

The Vital Anaesthesia Simulation Training (VAST) course: immersive simulation designed for low-resource settings

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KEY WORDS

Simulation, low-resource, non-technical skills

ABSTRACT

There is a global shortage of trained anaesthesia providers, with great disparities between high- and low-resource countries. In low-resource settings, the majority of anaesthesia providers work in relative isolation, under extreme pressure and with few opportunities for continuous professional development. The Vital Anaesthesia Simulation Training (VAST) course was developed for anaesthesia providers in this context and is a collaborative project between partners in Rwanda and Canada. The VAST course aims to maximise learning in a way that is simple, practical and vivid. The main modality used is immersive simulation, with clinical environments replicated through low-cost materials and a focus on a case mix that reflects practice at the district hospital level. The accompanying VAST facilitator course promotes sustainability, mentors future facilitators and is supported by intuitive materials and an opportunity to practise components of course delivery. The VAST course was piloted in early 2018 in Kigali, Rwanda. The pilot course demonstrated feasible course delivery and a participant desire for widespread dissemination in Rwanda. After minor course revisions, the next step is a formal evaluation of the VAST course's ability to strengthen anaesthetists' non-technical skills. The VAST course holds potential as an exciting vehicle for widespread application of simulation-based education in low-resource settings.

INTRODUCTION

Although the volume of surgery performed worldwide is increasing,¹ it is estimated that 143 million additional operations are required to address emergency and essential surgical conditions in low- and middle-income countries (LMICs).² Estimates suggest that

5 billion of the world's 7 billion people do not have access to safe anaesthesia and surgical care.² There is a global shortage of trained anaesthesia providers, with great disparities between high-resource and low-resource countries.³ Non-physician anaesthetists (NPAs), who commonly receive 1–3 years of post-secondary education, provide the majority of anaesthesia in low-resource settings.⁴ NPAs often work independently in challenging environments and have few opportunities for ongoing professional development.^{4,5} Training initiatives that focus on anaesthetic care in low-resource district hospitals are needed.² Although the challenges in this setting are amplified, the potential for impact is dramatic.⁶

Non-technical skills (NTSs), such as communication, team working and task coordination, are vital to anaesthesia safety.⁷ Up to 70–80% of untoward events in healthcare are associated with errors in NTSs.⁸ The Anaesthetists' Non-Technical Skills (ANTS) framework^{9,10} describes behaviour markers for NTSs in anaesthesia. Clinical simulation is often used to teach ANTS.¹⁰

In high-resource settings, simulation is crucial in anaesthesia education and training in NTSs.¹¹ Prohibitive costs have been considered a barrier to simulation-based education in low-resource settings. However, the emotional and conceptual responses to the simulated environment and psychological fidelity, are more essential to learning than the simulator's physical resemblance to real life.¹² Consensus is mounting that relatively low-cost technology paired with thoughtful scenario design can create effective simulation-based experiential learning.^{13,14} Low-cost equipment has been used successfully for simulation-based training of ANTS in a low-resource setting.¹⁵

The VAST course was designed for anaesthesia providers working in district hospitals in low-resource settings. Creation of the VAST course has been made possible through the longstanding relationship amongst the anaesthesia departments at Dalhousie University, the University of Rwanda and

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the Canadian Anaesthesiologists' Society International Education Foundation (CASIEF). Foundational work in Rwanda includes an ethnographic study of ANTS,¹⁶ development of the first simulation centre in East Africa¹⁷ and a feasibility study evaluating ANTS improvement with low-cost simulation.¹⁵ Prior to course development, a needs assessment was conducted amongst Rwandan anaesthesia providers to gauge interest in a new simulation training course, desired content and potential barriers to and facilitators of course success. Insights generated informed course design; anaesthesia providers wanted content to reflect their daily practice and to have a discussion forum for clinical practice challenges and solutions. The following is a description of the VAST course's development, design and pilot in Rwanda.

COLLABORATION

Starting from inception of the idea in mid-2017, the creation process for the VAST course has been consultative and collaborative. Broad goals were first established by the Dalhousie anaesthesia medical director of global health, the Dalhousie anaesthesia global health fellow and the leaders of the Rwanda Society of Anaesthesia. The ongoing development of the VAST course has been the principal project of the Dalhousie anaesthesia global health fellow (AM), supported by co-authors (CM, PL) who have had extensive experience in simulation and NTS training in low-resource settings.¹⁵⁻¹⁷ Input was sought from colleagues at the Scottish Centre for Simulation and Clinical Human Factors (SCSCHF). Simulation principles advocated by the SCSCHF are embedded in the VAST course scenario design and an adapted model of its debriefing framework is a pillar of the VAST facilitator course. A Dalhousie University-based nurse (Michelle Murray RN, Skills Centre Coordinator, Skills Centre for Health Sciences, Halifax, NS, Canada) provided insight into scenario mechanics, logistics and equipment.

The authors wanted content to accurately reflect practice in low-resource settings. Early in development, a course overview and sample scenarios were disseminated widely through the networks of the CASIEF and Dalhousie University's anaesthesia global health unit. This informal 'steering committee' comprised experts in the field of global health and simulation training from a broad range

of high- and low-resource countries. Feedback from the informal steering committee was invaluable in eventual course design and content. The World Federation of Societies of Anaesthesiologists (WFSA) was also engaged during this consultation period, advising on how to maximise VAST's utility alongside existing educational programmes. A preliminary set of scenarios was developed. Pre-pilot testing, first with Canadian and then with Rwandan anaesthesia residents, allowed for iterative refinement of materials and the VAST course's simulation methodology. The University of Rwanda, the Rwanda Society of Anaesthesia and the WFSA were approached for accreditation and endorsement of the VAST course prior to its pilot.

