

# ARRHYTHMIAS 2° TO HYPERKALAEMIA

MODULE: CRITICAL INCIDENTS

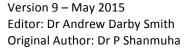
TARGET: ANAESTHETISTS, INTENSIVISTS, EMERGENCY, ACUTE PHYSICIANS

#### **BACKGROUND:**

Management of arrhythmias according to up to date guidelines is a learning objective in the 2010 Anaesthetic Curriculum. Safe defibrillation practice is an essential skill for doctors caring for acutely ill patients. This scenario also allows discussion of hyperkalaemia management, a life-threatening electrolyte abnormality.

## RELEVANT AREAS OF THE ANAESTHETIC CURRICULUM

In respect of intravenous induction:  • Makes necessary explanation to patient  • Demonstrates satisfactory preparation of drugs for induction of anaesthesia  • Demonstrates proper technique in injecting drugs for induction of anaesthesia  • Manages the cardiovascular and respiratory changes associated with induction of general anaesthesia  RC_BS_07 Monitor cardiac rhythm using defibrillator pads, paddle or ECG leads  RC_BS_08 Uses a manual or automated defibrillator to safely defibrillate patient  Arrhythmias:  • ST Segment changes  • Sudden tachyarrythmias  • Broad complex tachycardia  • Ventricular fibrillation  CI_BS_01  CI_BS_01  Demonstrates good non-technical skills such as: [effective communication, team-working, leadership, decision-making and maintenance of situation awareness].  CI_BS_02  Demonstrates the ability to recognise early a deteriorating situation by careful monitoring  CI_BS_03  Demonstrates the ability to recognise early a deteriorating situation by careful monitoring  CI_BS_04  Shows how to initiate management of each incident listed above  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  Adopts a structured and timely approach to the recognition, assessment and stabilisation of the acutely ill patient with disordered physiology  3.1  Manages the care of the critically ill patient with specific acute medical conditions  4.8  Recognises and manages electrolyte, glucose and acid-base disturbances  5.2  Performs emergency airway management  CT_IS_07  Demonstrates the ability to provide anaesthesia for procedures in cardiac intensive care including re-sternotomy, re-intubation, tracheostomy and cardioversion  Demonstrates placedership in resuscitation room/simulation when practicing response protocols with other healthcare professionals  Demonstrates appropriate use of team resources when practicing response protocols with other healthcare professionals			
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## **INFORMATION FOR FACULTY**

## **LEARNING OBJECTIVES:**

- Management of broad complex tachycardia according to Resus Council guidelines
- · Providing anaesthesia during the practical management of broad complex tachycardia
- Medical management of hyperkalaemia

#### SCENE INFORMATION:

Location: Resus

Expected Duration: 20 minsExpected Debriefing: 35-40 mins

This scenario takes place in ED resus. It can form the basis of a joint training scenario for foundation, ED, ICU, anaesthetic or ACCS trainees. The initial patient assessment could be performed by a Foundation or ED trainee, who would be expected to call for anaesthetic or ICU support to perform emergency DC cardioversion.

## **EQUIPMENT & CONSUMABLES**

PERSONS REQUIRED

Manikin – On resus trolley. Stocked Airway trolley

- Laryngoscopes (2 x Macintosh)
- ET Tubes (Various Sizes)
- OP, NP and Advanced Supraglottic airways (iGels, LMAs)

Simulated Anaesthetic drugs

Defibrillator trolley and working defibrillator

Anaesthetic/ICU Trainee Resus nurse Anaesthetic Senior Trainee ED Trainee (Optional)





## PARTICIPANT BRIEFING: (TO BE READ ALOUD TO PARTICIPANT)

#### Foundation/ED/ACCS Trainee:

• This patient has been brought in by ambulance with an extreme tachycardia. The patient is in ED Resus. Please perform the initial assessment of the patient and proceed as you feel appropriate.

#### Anaesthetic Trainee:

• You are the on-call anaesthetic/ITU SHO. You have been called to see a patient in ED Resus.

#### 'VOICE OF MANIKIN' BRIEFING:

You are breathless and find it difficult to speak in full sentences, but are able to give a history. During the acute pulmonary oedema phase of the scenario, you are unable to speak in more than single word sentences.

You are 72 years old.

You started to feel unwell earlier this evening (about 2 hours ago) when you started to feel breathless with a fluttery sensation in your chest. There was no chest pain. You took some GTN, but there was no improvement. You were starting to feel increasingly breathless at home, and decided to call the ambulance when you felt dizzy on your way to the bathroom.

