IV slowly, repeat 5mg q 5 min until goal achieved, max 20mg in 24 hrs. Repeat hourly as needed or give 12.5 mg IM every two hours as needed.
- **Labetalol oral:** 200mg PO, repeat q 1 hour if needed to achieve goal. Maximum dose is 1200mg in 24 hrs.
- **Labetalol IV:** 10mg IV, double dose q 10 min to 80mg until goal achieved. Maximum dose 300mg, then switch to oral labetalol. *Note: Do not use labetalol in women with congestive heart failure, hypovolemic shock, or asthma.*
- MgSO<sub>4</sub> can be safely used with antihypertensives.

## Quick check

**What is the BP threshold for antihypertensive medication?**

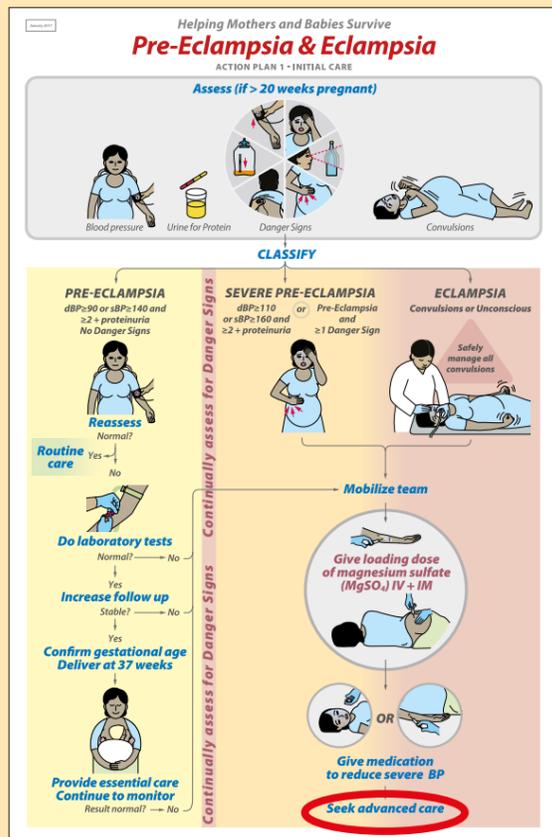
**sBP  $\geq$  160 mmHg OR dBP  $\geq$  110 mmHg**

**What is the target BP?**

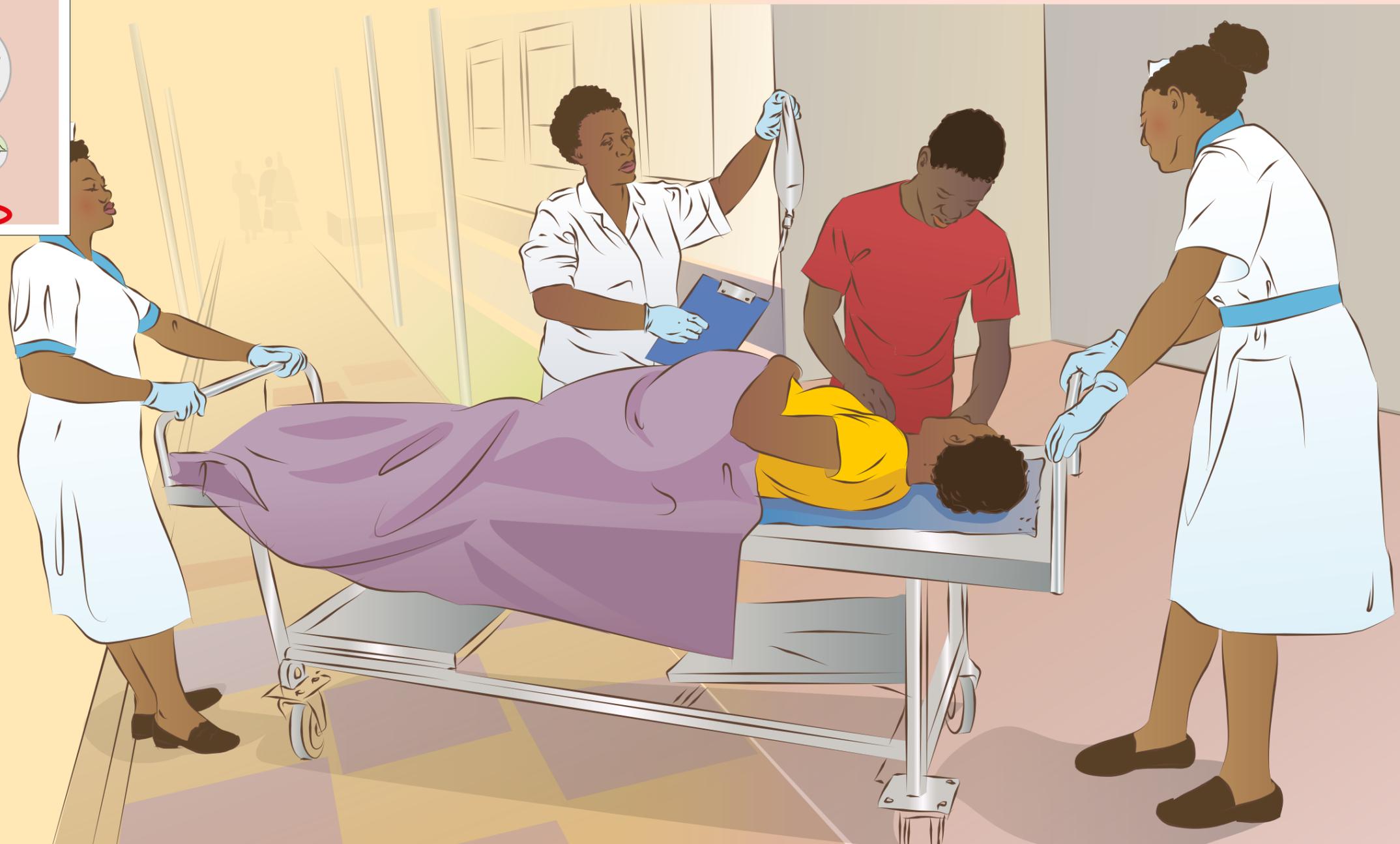
**140–155mmHg/90–100mmHg in 1–2 hours**

## Invite discussion

**Ask learners,** “What antihypertensives are used in your facility? What doses do you use for severe hypertension related to PE?” “Do you have guidelines for use of antihypertensives for SPE&E?”



# Seek advanced care



## Key points



- Women with SPE&E should be managed at facilities where they can be closely monitored.
- If you must send a woman out of your facility for care, **rapidly provide initial loading dose of MgSO<sub>4</sub> before referral!**
- **Also, rapidly provide initial dose of antihypertensive, if appropriate, before referral!**
- After initial stabilization and treatment, coordinate referral using:
  - Teamwork and timely mobilization
  - Accurate decision-making
  - Advanced preparation
  - Effective communication
  - Referral form giving diagnosis, vital signs, and treatments given

## Knowledge and skills

- Facilities must be able to closely monitor women with SPE or E.
- If your facility can provide close monitoring, getting advanced care may mean moving the woman from the clinic or outpatient department to the labor ward.
- If a facility cannot provide close monitoring, women with SPE should be transferred as soon as possible.
- **Always stabilize and begin appropriate treatment before transfer!**
- Explain to the woman and her family that she needs more services and closer monitoring than your facility can provide.

### Quick check

**What is the full loading dose for MgSO<sub>4</sub>?**  
4g MgSO<sub>4</sub> 20% solution IV AND  
10g MgSO<sub>4</sub> 50% solution IM (5g in each buttock)

**What is the correct dose for the antihypertensive you use in your facility?**  
Any of the following:  
Labetalol 10mg IV, nifedipine 5–10mg PO bitten then swallowed, OR hydralazine 5mg IV

## Invite discussion

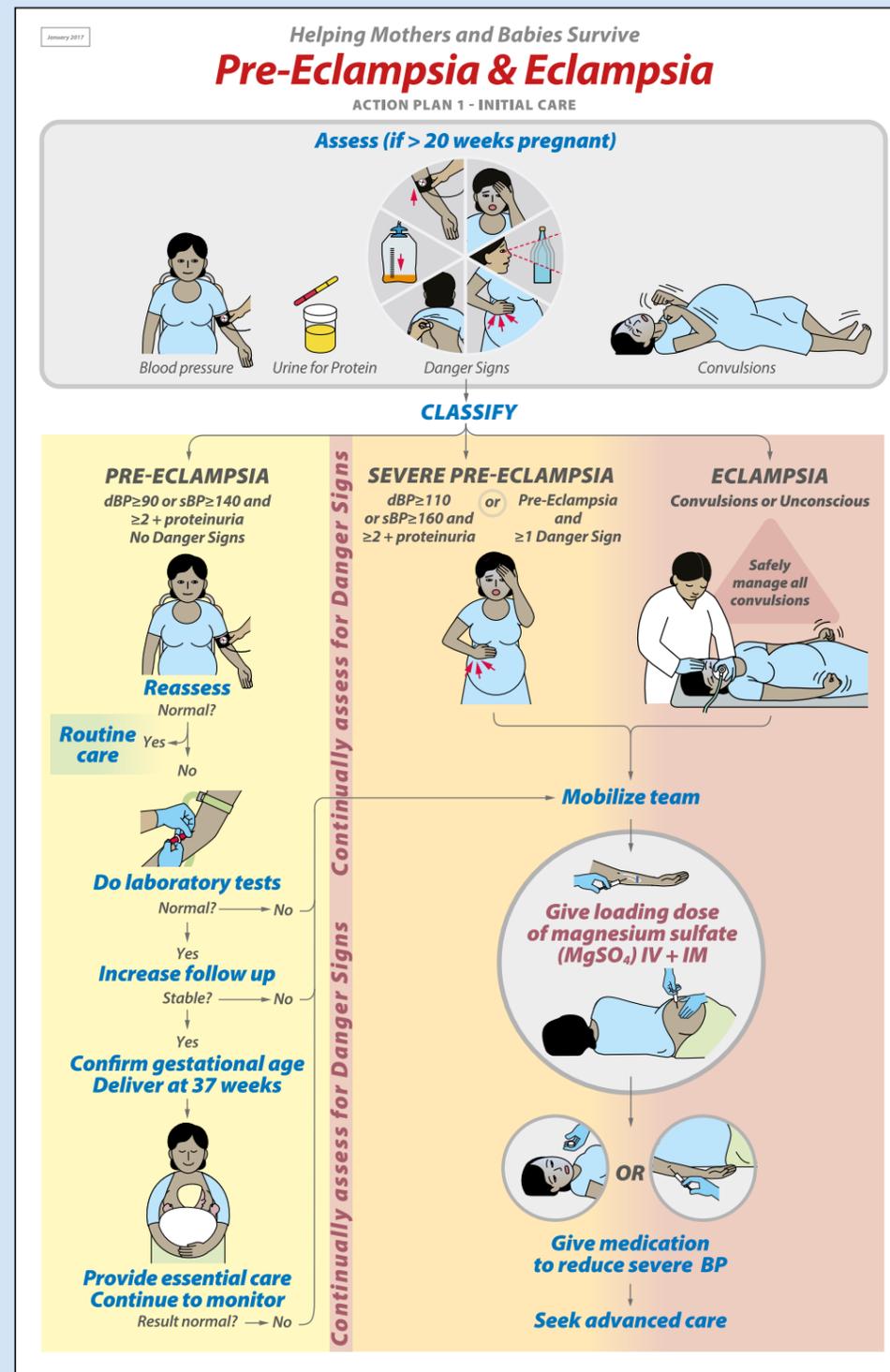
**Ask,** “What is ‘advanced care’ in your facility? Is your facility capable of providing continuous and close monitoring? If not, where is the nearest referral facility?”