CONTENT

To achieve a balance between breadth of content and feasibility of delivery, the VAST course is limited to 3 days. The caseload, available resources and required clinical performance aim were designed to reflect practice in a district hospital in a low-resource setting. The predominant learning methodology is simulation and, over the course, 15 simulation scenarios and debriefings are conducted. Content includes anaesthesia and resuscitation for obstetrics, paediatrics and trauma as well as safe general surgery and pre- and postoperative care. Targeted case-based discussions and skills stations further explore NTSs, trauma primary survey, difficult airway management, neonatal resuscitation, pain management and complex decision making. Table 1 provides a course overview.

A number of well-established programmes are directed at enhancing core clinical knowledge [i.e. Safer Anaesthesia from Education (SAFE) course, Essential Pain Management, Primary Trauma Course, Helping Babies Breathe]. From the outset, it was the intention for the VAST course to complement these courses. With permission, core resources from these programmes are referenced throughout the VAST course, reinforcing consistent clinical frameworks. Establishment of an immersive simulation environment and a strong emphasis on NTSs is central to the VAST course's value as a parallel training opportunity. All scenarios are followed by debriefing, which involves participant reflection and generation of learning points applicable in the workplace. Participants can deploy deliberate practice – the focused repetitive performance of a cognitive or psychomotor skill

Table 1. Course overview

Day 1	Day 2	Day 3
Introduction to simulation	Obstetric case-based discussion	Paediatric case-based discussion
Facilitator-led scenario ^a	Obstetric preoperative assessment ^a	Paediatric preoperative assessment ^a
Clinical frameworks	Caesarean section (C-section) under spinal anaesthesia ^a	Paediatric laryngospasm ^a
Non-technical skills	General anaesthesia for C-section ^a	Trauma primary survey ^b
Emergency surgery preoperative assessment ^a	Intrapartum haemorrhage ^a	Trauma – paediatric ^a
Pre-anaesthesia preparation ^a	Post-partum haemorrhage ^a	Trauma – adult ^a
Unanticipated difficult intubation ^b	Postoperative sepsis ^a	Trauma – adult reassessment ^a
Rapid sequence induction ^a	Morning handover in recovery ^a	No easy answers
Pain case-based discussion		Commitment to change
Neonatal resuscitation ^b		

^aSimulation scenario; ^bskill station.

– promoting a meaningful exploration and accelerated acquisition of NTSs.¹⁸ Learning is summarised daily through group reflection and the course concludes with a commitment to change workshop.

DESIGN PRINCIPLES

The design of the VAST course seeks to maximise learning and simultaneously promote practical delivery in low-resource settings. Design principles include:

- *Preparation.* A fundamental level of clinical knowledge and skills is required for participants to meaningfully engage in simulation. Participants are sent pre-course preparatory reading materials and guiding questions to help ensure a common understanding of core clinical concepts. During the course, key information is reviewed in case-based discussions and skills stations prior to application in simulation. This allows for greater emphasis during debriefing on behaviours and use of NTSs rather than knowledge gaps. Participants are prepared for simulation through an orientation session that includes principles of simulation, personal safety and use of scenario equipment. Time is given for orientation to the layout of equipment and for practice of basic anaesthesia skills in the simulated environment. Following orientation, participants observe a short demonstration scenario, with role-play by course facilitators. This preparation phase is designed to create a non-judgemental, supportive learning environment and optimise capacity for performance in scenarios.
- *Low cost.* A vivid immersive simulation environment is created with simple props, representative documentation and low-cost technology. The VAST course utilises SimMon software on paired iPads, available at <http://castleandersen.dk/apps/simmon/>. SimMon pairs any two iOS (Apple Inc., Cupertino, CA, USA) devices over Bluetooth to create a simple remotely controlled patient monitor. The facilitator can adjust variables such as oxygen saturation, blood pressure and electrocardiogram on one device, with participants seeing parameter changes on the other, which functions as a patient monitor. Visual and audible cues help to develop realism within a scenario. For example, patient desaturation is associated with a tone change of the pulse oximeter. SimMon is an affordable and intuitive tool that requires only a short period of practice prior to use. Other simulation equipment is simple and robust; basic airway manikins are used in scenarios when airway intervention is required. When airway management is not required, participants role-play as patients and follow pre-scripted instructions. Appendix 1 details the equipment required to conduct a VAST course.
- *Reproducible.* The VAST course aims to be an ‘off-the-shelf’ product. Detailed simulation materials outline predetermined learning objectives, allowing the facilitator to focus on simulation delivery and debriefing. Each simulation scenario is formatted in a consistent fashion including an overview, set-up instructions, briefing guidelines, a copy of participant briefing cards and a scenario run sheet with facilitator notes. The debriefing page includes the debriefing framework as practised in the VAST facilitator course, the scenario’s predetermined learning objectives mapped to ANTS elements and space for note taking. Facilitators are encouraged to record specific actions or behaviours observed during the scenario on a Post-it® note and then use these observations to trigger enquiry and discussion in the debriefing. Appendix 2 provides example scenarios from the course. Additionally, there are extensive course resource materials such as a course manual, presentations with presenter notes, registration and evaluation templates, equipment checklists and participant handbooks.
- *Key themes.* Although the clinical focus changes between scenarios, consistent attention is drawn to the role of NTSs. A systematic approach to core clinical practices such as handover, history taking, examination, pre-anaesthesia preparation and crisis management is reinforced across scenarios. This is supported through printed participant resources, posters and debriefing. The authors have also developed a simplified checklist for pre-anaesthesia preparation and early steps in crisis management. This aide-memoire is incorporated into VAST ID badges and its use is encouraged throughout the course (Figure 1).
- *Immersive.* Psychological fidelity is promoted by creating a simulated environment that reflects clinical practice. Participants wear theatre scrubs and are encouraged to behave as they normally would during clinical work. All scenarios have accompanying documentation with valuable clinical information (i.e. observation charts, anaesthetic charts, consent forms, imaging). Pathology is created through simple moulage and printed photos attached to either manikins or patient actors.
- *Inter-professional.* Dedicated roles are developed for non-anaesthesia participants in the course. Many scenarios, such as trauma and perioperative resuscitation, can accommodate non-anaesthesia providers as the ‘lead participant’. Further, there are active roles for nurses, students, patients and relatives during scenarios. This promotes exploration of a diverse set of themes such as hierarchy, conflict management, consent, complaint resolution and burnout.
- *Scalable.* To provide an appropriate clinical challenge for participants of varied experience, scenarios can be progressed from a ‘fundamental’ level to ‘intermediate’ and ‘advanced’ stages at the discretion of the facilitator. For each level, desired actions are indicated.
- *Accessible.* Equipment and resources are limited to what meaningfully contributes to simulation delivery. As such, the VAST course is readily transportable and can be delivered outside the confines of a dedicated simulation laboratory. This allows the course to be run in district hospitals, reducing transportation costs for participants and increasing accessibility of continuing professional development. Combined discussion sessions create a forum for participants to learn from a broad range of colleagues whereas dividing into two simulation groups maintains individuals’ engagement in scenarios.
- *Local governance.* A local course director is responsible for the selection of participants, course planning and liaison with professional bodies and relevant authorities. External support is provided as required.
- *Sustainable.* The VAST facilitator course is conducted immediately following the VAST course. The facilitator course begins

