

SIMULATION DESIGN IN SIMULATION-BASED EDUCATION

ASSESSMENT 1: DEVELOP A SCENARIO

TITLE: MANAGEMENT OF UPPER AIRWAY OBSTRUCTION IN ANAPHYLACTIC SHOCK

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■ IDENTIFIED NEEDS/NEED ASSESSMENT:

- Airway obstruction is a blockage at any part of the airway that impedes airflow to the lung and subsequently impairs gas exchange. Recognizing and initiating early management of upper airway obstruction will reduce morbidity and mortality of patients with airway obstruction.
- Laryngeal mask (LMA), a Supraglottic airway device; is an alternative to endotracheal intubation as a method of maintaining airway patency, especially during emergency procedures.
- Undergraduate medical students, at Monash University Malaysia, are less exposed to hands-on using the LMA in their clinical training, hence this scenario will offer the experience of learning LMA insertion.

■ INTENDED LEARNER GROUP:

1. Fifth-year undergraduate medical student
 2. Housemen / Intern practicing at the Emergency Department Department
- **Further classification of learners includes future medical practitioners (licensed) who practice communication and teamwork skills.

■ LEARNING OBJECTIVES:

By the end of the simulation participants will be able:

1. To determine the signs and symptoms of upper airway obstruction in Anaphylactic Shock
2. To demonstrate the insertion of a supraglottic airway device, Laryngeal Mask Airway (LMA)
3. To demonstrate effective leadership by the Team leader in the delegation process of team members in teamwork management

■ **BACKGROUND/ PRIOR KNOWLEDGE:**

- i) Learners had a 2-hour theory session on recognition and management of Upper Airway Anaphylactic Shock and were given the reading material on Anaphylactic Shock Management by National Clinical Practice Guidelines.
- ii) Learners have completed Emergency Medicine Rotation and were exposed to Anaphylactic cases and the step-by-step use of LMA.

1.0 PREPARATION (30 minutes)

1.1 SETUP OF ROLES IN THE SCENARIO:

FACULTY and FACILITATORS

■ This simulation activity involves:

- 1 Emergency Physician (EP)
- 3 Faculty Staff
- 1 Simulated patient (SP)

■ All personnel involved in the simulation will be briefed on the simulation session and their specific tasks before the session.

■ A dry-run session will be run a week before the session

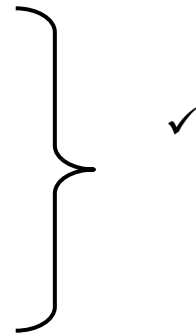
■ Faculty need to check the availability and ensure the functioning of equipment as below:

✓ **REQUIREMENT: EQUIPMENT / PROPS (with checklist)**

1. ED Red Zone Signage at the entrance door	✓
2. 1 Simulation room with 2 hospital beds	✓
3. Task Trainer for LMA Insertion	✓
4. Vital signs equipment attached to the computer device	✓
5. Cardiac table with clerking/patient clinical notes	✓
6. Medication chart notes with IV Ampicillin 1g BD charted	✓
7. Laryngeal Mask Airway – 2 sets	✓

PROPS:

- Stools and Blood-taking trolley and clinical waste dustbin
- Cardiac monitor / Defib machine
- Resus trolley and Oxygen delivery trolley at the corner of the room
- Whiteboard and marker pens
- Video recorder (recording from the control room) - ensure consent forms are signed



1.2 SCENARIO DESCRIPTION:

- In this simulation scenario, year 5 undergraduate medical students will perform the insertion of the Laryngeal Mask Airway (LMA).
- Simulation modalities that will be used include:
 - Simulated patient
 - Hybrid
 - Airway manikin
 - Role-play
- The learners will perform the practical session in a group of 5 members.
- They will be introduced to the clinical scenario.
- There is no observer role in this simulation activity

1.3 SETTING UP and FLOW OF SIMULATION SESSION (30 MINUTES)

❖ BRIEF DESCRIPTION:

- The setting is a Simulation Room at Monash University Malaysia. The entrance of the Red Zone, the Emergency Department is labeled. (*refer Picture 1*)
- The arrangement of the room of 2 beds that resembles the Red Zone Emergency Department (Setup) (*refer to Picture 2*).
- 1 bed is for the simulated patient (SP) and another bed is for LMA insertion on an airway manikin.
- The simulation activity will run in 2 cycles. Each cycle is estimated for **60 minutes in duration**.
- Learners will be in a group of 5, with one of them appointed as a Team Leader (at each cycle) – Role-play.
- At the beginning of the session, the learners will be given 1 minute to read the case presentation (printed pasted at the entrance door).

