

OXYGEN FAILURE

MODULE: PATIENT SAFETY

TARGET: ALL ANAESTHETISTS

BACKGROUND:

Pipeline gas failure is a rare but possible event and is a common scenario practiced in many simulation centres. This scenario also leads to cylinder oxygen failure leading the participant to have to continue the anaesthetic using alternate strategies.

This scenario has been designed to be used as part of the Readiness for the Initial Assessment of Competency Training (RIACT) Course, but is applicable to anaesthetists of all grades with minimal modifications.

In our Simulation suite, we are able to independently shut off the pipeline gas supply from the control room, and the scenario has been designed on this basis. Due to differences between individual simulation suites, there may need to be practical modifications to this scenario in how the pipeline oxygen failure occurs. The cylinder oxygen supply failure can easily be simulated by having an empty cylinder on the back of the machine or by removing the Bodok seal.

RELEVANT AREAS OF THE ANAESTHETIC CURRICULUM

IG_BS_01	Demonstrates safe practice in checking the patient in the anaesthetic room
IG_BS_02	Demonstrates appropriate checking of equipment prior to induction, including equipment for emergency use
IG_BK_03	In respect of the equipment in the operating environment: <ul style="list-style-type: none"> • Demonstrates understanding of the function of the anaesthetic machine including <ul style="list-style-type: none"> ○ Performing proper pre-use checks ○ Changing/checking the breathing system
IG_BS_06	In respect of monitoring: <ul style="list-style-type: none"> • Manages monitors appropriately e.g. set alarms; start automatic blood pressure • Demonstrates proficiency in the Interpretation of monitors
IO_BS_07	Demonstrates role as team player and when appropriate leader in the intra-operative environment
IO_BS_08	Communicates with the theatre team in a clear unambiguous style
IO_BS_09	Able to respond in a timely and appropriate manner to events that may affect the safety of patients [e.g. hypotension, massive haemorrhage] [S]
CI_BK_02	Unexpected fall in SpO ₂ with or without cyanosis
CI_BS_01	Demonstrates good non-technical skills such as: [effective communication, team-working, leadership, decision-making and maintenance of high situation awareness]
CI_BS_02	Demonstrates the ability to recognise early a deteriorating situation by careful monitoring
CI_BS_05	Demonstrates ability to recognise when a crisis is occurring
CI_BS_06	Demonstrates how to obtain the attention of others and obtain appropriate help when a crisis is occurring
CI_IS_01	Demonstrates leadership in resuscitation room/simulation when practicing response protocols with other healthcare professionals
CI_IS_02	Demonstrates appropriate use of team resources when practicing response protocols with other healthcare professionals

INFORMATION FOR FACULTY

LEARNING OBJECTIVES:

- Management of oxygen failure during general anaesthesia
- Understanding the importance of anaesthetic machine checks
- Recognising the practical importance of understanding the equipment used in anaesthesia and critical care

SCENE INFORMATION:

- Location: Theatre
- Expected Duration of Scenario: 20-25 mins
- Expected Duration of Debrief: 30-35 mins

EQUIPMENT & CONSUMABLES

Manikin – Male. Under general anaesthesia.
 Anaesthetic machine – Mechanism for stopping pipeline supply of gas, and Bodok seal removed from O2 cylinder on back of machine. Ensure cylinder is off.
 Spare oxygen cylinder with either a Schrader fitting (allowing continuation of anaesthesia via the anaesthetic machine) or only a standard oxygen output nozzle to allow connection of a self-inflating bag
 Stocked airway trolley
 Self-inflating bag
 Infusion/TIVA pumps
 (Simulated) Propofol for infusion ready to be drawn up into 50ml syringes
 Simulated anaesthetic drugs

PERSONS REQUIRED

Anaesthetic Junior Trainee
 Anaesthetic Assistant
 Anaesthetic Senior Trainee

PARTICIPANT BRIEFING: (TO BE READ ALOUD TO PARTICIPANT)

Mr Levi Caine is a 60 year old man who is undergoing a right total knee replacement. He has had a right femoral nerve block awake, prior to having a general anaesthetic. 30mls 0.25% bupivacaine was used in the block. He was induced with midazolam, propofol, fentanyl and a size 3 LMA was inserted. He is ventilating spontaneously. He has been haemodynamically stable since induction and has received anti-emetics and antibiotics.

He has hypertension, mild COPD and arthritis. His regular meds are amlodipine, seretide and salbutamol. There are no known allergies.

Knife to skin was about 15 minutes ago, and the anaesthetist who started the case has had to leave. Please continue the anaesthetic care for this patient.

'VOICE OF MANIKIN' BRIEFING:

Unresponsive. Under General Anaesthetic.

'IN SCENARIO PERSONNEL' BRIEFING:

ANAESTHETIC CONSULTANT

At some point there will be a pipeline oxygen supply failure. Help the anaesthetist manage this, but do not volunteer solutions unless they are obviously struggling.