Pre-anaesthesia check

Patient

History and functional status
Exam and airway assessment
Consent

Equipment

- A** Mask, oral airway, LMA
Laryngoscope, ETT, bougie
Suction
- B** Self-inflating bag
Anaesthesia machine
O₂ (primary and secondary)
Pulse oximeter, stethoscope
- C** BP cuff, ECG
IV cannula, fluid, blood

Medications (labelled)

Routine
Emergency

Staff

Assistant
Additional help



Crisis management

Recognise the crisis

Confirm reading, check equipment

Inform team and call for help

Manage A / B / C

- A** Open airway
Secure with an ETT if required
- B** Support breathing
Give 100% O₂
- C** Assess circulation (HR, BP)
IV access, fluids, blood loss

Find the cause

Avoid fixation error
Ask team for input

Give specific treatment

Reassess

Post-crisis care

Refer if required



training programme, in a low-resource setting. Some revision of course materials will occur, particularly to strengthen the focus on NTSs, improve interactivity in the discussion sessions and expand the scope of facilitator training. Participants expressed a desire for more supporting resources. In the future, this will be addressed through the development of the VAST course website (<http://vastcourse.org>) and review of hard and soft copy materials provided. To simplify delivery and test course mechanics, the pilot courses included only anaesthesia providers. However, the VAST course is designed to accommodate inter-professional participants. Future courses should endeavour to include participants outside anaesthesia, that is, nursing, surgical and medical colleagues. This will ultimately establish a richer and more dynamic learning experience. The VAST facilitator course will be expanded to a 2-day programme. In addition to increasing the opportunity for practice in components of facilitation, trainee facilitators will be tasked with the design and delivery of their own simulation scenarios. This exercise helps build confidence with the internal workings of simulation.

FUTURE DIRECTIONS

After the success of the pilot courses, there is enthusiasm for ongoing delivery of the VAST course in Rwanda. Future delivery will incorporate Rwandan anaesthesia providers who have completed the VAST facilitator course, supported by international facilitators. In addition, planning for broader dissemination of the VAST course is in progress, with the ongoing support of the CASIEF and WFSA. Courses will now aim to have an inter-professional participant group, with each simulation group ideally comprising three or four anaesthesia providers, two nurses and one or two doctors (surgeons or medical officers) from a non-anaesthesia background. A longitudinal study is also underway, formally evaluating the impact of the VAST course on the development and retention of participants' NTS. Additionally, Dalhousie University and the University of Rwanda are extrapolating the VAST course into a 'very VAST' simulation curriculum for first year anaesthesia trainees in Rwanda. Ongoing collaboration and affiliation is being sought with the CASIEF and WFSA to bolster delivery of the VAST course in Rwanda and to consider if the VAST course has a role in other low-resource settings. Although the current materials are in English, translation to other languages is planned.

CONCLUSION

Simulation-based education offers a dynamic and safe forum for practical application of knowledge and skills. In debriefing, there is opportunity to reflect on performance and contemplate meaningful learning outcomes. The successful piloting of the VAST course reinforces the feasibility of offering simulation-based learning outside the simulation laboratory. The next important step is to evaluate programme efficacy for developing NTS. The VAST course holds potential as an exciting vehicle for widespread application of simulation-based education in low-resource settings.

Figure 1. VAST course aide-memoire. The VAST course aide-memoire is printed as a double-sided, 5 × 8.5cm plastic card. The aide-memoire is looped on a ring-pull ID clip that is given to all participants. This ID clip is worn throughout the course and its use encouraged when appropriate. BP, blood pressure; ECG, electrocardiogram; ETT, endotracheal tube; HR, heart rate; IV, intravenous; LMA, laryngeal mask airway.

with an exploration of the theoretical principles of simulation methodology. Trainee facilitators are then familiarised with the practical aspects of the VAST course including equipment, technology and the mechanics of conducting simulated scenarios. Over time, trainee facilitators are mentored towards independent facilitation on subsequent courses. The goal of facilitator training is to develop a local network of simulation leaders both for teaching the VAST course and more broadly to promote simulation-based education.

