Appendix C: Simulation Scenarios

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NOTE: The HDP Task Force does not endorse any particular simulation system and the references to trade names in this section are included as reference only. This is a SAMPLE developed by a particular facility as an example to work from. You may need to adjust based on the individual circumstances of your facility.

Preeclampsia with Severe Features and Eclampsia in Postpartum Unit

Part 1: General directions for use

General

1. This scenario is written using Laerdal LLEAP software and can be used with either SimMan3G or SimMan Essentials. It is designed to operate the simulator and the patient monitor display in a standardized fashion with minimal input from the operator.
2. This scenario can be varied depending on several factors and can be used with little or no dedicated simulation equipment. This could be as simple as using cue cards with a staff member acting as the patient.

Possible Variants:

1. Clinical area: this scenario is written for use in the postpartum unit but could easily be adapted for use in LDR, ED, etc.
2. Patient simulator options:
    a. Other Laerdal simulators including SimMom
    b. Other high fidelity simulator manufacturers
    c. Use of a confederate to act as the patient
        i. this can be highly effective to better simulate seizure-like activity
        ii. It is critical that participants do not attempt to do procedures on the "patient" e.g. IV start, intubation, etc.
3. Pre-programmed content vs. "on the fly" – Using the parameters in the scenario algorithm, the operator could run the case manually instead of using the pre-programmed case file.
4. Providing vital signs during the case
    a. Use of other patient monitor simulators
    b. Use of vital sign generator apps that work on phones, tablets, etc.
    c. Use PowerPoint slides on a tablet, or even cardboard "cue cards" to indicate changes in vital signs and patient status.
    d. Cue cards to provide vital signs
5. Patient care materials: can be run with or without patient care materials like IV, medications, etc.
6. Video for debriefing: the use of video for debriefing can be a powerful when done appropriately but is not necessary for effective debriefing. There are several AV capture options if desired.

Part 2: Scenario overview

Scenario Program File	Preeclampsia/Eclampsia/PP Unit 3G v1.0 (SimMan3G) or Preeclampsia/Eclampsia/PP Unit Ess v1.0 (SimMan Essentials)
Scenario Time	15-20 minutes
Debriefing Time	20-45 minutes – will vary depending on how the team manages preeclampsia/eclampsia and hypertension as well as what TeamSTEPPS concepts will be covered.
Target Group	Postpartum nurses, OB physicians, Anesthesiologists, & CRNAs
Case Summary	This is a case of a patient in the postpartum unit with postpartum preeclampsia with severe features that progresses to eclampsia. The patient requires antihypertensive treatment as well as magnesium sulfate to control seizures. Despite an initial magnesium bolus and drip, the patient continues to seize and will require an additional magnesium bolus to control her seizures. Varying airway compromise can be added if desired. This case is designed to ensure staff are following ACOG & CMQCC guidelines for treatment of preeclampsia and eclampsia. Therefore, there is a great emphasis on appropriate medication dosing and timing per these guidelines. There are two very important operational conditions to make this scenario work effectively. 1. The appropriate dosing interval between antihypertensives requires the operator to "artificially speed up time" during the case in order to complete the case in 15-20 minutes. 2. It is critical that the participants recognize the patient is seizing. Options: a. Use of a "seizure mattress" works well to create seizures. b. SimMan3G has a seizure feature but the effectiveness of this feature is limited, so a confederate may need to point out seizure if the team does not recognize one is occurring. c. If using a confederate for the patient, that person should simulate a generalized tonic-clonic seizure and post-ictal state.