You have a past medical history of a heart attack 3 years ago (treated with clot busting medications, no stents). Since then your doctor has been treating you for heart failure as you have become breathless when walking to the shops, and in recent months, when climbing up the stairs in your home.

You take aspirin, ramipril, frusemide, simvastatin and were started on spironolactone 5 days ago. No allergies.

You've never had any previous problems with general anaesthetics. You've previously had bowel cancer treated with an operation, and several sinus procedures when you were young.

#### OTHER IN-SCENARIO PERSONNEL BRIEFING:

Whoever operates the defibrillator must have been safely trained to do so.





## ADDITIONAL INFORMATION

## **RADIOMETER ABL**

ABL725 ICU 00 00 C0 08-12-2013 PATIENT REPORT Syringe - S 195uL Sample# 90396

## Identifications

Patient ID
Patient First Name
Patient Last Name
Date of Birth
Sample type

Fi O<sup>2</sup> 1.0 Department ED

Operator Emergency Dept

## **Blood Gas Values**

pH	7.34		[7.340 - 7.450]
<i>p</i> CO <sup>2</sup>	4.2	kPa	[ 4.70 - 6.00 ]
<i>p</i> O²	11.2	kPa	[ 10.0 - 13.3 ]

## Oximetry Values

<b>c</b> tHb	11.2	g/dL	[ 12.0 - 16.0]
sO <sup>2</sup>	95	%	[ 95.0 - 98.0]
<i>F</i> O²Hb		%	[ 94.0 - 99.0]
<i>FC</i> OHb		%	[ - ]
<i>F</i> HHb		%	[ - ]
<i>F</i> metHb		%	[ 0.2 - 0.6 ]
Hctc	34.1	96	

## **Electrolyte Values**

cNa+	146	mmol/L	Ε	136 - 146 ]
cK+	7.8	mmol/L	Ι	3.0 - 5.0 ]
cCa²+	1.04	mmol/L	Γ	1.15 - 1.29 ]
<i>c</i> C1−	102	mmol/L	[	98 - 106 ]

#### **Metabolite Values**

<i>α</i> Glu	6.2	mmol/L [	3.5 - 10.0]
d_ac	2.1	mmol/L [	0.5 - 1.6 ]

## Acid Base Status

 cBase(Ecf)c
 -3.8
 mmol/L

 cHCO³-(P,st)c
 21.2
 mmol/L





## CONDUCT OF SCENARIO **INTIAL SETTINGS INTIAL SETTINGS** A: Patent and self-maintained A: Patent and self-maintained B: RR 36, SpO2 94% on 15L O2 B: RR 36, SpO2 94% on 15L O2 C: HR 170 VT. BP 75/40. ECG: VT C: HR 170 VT. BP 95/70. ECG: VT D: GCS 14/15, E3V5M6 - Eyes closed D: GCS 15/15, E4V5M6 **ABG RESULTS EXPECTED ACTIONS** pH 7.34 pCO2 4.2 • Rapid Assessment of patient (Hx and Exam) & perform relevnt investigations (ABG, ECG) pO2 11.2 Recognition of hyperkalaemia on ABG BE -3.8 Rx: Slow bolus of 10ml Calcium Chloride or Calcium Gluconate Lact 2.1 Rx: Insulin & 50% Dextrose infusion Hb 11.2 Prepare for cardioversion K+ 78 Glu 6.3 **POOR INITIAL RESPONSE** A: Patent and self-maintained B: RR 36, SpO2 94% on 15L O2 C: HR 160 VT. BP 90/70. ECG: VT D: GCS 14/15, E3V5M6 - Eyes half open **NORMAL DIFFICULTY** LOW DIFFICULTY **HIGH DIFFICULTY** No improvement with medical mx No improvement with medical mx Improving ECG morphology and rate with medical mx BP remains borderline BP remains low Appropriate further Patient has fully fasted for last 8 Patient had full meal 2 hours ago. management: monitored hours. bed, stop K+ elevating drugs. **EXPECTED ACTIONS DECOMPENSATION** Appropriate sedation or anaesthetic A: Patent and self-maintained to achieve DC cardioversion B: RR 48, SpO2 84% on 15L O2. Crepitations throughout chest Appropriate airway management C: HR 160 VT (HR 180 VT - if no CaCl given). BP 60/30. ECG: VT Safe defibrillation D: GCS 12/15, E3V4M5 - Eyes closed Consider other therapies for hyperkalaemia e.g. Salbutamol **RESOLUTION**

Version 9 – May 2015 Editor: Dr Andrew Darby Smith Original Author: Dr P Shanmuha



1-2 shocks will resolve VT into sinus tachycardia. Plans for further management.



