SIMulatED RDH Emergency Department - Author: RD/MDS

# Scenario Run Sheet: Hyperkalemic cardiac arrest

## Learning Objectives

**Target Group:** ED Registrars, ED Nurses, ED PCA’s

**General:** Interdisciplinary communication/allocation of roles/teamwork/leadership

**Scenario Specific:**

Ability to rapidly deploy the “Shockable rhythm” ALS algorithm in a patient with sudden cardiac arrest, including focus on immediate CPR, minimal delay to first rhythm check/defibrillation and identification of reversible causes of VF

Cohesive team approach to “charge and check” aspect of ALS algorithm

Management of hyperkalemia in cardiac arrest.

Situational awareness: consideration of ideal time to transfer patient to resus room from initial ED location (minimal interruption to ALS, ensure staff safety + patient privacy, minimise onlooker distress)

## Scenario Overview

**Brief Summary:**

72yo man presents with acute renal failure provoked by NSAID use, resulting in hyperkalemic cardiac arrest.

Team responds to in-ED alarm and uses shockable rhythm ALS algorithm to manage VF arrest, identifies hyperkalemia and institutes relevant therapies in a prioritised manner. ROSC is achieved and patient is stabilised post arrest and prepared for urgent haemodialysis in ICU. Team considers other causes of acute renal failure and cardiac arrest in the given context.

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| --- | --- | --- | --- |
| Intro Time | Scenario Time | Debrief Time | Soundbite  |
| 1 min | 20-25min | 20 mins | 10 mins |

## Observers’ Engagement Task

If you were involved how would you manage your resources at this time of night?

## Equipment Checklist

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| --- | --- |
| **Mannikin:** | SimMan 3G adult mannequin.  |
| **Monitoring:** | SimMan 3G laptop |
| **Docs and Forms**  | ED green sheet, EDNA (partially filled out by RN), ALS algorithm |
| **Other Equipment** | Resus trolley from ED floor, ETCO2 monitorUltrasoundArterial line and pressure bagQuad lumen CVC / vascathNG tube / IDC |
| **Consumables** | Normal Saline |
| **Medications** | Adrenaline 1/1000, amdiodaroneNaBic/50% dextrose/actrapid/Ca Gluconate 4 vials/salbutamol nebules/resonium |

|  |  |
| --- | --- |
| **Sim Prompts** | CXR (post intubation), 12 Lead ECG’s: hyperkalemia broad and narrow cplx, VBGsHandwritten drug list from wallet |

## Participants

**Staff:** ED RN’s x3 (first RN “partial confederate”) ED Registrars x3 (1 plays RMO

PCA x 1

**Instructor Roles:** Facilitator in room (FACEM)

**Confederates:**

Son (FACEM)

Sim switch (FACEM)

## Additional Information/Medical History

**Demographics:** 72 year old JIM lives alone independently with support from son STEVE. Wife died 20 years ago in a car accident.

**PMH: (from son and medication list)**

IHD with previous stent RCA 2010, pain free since

Aspirin 100mg

HT on ramipril 10mg od, atenolol 25mg od

Hypercholesterolaemia on atorvastatin 40mg daily

Gout: allopurinol 300mg od; prolonged exacerbation Right great toe: taking ibuprofen and panadol osteo “regularly” for about 2 weeks.

Peripheral vascular disease with previous Right fem-pop bypass 2014: reformed smoker

CKD with baseline creatinine 130

COPD on salbutamol MDI prn

Appendicectomy

NKDA

**HPC (Son STEVE):**

“Dad’s been vomiting and feeling weak for the past couple of days and had put himself to bed yesterday morning. I made him book a GP appointment for tomorrow morning. I came to see him tonight and he looked terrible but he refused to come to ED. I ended up staying the night last night but heard him vomiting. I found him in his bed looking dreadful but he refused to let me call an ambulance. I insisted on driving him to ED straightaway.”

If asked: “His gout’s been playing up for a couple of weeks and he’s been taking regular painkiller. The swelling had gone down heaps”. (Meds: reveals panadol osteo and neurofen if asked directly)

**Majors 8 RN Partial confederate (shown IMIST, EDNA with hx and meds):**

I: 72year old Jim; Normally lives alone independently. Driven in by son Trevor.

M: 48hours vomiting and lethargy, found in bed by son about 1 hour ago clammy, pale and vomiting

No chest or abdominal pain, no diarrhoea. Known IHD, HT, PVD, HT, cholesterol, COPD. Recovering from 2 weeks gout in the Right foot.

I: His initial BP was 120/70, HR 80 reg, RR 20, SaO2 95%RA, afebrile. GCS 14 E3. I have just put in a line and taken a VBG purple and 2 greens: Asks: “do you want to write a form for bloods? Do you want an antiemetic and some saline?” LEAVES ROOM TO SEND BLOODS and get meds/fluids. You will be told when to reenter the room.

## Proposed Scenario Progression

**STEM: You are the Majors night registrar. It is 3am. You have gone to RAT a 72year old man who presented 15 minutes ago as an ATS 3 with “vomiting”.**

