

Virtual Simulation

Participants in the experimental condition completed a gamified virtual simulation asynchronously using a Choose-Your-Own-Adventure format. The VS was a screen-based simulation hosted on Affinity.¹ The VS that was used has previously shown benefits for speaking up and the use of CUS.² In the VS the participants make choices for an emergency department RT who is providing treatment to a status asthmatic patient. To complete the simulation participants had to successfully use CUS to convince a doctor to provide appropriate attention and care to a patient. The simulation contained six decision points, two of which were therapeutic decisions and four of which related to interprofessional competencies. At each decision point, there was a correct choice, a partially correct choice, and one or two incorrect choices to choose from. Feedback was provided after each decision point in the simulation and participants could go backwards and try again if they chose incorrectly. Immediately after the VS participants were provided with a written debriefing about the simulation, the purpose of the simulation, and the need for speaking up.

Virtual Patient Simulation Scenario Flow

Stage 1 - Initial Assessment

- Participants begin the simulation by learning they are to go assess an asthmatic in an emergency department setting.
- The first decision point is related to a patient assessment after viewing a video of a patient in respiratory distress. By the end of stage 1 the participants are well aware this is a "very sick" patient.

Stage 2 - Colaborative Practice

- Stage 2 requires the participant to recognize they need help and the involment of other members from the care team.
- After calling for the help of the ED Physician the participant is brushed off by the physician.
- The participant then has the option of making a strong, moderate, weak, or no challenge to the physician.
- Even if a strong challenge is chosen, the participant is again brushed off by the physician despite the patient becoming more critically ill.

Stage 3 - "CUS" Challenge

- In stage 3 the participant has the opportunity to make a second challenge. The correct choice is to use "Concerned and Uncomfortable" from CUS.
- Despite the use of a strong challenge, the participant is brushed off one more time and must use "This is a safety issue" from CUS.
- After this successful challenge the physician and RT work together to successfully intubate the patient.

<https://360.articulate.com/review/content/fdaded8b-886c-4fee-9cbf-a48c274b3091/review>

Simulation One

Simulation One was based on the simulation previously used by Violato et al.^{2,3} The scenario involved an interprofessional airway management scenario with a senior anesthesiologist on the third attempt in a can't-intubate scenario. The participant must challenge the anesthesiologist to prevent patient harm. All actors and facilitators were registered RTs or other healthcare professionals with experience and confidence performing intubation, were knowledgeable about patient advocacy and challenging authority, and were experienced with conducting simulation and debriefing. All actors and facilitators received training and rehearsed the scenario.

The role of the anesthesiologist at NXXX was portrayed by three males, and the doctors at SXXX were portrayed by three females. Though prior research has identified sex effects for differences of the doctors being challenged⁴ in two prior studies using the same simulation design with anesthesiologists of different sexes no differences in rates of speaking up were observed based on sex,^{2,3} other research using a similar design also found no effects for physician sex.⁵ It is likely the serious and immediate threat to patient safety presented by the scenario negates sex effects; the doctor's sex is superseded by the risk of harm.

As in the previous implementations of the study protocol, the scenario pre-briefing was presented in an OSCE style, informing participants they were returning from lunch when a charge nurse told them that Dr. Anderson from anesthesia was attempting to intubate a patient and needed help. As participants entered the simulation, they would see Dr. Anderson struggling with the intubation, Dr. Anderson would ignore the participant and continue with the intubation attempt. If a participant made a challenge the doctor would continue to ignore the participant, if the participant made a second challenge, the doctor would state, *"It's ultimately my responsibility for what happens here. I need to get this tube in."* If the participant challenged a third time the scenario would end. If the participant did not make three strong challenges the scenario would end after three minutes. If no action was being taken after a reasonable time facilitators had the discretion to end the simulation early. To create a naturalistic scenario there were no specific points in the simulation where a challenge or reply was expected, a challenge could be made at any time (see Supplemental Material 1).

CAE Healthcare iStan Mannequins⁶ were used at NXXX. At SXXX Laerdal high-fidelity mannequins⁷ or Laerdal airway management trainers⁸ set up to give the impression of a full patient were used. Simulations ran concurrently, all simulations and debriefings were audio and video-recorded for analysis. The debriefing of the simulation was treated as a didactic opportunity to discuss the importance of speaking up, tools for speaking up, and address any participant questions related to speaking up.

In-person Simulation One Scenario Flow

School of Health and Life Sciences

Simulation Centre

Compliance Behaviour During an Airway Emergency

Creation Date: February 2021

Public Scenario Title

Compliance Behaviour During an Airway Emergency

Scenario Description

In an urban emergency department an Anesthesiologist has had two intubation attempts without success. The RT is called in by the charge nurse to assist with capturing the airway and as they enter the room the anesthetist begins to attempt intubation for the third time.