Teaching Personnel Recommend 4 Instructors: Must include at least 1 MD and 1 RN	Instructor Roles: 1. GUI operator/Voice of patient: can be operated by sim technician if available 2. AV capture operator: collect data for debriefing and data collection purposes. 3. Lead debriefer: may be AV capture operator or another instructor who works alongside to insure all relevant information for debrief & data collection is collected accurately. 4. Confederates to act as family member. They should be holding the new infant and can point out the seizure if not apparent to the team.
Participants	1. Physicians (minimum 1 OB/emergency medicine physician, may include anesthesia, trainees, etc. if desired) 2. Nurses (4-5) to include no more than 1 LVN. (May use 3-4 RNs with 1 Tech/MA)
Learning Objectives	1. Demonstrate superior teamwork and communication skills using the TeamSTEPPS model with a focus on shared mental model and role clarity throughout the case. 2. Recognize and treat preeclampsia with severe features, and eclampsia with hypertension, by treating with: a. Antihypertensives per ACOG/CMQCC guidelines b. Magnesium sulfate for seizures 3. Maintain airway and oxygenation in seizing and post-ictal patient
References	1. ACOG. Gestational hypertension and preeclampsia. Practice Bulletin No. 222 of the American College of Obstetricians and Gynecologists. Obstetrics and Gynecology 135, 1492-1495, doi:10.1097/AOG.0000000000003892 (2020). 2. Bernstein PS, Martin JN Jr, Barton JR, et al. National Partnership for Maternal Safety: Consensus Bundle on Severe Hypertension During Pregnancy and the Postpartum Period. Obstetrics and Gynecology 2017; 130:347.

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Part 3: Detailed objectives

Medical Management	1. Identify the patient with postpartum preeclampsia with severe features that progresses to eclampsia a. Identify possible signs and symptoms of postpartum preeclampsia i. Neuro: Headache, Visual Complaints, Altered Mental Status, CVA, Seizure ii. Abdominal pain – especially RUQ or epigastric pain iii. Shortness of breath – pulmonary edema b. Identify the hypertensive emergency that is part of preeclampsia with severe features in this case, i.e., SBP ≥ 160 mm Hg OR DBP ≥ 110 mm Hg 2. Manage the patient with postpartum preeclampsia with severe features that progresses to eclampsia a. Treat hypertension per ACOG and CMQCC guidelines i. Target BP = 130-150/80-100 mm Hg ii. Labetalol IV - escalating doses 20mg, 40mg, 80mg, q10 min prn iii. Hydralazine IV - escalating doses 5-10mg, 10 mg, q 20 min prn iv. Nifedipine PO (immediate release) - escalating doses 10 mg, 20 mg, q20 min prn b. Treat refractory eclampsia with magnesium sulfate. i. Initial magnesium sulfate load and drip ii. Additional magnesium sulfate bolus for recurrent seizures. Can include other medications including benzodiazepines if desired 3. Maintain airway and oxygenation – basic airway positioning, optional intubation
Psychomotor Skills	1. Prepare, and administer critical medications 2. Seizure precautions – positioning, padding of rails, etc. 3. Provide airway support with basic airway positioning, optional intubation

Teamwork & Communication Skills (TeamSTEPPS)	1. Communication: a. SBAR to team responding to call for help b. Call outs before meds are given and after medications have been given – timing of antihypertensive dosing is critical for this scenario. c. Check backs (i.e. closed loop communication) i. Team leader to team members re: role clarity ii. RN call backs to confirm dosages d. Importance of team recorder to keep team on track with times of meds/interventions 2. Leadership – joint duty of primary nurse and primary physician a. Role clarity for team members – primary nurse b. Shared mental model – physician – briefs team after initial assessment on patient condition and plan of care. 3. Situation Monitoring a. Situational Awareness b. Maintains shared mental model – briefing during case to keep up to date and address challenges in treatment. c. Cross-monitoring – "watching each other's back" 4. Mutual Support a. Task assistance – help with medications, seizure precautions, airway etc. as needed b. Assertion for important information i. Speak up in firm and respectful manner – offer explanation of concern and proposed solution ii. CUS – I'm Concerned! I am Uncomfortable! This is a Safety issue! 5. Demonstrate successful strategies to deal with concerned family members who may become an obstruction to patient care

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Part 4: Patient background information