* ED reg walks in to room to find patient connected to monitoring and is informed “Patient is actively vomiting and looks pale and weak”. The nurse has just cannulated him and is holding blood specimens and a VBG specimen. She as asks “what bloods you would like?” and says “I’m thinking we could give him something for vomiting?”
* Nurse leaves the room; ED reg commences interviewing son (patient unable to answer), who provides HPC and MHX
* Patient then suddenly becomes unresponsive (son prompts “he’s not breathing”): VF on monitor. Reg should press alarm and commence CPR. First RN and 2 other RN’s and 2 ED registrars appear.
* Delegation of resus team roles: continues CPR with BVM; immediate charge and check; delivers up to 3 synch shocks without ROSC.
* During ALS team delivers IV fluid, adrenaline and amiodarone as per ALS guideline
* Seeks 4H’s and 4T’s
* Recognises severe hyperkalemia and likely ARF on VBG, (arrives at bedside 2-3 minutes after CPR initiated.)
* Delivers Ca Gluconate 10mL bolus with ROSC at next rhythm check; considers q 15minutely rebolusing.
* During scenario team considers ideal time to relocate patient to resus room (minimising interruption to effective CPR)
* Initiates Insulin 10IU, dextrose 50mls 50%; if patient intubated considers neb salbutamol 10-20mg via T piece or gives IV loading dose 0.5mg
* Delivers post ROSC care including consideration of sedation and arterial line for close K monitoring. If CVC attempted via SVC considers risk of recurrent VF arrest if guidewire inserted into RA. Refers to medical registrar and ICU registrar for urgent CVVHDF.
* Explanation to NOK

## Scenario Preparation/Baseline Parameters

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| --- | --- | --- | --- | --- | --- |
|  | **Stage 1 (pre arrest)** | Progression Trigger | **Stage 2 (VF arrest** | Progression Trigger | **Stage 3 (ROSC)** |
| **RR** | 20 | BVM | BVM |
| **SpO2** | 95% RA | 92% 100% O2 | 92% |
| **HR/Rhythm** | 80 sinus (broad QRS + PVCs | VF | SR 70, 1st deg AVB, broad QRS |
| **BP** | 120/70 | - | 95/60 |
| **T** | 36.5 | - | - |
| **Other** |  | ETCO2 (if used) | ECG post: hyperK |
|  |  |  | Broad QRS still |

## Debriefing/Guided Reflection Overview

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| --- | --- |
| **Opening Gambit**So who’s dealt with an arrest outside of resus before?What challenges did the team face in major 8 after the patient arrested? | **Anticipated themes:**Resus role allocationsTiming of first R check (ASAP)Witnessed VF arrest 3 stacked shocks ONLY IF time to first shock <20 secs and <10 secs between shocks (analysis, charge and repeat shock); ie not likely in this case as no defib/pads in room at time of arrest.4H’s and 4T’sBlood gas specimen if arrest with no IV accessIdeal time to move to resus from other ED location (identify differences in location wrt ability to deliver patient care, support staff and remove from view of onlookers) ie WR, corridor, FT, paeds, Majors, EEMU, double bunked bed)Hierarchy of Rx for hyperkalemic arrest1. ALS
2. Ca Gluconate (not if digoxin poisoning)
3. NaBic if acidosis
4. Insulin + dextrose
5. Salbutamol
6. HD
7. Rx cause (digibind)
 |
| **Exploration with key players** |  |
| **Engaging the general group** |  |
| **Sharing facilitator’s thoughts** |  |
| **Any other questions or issues to discuss?** | Cooling after IHCA (if shockable rhythm and “remain unresponsive after VF arrest”) |
| **Summary** |  |

## The Soundbite

**1. ALS algorithm (show ANZCOR 2016 guideline)**

Charge and Check

4H’s and 4T’s

**2. Hyperkalemia:**

Ca Gluconate 10mls 10%: 2.2mmol Ca

CaCl2 10mls 10%: 6.8 mmol Ca

NaBic: incompatible with adrenaline and calcium; less evidence; consider if pH<7.20

Causes:

Reduced excretion

Intracellular release

Excessive intake

Presentation

Clinical: weakness/flaccid m paralysis, fatigue, vomiting, reduced DTR, dysrhythmia/arrest

Bedside: ECG: show changes

VBG

Initial approach:

Stabilise cardiac membrane with calcium (Chloride 3x more potent): EXPLAIN

NB Digoxin poisoning: avoid Ca;

1 Intracellular K shift: Insulin/dex, Salbutamol, NaBic (if acidotic)

2. Enhanced excretion: N saline diuresis (correct prerenal failure, increased GFR, frusemide, HD

3 Treat cause / avoid further exacerabations:

Cease nephrotoxins

Prevent Tumour lysis

Normothermia

Treat acidosis, sepsis, endocrinopathies

Avoid further intracellular release (suxamethonium in burns/crush injury, surgical control of tissue ischaemia

Other therapies

Fludrocortisone

Surgery

Cautions:

Irritable myocardium; avoid CVC guidewire contacting endocardium

References: ANZCOR 2016 guidelines, UTD, BMJ, LITFL – see powerpoint

General Feedback Prompts/Examples:

Opening Gambit:

* What did you feel were your specific challenges there?
* Let’s talk.
* Can you describe to me what was happening to the patient during that scenario?
* Can you describe to me what was going on?
* What was important to you in choosing to manage that situation?
* Can you tell me what your plan was and to what extent that went according to plan?
* That seemed to me to go smoothly, what was your impression?
* That looked pretty tough. Shall we see if we can work out together what was going on there so that you can find a way to avoid that situation in the future?

Exploration with key players

* Questions to deepen thinking
* Questions to widen conversation
* Introduce new concepts; challenge perceptions; listen and build
* So what you’re saying is…
* Can you expand on…
* Can you explain what you meant by…
* When you said…
* I noticed that you…

Engaging the general group

* Let’s check with the rest of the group how they reacted to you saying that.
* Did you [scenario participants/observers] feel the same?
* What did you [scenario participants/observers] want from [scenario participant] at that point?
* What ideas or suggestions has anyone else got for how to deal with that situation?

Sharing facilitator’s thoughts

* Use advocacy with inquiry to share your observations and explore their perception
* What does the protocol say on…..
* What do you think was happening ….?
* How do you think … would respond to…. ?
* What about next time…..?
* Do you think there’s anything to be gained from…?

Any other questions or issues to discuss?

Summary