Scenario Objectives

1. Ensure closed-loop communication between team members
2. Use NOD (name, occupation, duty) when first introducing self to physician
3. Rapid Patient Assessment
4. Appropriately challenging inappropriate decision making

Equipment and Supplies

Mannequin laying on bed, wearing hospital gown.	Sim cart
OPA's	Suction set up with yankeur suction attached
Intubation Tray	Bougie Stylette
Bagger and mask	

Scenario Flow

Briefly describe progressive scenes (aka states or stages)

1st Scenario:

1. Patient in hospital gown, laying on stretcher being bagged by an SP playing the role of the Anesthetist.
2. Mannequin Settings: RR 0 HR 118 BP 110/70 SpO2 88%
3. Students should introduce themselves and perform a rapid situation assessment/get a situation report from the Anesthetist.

1. As the student assesses the patient the anesthetist rushes into a third intubation attempt.
 - a. As soon as the anesthetist inserts the laryngoscope in the mouth set the SpO2 to decrease to 65% over the next 60 seconds.
2. The student should challenge the anesthetist and suggest methods for increasing the patient's SpO2 (ex. bagging with an OPA) and optimizing conditions for successfully capturing the airway (ex. Shoulder roll, sniffing position, difficult airway device)
 - a. If/when the student challenges the anesthetist the anesthetist proceeds as-is with the intubation attempt anyways.
 - b. If/when the student fails to challenge the anesthetist the HR is set to decrease to 40 over the next 60 seconds.

1. The student is provided with one more opportunity to challenge the Anesthetist.
 - a. If/when the student challenges the anesthetist the anesthetist states "It's ultimately my responsibility for what happens here, I need to get this tube in."
 - i. If the student challenges again the scenario concludes, and if they do not challenge again the scenario also concludes.
 - b. If/when the student does not challenge the anesthetist the scenario concludes.

Briefing (or Prebriefing) Information

Participant(s) in the Hot Seat

You are working a shift at the UofA emergency department and have just returned from Lunch break when the charge nurse rushes over to you and says “we need you right away in room one, I think Dr. Anderson from Anesthesia is having trouble getting an airway on a sepsis patient that just arrived.

Debriefing Information

Debriefing will be performed as per the debrief protocol submitted to the NAIT research ethics board.

Roles of the Facilitator through the Simulation Experience

- Respect for learner opinions and psychological safety
- Belief in integrity of learning through simulation
- Manages upset/monopolizing/outlier individuals

Simulation Two

To determine if the VS, Simulation One, and a clinical practicum would lead to generalized speaking up skills a novel scenario was developed for the second in-person simulation. The simulation was developed based on a clinical encounter one of the researchers witnessed in their practice. The scenario involved the insertion of an arterial line by an attending physician, the participant was tasked with checking the ventilatory settings, ensuring the patient was stable, and assisting the physician if necessary. During the scenario, the physician would commit three progressively egregious and obvious violations of sterility. The violations were 1) the use of unclean procedure gloves while inserting the arterial line; 2) the placement of the arterial line on a clean though non-sterile pad and re-attempting the procedure with the line that had been placed on the pad; 3) the disposal and retrieval of the arterial line from a garbage can at the bedside. Each breach in sterility was a point at which the participant could challenge the physician. The scenario was constructed to require the integration of basic clinical knowledge/skill (sterility) with speaking up. At each violation, if the participant challenged the physician, the physician would dismiss the participant's challenge in a courteous but firm manner and move on with the procedure. If the participant persisted in the challenge the physician would respond in the same way. If a third challenge was made the physician would acknowledge the participant's concern and desist. The physician's disposition was changed from Simulation One to determine if participants would be able to speak up in a different context and so that it would not be obvious to participants that the simulation was looking for the same behaviour as Simulation One. Three persistent challenges were required throughout the simulation for a successful challenge to be recorded. Successful challenges could occur at any of the breaches in sterility. Three persistent challenges were required to align with Simulation One, this approach reflects other research where three error points were used to investigate speaking up.⁵ If the participant had not successfully challenged, the end point for the simulation was if the doctor retrieved the arterial line from the garbage and touched the patient with the arterial line with no challenge from the participant.