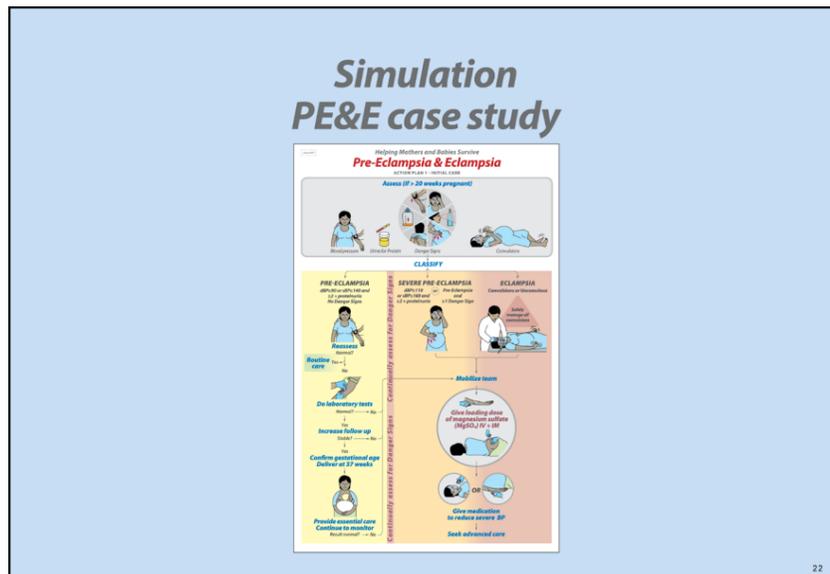
**Ask,** “What are the steps in executing an effective referral?” Guide learners with the following responses:

1. Organize reliable transportation.
2. Communicate with the referral facility:
  - Explain her diagnosis and condition.
  - Describe care provided including medicines.
  - Estimate her time of arrival.
3. Ensure that the woman is accompanied by a companion.
4. If possible, send a provider to go with her to:
  - Monitor her and the fetus or newborn
  - Provide the first maintenance dose of MgSO<sub>4</sub> if she does not reach referral facility within 4 hours.
5. Keep her IV in place.
6. Complete the referral record to send with her.
7. Record referral.
8. Obtain report from the referral facility and ensure that she receives follow-up care.

# Simulation

## PE&E case study





## Facilitation note

**Tell learners that they will be experiencing a simulation. Participants should act as if they are providing care for a real woman. Observers should be ready to provide feedback. If there are more than 3 participants, a second simulation will be needed so all learners can actively participate.**

**As facilitator, you will be Mrs. C. Assign up to 3 learners to act as providers and any remaining learners to observe and give feedback after the role-play.**

**Allow 15 minutes for this activity. The goal is for learners to diagnose and initiate treatment of Mrs. C, who has SPE**

**even though she has no danger signs and appears to be normal. Her BP is dangerously high and the team needs to identify and begin treatment quickly. Read the following scenario to the group:**

**Case 1:** *"I am Mrs. C, 27 years old and 39 weeks pregnant with my first baby. I have been to 4 ANC visits with no problems and I think I am in labor. Please begin your assessment and tell me what you are doing. If you choose to assess something, please do so and I will give you the results. Afterwards we will debrief as a team."*

Give the following but only if assessed:

- BP 178/112
- No danger signs
- Urine protein 2+
- Fetal heart rate of 140, movement present
- Vaginal exam: cervix is 4 cm dilated
- Contractions every 4 minutes lasting 45 seconds, moderate
- All other measurements are normal

**Debrief:** Upon completion of the role-play, begin structured debrief. Be sure to include feedback about communication and RMC. Include the following points:

- Confirm correct diagnosis and treatments
  - SPE and full MgSO<sub>4</sub> loading dose (IV and

IM) and antihypertensive. If participants will receive only Day 1 of training, they must then refer to advanced care.

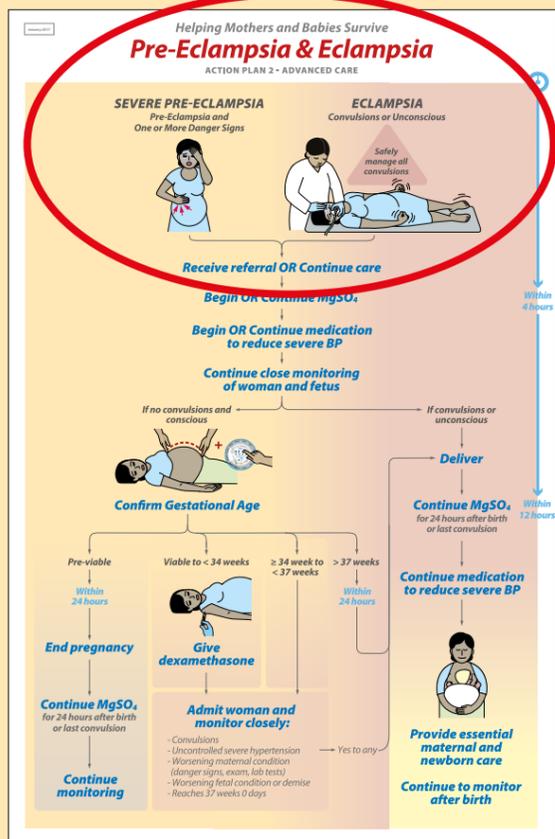
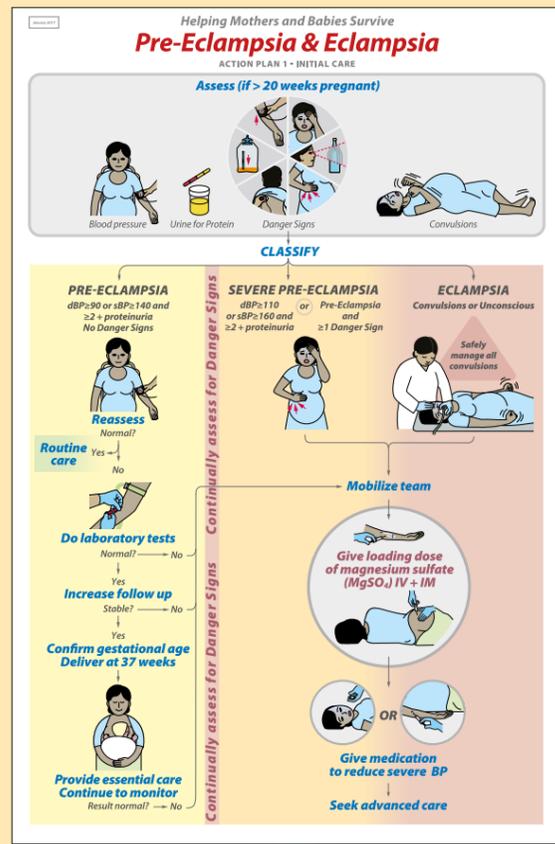
- Ask the following: *"Why this diagnosis? What went well? Did you miss anything? How did the team function? What did you learn that you will remember for next time?"*
- Help learners identify that women can have SPE without danger signs. The team must move quickly from assessment and diagnosis to management.
- Be sure to address any communication gaps. Were all team members comfortable working together, delegating? As the client, share how YOU felt. Did they delegate, communicate, provide RMC?

**To ensure all learners participate as providers, repeat with Case 2 if needed.**

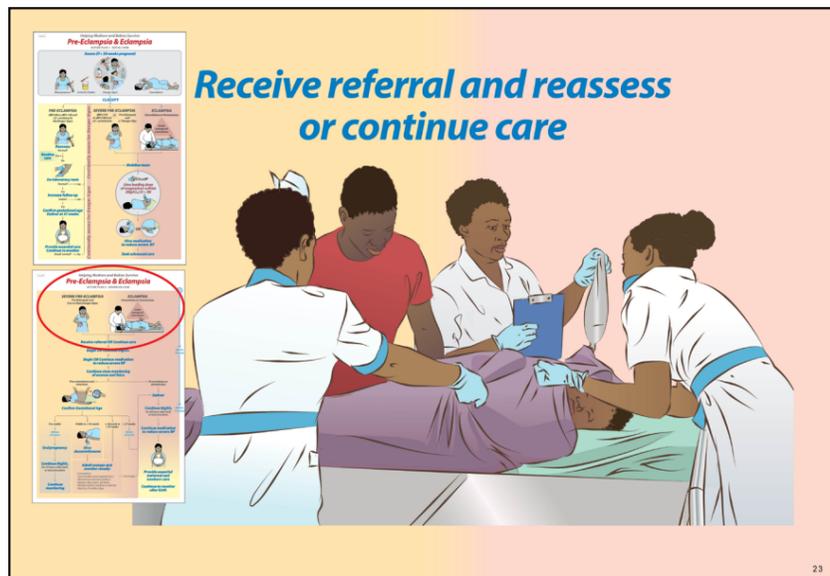
**Case 2:** *Read the same case but use the following measurements only if assessed:*

- BP 156/106
- Blurred vision
- Urine protein 2+
- Fetal heart rate of 150, movement present
- Vaginal exam: cervix is 7cm dilated
- Contractions every 3 minutes lasting 60 seconds, moderate
- All other measurements are normal

# Receive referral and reassess or continue care



## Key points



- A woman may be referred to you from another facility OR she may have been diagnosed at your hospital.
- If you did not make the initial diagnosis, conduct a rapid initial assessment and review information from the referring facility or unit of your hospital.

## Knowledge and skills

### Rapidly assess:

- Respirations, pulse, BP, reflexes, and consciousness
- Lungs
- Fetal heart rate and movement
- Confirm GA
- For labor or ruptured membranes

Provide immediate emergency care if needed. Review referral card or speak with referring provider about the diagnosis and treatment that was given including:

### Anticonvulsant

- Did the woman have convulsions or other danger signs?
- Was MgSO<sub>4</sub> loading dose given?
  - If so, how much and when?
  - Were any other doses given?
  - When is she due for her next dose?
  - Is she showing signs of toxicity?

### Antihypertensive

- What was the woman's initial BP?
  - What is it now?
- Was antihypertensive medication given?
  - If so, what drug, dose, and time?
- Continue antihypertensive treatment, if needed.

### Fluid balance

- Is the woman getting IV fluids?
- Any signs of pulmonary edema (rales)?
  - If none, start/continue IV fluids.
- Is a urinary catheter in place?
  - If so, empty now and record amount.
  - If not, insert one and begin strict fluid balance chart.

Repeat laboratory investigations.

Review or start MgSO<sub>4</sub> Monitoring Sheet.