COURSE PILOT IN RWANDA – JANUARY 2018

The VAST course was piloted three times over 3 consecutive weeks in January 2018 in Kigali, Rwanda. In total, 40 participants completed the VAST course and 12 completed the VAST facilitator course. The pilot courses represented the first time that the VAST course had been conducted in its entirety. This created an opportunity to test feasibility and gather information on the logistics of running a 3-day simulation programme on a modest budget in a low-resource setting. In reviewing course feedback, participants appreciated the simulation format and case mix. They were consistently positive about interactivity, the supportive learning environment, course organisation, central themes and time management. There was a strong desire to see the course disseminated throughout Rwanda and that it be offered to other health professionals.

LESSONS LEARNT

The key outcome from the pilot was demonstrated feasibility of conducting the VAST course, a low-cost immersive simulation

APPENDIX 1: VAST COURSE EQUIPMENT LIST

The equipment list in Table 2 is for **one simulation group**:

- Parallel simulation groups can be run in order to accommodate more participants.

- Other than the laptop and projector, personnel and equipment will need to be multiplied by the number of parallel simulation groups.

Table 2. VAST course equipment list

Category	Detail
Personnel	Simulation group size should be limited to seven participants: <ul style="list-style-type: none"> • two facilitators are required for each simulation group In addition to the facilitators, a simulation coordinator is recommended. Responsibilities include: <ul style="list-style-type: none"> • set-up and changeover between scenarios • checking equipment completeness and function This role can be conducted by an additional facilitator or a simulation technician
General	Laptop Projector and cable for laptop Whiteboard or large paper for debriefing Markers USB loaded with course materials and presentations Printed materials: <ul style="list-style-type: none"> • VAST course manual • VAST course scenario documentation • VAST facilitator course manual • VAST course handbooks (for participants) • VAST facilitator course handbooks (for trainee facilitators) • supplementary resources: <ul style="list-style-type: none"> – equipment checklist – scenario documentation inventory – participant registration template – course timetable – evaluation forms – course certificates Wall posters: <ul style="list-style-type: none"> • SBAR for handover • AMPLE for history • A to E for examination • ANTS framework • WHO Surgical Safety Checklist Blu Tack or tape for hanging posters Post-it® notepad (4 × 6 inches) Masking tape
Manikins	Adult intubation trainer Paediatric intubation trainer (age ≈ 3 years) NeoNatalie
Monitors	SimMon app loaded on two devices (iPad + iPad or iPad + iPhone) (https://itunes.apple.com/ca/app/simmon/id364731597?mt=8)

Table 2. VAST course equipment list continued

Category	Detail
Simulation set-up	<p>Organise equipment into four boxes:</p> <ul style="list-style-type: none"> • boxes 1, 2 and 3 are for use during all scenarios • boxes 1, 2 and 3 should be located near the anaesthetic workstation • box 4 contains extra equipment that is required only for certain scenarios <p>Box 1 – airway equipment:</p> <ul style="list-style-type: none"> • oral airway (3, 4, 5), nasal airway • Yankauer sucker, laryngoscope, laryngoscope blade (Mac 3) • ETT size 4, 5, 6, 7, 8, bougie, stylet • LMA (size 3 – ideally second generation) • tie, 20-ml syringe <p>Box 2 – breathing equipment:</p> <ul style="list-style-type: none"> • self-inflating bag (adult, paediatric, neonate) • Mapleson F circuit (Ayles T-piece) • mask (adult, paediatric, neonate) • nasal prongs, O₂ mask • pulse oximeter probe (does not need to function) <p>Box 3 – circulation equipment and medications:</p> <ul style="list-style-type: none"> • IV cannulae (14, 16, 18, 20, 22G) • IV fluids, tubing • tourniquet, tape • blood pressure cuff, stethoscope, ECG leads • labelled empty syringes – ketamine, thiopentone, propofol, succinylcholine, rocuronium, morphine, fentanyl, midazolam, adrenaline, atropine, ephedrine, ondansetron, antibiotic, oxytocin, ergometrine, carboprost, labetalol, hydralazine, MgSO₄, lignocaine, tetanus immunisation • labelled empty tablet containers – misoprostol, nifedipine, methyldopa <p>Box 4 – extra equipment:</p> <ul style="list-style-type: none"> • surgical drape and clips × 2 • surgical gown × 2, gloves, hats • pre-cut shirt and pants, reassembled with Velcro® • sheets for gravid uterus • wedge or sheets for lateral tilt • 'blood'-soaked pads (see VAST course manual for instructions on how to make fake blood) • clean dressings for paediatric burns • neonatal resuscitation equipment: <ul style="list-style-type: none"> – neonatal self-inflating bag, neonatal mask – suction (bulb or suction device) – cord clamp or tie – scissors – towel <p>Additional large equipment required:</p> <ul style="list-style-type: none"> • stretcher or operating room table • pillow × 2 • sheet × 2 • small table × 2 (for surgical and anaesthesia equipment) • IV pole × 2

AMPLE, Allergies, Medications, Past medical history, Last ate, Events; ECG, electrocardiogram; ETT, endotracheal tube; IV, intravenous; LMA, laryngeal mask airway; SBAR, Situation, Background, Assessment, Recommendation; WHO, World Health Organization.

APPENDIX 2: EXAMPLE SCENARIOS

2.3 – SCENARIO

- C-section under spinal anaesthesia

Learning objectives

Identify the need for left uterine displacement during C-section under spinal anaesthesia

Recognise and treat post-spinal hypotension

Consider the differential diagnosis and management for persistent hypotension post-spinal

Scenario summary

Grace is a 21-year-old G1P0 who is in the operating theatre and has just been given spinal anaesthesia for urgent C-section. She has been in labour for 18hrs, is 5cm dilated with poor progression, signs of foetal distress and the surgeons are concerned regarding cephalopelvic disproportion. The co-facilitator is an anaesthesia provider, wanting to take a quick break. The scenario starts with handover between two anaesthesia providers. Routine care post-spinal anaesthesia is required. Optional progression of the scenario to Int. *hypotension and nausea* or Adv. *persistent hypotension* stages requires management of post spinal hypotension and consideration of the differential diagnosis for persistent hypotension respectively.