In-person Simulation One Scenario Flow

School of Health and Life Sciences

Simulation Centre

RESP 342

Case Name: ICU Head Injury / Speaking up

Case Description: 53-year-old female patient who has been in a single vehicle MVA. Was conscious at the scene when EMS arrived but GCS then deteriorated – intubated without complications. Admitted to OR for intraventricular drain insertion and then ICU post op . IBW 60kg

Case Objectives:

- Students to use CUS technique for speaking up
- Perform patient assessment
- Perform ventilation management

Timeline	Presentation	Room/Equipment set up/	Actor MD/Patient Notes	Expected Participants Actions
Room set up	<p>Baseline Physiology Vent settings: PRVC, RR 16, Vt 450ml, FiO2 0.60, PEEP 5, Ti 1.0 sec</p> <p>HR 78 NSR</p> <p>NBP 110/70 mmHg</p> <p>SpO2 99%</p> <p>O/A Bilateral air entry with scattered coarse exp crackles t/o</p>	<p>Patient with head wound and other areas of trauma, blood and facial injuries</p> <p>Patient intubated and ventilated. #7.0 OETT at 21 cm ATT</p> <p>Physician at bedside attempting to insert arterial line. Transducer flushed and present</p>	<p>Patient was admitted to ICU about an hour ago, appears stable at first glance.</p> <p>Physician struggling with arterial line insertion at bedside. Huck towel on patient's wrist, arterial line kit in garbage can. Muttering to self</p>	<p>ICU assessment post shift change.</p> <p>Notice what physician is doing.</p>
Scenario Start	<p>Patient appears stable on settings. ABG provided to students as they enter the room</p> <p>Physician at bedside attempting to troubleshoot arterial line as waveform is damped</p>	<p>Outside the sim room: Give students basic history and ask to perform assessment.</p> <p>Upon Assessment: Patient has higher pressure on the ventilator to signify need for suction</p> <p>Physician at bedside troubleshooting the arterial line.</p>	<p>When students arrive and introduce themselves physician can say hello and intro self, and then say "the patient was just coughing, maybe they need a suction? Don't mind me, I am just trying to get this artline to work better".</p> <p>Physician wiggles artline, repositions wrist, and looking at monitor to see if working.</p> <p>Physician places blue pad under the wrist. Moves garbage can over with foot, and then opens sterile package of guidewire with dirty procedure gloves.</p>	<p>Perform auscultation and routine assessment</p> <p>Students should notice need for suctioning</p> <p>Student should notice the physician's actions, and raise patient safety concerns with CUS or other attempts to challenge.</p>

			<p>Drops wrapper in garbage and proceeds to detach transducing tubing and insert guidewire. Again, wiggles artline, adjusts with guidewire, and <i>after 15 seconds asks for the students to place a blue pad on the patient's chest.</i></p> <p>Continues wiggling artline with guidewire. Once blue pad in place puts the guidewire on the blue pad and reattaches the transducing tubing.</p> <p>Waveform still appears damped. Physician then detaches tubing and reinserts the dirty guidewire—again 15-20 seconds of 'wiggling' to troubleshoot. Says 'ahh, that should do it', and throws the guidewire in the garbage.</p> <p>Then waveform damped still and physician wiggles the wrist more and says "hmm, not quite, almost got it.</p> <p>One more should do it" and make a reach towards the guidewire in the garbage can. Scenario ends with either a successful challenge or once physician grabs the guidewire from the garbage and touches the patient with the guidewire.</p>	<p>Students may ask for doctor's orders for ventilation, ABG goals (these will be in a "chart" at the bedside. If asked, the physician can just direct them to the chart).</p>
Transitions	<p>Orders state TBI protocol</p> <p>ABG will show PaCO2 elevated with acidotic pH</p>	<p>Garbage can at bedside</p> <p>Reseal guidewire in 'sterile' packaging</p>	<p>Maintain stable patient conditions throughout</p> <p>No cough or gag with suction</p>	<p>Students should see the need to manipulate vent settings to achieve proper orders</p> <p>Students will continue to offer assistance to physician as well as intervene to prevent patient safety issue with IP&C. Use CUS</p> <p>Check CXR</p> <p>State they want ABG post vent changes</p>

RADIOMETER ABL SIM SERIES

Syringe - S 196 uL

Sample # 63204

Identifications

Patient ID	12345678
Acession No.	
Patient Last Name	Moore
Patient First Name	
Sample type	Arterial
temp	37.0 °C
Draw Time	
Sex	
Date of birth	

Blood Gas Values

pH	7.30		
pCO ₂	50	mmHg	
pO ₂	120	mmHg	

Acid Base Status

cBase(B) _c	0.2	mmol/L	
cHCO ₃ ⁻ (P) _c	24	mmol/L	

ctHb	116	g/L	
FO ₂ Hb	98	%	
FCOHb	0.5	%	
FMetHb	0	%	

Acid Base Status

cNa ⁺	142	mmol/L	
cK ⁺	4.95	mmol/L	
cCl ⁻	106	mmol/L	
cCa ²⁺	1.2	mmol/L	

Metabolite Values

cGlu	4.2	mmol/L	
cLac	1.0	mmol/L	

Calculated Values

cCa ²⁺ (7.4) _c	1.18	mmol/L	
Hct _c	48	%	
Baro.	670	mmHg	

Notes

† Value(s) above reference range

- ↓ Value(s) below reference range
 - ↑↑ Value(s) above the critical limits
 - c Calculated value(s)
 - * User correction applied to value(s)
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References

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