Patient Information	Background OPTION #1
Age	25
Weight	197 lb.
HPI	25 y/o G1P1 who is post-op day 2 from a primary c/s for fetal macrosomia. Prenatal course uncomplicated and c/s uneventful. QBL 800ml. Post-op course to date has been uneventful. The patient has been doing well until approx. 24 hours ago when she delivered and had a worsening headache and dizziness. In the last 6-8 hours, she has developed some RUQ abdominal pain with nausea. She is not vomiting but is having a difficult time taking adequate po due to pain and nausea.
PMHx	None
Medications	Prenatal Vitamins, Ibuprofen 800mg tid
Allergies	None
Social Hx	Married, works as cashier at grocery store. No EtOH, Drugs, Tobacco.
Presentation	Patient calls the nurse after developing a worsening headache and dizziness. The nurse should evaluate the patient's VS and note that she is now markedly hypertensive. If the RN does not check VS, the patient should complain about worsening symptoms including RUQ pain and nausea.
Vital Signs	T 98.3, HR 93 BP 170/109, RR 16, SpO2 99% on RA.
Labs	WBC 13, Hgb 10.7, Hct: 32, Plt: 220, ALT 42, AST 27, BUN 10, Cr. 0.7, Uric Acid: 5.6

Patient Information	Background OPTION #2
Age	42
Weight	221 lb.
HPI	42 y/o G1P1 is 8 hours s/p vaginal delivery at 38 weeks. Prenatal course was complicated by some mild-range hypertension that did not require antihypertensive medication. QBL 250ml and she has been doing well otherwise
PMHx	HTN – not on medications

Patient Information	Background OPTION #2
Medications	Prenatal Vitamins, Ibuprofen 800mg tid
Allergies	None
Social Hx	Married, works as a corporate attorney. No EtOH, Drugs, Tobacco.
Presentation	Patient calls the nurse after developing a worsening headache and dizziness. The nurse should evaluate the patient's VS and note that she is now markedly hypertensive. If the RN does not check VS, the patient should complain about worsening symptoms including RUQ pain and nausea.
Vital Signs	T 98.3, HR 93 BP 170/109, RR 16, SpO2 99% on RA.
Labs	WBC 13, Hgb 10.7, Hct: 32, Plt: 220, ALT 42, AST 27, BUN 10, Cr. 0.7, Uric Acid: 5.6

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Simulation scenarios for preeclampsia with severe features and eclampsia in postpartum unit

Part 5: Equipment/materials list

Simulation Equipment:

- ☐ Option #1 – SimMan 3G – Instructor PC & Patient Monitor PC – Seizures produced using "Tonic-Clonic" seizure on GUI
- ☐ Option #2 – SimMan Essential or 3G – Instructor PC & Patient Monitor PC with "Seizure Mattress" – Seizures produced from seizure mattress independent of GUI.
- ☐ Option #3 – SimMom
- ☐ Option #4 – Standardized patient with Instructor PC & Patient Monitor PC.
- ☐ Option #5 – Standardized patient with low fidelity cue cards for VS OR use of VS apps on phone/iPads
- ☐ Microphone for GUI operator to simulate patient's voice
- ☐ Video Capture: can use Laerdal software or other AV capture software e.g. Vosaic Connect for video debriefing and data collection. Alternatively, can use combo of laptop with iPad or GoPro for video capture.
- ☐ Debrief using laptop and video projector.
- ☐ Low fidelity option includes note taker rather than video capture, with review of notes for

debrief. Video is preferable if equipment and expert debriefer available.

- ☐ Low fidelity infant simulator/doll for family member to hold at bedside

Patient Care Equipment:

- ☐ ID band on patient (simulator or standardized patient)
- ☐ IV in place
- ☐ Normal saline and IV pole
- ☐ Crash cart – should be outside room if planning on more advanced airway issues
- ☐ 100% O2 Non-Rebreather Mask
- ☐ Adult ambu bag and oxygen tubing
- ☐ Suction module, canister, tubing, yankauer tip
- ☐ Optional - Medication pump to administer magnesium sulfate

Medication:

Unless otherwise specified, nursing should draw up meds or mix medication drips

- ☐ Magnesium 6g
- ☐ Magnesium 4g
- ☐ Magnesium 2g x 2 – one for drip and another for additional bolus
- ☐ Labetalol 10mg, 20mg, 40mg and 80mg
- ☐ Hydralazine 5 and 10mg – multiple doses
- ☐ Nifedipine immediate release 10 mg tabs – multiple doses
- ☐ Optional - Benzodiazepines – Ativan, Versed, or Valium

Moulage:

None

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Part 6: Program algorithm and operator notes

Case Summary and Key Points

This is a case of a patient with postpartum preeclampsia with severe features that progresses to eclampsia. The patient develops severe signs and symptoms of preeclampsia that progress to eclampsia and requires anti-hypertensive treatment as well as magnesium sulfate to control seizures. Despite an initial magnesium sulfate bolus and drip, the patient continues to seize and will require an additional magnesium sulfate bolus to control her seizures. Varying airway compromise can be added if desired. This case is designed to ensure staff are following ACOG & CMQCC guidelines for treatment of preeclampsia and eclampsia. Therefore, there is a great emphasis on appropriate medication dosing and timing per these guidelines.