SCENARIO SETUP

Location	Operating theatre
Layout	Patient on stretcher, surgical instruments on a small table
Patient	
<i>Type</i>	Human actor, wearing a patient gown
<i>Details</i>	Grace, 21-year-old female
<i>Position</i>	Sitting up, immediately post insertion of spinal
<i>Equipment on</i>	Pulse oximeter, 16G IV line with fluids, BP cuff, ECG leads
<i>Additional</i>	Patient gown, rolled blankets for gravid uterus
Other	
<i>Standard VAST equipment</i>	See VAST Course manual for standard equipment list
<i>Extra equipment</i>	Wedge / sheets for left lateral tilt Surgical equipment on tray for C-section - gowns, drape Antibiotic syringe out on equipment table
<i>Monitors</i>	2 x iPads with SimMon
<i>Documentation</i>	Prefilled pre-anaesthesia, observation, consent and intra-op charts
<i>Cut out briefing notes</i>	Anaesthesia provider (co-facilitator) Simulated patient Scrub nurse Circulating nurse Surgeons, medical students

2.3 – BRIEFING INSTRUCTIONS

Overview of roles	
<i>Lead participant</i>	Anaesthesia provider
<i>Present at start</i>	Anaesthesia provider (co-facilitator) Simulated patient Scrub nurse Circulating nurse Surgeons, medical students
<i>Additional</i>	The co-facilitator will 'leave' the scenario after handover: - Cue the co-facilitator to re-enter if called for by the lead participant or at any stage to help with crisis management following their 'break'

Prepare the scenario
<p>Isolate the lead participant outside the simulation room</p> <p>Prepare the other participants in the simulation room:</p> <ul style="list-style-type: none"> - Allocate roles and briefing cards - Allow time for reading and asking questions - Arrange participants in the scenario according to their roles <p>Provide briefings:</p> <ul style="list-style-type: none"> - In the simulation room for 'other participants' - For the lead participant after the scenario is prepared and other participants briefed

Briefing in the simulation room
<p>This is Grace, a 21-year-old female who is the operating theatre</p> <p>She is having an urgent C-section for failure to progress</p> <p>The spinal anaesthetic has just been placed</p>

Briefing for the lead participant
<p>You are an <u>anaesthesia provider</u></p> <p>You are going into the operating theatre to give a quick coffee break to one of your colleagues who has been working solidly all morning</p>

How to start the scenario
<p>Cue the lead participant to enter the operating theatre to give the colleague a break</p>

2.3 – COPY OF BRIEFING CARDS

2.3– Anaesthesia provider (co-facilitator)

You are an anaesthesia provider and are in desperate need for a coffee break. You have just placed the spinal anaesthetic and the Grace's legs are starting to feel numb. As the lead participant enters, lay Grace down flat, handover with SBAR and then leave the scenario:

S situation:

- This is Grace, a 21-year-old female, G1P0 having an emergency C-section for failure to progress with signs of foetal distress

B background:

- Grace has no allergies, takes no regular medications, has no significant past medical history
- I have just placed the spinal (2.2mls 0.5% heavy bupivacaine)
- **I have just given the antibiotics**

A assessment:

- Grace has told me her legs are numb, so I think the spinal is working well

R recommendation:

- All her documentation is here, the nurses have my number if you need me, I just desperately need to take a quick break

Extra notes:

- Wait to be cued by the facilitator before returning to the scenario

2.3 – Simulated patient

Your name is Grace. You are a 21-year-old female, G1P0 and about to have an urgent C-section:

- You have been in labour for 18hrs with failure to progress and signs of foetal distress
- You are otherwise well, have no past medical history, take no medications and have no allergies
- The spinal anaesthetic has just been placed and your legs are feeling numb

Follow this instruction **only if cued by the facilitator:**

- **One tap on your foot** – complain of having nausea and wanting to vomit
- **Two taps on your foot** – complain of feeling terrible. You now have difficulty talking and breathing, are feeling anxious and your heart is racing

2.3 – Scrub nurse

Act realistically in this role

Follow this instruction **only if cued by the facilitator:**

- **If tapped on the shoulder** – tell anaesthesia the patient has a rash on her abdomen

2.3 – Circulating nurse

Act realistically in this role

Follow this instruction **only if cued by the facilitator:**

- **If tapped on the shoulder** – comment to the anaesthesia provider, “When my sister was pregnant, she was so much more comfortable on her side...will she be ok on her back?”

2.3 – Surgeons, medical student

You should be talking near the surgical equipment:

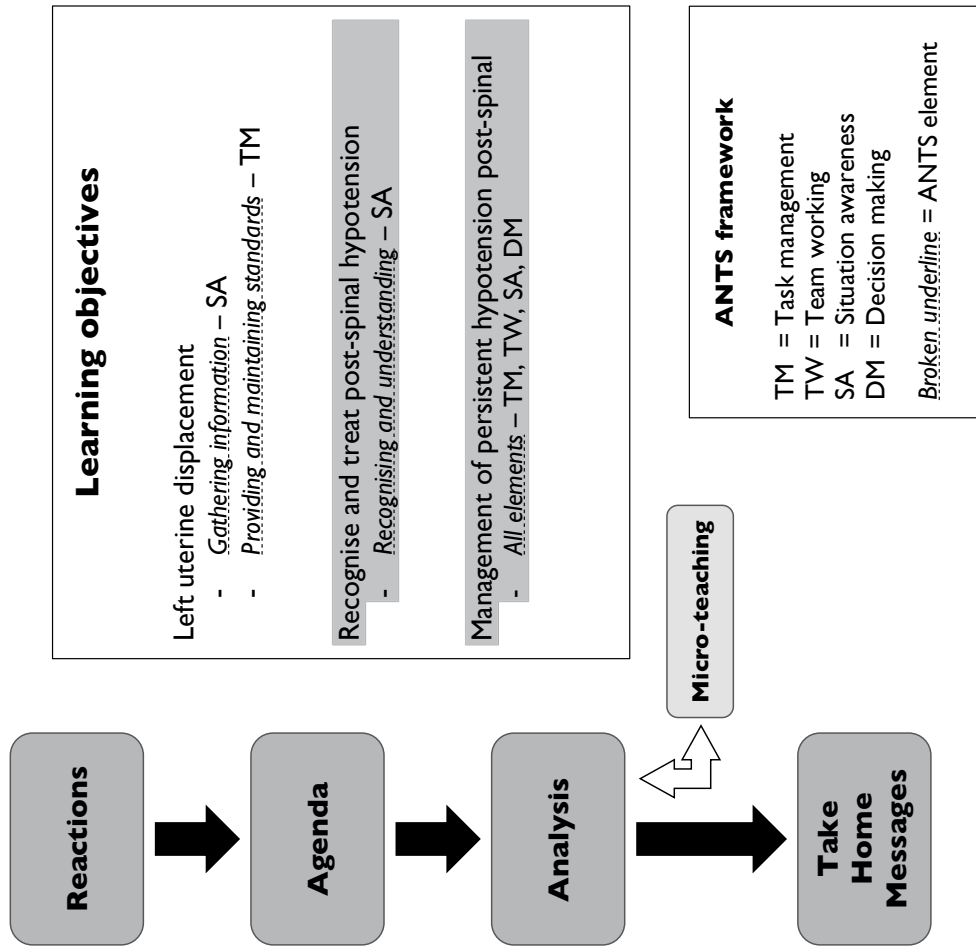
- After the patient is lying down, ask if it is ok to prep and drape
- Start the surgery and deliver the baby if time allows. The operation is going routinely

Give this information **only if asked** - there is a widespread rash over the patient's abdomen

2.3 – SCENARIO SEQUENCE (10 minutes)

Stages	Parameters	Actions	Transition triggers	Additional notes
Fund.	<p><u>Initial vitals:</u></p> <p>A. Alert RR 20, SaO₂ 99% C. HR 90, BP 100/56</p> <p><u>2nd set of vitals:</u></p> <p>A. Alert RR 24, SaO₂ 98% C. HR 98, BP 90/48</p>	<p>Receive handover Lay patient down Position with L uterine displacement Scan monitoring and confirm readings Confirm – IV and running fluids, vasopressor available, antibiotics given Communicate with surgical team Prepare oxytocin for delivery</p>	<p>Uterine displacement or lateral tilt</p> <p><u>Prompts:</u></p> <p>1. 2nd set of vitals 2. One tap circulating nurse – “when my sister was pregnant, she was so much more comfortable on her side... will she be ok on her back?”</p>	<p><u>Post-spinal hypotension possible causes:</u></p> <ul style="list-style-type: none"> - Drug induced vasodilation / neuraxial blockade - Aorto-caval compression - High spinal - Haemorrhage or hypovolaemia - Anaphylaxis - Vasovagal - Drug overdose or toxicity - Amniotic embolism
Int.	<p>A. Alert – nauseated ++ B. RR 25, SaO₂ 97% C. HR 115, BP 82/41</p>	<p>Reassure patient Confirm sufficient uterine displacement Treat hypotension: - Fluid bolus, vasopressor Recycle BP and reassess vital signs</p>	<p>Recognise and treat hypotension</p> <p><u>Prompts:</u></p> <p>1. Change in vital signs 2. One tap patient’s foot – triggers nausea</p>	<p><u>Anaphylaxis grades:</u></p> <p>Grade I – Mild (<i>mucocutaneous signs only</i>) Grade II – Moderate (<i>multi-organ manifestations</i>) Grade III – Life-threatening (<i>severe hypotension or high airway pressure</i>) Grade IV – Cardiac arrest</p>
Adv.	<p>Patient looks awful, sweaty</p> <p>A. Hoarse voice Difficulty talking RR 30, SaO₂ 86% Difficulty breathing Diffuse wheeze</p> <p>C. HR 135, BP 70/32 Responds to voice Extremely anxious Widespread rash</p>	<p>Recognise the crisis, call for help, allocate tasks Support A / B / C: - Assess airway - Give O₂, consider salbutamol - Fluid bolus, vasopressor, adrenaline Consider the differential diagnosis: - Check block height - Assess amount bleeding with surgeons - Assess for signs of anaphylaxis: o Diagnose and treat anaphylaxis Communicate with the team: - Expedite the surgery - Plan for ongoing management of the patient</p>	<p>Consider the differential diagnosis for hypotension</p> <p><u>Prompts:</u></p> <p>1. Two taps patient’s foot – triggers breathing difficulty 2. One tap scrub nurse – comments on the widespread rash 3. Cue original anaesthesia provider to return from break and ask what is happening</p>	<p><u>Adrenaline (epinephrine) dosing in anaphylaxis:</u></p> <ul style="list-style-type: none"> - Initial dose: <ul style="list-style-type: none"> o Grade II – 20mcg IV or 500mcg IM o Grade III – 100mcg IV or 500mcg IM o Grade IV – 1mg IV - Consider IM if no IV access or no monitoring - Repeat adrenaline after 1-2 minutes if needed - Increase dose if no clinical improvement - Prepare an adrenaline infusion, titrate to effect <p><u>Anaphylaxis guideline</u> – www.anzaag.com</p>
End	<p>A. Alert B. RR 22, SaO₂ 96% C. HR 90, BP 110/56</p>	<p>End the scenario when expected actions performed or 10 minutes has elapsed</p>		