- The session will start with a ring of the bell when a simulated patient is brought in from Triage to the Red Zone, with a complaint of difficulty breathing and generalized rashes.
- Hybrid Simulation – The simulated patient will be lying on the bed (**the first 15 minutes of the session**). Learners may proceed with history taking and physical examination.
- After 15 minutes, SP will act unconscious and the scenario progresses to the next bed with management on the airway manikin.
- Airway manikin for the LMA Insertion process will be placed at a different bed (separated by a screen) and the LMA set placed just beside the bed.
- The duration for the LMA insertion is estimated at **45 minutes**.
- Session ends when LMA is inserted successfully and connected to the oxygen.
- The second cycle (repeated session) will start soon to allow repetition training.
- The evaluation via checklist of the steps for LMA insertion will be done by the faculty, during the session (via observation from the control room

❖ **TIMELINE:**

- SET UP: **30 minutes**
- BRIEFING: **30 minutes**
- **SIMULATION SESSION: 120 Minutes (2 repetitive session)**
 - **Each session is 60 minutes**
- DE-BRIEFING: **60 minutes**

TOTAL HOURS: 4 Hours

2.0 BRIEFING (30 minutes)

2.1 BRIEFING FOR FACULTY

1. To test run the scenario, technology, and simulator
2. To take learners' attendance
3. To keep track of the timing of the session
4. To train SP, a week before the session
5. To do an evaluation and complete the LMA insertion checklist for each learner -
Faculty will evaluate the learner using a checklist:
 1. The steps in LMA insertion during the simulation activity
(Checklist of the steps recommended by LMA Supreme from LMA
Websitehttp://www.lmana.com/files/lma_656_supreme_qrg.pdf?PHPSESSID=b8c8d57359c66bcb5899c04f2037bc37) (**Appendix 1**)
 2. The selection of LMA Size (**Appendix 2**)

OTHER INSTRUCTION TO FACULTY

- Test run the scenario, technology, and simulator
- To take learners' attendance
- To keep track of the timing of the session
- To train SP, a week before the session
- To do an evaluation and complete the LMA insertion checklist for each learner



Picture 1: ED Red Zone signage at the entrance door



Picture 2: The bed and equipment set up resembling ED Red Zone

2.2 BRIEFING FOR THE LEARNERS:

INSTRUCTION TO LEANERS: This step consists of 5 Components:

1. Structure of activities:

- Inform learners about the teaching team and the simulation session for 2 hours per session
- 5 students per group and there are 2 repetitive sessions (each session is 60 minutes (to allow repetitive opportunities of experiencing learning))

2. Set a safe and conducive learning environment

- Acknowledge their names and anxiety (if any)
- Emphasize the nature of the session is training (no assessment) – Do not be afraid to make mistakes
- Care about psychological safety – everything happens stays within the 4 walls

3. Review Learning Objective

- Go through all 3 Learning Objectives and clarify any doubts

4. Establish a Fiction Contract

- Learners need to take the simulation activity as real (suspension of disbelief)

5. Orientation for learners to the:

- i. Simulators (Airway manikin)
– how it functions. Inform the “do” and “don't” with the simulator
- ii. Equipment - how it functions
- iii. Environment – It is a Red Zone ED setting
- iv. Simulated patient's role in a simulation session

2.3 BRIEFING FOR THE SIMULATED PATIENT:

- You are Mr. Jack, a 40 years old gentleman who arrived at ED with a complaint of difficulty breathing, generalized rashes, and change of voice after eating seafood 30 mins ago
- You can barely talk and have a breathing rate of 30 breaths per minute
- You will be attended by the medical student (5 students in a group)
- You will answer the question according to the script. If you are not sure about the answer, you can say “I am not sure”.
- You are getting dizzy after 15 minutes and you faint.
- Your session ends at 15 mins/prompted by facilitators to be ended.
- Then the scenario will continue with a different simulation modality (Airway Manikin for insertion of LMA for Upper Airway Obstruction).