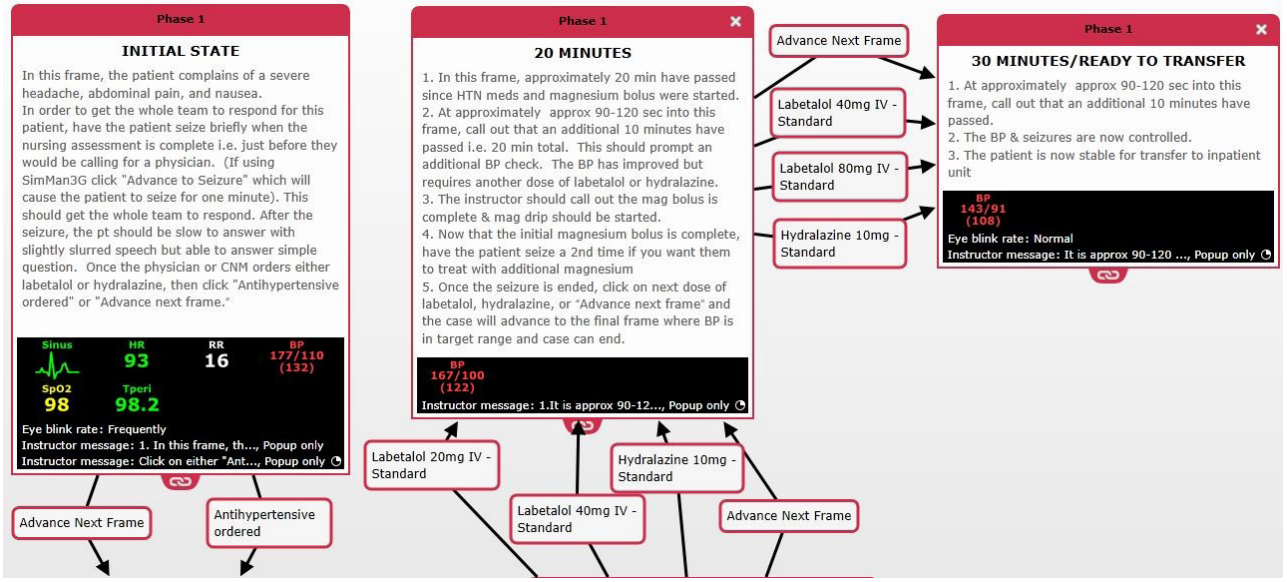
There are also important operational conditions to make this scenario work effectively

1. The appropriate dosing interval is 10 min for IV labetalol, 20 min for IV hydralazine, and 20 min for PO nifedipine (immediate release tabs). This requires the operator to "artificially speed up time" during the case in order to complete the case in a timely fashion. There are cues built into the scenario that prompt a call out that 10 min have passed approx. 90-120 seconds into the frame. This cue should be discussed in the pre-scenario briefing so that participants won't be surprised during the scenario.
2. It is critical that the participants recognize the patient is seizing. Use of a "seizure mattress" is ideal to create seizures, but if not available, SimMan3G does have a seizure feature. Unfortunately, the effectiveness of this seizure feature is limited, so a confederate may be required to point out the seizure if the team does not recognize that a seizure is occurring.

The scenario flows as noted in the diagram below

1. Scenario advances when anti-HTN meds are ordered, given, or "Advance Next Frame" is clicked. Note the events that connect frames in diagram below.
2. The event menu contains antihypertensive meds, critical scenarios controls and magnesium doses. Note the Magnesium tab that must be clicked to see the magnesium bolus doses and magnesium drip. (Figure 1 on page 189)
3. The resources menu shows the ED Monitor setup as well as the GUI setup for this case (Fig. 2).
4. Seizure control will be up to the instructor, but there are instructor messages to cue seizures at the recommended time. It is recommended to have the patient seize for the first time after the primary nurse completes their initial assessment and is ready to call for help. This will insure that the whole team responds. If you want the team to treat refractory seizures, have the patient seize again approx. 20 min into the case because the first mag bolus should be complete at that time.
5. The case ends after the BP is under control and the patient is no longer seizing.