2.3 – DEBRIEFING (25 minutes)



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3.6 – SCENARIO

- Trauma – motorbike accident

Learning objectives
Prepare for the arrival of a trauma patient
Co-ordinate the completion of a primary survey
Institute immediate management for a compound fracture

Scenario summary
This scenario is set in the emergency department. Eric, a 27-year-old male motorbike driver has been hit on his R side by a car travelling at low speed. He has extensive rib bruising and an open R femur #. The scenario starts without a patient present. Participants are required to prepare for the ambulance arrival. The ambulance officer (co-facilitator) enters and provides handover. Coordination of primary survey and # management must be completed.

SCENARIO SETUP

Location	Emergency department
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Layout	Patient on a stretcher: - Note – the scenario starts without a patient <i>(Either cover the patient with a sheet, to have them ‘outside’ the scenario or if the stretcher is on wheels, have it outside the room to be wheeled in)</i>
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Patient	
Type	Human actor
Details	Eric, 27-year-old male
Position	Supine on stretcher
Equipment on	C-spine collar, pre-cut shirt and pants closed with Velcro
Additional	Photos of R chest injury, open R femur # under clothes Fake blood on pants

Other	
Standard VAST equipment	See VAST Course manual for standard equipment list
Extra equipment	C-spine collar, photos of chest and leg injuries Pre-cut shirt and pants closed with Velcro Sheet to cover patient at start of scenario Fake blood
Monitors	2 x iPads with SimMon
Documentation	Blank observation, blank pre-anaesthesia chart
Cut out briefing notes	Ambulance officer (co-facilitator) Simulated patient Nurse - A Nurse - B Radiographer

3.6 – BRIEFING INSTRUCTIONS

Overview of roles	
<i>Lead participants</i>	Team approach, consisting of: <ul style="list-style-type: none"> - Nurse - A - Nurse - B - Anaesthesia provider - Surgeon - Medical officer - Radiographer
<i>Present at start</i>	All team members: <ul style="list-style-type: none"> - The ambulance officer (co-facilitator) and patient are initially 'outside' the scenario. Cue them to enter after the first transition trigger.
<i>Additional</i>	None available

Prepare the scenario
<p>Isolate the patient and ambulance officer (co-facilitator) 'outside' the scenario:</p> <ul style="list-style-type: none"> - Allocate them their briefing cards, allow time for reading and asking questions - Achieve this by either covering the patient with a sheet or if the stretcher has wheels, the co-facilitator can wheel the patient in during the scenario <p>Prepare all participants in the simulation room:</p> <ul style="list-style-type: none"> - Inform them to ignore the patient covered by a sheet - Allocate roles and briefing cards - Allow time for reading and asking questions - Confirm participants <p>Provide briefing:</p> <ul style="list-style-type: none"> - In the simulation room for all participants

Team briefing in the simulation room
<p>You have been attending a farewell morning tea for a senior emergency department nurse who is retiring:</p> <ul style="list-style-type: none"> - One of your colleagues received a phone call about a serious car versus motorbike accident near the hospital - The patient is being brought to the hospital by ambulance and will arrive very soon - As a team, you need to go to the resuscitation bay to prepare for the patient's arrival

How to start the scenario
<p>You are about to enter the emergency department resuscitation bay:</p> <ul style="list-style-type: none"> - When you enter, you will have a short amount of time to get ready for the patient's arrival <p><i>(Note - If the patient is in the simulation room covered by a sheet, inform the participants to ignore anything in the room that is covered by a sheet)</i></p>

3.6 – COPY OF BRIEFING CARDS

3.6 – Ambulance officer (co-facilitator)

You and the patient are initially 'outside' the scenario. When cued to enter the scenario, either wheel the patient into the room or remove the sheet covering the patient.

Handover using SBAR:

S situation:

- 27-year-old male, motorbike driver hit by a car. Car travelling at low speed
- The accident occurred near the hospital, around 10 minutes ago

B background:

- No significant allergies, medications, past medical history

A assessment:

- He is in pain. We were so close, so I brought him here without delay for treatment

R recommendation:

- Can you take over his care?

Prompts:

1. **One tap** – you will be cued to give this prompt if there is not a clear team leader. Ask the team “Who is in charge of the patient? I need to leave my paperwork with someone.”
2. **Two taps** – tell the lead participant “I wanted to give antibiotics for his leg, but I didn't have time to get IV access”

3.6 – Simulated patient

Your name is Eric, A 27-year-old male. You have no significant past medical history, take no medications and have no allergies. You last ate 2 hours ago (rice, beans and vegetables). You were riding your motorbike and were hit on the R side by a car. You were wearing a helmet and did not lose consciousness. You have severe pain in your R chest and R leg.

Follow this instruction **only if cued by the facilitator:**

- **If tapped once on the foot** – complain, “Arrrrggghhhh...my leg hurts so much. Please help me.”

3.6 – Nurse A

You are an experienced and capable nurse. Act realistically in this role

Follow this instruction **only if cued by the facilitator:**

- **If tapped once on the shoulder** – ask the anaesthesia provider “Should I prepare a fluid line for the patient?”

3.6 – Nurse B

You are an experienced and capable nurse. Act realistically in this role

Follow this instruction **only if cued by the facilitator:**

- **If tapped once on the shoulder** – ask loudly “Please can just one person give me instructions? It is very difficult to work with so many people making decisions!”