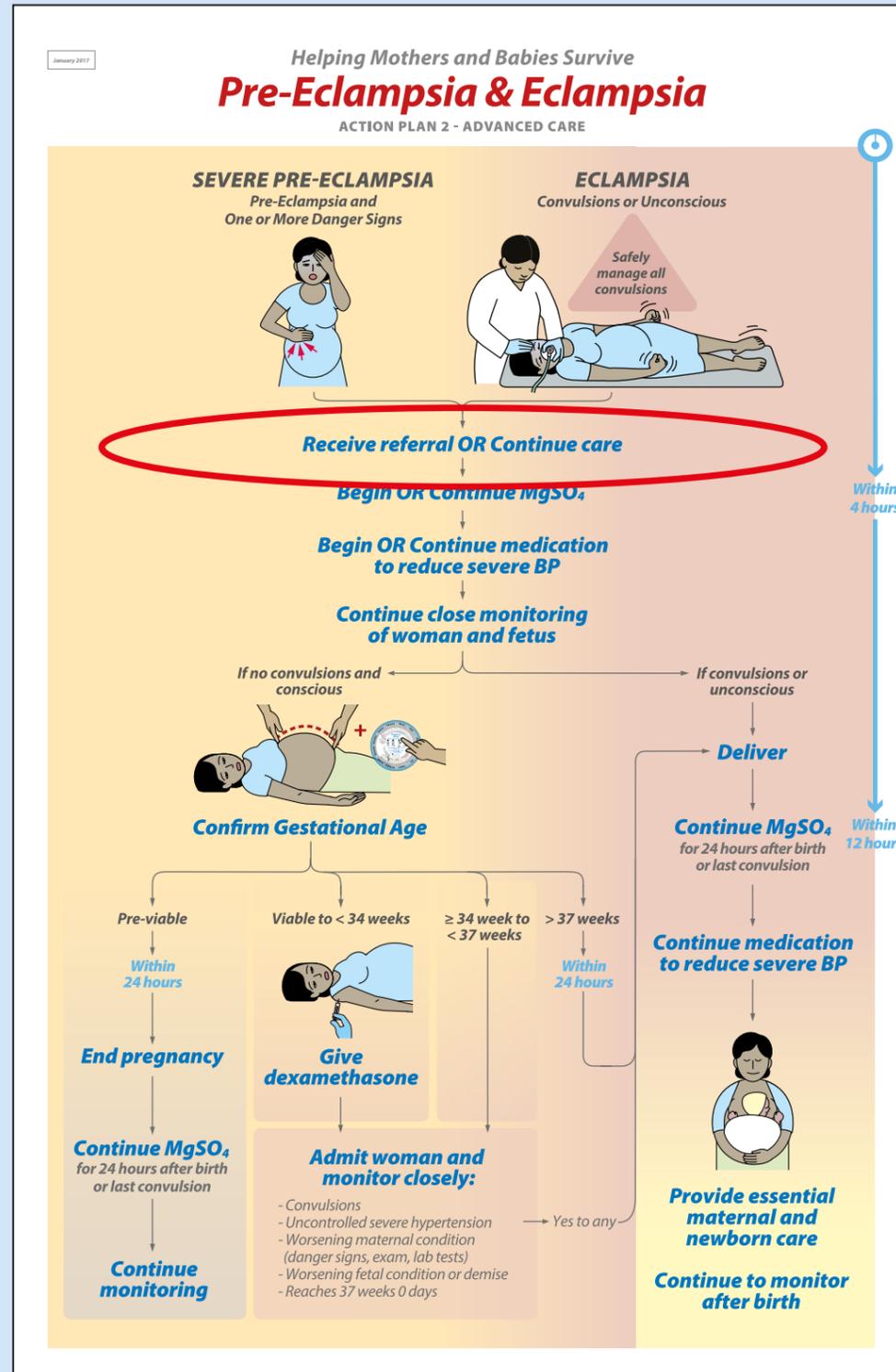
## Quick check

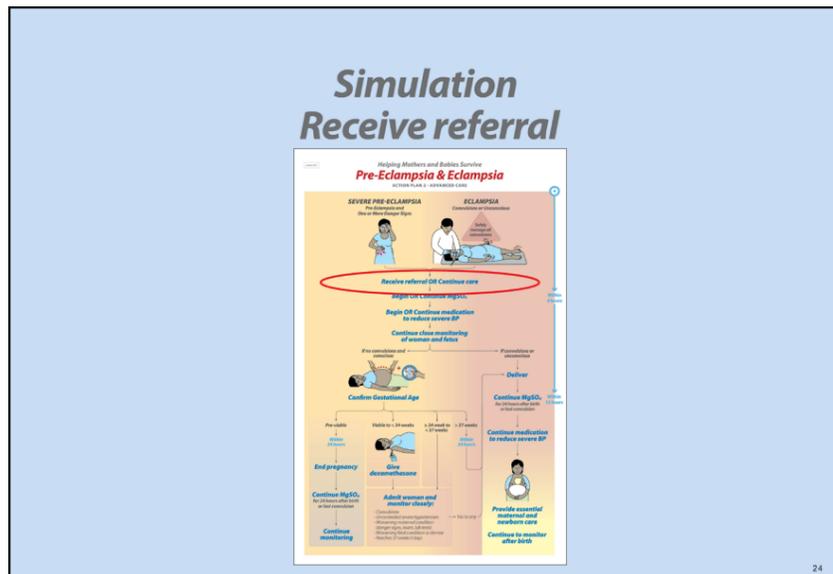
**What BP requires antihypertensive medication?**  
*sBP ≥ 160 or dBP ≥ 110?*

**What range do you want to keep the dBP?**  
*Between 90 and 100 mmHg.*

# Simulation

## Receive referral





## Facilitation note

**Tell learners that they will be experiencing a simulation similar to the previous activity. Participants should act as if they are providing actual care. Observers should be ready to provide feedback. If there are more than 3 participants, a second simulation will be needed so all learners can actively participate.**

**Assign up to 3 learners to act as providers.**

**Allow 15 minutes for this activity. The goal is for learners to rapidly assess and provide ongoing treatment to Mrs. K, who has just arrived** by ambulance from a nearby health center. Prepare volunteer ahead of time to play Mrs. K.

Case 1: “Mrs. K just arrived by ambulance and has a referral card, which says, ‘Eclamptic fit at 38 weeks. 6:30am. MgSO<sub>4</sub> 4g IV and 10g IM (5g per buttock) at 7am.’ She has an IV LR in place but at minimal drip rate. There is no urinary catheter in place. Please, can you help her?”

Give the following but only if assessed:

- BP 188/106
- RR 20, lungs clear, pulse 80, reflexes 1+
- IV is open
- If catheter placed, 140 mL urine collected, urine protein: 2+
- Fetal status: movement and FHR 144
- Confirm GA: 38 weeks based on LMP
- Confirm time of IM and IV dose: (3 hours prior to the current time)
- Draw blood for serum creatinine, CBC w/platelets, liver enzymes (all normal)
- No danger signs
- No signs of labor
- Any other measurements are normal

**Debrief:** Upon completion of the role-play, begin structured debrief. Include the following points:

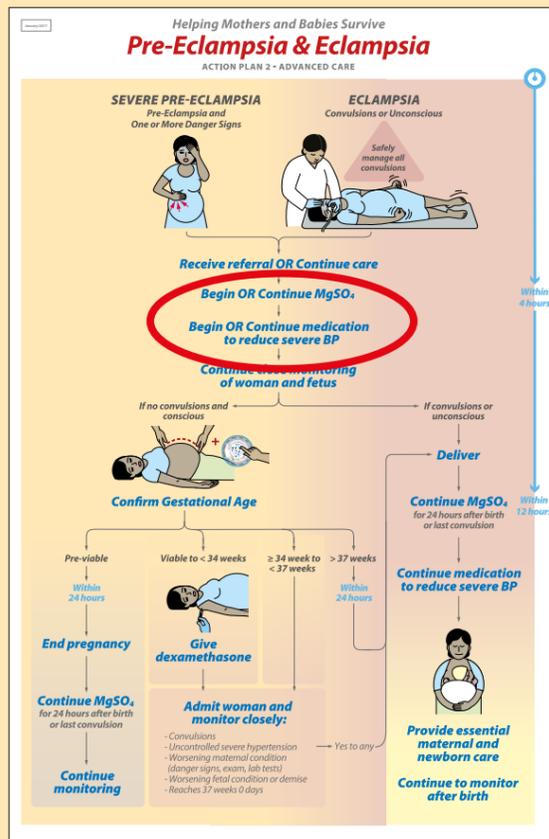
- Confirm correct diagnosis: eclampsia
- Confirm opening of IV line and placement of urinary catheter

- Antihypertensive medication immediately; choice depends on context:
  - Labetalol 20mg IV, 20–80mg IV q 30 min max 300mg OR
  - Nifedipine 5–10mg PO or bitten then swallowed q 30 min OR
  - Hydralazine 5mg IV, 5–10mg q30min, max 20mg IV
- Plan for MgSO<sub>4</sub> 5g IM in 1 hour (or 4 hours after documented loading dose).
- Begin MgSO<sub>4</sub> Monitoring Sheet
- Ask same questions as prior debrief, “What went well? Did you miss anything? How did the team function? What did you learn that you will remember for next time?” Be sure to address communication gaps, teamwork, RMC, etc.