■ SP TRAINING

- You are trained for the role 1 week earlier before the session
- You may need to attend a Dry-Run as SP, before the exact Simulation Day

■ SAFE WORK ENVIRONMENT

- SP needs to be comfortable with the role given. At any time you feels uncomfortable, kindly inform the facilitator
- Your personal information will be kept confidently

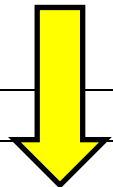
3.0 SIMULATION ACTIVITY (60 minutes for 1 cycle)

3.1 THE FLOW OF SIMULATION ACTIVITY AND CASE

PROGRESSION

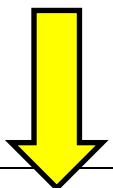
SETUP AND FLOW OF SIM

- The setting is a Simulation Room at Monash University Malaysia.
- The arrangement of the room resembles the Red Zone Emergency Department (Setup)
- Learners will be in a group of 5, with one designated as Team Leader – Role-play
- **The session will START** with a ring of the bell when a simulated patient is brought in from Triage with a complaint of difficulty breathing.
- Hybrid Simulation – The simulated patient will be lying on the bed (the first 15 minutes of the session).
- After 15 minutes, SP will act unconscious and the scenario progresses to the next bed with management on the airway manikin.
- Airway manikin for the LMA Insertion process will be placed at a different bed (separated by a screen) and the LMA set placed just beside the bed
- **The session will END** when LMA is inserted successfully



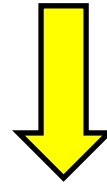
SCENARIO (1-minute reading):

- Jack is a 40-year-old gentleman
- At about 30 minutes of seafood consumption, he developed a generalized urticaria rash difficulty breathing, and dizziness
- He has cold peripheries, cyanosis, and tachypnea.at ED arrival
- **Vital Signs:**
 - BP: 80/60mmHg
 - Pulse rate: 120 beats per minute
 - SPO₂ is 80% under a high-flow mask.



INSTRUCTION TO LEARNERS:

- In a group of 5, you will be alerted to review this patient urgently. One of you is the Team Leader.
- You can start with a general approach with the Simulated patient proceed with a history-taking physical examination, and start initial management of the situation.
- At any point, you may call for help from your senior/specialist
- Once you decide to insert LMA, the process will be done on a task trainer.
- Evaluation on Insertion and LMA size selection will be conducted in the session (**Refer to Appendix 1 and 2**)



CONTROLLED INSTRUCTION FROM FACILITATORS TO LEARNERS:

- Vital Signs: HR 120; RR 30 with generalized rhonchi on breath sound, BP: 80/60mmHg, Oxygen saturation is 88% under High Flow Mask
- Red urticarial rash on the face, arms, and trunk. Tongue or lip swelling present. Changes in voice with pharyngeal swelling are noted
- SP will be unconscious at the 15th minute of the scenario.
- Deterioration of Oxygen saturation to 70% under high flow mask.
- The learner will be prompted for the choice of Airway device available (Only LMA)
- The learner will be prompted for HELP from a senior (if not done)
- Scenario ENDS once LMA is inserted including a correct LMA size selected.

3.2 RUNNING SHEET of 1st CYCLE of the SCENARIO (60 Minutes)

DURATION	FLOW OF EVENT	EXPECTED ACTIVITY BY LEARNERS	POTENTIAL DISCUSSION POINTS
0-1 mins	Case summary printed and pasted at the entrance door	Reading the case	-Planning the approach -Delegation of Team Leader
0-15 Mins	START Cue: a ring of the bell when a simulated patient is brought in from Triage to the Red zone ** NEED TO PROMPT IF NEEDED	-Learners attended SP urgently at Red Zone -History taking -Physical examination -Initial management of obstruction airway	-Detection of signs and symptoms of airway obstruction
After 15 mins	Pt became unconscious Cyanosed More tachypnoea ** NEED TO PROMPT IF NEEDED	-Airway assessment -Calling for help using ISBAR -Suggestion for LMA insertion	-Detection of clinical deterioration - Airway obstruction management
15 – 45 minutes	Hybrid simulators – Airway manikin used for LMA insertion	-LMA insertion	-Steps of LMA Insertion (checklist)
By 60 minutes	END	-LMA inserted and attached to oxygen	Teamwork and communication throughout the session

MONITOR REVIEW



3.3 INSTRUCTION TO THE FACULTY / FACILITATOR

****Faculty/ Facilitator are expected to adhere to the TIME-BASED PROMPTING****

- Reward Oxygen saturation to a maximum of 88% with bag valve mask ventilation
- Prompts on the signs (cyanosis, more tachypnoea) and symptoms (more breathless)
- SP will lose consciousness level once learners realize their BP is low / or at the 15th minute of the session.
- At this point, prompt that Nurse has given Adrenaline 0.5mg bolus and IV fluids running respectively.
- Once SP is unconscious, Ask the learners about the choice of Airway device that is appropriate to be used.
- Prompt on the insertion of LMA if choice not stated by learners.