Example of simulation models:



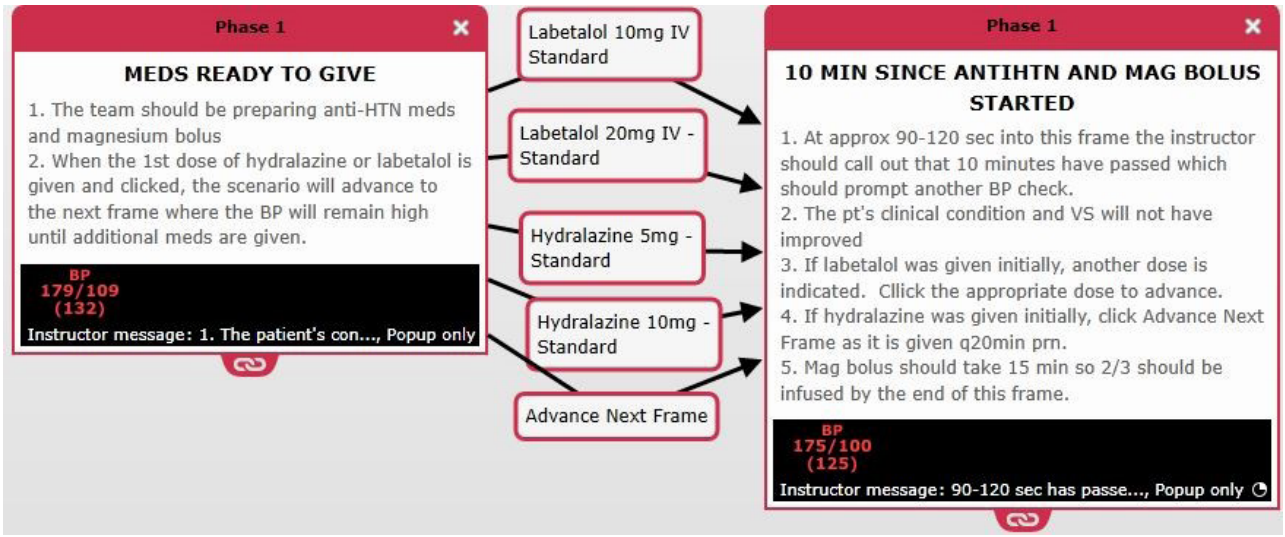


Figure 1. Event Menu

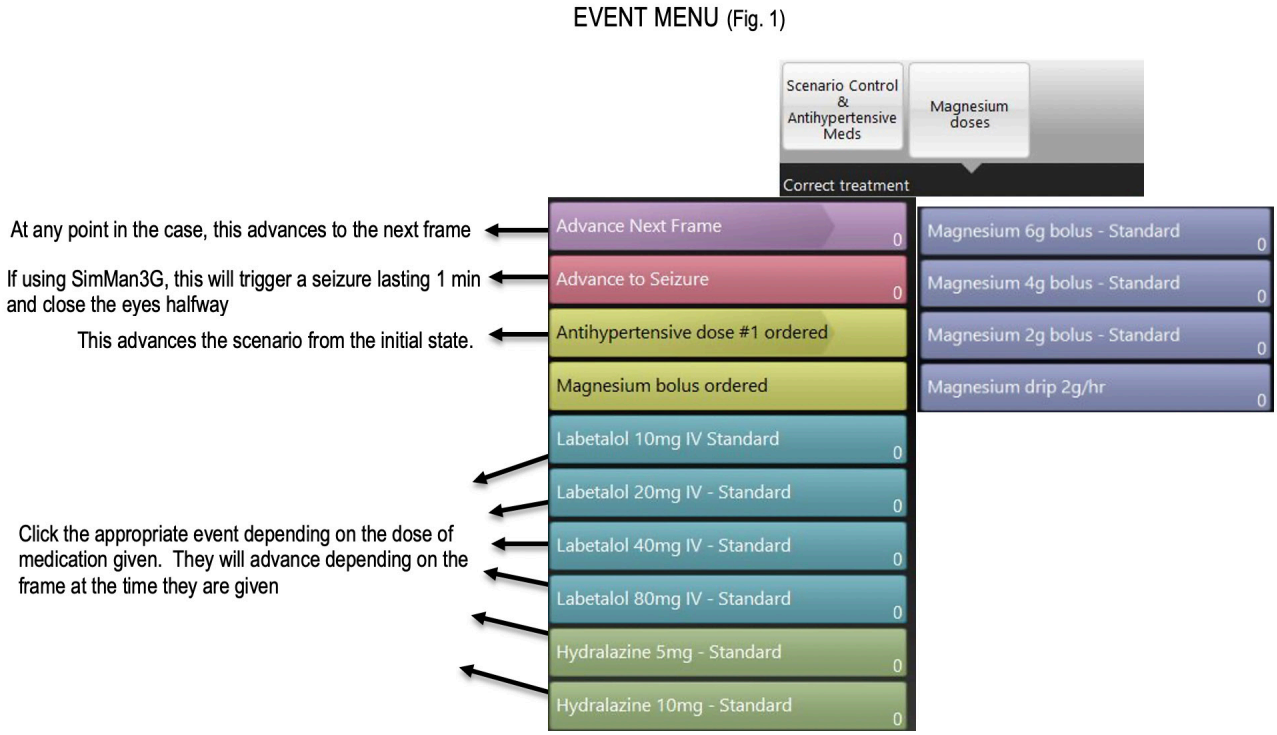


Figure 2. Event Menu (Resource Menu)

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Part 7: Debriefing objectives

Estimated Debriefing Time	20-45 minutes – will vary significantly depending on the detail of the discussion regarding medical management as well as considering what TeamSTEPPS concepts will be covered.
Debriefing Objectives	Recommend 2-3 TeamSTEPPS skills and 1-2 medical management issues for a maximum of 4-5 objectives
Teamwork & Communication Skills	
TeamSTEPPS	There are several TeamSTEPPS tools that the team will need to employ to successfully manage this case. There are a few that are especially applicable.
(TeamSTEPPS) 1. Initial SBAR to team	1. Establishing a shared mental model at the outset of the case: Initial SBAR from RN to responding team a. Did the critical information get relayed to the team? b. Did entire team and/or latecomers "receive" report? i.e. did they actually stop and listen or immediately jump into doing tasks?
(TeamSTEPPS) 2. Role Clarity – leaders, checklist reader	2. Role Clarity a. Was there clearly a lead physician and a lead nurse? b. Were there clearly understood roles/task clarity for other critical tasks? (including closed loop communication during assignment) c. Was there a designated checklist reader?