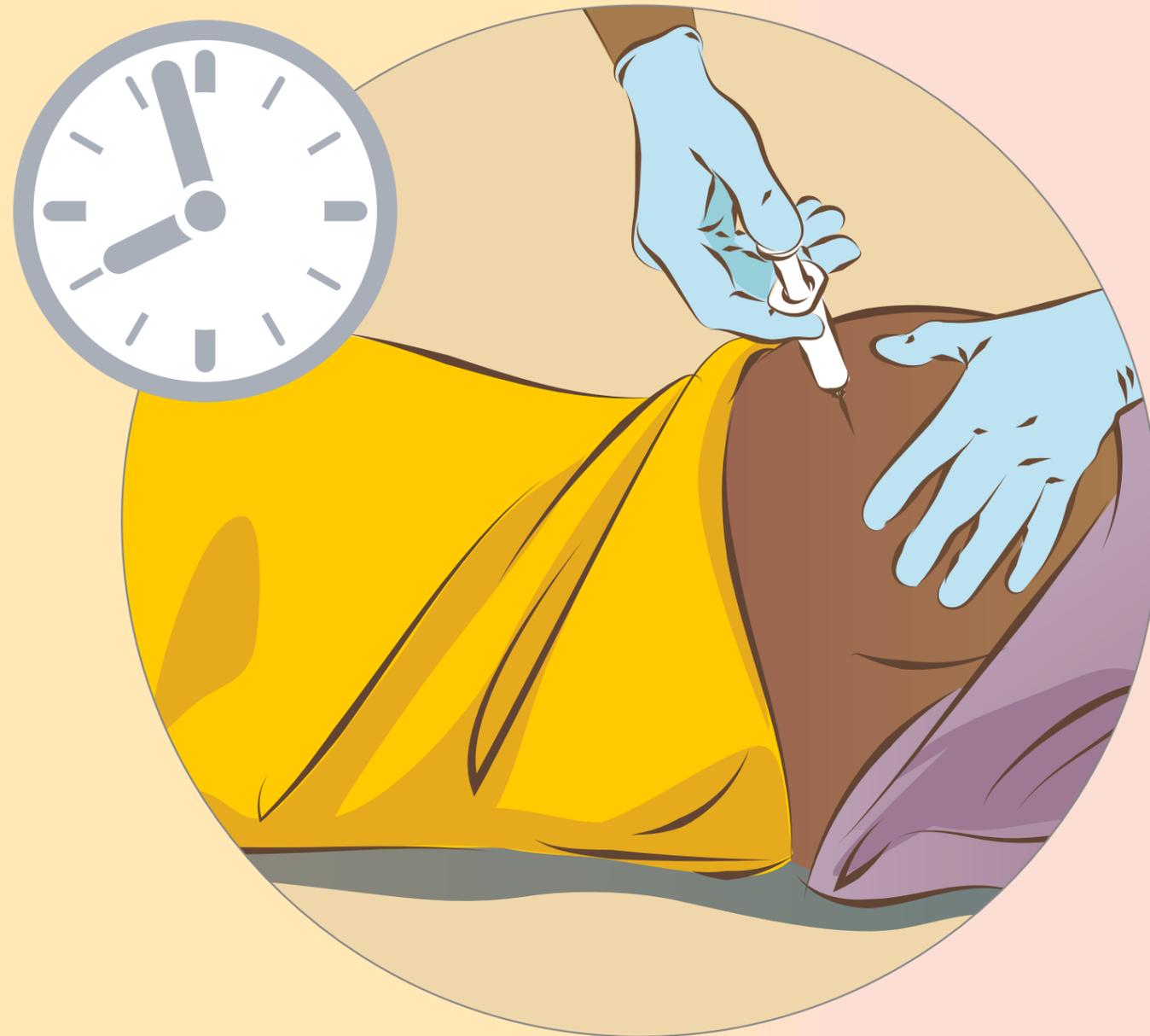
**To ensure all learners participate as providers, repeat with Case 2 if needed.**

**Case 2:** Give the same measurements as Case 1, but change the following and only if assessed:

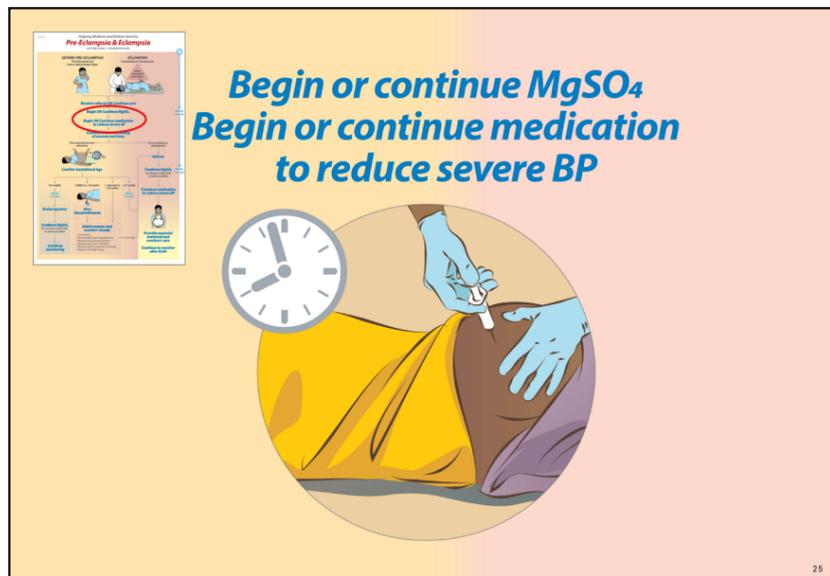
- BP 164/110, RR 18
- Contraction q 3 min moderate, cervix (cx) 5 cm



**Begin or continue MgSO<sub>4</sub>**  
**Begin or continue medication**  
**to reduce severe BP**



## Key points



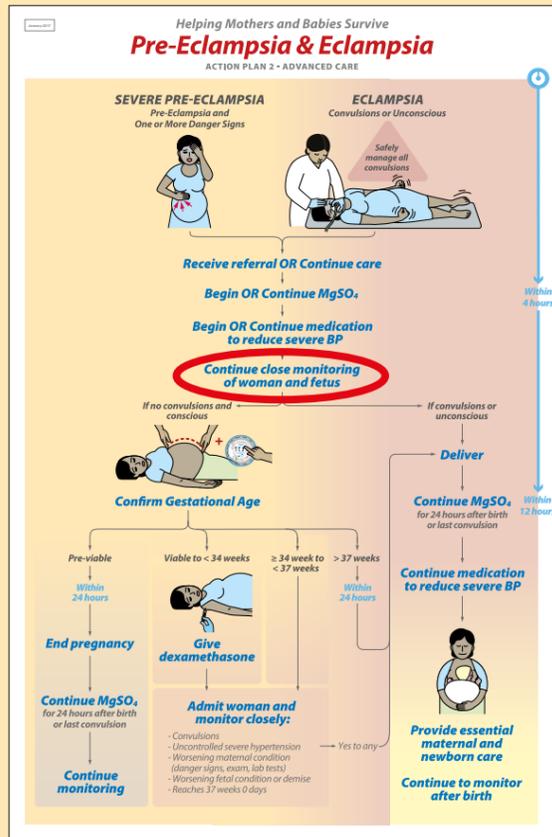
- If using IM MgSO<sub>4</sub> for maintenance, always ensure that there are no signs of toxicity before giving the next dose.
- If using IV MgSO<sub>4</sub> (Zuspan), use gravity infusion or pump and monitor for MgSO<sub>4</sub> toxicity hourly.
- Monitor all women for MgSO<sub>4</sub> toxicity hourly.
- **MgSO<sub>4</sub> must be continued for 24 hours after birth, BUT if she has a convulsion after birth, MgSO<sub>4</sub> must continue for 24 hours after last convulsion.**
- Calcium gluconate reverses MgSO<sub>4</sub> toxicity. Use it if breathing stops. Keep it nearby.
- Use antihypertensives to maintain dBP between 90 and 100 mmHg.

## Knowledge and skills

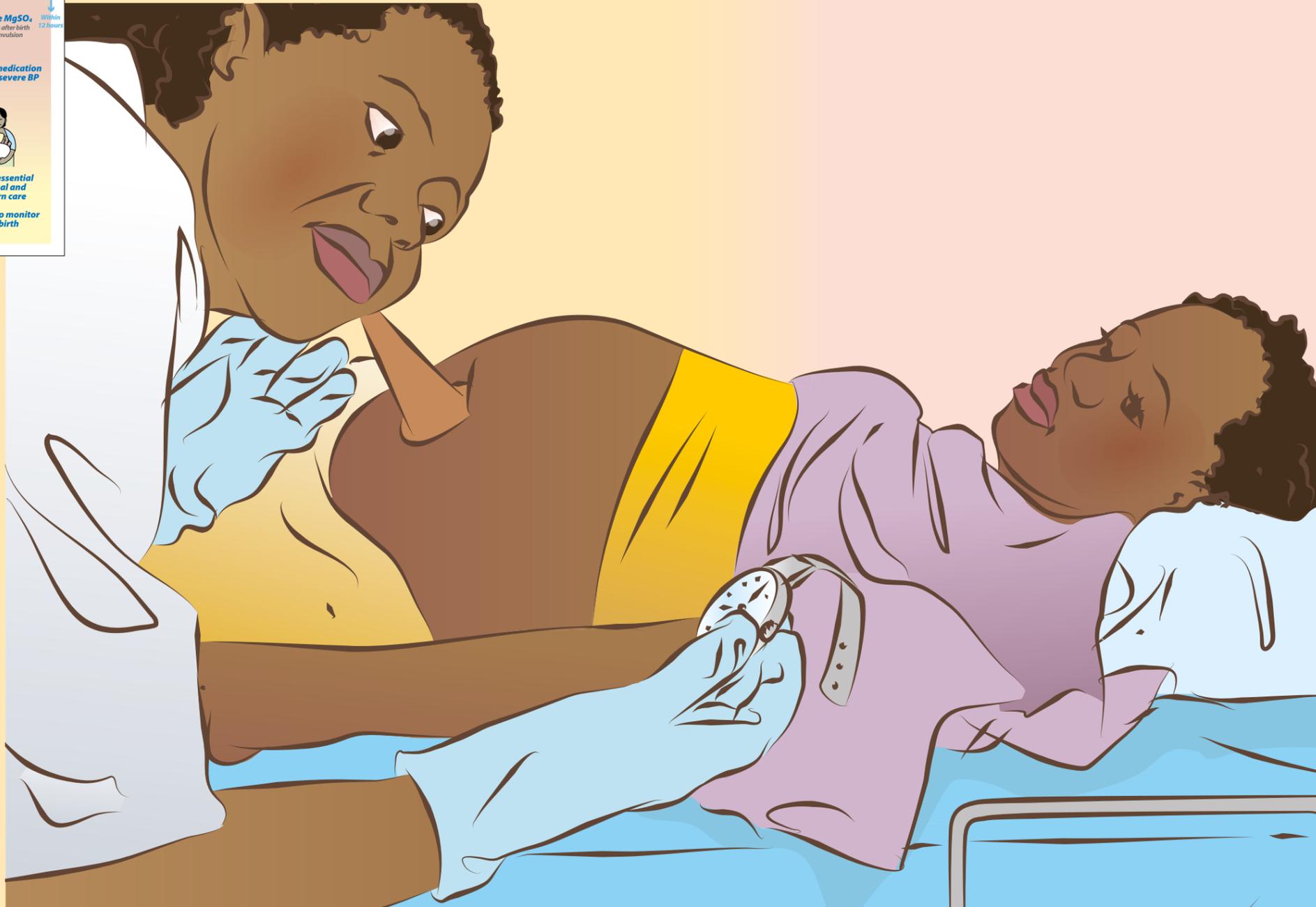
Document condition using the MgSO<sub>4</sub> Monitoring Sheet every hour: time, reflexes, respiration, urine output, convulsions, and MgSO<sub>4</sub> when given.

- Women must receive MgSO<sub>4</sub> IM every 4 hours OR continuous IV at 1g/hr if MgSO<sub>4</sub> is given by IV alone.
- Before repeating MgSO<sub>4</sub>, check for toxicity and ensure:
  - Respiratory rate is  $\geq 16$  breaths per min
  - Patellar reflexes are present
  - Urinary output is  $\geq 30$  mL per hour averaged over preceding 4 hours
- If there are no signs of toxicity, give: 5 g MgSO<sub>4</sub> (50% solution) + 1 mL lignocaine 2% IM every 4 hours in alternate buttocks.
- **If you withhold MgSO<sub>4</sub> due to toxicity, continue to check hourly and document on the MgSO<sub>4</sub> Monitoring Sheet. Restart when there are no signs of toxicity.**
- Limit fluid intake to 1 L /12 hr (2 L in 24 hr)
- If urine output is less than 30 mL/hour: Administer IV fluids (normal saline or lactated Ringer solution) at 1 L in 8 hours and monitor for pulmonary edema.