3.4 THE METHOD USED BY THE FACULTY /FACILITATOR

1. A ***pause and discuss method*** will be used as appropriate to explore the medical or technical issue and patient safety component. Make the pause short and restart from the point they left off.
2. A ***Continuos-end method*** can also be an option method to use.
3. As far as possible, the facilitator should try NOT to interrupt the simulation activity. This is because the learners need to immerse into the simulation as much as possible and treat the whole simulation scenario as evolving around them.

3.5 THE METHOD USED BY EP/FACILITATOR

1. A ***pause and discuss method*** will be used as appropriate to explore the medical or technical issue and patient safety component. Make the pause short and restart from the point they left off.
2. A ***Continuos-end method*** can also be an option method to use.
3. As far as possible, the facilitator should try NOT to interrupt the simulation activity. This is because the learners need to immerse into the simulation as much as possible and treat the whole simulation scenario as evolving around them.

4.0. DEBRIEFING SESSION (60 Minutes)

- Debriefing session is an important process post-simulation session exercise where educators and learners re-examine the simulation experience toward the assimilation of learning.
- Debriefing method of choice: PLUS/DELTA; The de-briefer will encourage the learner to actively perform their self-assessment.
- Debriefing tool: Facilitator notes, recorded video, and, learners' notes
- Debriefing approach: The approach of Debriefing refers to the PEARL <https://debrief2learn.org/pearls-debriefing-tool/> approach of debriefing that consists of allowing the learner to express their reaction, describe their perspective, analyze their actions, and summarize what learners has learned

4.1 DEBRIEFING GUIDANCE FOR THE FACULTY

THE DE-BRIEFING POINT OF THIS SESSION INCLUDES:

- Discussion on the desired outcome expected of the steps in LMA insertion, (**Appendix 1**) and the selection of LMA size (**Appendix 2**)
- Explore the content of the checklist of the steps recommended by LMA Supreme with the student.
- Delineate effective communication with the team member
- Sharing experiences on detecting the signs and symptoms of Upper Airway Obstruction and getting senior help.

4.2 THE FOCUS AIM OF DEBRIEFING:

1. Development of Clinical judgment and critical thinking
2. Explore the learner's emotion
3. Provide feedback to one another about their performance
4. Open discussion for improvement for the scenario design

5.0 REFLECTION

- Verbal and written reflection is to explore learners' experience during simulation activity.
- Learners and facilitators are to verbally or write in 200 words on their reflection from the Simulation session that includes:
 - ✓ 3 the things they learn from the session
 - ✓ 3 important learning points they can apply in the practice and future decision-making, Especially, on how to insert LMA in a patient with an obstructed airway.
 - ✓ 3 suggestions on how the session can be improved

6.0 EVALUATION of the SCENARIO DESIGN

- A process to review simulation based on learners' and/or confederate's feedback. (Evaluation form given to learners soon after the session)
- Evaluate technology issues and technical aspect
- Open discussion on scenario design and objective met

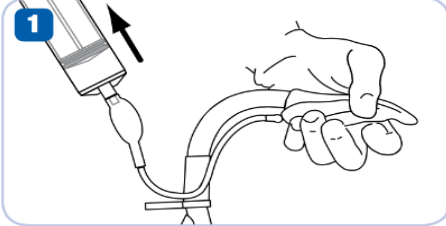
6.1 EVALUATION STRATEGY:

- Gathering input from the Faculty on improvement in skills, and knowledge, on insertion of LMA based on the evaluation checklist.
- Evaluation using an online Google Form that consists of 10 questions – addressing the appropriateness of the simulation scenario, learning objectives, and activities including a Debriefing session
- The evaluation report will be reviewed and shared within 2 weeks

■ REFERENCES:

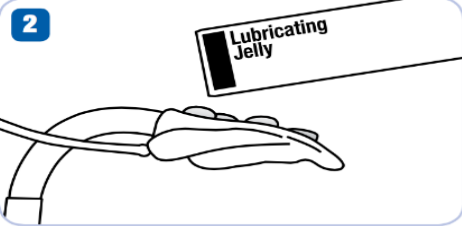
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Bielski A, Evrin T, Gawel W, Kosiacka K, Szarpak L. The knowledge and attitude of last year medical students towards supraglottic airway devices.
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LMA Supreme™ Insertion Technique



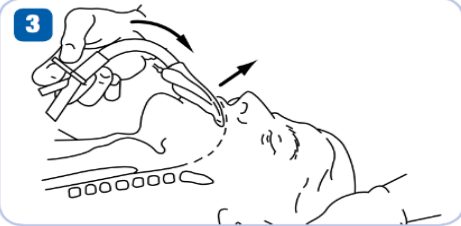
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Figure 1: Fully deflate the mask for insertion. Attach a syringe. Compress the distal tip of the mask with thumb and index finger. Apply slight tension to the inflation line while removing all air until a vacuum is felt. Disconnect the syringe.