## **DEBRIEFING**

#### POINTS FOR FURTHER DISCUSSION:

#### Technical:

- ALS tachyarrhythmia algorithm
- Management of hyperkalaemia
- Options for anaesthesia for emergency DC cardioversion

## Non-technical:

- Situation awareness
- Prioritisation
- · Team-working and task management
- Leadership

#### **DEBRIEFING RESOURCES**

- 1. Resusitation Council (UK) 2010 guidelines. Adult tachycardia algorithm. http://www.resus.org.uk/pages/tachalgo.pdf
- 2. GAIN Guidelines for the treatment of hyperkalaemia in adults. Dec 2008. http://www.gain-ni.org/Publications/Guidelines/hyperkalaemia\_guidelines.pdf
- 3. M Stoneham. Anaesthesia for Cardioversion. Anaesthesia 1996, 51:565-570 http://deepblue.lib.umich.edu/bitstream/2027.42/73622/1/j.1365-2044.1996.tb12566.x.pdf





# **INFORMATION FOR PARTICIPANTS**

## **KEY POINTS:**

- Management of broad complex tachycardia according to Resus Council guidelines
- Providing anaesthesia during the practical management of broad complex tachycardia
- Medical management of hyperkalaemia

## RELEVANCE TO AREAS OF THE ANAESTHETIC CURRICULUM

	In respect of intravenous induction:	
	Makes necessary explanation to patient	
IC BC 00	<ul> <li>Demonstrates satisfactory preparation of drugs for induction of anaesthesia</li> </ul>	
IG_BS_08	<ul> <li>Demonstrates proper technique in injecting drugs for induction of anaesthesia</li> </ul>	
	<ul> <li>Manages the cardiovascular and respiratory changes associated with induction of general</li> </ul>	
	anaesthesia	
RC_BS_07	Monitor cardiac rhythm using defibrillator pads, paddle or ECG leads	
RC_BS_08	Uses a manual or automated defibrillator to safely defibrillate patient	
	Arrhythmias:	
	ST Segment changes	
CI_BK_11	Sudden tachyarrythmias	
	Broad complex tachycardia	
	Ventricular fibrillation	
CI_BS_01	Demonstrates good non-technical skills such as: [effective communication, team-working,	
CI_B3_01	leadership, decision-making and maintenance of situation awareness].	
CI_BS_02	Demonstrates the ability to recognise early a deteriorating situation by careful monitoring	
CI_BS_03	Demonstrates the ability to respond appropriately to each incident listed above	
CI_BS_04	Shows how to initiate management of each incident listed above	
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	
1.1	Adopts a structured and timely approach to the recognition, assessment and stabilisation of the	
1.1	acutely ill patient with disordered physiology	
3.1	Manages the care of the critically ill patient with specific acute medical conditions	
4.8	Recognises and manages electrolyte , glucose and acid-base disturbances	
5.2	Performs emergency airway management	
5.11	Performs defibrillation and cardioversion	
CT_IS_07	Demonstrates the ability to provide anaesthesia for procedures in cardiac intensive care including	
C1_13_07	re-sternotomy, re-intubation, tracheostomy and cardioversion	
CT_IS_01	Demonstrates leadership in resuscitation room/simulation when practicing response protocols with	
51_15_01	other healthcare professionals	
CT_IS_02	Demonstrates appropriate use of team resources when practicing response protocols with other healthcare professionals	





## WORKPLACE-BASED ASSESSMENTS

## **FURTHER RESOURCES**

- 1. Resusitation Council (UK) 2010 guidelines. Adult tachycardia algorithm. http://www.resus.org.uk/pages/tachalgo.pdf
- 2. GAIN Guidelines for the treatment of hyperkalaemia in adults. Dec 2008. http://www.gain-ni.org/Publications/Guidelines/hyperkalaemia\_guidelines.pdf
- 3. M Stoneham. Anaesthesia for Cardioversion. Anaesthesia 1996, 51:565-570 http://deepblue.lib.umich.edu/bitstream/2027.42/73622/1/j.1365-2044.1996.tb12566.x.pdf





## 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?

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PARTICIPANT FE	EDBACK	
Date of training s	session:	 
Profession and g	rade:	 
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?