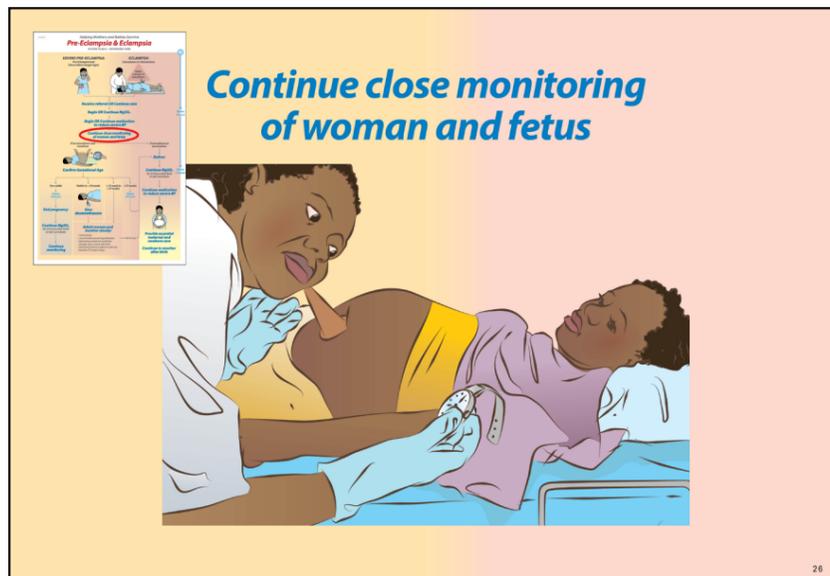
- If rales are heard: Withhold fluids and give furosemide 40 mg IV once.
- In case of respiratory arrest:
  - Shout for help
  - Ventilate with bag and mask.
  - Give calcium gluconate 1 g (10 mL of 10% solution) IV slowly over 3 minutes.
- Continue MgSO<sub>4</sub> for 24 hours after birth BUT if she has a convulsion after birth, continue MgSO<sub>4</sub> for 24 hours after the last convulsion.
- If the woman has received antihypertensive for severe high BP, continue use to maintain the dBP between 90 and 100 mmHg.
- If the dBP falls below 90 mmHg, this will decrease blood to the fetus and can cause distress. Decrease dose or frequency as needed to keep dBP in range.
- If the dBP is  $> 100$  mmHg, the woman is at risk for stroke. Increase the dose or frequency of antihypertensive or change to another antihypertensive medication.



# Continue close monitoring of woman and fetus



## Key points



- Remember, the cure for SPE or E is delivery. While awaiting birth, the woman and fetus must be closely monitored. Monitor at least hourly.
- Women with E must be delivered as soon as they are stable but within 12 hours. Usually, women with SPE must be delivered in 24 hours.
- In some cases of SPE, if the fetus is between viability and 37 weeks and the woman is stable, delivery may be postponed.  
**This can only happen if she and her fetus can be closely monitored!**

- If providers or facilities cannot provide close monitoring, deliver the woman or transfer her to a facility that can closely monitor her.
- Never leave women with SPE or E alone!

## Knowledge and skills

- Women with SPE&E are at great risk for convulsions, worsening disease, and death.
- Close maternal and fetal monitoring includes continuous assessment and rapid, appropriate response if she gets worse.
- Maintain strict fluid balance chart to monitor fluid inputs and urinary output to prevent fluid overload.
- Regularly assess the fetus. Use ultrasound to assess fetal growth and amniotic fluid volume.
- Regularly assess for danger signs of severe disease.
- Check hourly or more often:
  - Ask how she is feeling: Any headaches or visual changes? Is the baby moving?

Is she contracting, having leaking fluid or vaginal bleeding?

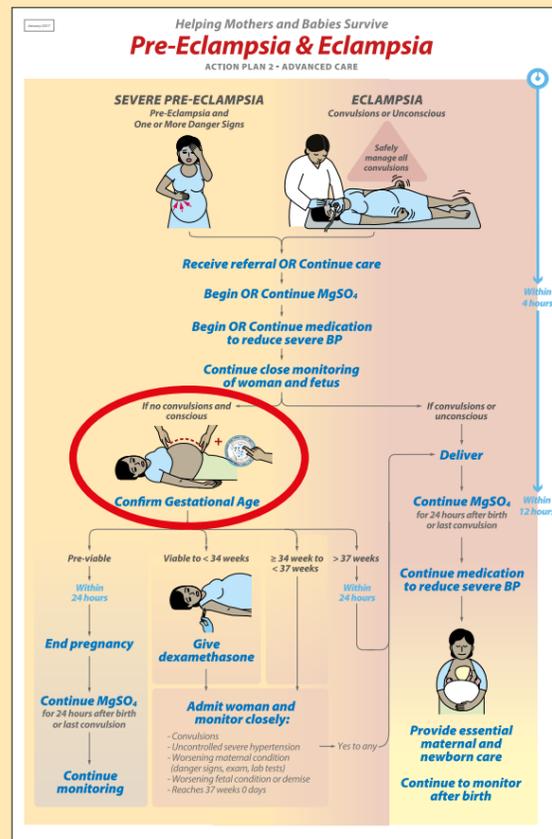
- BP, pulse, and respirations
  - Skin color
  - Reflexes
  - Fluid input and urine output
  - Listen to her lung bases for rales which indicate pulmonary edema. If heard, withhold fluids and give furosemide 40 mg IV once.
  - Palpate abdomen for liver tenderness.
  - Check fetal heart rate.
- Check temperature every 4 hours.
  - If the woman is in labor, use the partograph and check fetal heart rate every 30 minutes.

## Invite discussion

How closely do these recommendations match the usual practice at your facility?

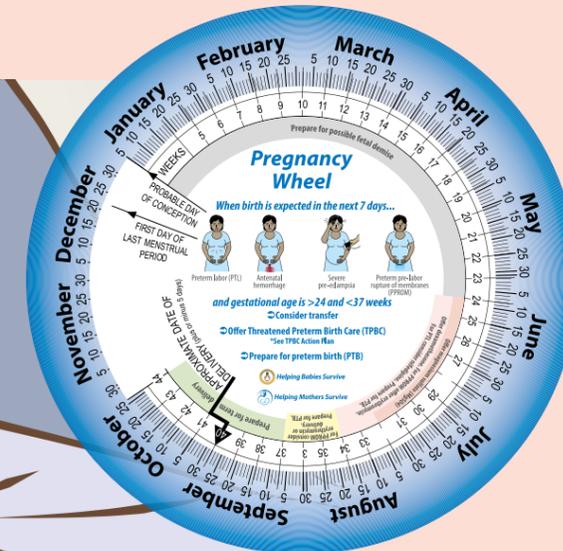
Do you have challenges adhering to such close monitoring?

What can be done to overcome these challenges?

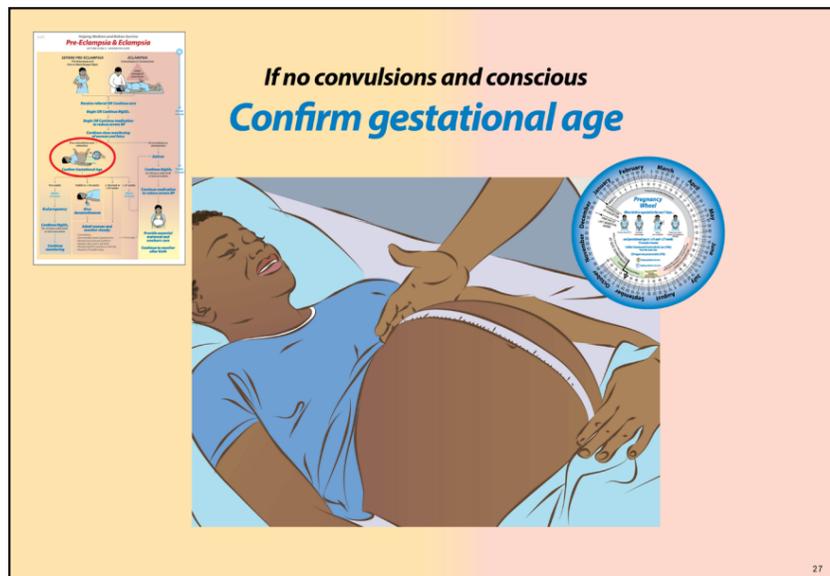


# If no convulsions and conscious

## Confirm gestational age



## Key points



- Once you have begun  $MgSO_4$  and antihypertensive medication for a pregnant woman with SPE, you need to confirm GA to decide if she needs antenatal corticosteroids to help the fetus mature and to know when to deliver.
- Depending on GA, the woman will be in one of three categories:
  - pre-viable,
  - viable to 37 weeks, OR
  - 37 weeks or more
- Each category requires different care, so GA must be confirmed.

## Knowledge and skills

It is important to time delivery in order to prevent severe complications and death for both mother and newborn and to provide the best chance of survival for the newborn.

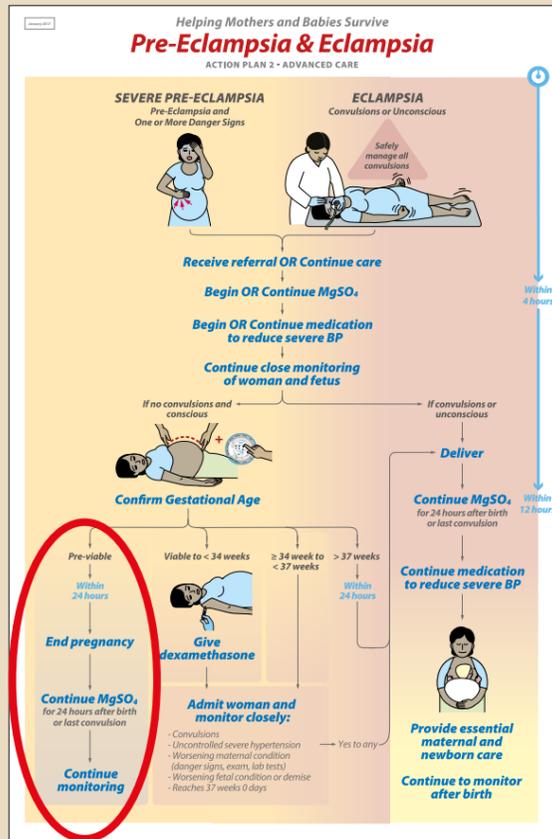
- The definitive treatment for SPE&E for the woman is delivery.
- Both SPE&E and premature birth increase the risk to the newborn.
- Steps can be taken to increase lung maturity for a fetus less than 34 weeks.
- If a woman is having convulsions or is unconscious, she has eclampsia and must be delivered within 12 hours.

Because the interventions are based on GA, and because incorrect interventions can cause harm, it is important to confirm the GA.

Where the EDD is not clear, it is advisable to review the information you have with experienced members of your labor ward team.