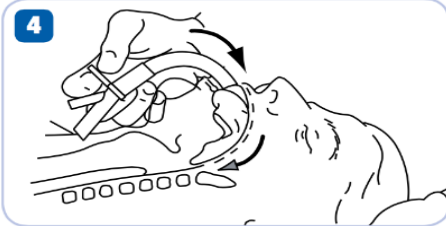
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Figure 2: Generously lubricate the posterior surface of the cuff and airway tube.



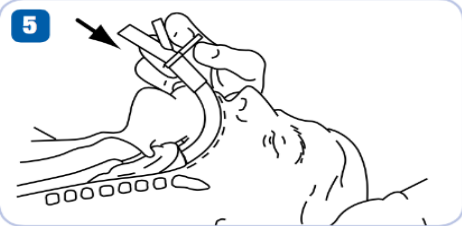
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Figure 3: Place the patient's head in a neutral or slight "sniffing" position. Hold the LMA Supreme™ at the proximal end with the connector pointing downward to the chest and the tip of the distal end pointing toward the palate.



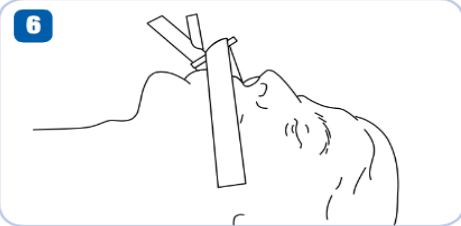
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Figure 4: Press the tip of the mask against the hard palate. Maintaining pressure against the palate, continue to rotate the mask inwards in a circular motion following the curvature of the hard and soft palate.



5

Figure 5: Continue until resistance is felt. The distal end of the mask should now be in contact with the upper esophageal sphincter. The device is now fully inserted.



6

Figure 6*: Maintaining inward pressure, secure the mask into position by taping cheek to cheek across the fixation tab. This should be done prior to inflation. Inflate with the minimum amount of air needed to achieve an effective seal. The recommended intracuff pressure should not exceed 60 cm H₂O.

The steps recommended by LMA Supreme.

Checklist of the steps recommended by LMA Supreme from LMA Website (http://www.lmana.com/files/lma_656_supreme_qrg.pdf?PHPSESSID=b8c8d57359c66bc b5899c04f2037bc37)

APPENDIX 2

What Size Should I Use?

There are sizing charts and I attached one from the official LMA website. However, be aware that the body weight size chart is really designed for ideal body weight. In my experience, a 300 lb (136 kg), 5 ft tall (1.5 m) woman will not take a size 5 in either type of LMA.

The following table shows the recommended weight-based guidelines for determining the appropriate size LMA Supreme™ for your patient.

CATALOG	MASK SIZE	PATIENT SIZE	PRODUCT DESCRIPTION	MAX INFLATION CUFF VOLUME	LARGEST SIZE OG/NG TUBE
175010	Size 1	Neonates/infants up to 5 kg	LMA Supreme™ size 1	5 mL	6 French
175015	Size 1.5	Infants 5 - 10 kg	LMA Supreme™ size 1.5	8 mL	6 French
175020	Size 2	Infants 10 - 20 kg	LMA Supreme™ size 2	12 mL	10 French
175025	Size 2.5	Children 20 - 30 kg	LMA Supreme™ size 2.5	20 mL	10 French
175030	Size 3	Children 30 - 50 kg	LMA Supreme™ size 3	30 mL	14 French
175040	Size 4	Adults 50 - 70 kg	LMA Supreme™ size 4	45 mL	14 French
175050	Size 5	Adults 70 - 100 kg	LMA Supreme™ size 5	45 mL	14 French

Also available in LMA Supreme™ Plus Pack including syringe and lubricant.

Alternative Sizing Method: palatal – cricoid distance
Hold the LMA Supreme™ to the side of the patient's face. With the bite block positioned at the level of the palate, the distal tip of the mask should reach the level of the cricoid cartilage.



LMA | Supreme™



Size recommendation chart for use of LMA Supreme from website
<http://www.lmana.com>

The selection of LMA Size