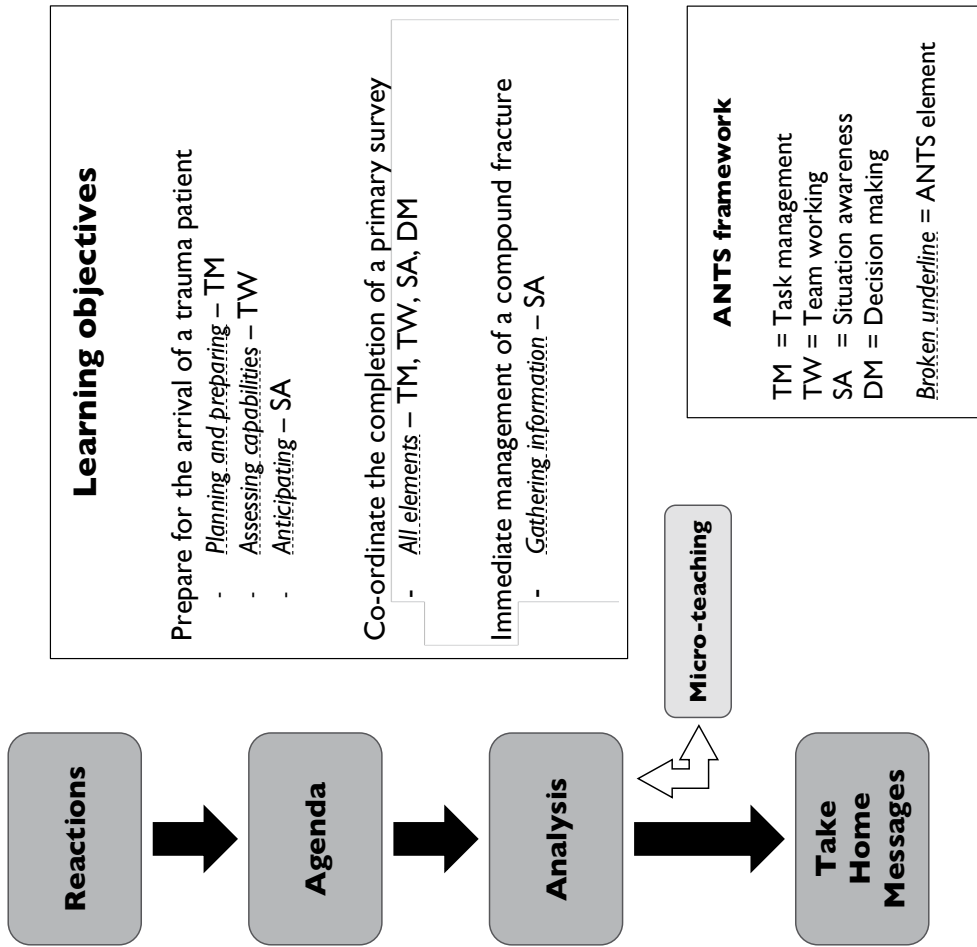
3.6 – Radiographer

You are a radiographer. Simulate conducting X-rays if requested by the team

3.6 – SCENARIO SEQUENCE (10 minutes)

Stages	Parameters	Actions	Transition trigger	Additional notes
Fund.	No patient	<p>Introductions amongst staff Identify roles and capabilities Pre-allocate tasks Prepare equipment and medications Don personal protective equipment: - Gloves, eye wear, gowns</p>	<p>Prepare medications or equipment prior to patient arrival</p> <p><i>Prompts:</i> 1. Briefing to participants 2. One tap nurse A – “Should I prepare a fluid line for the patient?”</p>	
Fund.	<p>A. Alert and in pain ++ B. RR 28, SaO₂ 96% R sided chest bruising Equal breath sounds C. HR 100, BPI00/56 Capillary refill 2 seconds Skin slightly cool D. AVPU - A, pupils equal Moving all 4 limbs E. Open right femur # Temperature 36.1°C Blood sugar 4.5mmol/L</p>	<p>Receive handover Conduct primary survey: - Prioritise A-E assessment - Recognise and treat life threats Co-ordinate activities: - Identify a team leader - Use closed loop communication - Use a systematic approach - Share information Documentation Communicate with patient Maintain patient dignity</p>	<p>Identify a team leader to co-ordinate the primary survey</p> <p><i>Prompts:</i> 1. One tap co-facilitator – “Who is in charge of the patient? I need to leave my paperwork with someone.” 2. One tap nurse B - “Please can just one person give me instructions? It is very difficult to work with so many people making decisions!”</p>	<p><u>Components of the primary survey:</u> A. Assess airway patency, give oxygen Maintain C-spine precautions B. Look, feel, listen Give oxygen, attach pulse oximeter Note rib bruising C. Assess colour, perfusion, pulse Attach BP cuff and check BP Establish IV access, blood for X-match Request a CXR D. Assess AVPU, pupils and glucose E. Expose patient - note open femur # Assess for external haemorrhage Maintain patient dignity and temperature</p>
Fund.	As above	<p>Recognise and manage an open # Begin secondary survey Plan for transfer for surgery</p>	<p>Recognise the open #</p> <p><i>Prompts:</i> 1. One tap on the patient's foot – “Arrgggh, my leg hurts so much...” 2. Two taps co-facilitator – “I wanted to give antibiotics for his leg, but I didn't have time to get IV access”</p>	<p><u>Immediate management for open #:</u> - Tetanus prophylaxis - Antibiotics - Analgesia - # reduction - Splinting and immobilisation</p>
End	As above	End the scenario when expected actions performed	End the scenario when expected actions performed	End the scenario when expected actions performed or 10 minutes have elapsed

3.6 – DEBRIEFING (25 minutes)



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DECLARATION

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