## Invite discussion

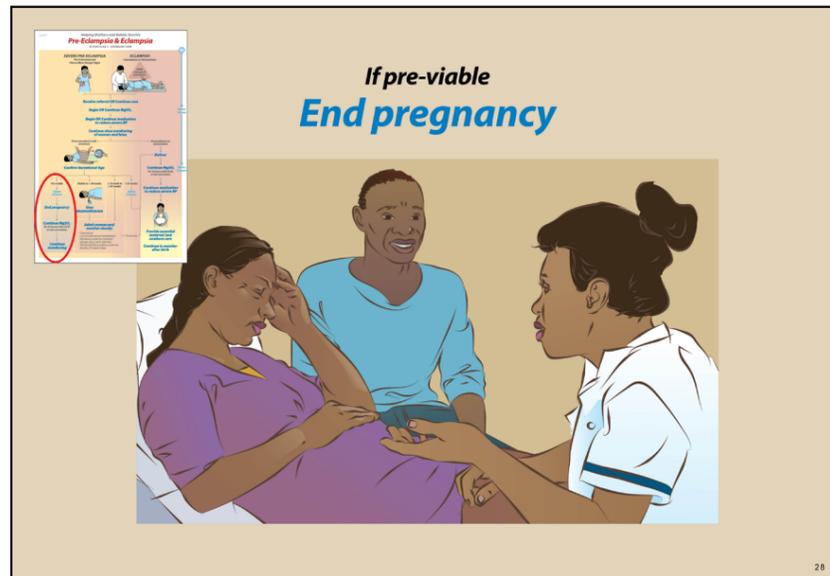
What do you do when a woman with SPE has unknown dates?



If pre-viable  
**End pregnancy**



## Key points



- If a woman develops SPE when the fetus is too premature to survive, ending the pregnancy within 24 hours can save the woman's life.
- Respectful, compassionate care is essential. Provide grief counseling for the woman and her family.
- Continue MgSO<sub>4</sub> for 24 hours after delivery or the last convulsion and continue to monitor.
- Counsel the woman that she is at increased risk for SPE&E in future pregnancies and that she is at risk for high blood pressure later in life.
- Counsel her on the importance of pregnancy spacing and ensure that she leaves the facility with a contraceptive method of her choosing.

## Knowledge and skills

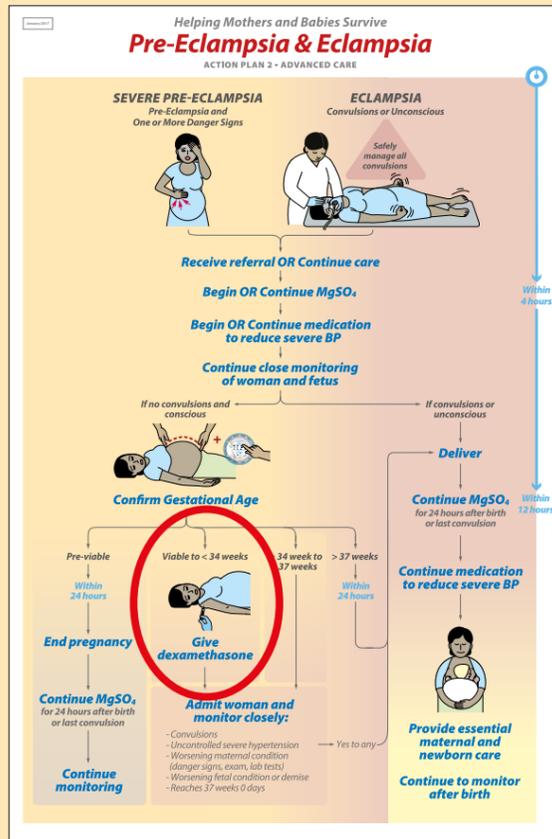
- Accurate GA assessment is essential to determine if a fetus is pre-viable.
- A pre-viable fetus is too premature to survive. The timing of viability depends on facility and country resources.
- If the fetus is not viable, expectant management increases the risk of stillbirth and maternal death.
- Delaying birth to improve fetal maturity is not likely to improve newborn outcomes.
- Because SPE is progressive and delivery is the only cure, ending the pregnancy may save the woman's life.
- The decision to end the pregnancy should be made in consultation with obstetric and pediatric specialists where available. Each case is unique and should be considered individually.
- Communicate respectfully with women and families about why it is recommended to end the pregnancy.
- The method to end a pregnancy depends on fetal age, local standards, and provider experience.
- Counsel her on her risk of high BP and SPE&E in the future and be sure she has a contraceptive method before discharge.

## Invite discussion

**Ask learners,** "What gestational age is generally considered viable where you work? What do you do if SPE is diagnosed before the fetus is viable? How can you help families cope with this loss?"

Encourage these responses:

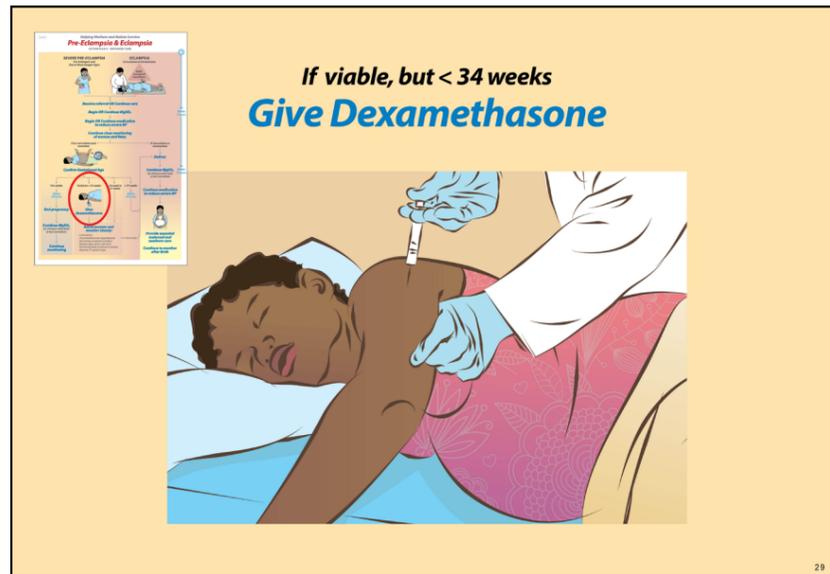
- Acknowledge the experience of grief and sadness that follows pregnancy loss.
- Deliver difficult news privately, in a timely and patient manner.
- Answer questions honestly.
- Remind women, partners, and families that PE&E was not their fault.
- Encourage the presence of a support person of the woman's choosing throughout care and counseling.



*If viable, but < 34 weeks*  
**Give Dexamethasone**



## Key points



- Give dexamethasone to improve newborn outcomes for women with a viable fetus but less than 34 weeks GA. Maximum benefit occurs 48 hours after the first dose.
- Do NOT give if you cannot confirm the GA is  $> 24$  weeks but  $< 34$  weeks.
- Do NOT give if you think the woman may have an infection, or the preterm infant cannot receive adequate care if needed.

## Knowledge and skills

- Dexamethasone is an antenatal corticosteroid (ACS). ACS reduces death in preterm babies by 31%, by helping mature fetal lungs and by protecting fetal intestines and blood vessels in the brain.
- Only give dexamethasone if:
  - High confidence that GA is  $< 34$  weeks
  - High confidence that she will deliver within the next 7 days
  - There is no suspicion of maternal infection (chorioamnionitis or sepsis)
  - Adequate childbirth care is available (including the ability to recognize and safely manage preterm labor and birth).
  - Adequate preterm newborn care is available (including resuscitation, thermal care, feeding support, infection treatment, and safe oxygen use).
- Give 12 mg dexamethasone IM as soon as possible, followed by another 12 mg IM 24 hours later.
- Dexamethasone may increase the risk of maternal sepsis and neonatal mortality in infants born  $\geq 37$  weeks GA.
- Maximum benefit is seen 48 hours after the first dose but delivery even a few hours

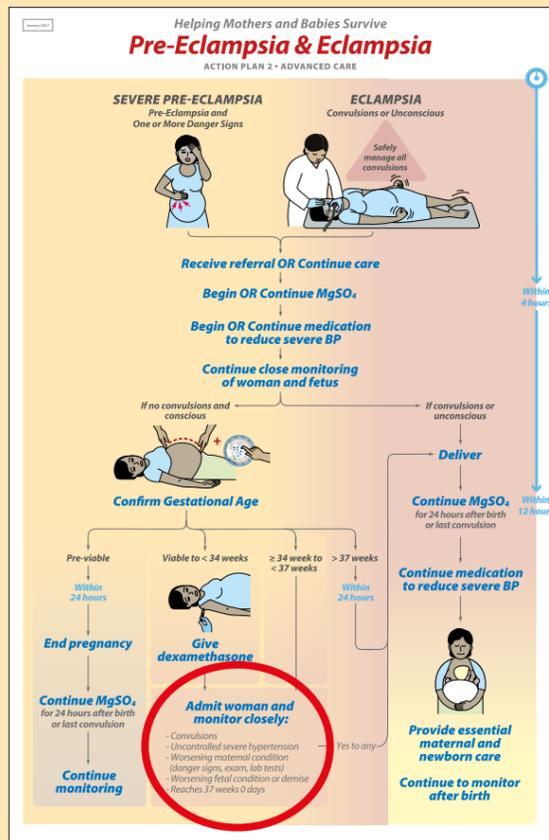
after one dose may increase the chance of survival.

- Do not delay birth in order to give the second dose if quick delivery is needed to protect the woman or fetus.
- Give a single, repeat course if preterm birth does not occur within 7 days, the woman is  $< 34$  weeks, and the risk of preterm birth persists. **Never give more than two courses.**
- Betamethasone can also be used for ACS but it is less available and more expensive than dexamethasone. The suggested regimen is also 12 mg IM as soon as possible, followed by 12 mg 24 hours later.