Remind them of the cylinder of the back of the anaesthetic machine and, if necessary, show them how to open the valve. The lack of Bodok seal should lead to a escape of gas from the cylinder and a loud hissing noise. If they do not recognise this as a problem, tell them that this is not normal – do not tell them this is caused by a lack of (or damaged) Bodok seal.

If necessary, offer to get another oxygen cylinder from another theatre, but do not volunteer to connect this up automatically.

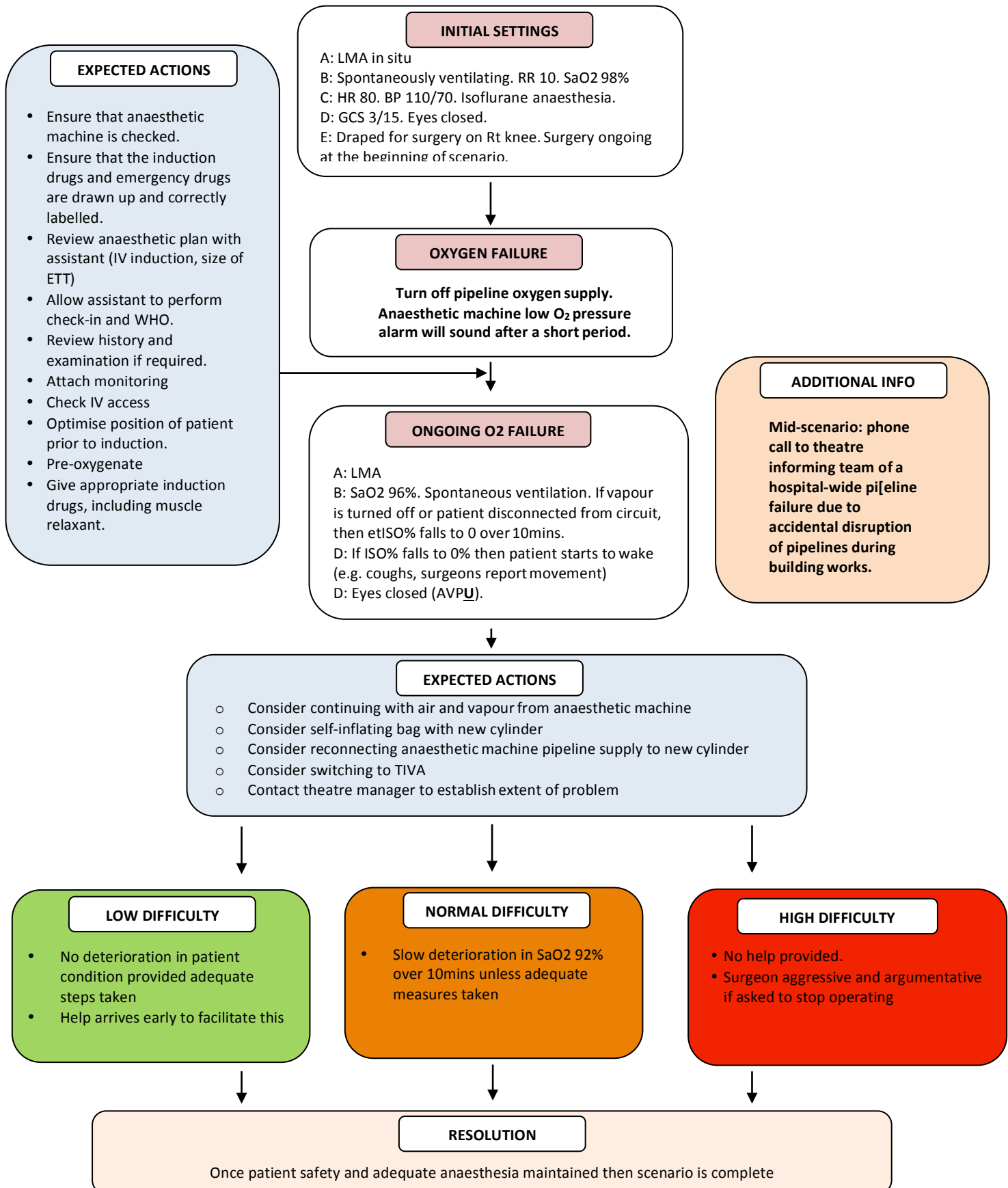
The participant may need to be reminded that the patient may need to be kept asleep – do not suggest alternatives.

SURGICAL TEAM

At some point the anaesthetist will inform you that they are having problems with oxygen supply, and that surgery should conclude as soon as possible. Be initially resistant to this as surgery is proceeding, but if pushed by the anaesthetist acknowledge that it is possible to start to close if absolutely necessary.

Has the participant explored all the options to continue the anaesthetic?