(TeamSTEPPS) 3. Call outs with QBL/VS and when tasks are complete	3. Other important communication: a. Call outs before meds are given and after medications have been given to reduce delays and potential errors b. Check backs (i.e. closed loop communication) e.g. RN call backs to confirm dosages

(TeamSTEPPS) 4. Situation monitoring and communication to maintain shared mental model	4. Situation Monitoring a. Situational Awareness b. Maintains shared mental model – briefing during case to keep up to date, assess response to treatment, and address challenges in treatment.
Medical Management	
(Medical Management) 1. Manage HTN using alternative medication regimens.	1. Identify the patient with postpartum preeclampsia with severe features with hypertensive emergency that progresses to eclampsia (i.e. SBP ≥ 160 OR DBP ≥ 105)
(Medical Management) 2. Manage refractory seizures with magnesium	2. Manage the patient with postpartum preeclampsia with severe features that progresses to eclampsia a. Treat hypertension per ACOG guidelines using alternative regimens that do NOT utilize labetalol. Since the patient seizes and is post-ictal, PO medications are not recommended. The team should treat BP with IV hydralazine + IV metoprolol b. Treat preeclampsia/eclampsia with magnesium. May require additional mag bolus for refractory seizures. c. Maintain airway and oxygenation – basic airway positioning, optional intubation

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