## Quick check

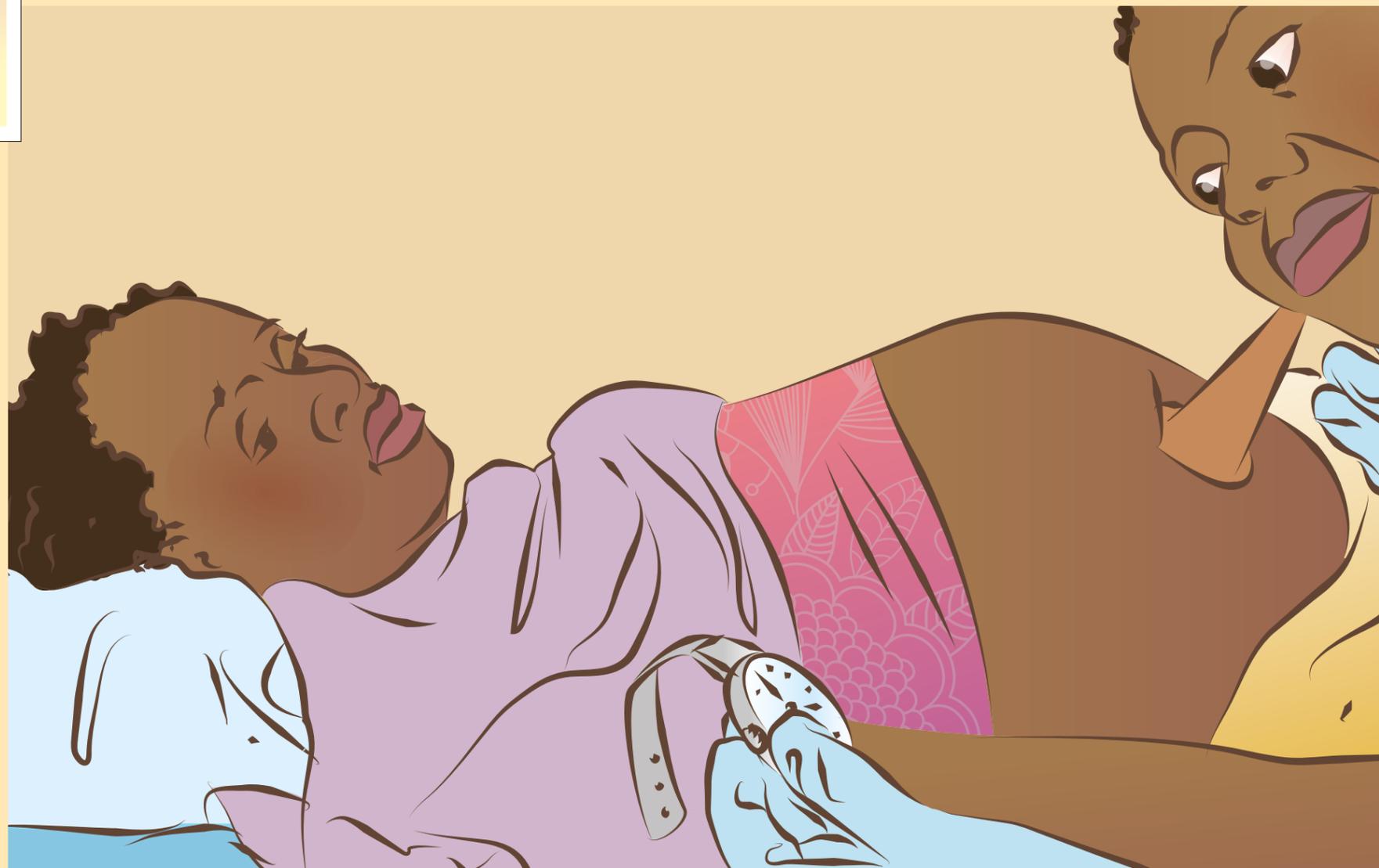
### When should you NEVER give ACS?

1. If the woman is  $> 34$  weeks OR
2. If the woman has an infection OR
3. If she has already had two courses of ACS

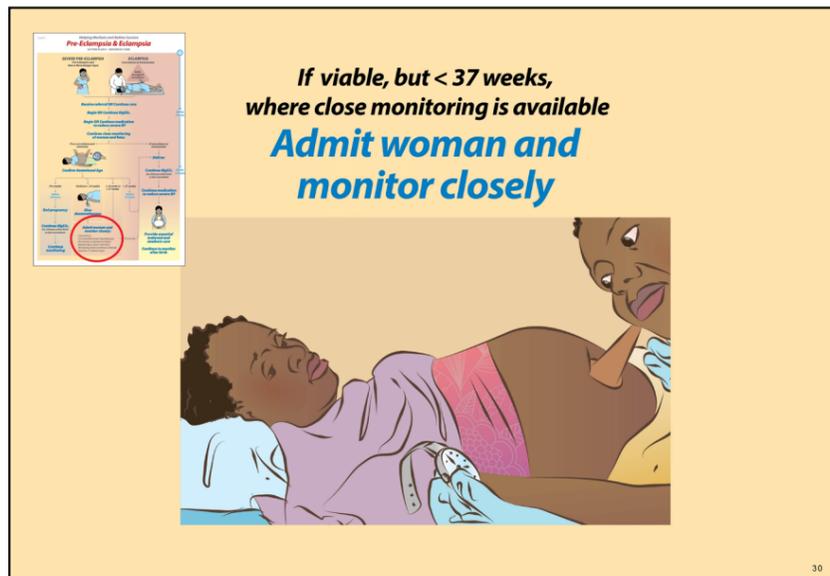


**If viable, but < 37 weeks,  
where close monitoring is available**

**Admit woman and  
monitor closely**



## Facilitation note



### **Prior to training day, assess if close monitoring is feasible at this facility.**

SPE can rapidly progress and put both woman and fetus in danger. To be able to consider delaying birth, the facility must be able to:

- Safely and quickly induce labor if needed
- Provide safe surgery and postoperative care
- Care for premature or sick newborns

In addition, the facility must be able to provide close Maternal and Fetal Assessment (3rd column on this page). If these criteria cannot be met, give first key point below and move to the next page.

## Key points

- **Expectant management for women with SPE is an option only if a woman and her fetus are stable and less than 37 weeks and if continuous monitoring is available.**
- If at any time a woman experiences a contraindication to expectant management, the baby should be delivered within 24 hours.

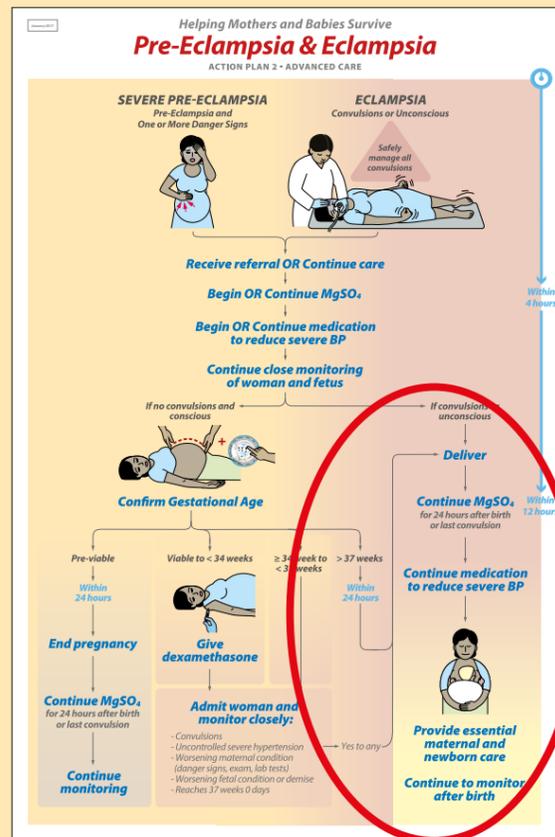
## Knowledge and skills

- Between viability and 37 weeks, it may be possible to prolong the pregnancy to decrease neonatal mortality if:
  - The woman and fetus are stable.
  - The woman can receive close monitoring and care in an advanced care hospital.
- You may provide expectant management if none of the following are present: Eclampsia; pulmonary edema; uncontrolled, severe hypertension; persistent symptoms (headache, visual changes, RUQ pain); abnormal laboratory values (kidney or liver dysfunction; low platelets; hemolysis, elevated liver enzymes, and low platelets [HELLP]

syndrome; disseminated intravascular coagulation [DIC]); placental abruption; maternal shock; nonreassuring fetal assessment; fetal death; preterm labor; or preterm rupture of membranes

- Maternal Assessment: vital signs, fluid balance, labor and abdominal assessment every 8 hours, with laboratory testing daily. Testing may be every other day if the woman is stable and without symptoms.
- Fetal Assessment: daily fetal movement check and nonstress testing, amniotic fluid index twice weekly, fetal growth check per ultrasound every 2–3 weeks.
- MgSO<sub>4</sub> is given for 24–48 hours and then discontinued. It is restarted with onset of labor or worsening disease.
- Give antihypertensives as needed.
- MgSO<sub>4</sub> decreases the incidence and severity of cerebral palsy. If GA < 32 weeks and birth may occur within 24 hours, give IV-only MgSO<sub>4</sub> (the Zuspan regimen) for fetal neuroprotection if IV infusion pumps are available.

**Move to prompt delivery or refer if any of the contraindications develop or if the monitoring criteria cannot be met!**

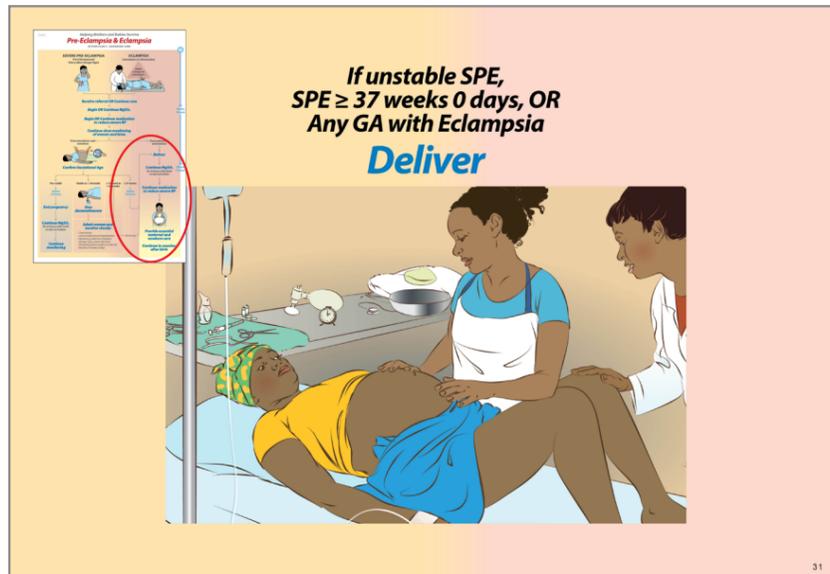


**If unstable SPE,  
 SPE ≥ 37 weeks 0 days, OR  
 Any GA with Eclampsia**

**Deliver**



## Key points



- **A woman with SPE ≥ 37 weeks 0 days should deliver within 24 hours.**
- **A woman with SPE of any GA who is not stable should deliver within 24 hours.**
- **A woman with SPE of any gestational age who cannot be closely monitored should deliver within 24 hours.**
- **A woman with E of any gestational age should deliver within 12 hours.**
- Vaginal birth is preferred if possible.

## Knowledge and skills

- Delivery is the definitive treatment for SPE&E.
- A woman with SPE should be delivered within 24 hours if:
  - She is < 37 weeks with a contraindication to expectant management OR cannot be closely monitored
  - She is ≥ 37 weeks and 0 days
- Decision about mode of delivery should be based on whether the woman is in labor, GA, ripeness of cervix, and fetal condition and position.
- A woman with E of any gestational age should be delivered within 12 hours.
- Give the first dose of ACS to improve outcomes for the newborn, but only if it does not delay birth.
- Continue close maternal and fetal monitoring during labor and birth.
- Monitor routine findings on the partograph according to protocol.
- Continue administration of MgSO<sub>4</sub> throughout intrapartum period, regardless of mode of childbirth.