CONDUCT OF SCENARIO



ANAESTHETIC RECORD SHEET



PATIENT DETAILS / ADDRESSOGRAPH
 Hospital No. _____
 SURNAME: **Levi Caine**
 (Block Letters)
 FORENAMES: **60 years old**
 Address: _____
 Ward/Hosp: _____
 DOB: _____ Sex: M / F

Procedure(s) proposed:
RHS Total Knee Replacement
 CEPOD CLASS: ELECTIVE / SCHEDULED / URGENT / EMERGENCY

Anaesthetist's preoperative assessment by

Name: _____ Grade: Cons AS SG Trainee _____
 Date: _____ Time: _____ Signature: _____

Anaes / Surg history:
 Previous Appendicectomy

Medical history:
 Hypertension
 COPD (mild) – no hospital admission
 Arthritis

Good exercise tolerance – swims >200m weekly
 Walking limited by arthritis

VTE Risk: High Low

NBM since Solids: **2200 yesterday** Pregnancy: **Neg**
 Clear Fluids: _____ Lactation: _____

O/E
 Unremarkable

Airway Assessment
 Mouth Opening:
 MP Score: 1 2 3 4
 Jaw: **Good mouth opening**
 Neck: **Neck ROM OK**

TEETH

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

X = missing L = loose B = bridge
 C = caps / crowns D = damaged

ASA

BP: _____
 HR: _____
 Temp: _____
 Weight: _____
 Height: _____
 BMI: _____
 Smoke: _____
 Alcohol: _____
Apfel Score _____

Relevant Medication:
 Amlodipine 10mg OD
 Seretide 1 puff OD
 Salbutamol INH PRN

ALLERGIES
 NKDA

Investigations

<input type="checkbox"/> Haematology FBC Hb 12.8 Plt 311 Sickle: _____	<input type="checkbox"/> Biochemistry U & E NAD Blood Sugar: _____	<input type="checkbox"/> Coag. NAD <input type="checkbox"/> Gp. & Save <input type="checkbox"/> X - Match
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<input type="checkbox"/> ECG NAD <input type="checkbox"/> X - Ray	Other: _____
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CONSENT: GA Sedation Epidural Spinal Regional Suppository
 PCA EPCA Other

Notes / Discussion / Technique proposed:

Consented for GA with LMA.
 Risks explained and consented

Anaesthetic Information leaflet received by patient

For attention of ward staff: (further investigations, fasting, continue/omit current medication, etc.)

DEBRIEFING

POINTS FOR FURTHER DISCUSSION:

- Management of oxygen failure during general anaesthesia
- Understanding the importance of anaesthetic machine checks
- Recognising the practical importance of understanding the equipment used in anaesthesia and critical care

DEBRIEFING RESOURCES

1. Weller J, Merry A, Warman G, Robinson B. Anaesthetists' management of oxygen pipeline failure: room for improvement. *Anaesthesia* 2007, 62: 122-126
<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2044.2006.04899.x/full>
2. Lorraway PG, Savoldelli GL, Joo HS *et al.* Management of Simulated Oxygen Supply Failure: Is there a Gap in the Curriculum? *Anaesthesia & Analgesia* 2006, 102: 865-867
<http://www.anesthesia-analgesia.org/content/102/3/865.full>
3. J. Johner, G. Rise: Loss of Pipeline Oxygen Supply. *The Internet Journal of Anesthesiology*. 2008 Volume 16 Number 2. DOI: 10.5580/b
<http://www.ispub.com/journal/the-internet-journal-of-anesthesiology/volume-16-number-2/loss-of-pipeline-oxygen-supply.html>

INFORMATION FOR PARTICIPANTS

KEY POINTS:

- Management of oxygen failure during general anaesthesia
- Understanding the importance of anaesthetic machine checks
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PARTICIPANT REFLECTION:

What have you learnt from this experience? (Please try to list 3 things)

How will your practice now change?

What other actions will you now take to meet any identified learning needs?

PARTICIPANT FEEDBACK

Date of training session:.....

Profession and grade:.....

What role(s) did you play in the scenario? (Please tick)

Primary/Initial Participant	
Secondary Participant (e.g. 'Call for Help' responder)	
Other health care professional (e.g. nurse/ODP)	
Other role (please specify):	
Observer	

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
I found this scenario useful					
I understand more about the scenario subject					
I have more confidence to deal with this scenario					
The material covered was relevant to me					

Please write down one thing you have learned today, and that you will use in your clinical practice.

How could this scenario be improved for future participants?
 (This is especially important if you have ticked anything in the disagree/strongly disagree box)

FACULTY DEBRIEF – TO BE COMPLETED BY FACULTY TEAM

What went particularly well during this scenario?

What did not go well, or as well as planned?

Why didn't it go well?

How could the scenario be improved for future participants?