- Maintain the MgSO<sub>4</sub> Monitoring Sheet during labor, birth, and postpartum.
- Continue antihypertensive as needed during labor, birth, and postpartum.
- Perform active management of the third stage of labor (AMTSL) for all women, using 10 IU oxytocin IM OR 600 mcg misoprostol by mouth within one minute of birth.  
**Do not use ergometrine: it can cause hypertensive crisis.**

## Quick check

**When should ACS be given to improve neonatal outcomes?**

*Between the age of viability and 34 weeks GA*

**If a woman has eclampsia regardless of GA, by when should she be delivered?**

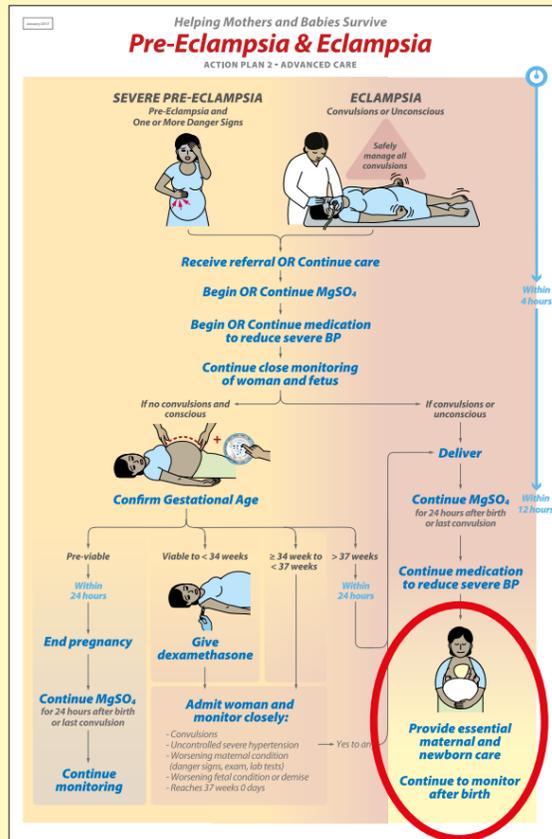
*As soon as she is stable but within 12 hours*

**How long should a woman stay on MgSO<sub>4</sub>?**

*24 hours after birth, but if she has a convulsion, 24 hours after the last convulsion*

## Invite discussion

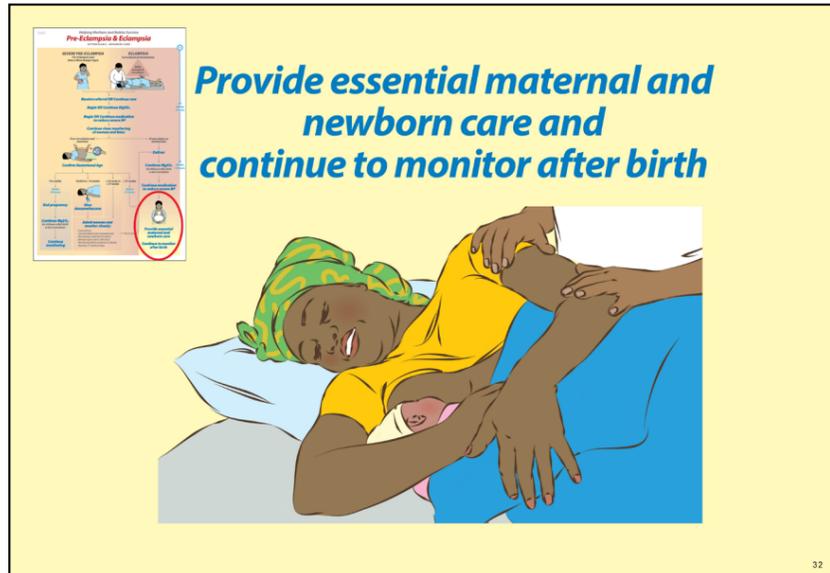
What is your facility's current practice for delivering women with SPE or E?



# Provide essential maternal and newborn care and continue to monitor after birth



## Key points



- Women are still at risk for PE&E after birth.
- All women should receive essential postpartum care.
- All babies should receive essential newborn care.

## Knowledge and skills

- For women with SPE or E, continue to monitor closely for at least 72 hours postpartum in a facility.
- Continue MgSO<sub>4</sub> for 24 hours postpartum or 24 hours after last seizure, whichever happens last. Carefully track for toxicity hourly using the MgSO<sub>4</sub> Monitoring Sheet.
- Continue to assess for danger signs.
- Continue to listen to lungs.

- Continue to monitor fluid input and urine output.
- Continue antihypertensive therapy as needed. Maintain dBP between 90 and 100 mmHg.
- Do not provide nonsteroidal anti-inflammatory drugs (NSAIDs) to women with poorly controlled hypertension, oliguria, renal insufficiency, or low platelets.
- Support breastfeeding in the first hour.
- Provide routine postpartum care and monitoring per national guidelines.
- Provide routine essential newborn care detailed in Provider's Guide pg. 25.
- Ensure the woman understands the danger signs and can seek care if she has any of these. Ensure visit in 7 days or less.
- Ensure she has a contraceptive method prior to discharge.
- Let her know she is at risk for PE&E in future pregnancies and hypertension later in life.

## Facilitation note

**Tell learners that they will be experiencing a simulation. If there are more than 5 participants, have learners break into groups of three. Have two be providers and one be the woman. Tell all "woman"**

**actors privately to "convulse" for 20 seconds when the "provider" arrives then pretend to be unconscious. Allow 15 minutes for this activity. Read the following to the group:**

"Mrs. A is 24 years old and delivered with no problems 4 hours ago. She now says she has a severe headache. The midwife arrives and begins assessment. Please provide care as you would for a real woman." Observe and note whether learners do the following. Give measurements only if asked:

- Shout for help
- Assess airway, breathing, circulation: RR 22, pulse 104, unconscious
- Do not restrain woman, put nothing in mouth
- Start oxygen, IV, place Foley: 100mL urine
- Administer MgSO<sub>4</sub> loading dose correctly and quickly
- Assess BP (158/102)
- Assess lung sounds (no rales)
- Draw CBC with platelets, creatinine, LFTs

## Debrief:

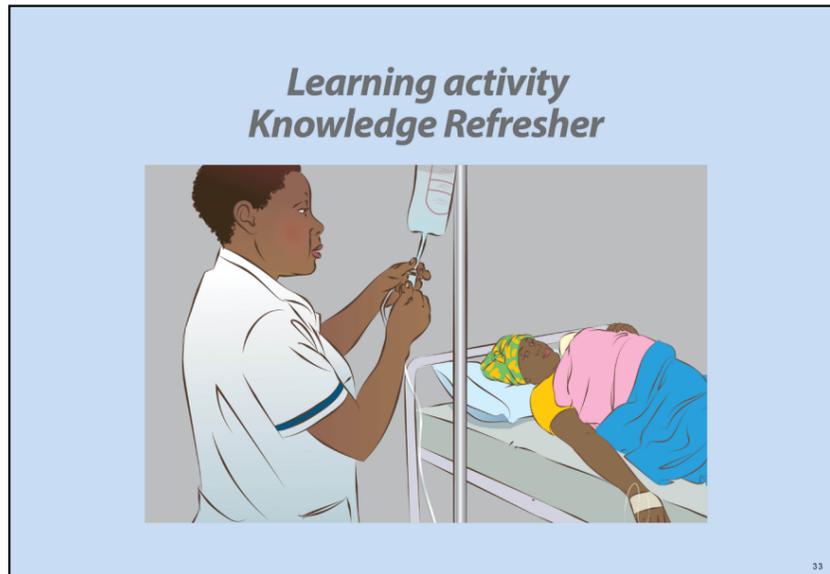
Confirm diagnosis—Eclampsia  
As in prior simulations, ask learners to assess their performance including diagnosis, treatment, teamwork.

# *Learning activity*

## *Knowledge Refresher*



## Facilitation note



Ask the participants to divide into 2 teams. Alternate questions between the teams. Each correct answer earns one point. If one team gives a wrong answer, the other team may offer an answer. Whichever team answers the most questions correctly wins.

## Knowledge refresher

**True/False? A woman has the right to decline services she does not want to receive.**

**True**

**When preparing the loading dose of MgSO<sub>4</sub>, if you use a multiuse dilution source such as an IV bottle, what do you draw up first in the syringe?**

**Sterile water or saline**

**When are women at risk for PE&E?**

**20 weeks pregnancy or later, during labor and delivery, and postpartum**

**How would you deliver the maintenance dose for MgSO<sub>4</sub> (please state the medication, concentration, dose, route, and frequency)?**

**5g MgSO<sub>4</sub> (50% solution) + 1 mL lignocaine 2% IM every 4 hours in alternate buttocks**

**What must be assessed before repeating maintenance dose of MgSO<sub>4</sub>? Give the criteria for each.**

- 1. Respiratory rate  $\geq$  16 breaths per minute**
- 2. Patellar reflexes are present**
- 3. Urinary output  $\geq$  30 mL per hour over 4 hours**

**How frequently should you monitor for MgSO<sub>4</sub> toxicity?**

**Every hour**

**What should you do if you detect a sign of MgSO<sub>4</sub> toxicity?**

**Withhold MgSO<sub>4</sub> maintenance dose**

**You delivered a maintenance dose of MgSO<sub>4</sub> to your patient 4 hours ago. You return to assess and discover her urine output is 90 mL over the last 4 hours. What will you do next?**

**Administer IV fluids at 1 L over 8 hours and monitor for pulmonary edema and withhold MgSO<sub>4</sub>**

**You check this woman 1 hour later and you discover rales in her lungs. What will you do next?**

**Withhold fluids, administer furosemide 40mg IV once, and continue to monitor**

**A woman on MgSO<sub>4</sub> goes into respiratory arrest and stops breathing. What will you do next?**

**Shout for help, ventilate with bag and mask, give calcium gluconate 1 g (10 mL of 10% solution) IV slowly over 3 minutes**

**What are the risks of dexamethasone to a mother?**

**Maternal sepsis**

**How long after birth must you continue MgSO<sub>4</sub>?**

**For 24 hours after birth or 24 hours after the last convulsion, whichever occurs last**

**When using antihypertensives in a pregnant woman for severe BP, what is the target BP range?**

**Between 140 and 155mmHg sBP / 90 and 100 mmHg dBP**

**What should you do if the dBP is below 90mmHg and why?**

**Reduce the frequency or dose of anti-hypertensive. If you reduce the BP lower, it can harm the fetus.**

Tiebreaker if needed. If not, ask the question to the next team. For tiebreaker, whoever raises hand first gets to try and answer.

**What two things are women at risk for in the future if they have had PE or E?**

- 1. PE&E in future pregnancies**
- 2. High BP later in life**

# Acknowledgments

## Helping Mothers Survive Pre-Eclampsia & Eclampsia

### Facilitator Flip Chart

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innovating to save lives



an affiliate of Johns Hopkins University

*Jhpiego is an international, nonprofit health organization affiliated with Johns Hopkins University. For more than 40 years, Jhpiego has empowered frontline health workers by designing and implementing effective, low-cost, hands-on solutions to strengthen the delivery of health care services for women and their families. By putting evidenced-based health innovations into everyday practice, Jhpiego works to break down barriers to high-quality health care for the world's most vulnerable populations.*

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The American College of  
Obstetricians and Gynecologists  
WOMEN'S HEALTH CARE PHYSICIANS



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