

TRICYCLIC ACID OVERDOSE

MODULE: EMERGENCY MEDICINE TOXICOLOGY

TARGET: SENIOR TRAINEES IN EM, ACUTE MEDICINE, INTENSIVE CARE, ANAESTHESIA

BACKGROUND:

TCA are used in the management of depression, anxiety and chronic pain. However, despite recent changes to prescribing recommendations, TCAs still accounts for up to 18% of all poisoning deaths in the UK. The toxicity of the TCA coupled with the high risk patient group means that self-poisoning episodes are more likely to be fatal. In 2005 there were 272 TCA overdose-related deaths in the UK.

Patients presenting acutely will often exhibit a constellation of symptoms and signs or 'toxidrome'. Awareness of the TCA toxidrome and its treatment will facilitate the early identification of the type of overdose, subsequent management and reduce the risk of clinical deterioration requiring critical care input or fatality.

RELEVANT AREAS OF THE CURRICULUM

- CC2 Clinical Examination
- CC3 Therapeutics & safe prescribing
- CC5 Decision making & clinical reasoning
- CC7 Prioritisation & patient safety in clinical practice
- CC8 Team working & patient safety
- CC12 Relationship with patient & communication in consultation
- CC15 Communication with colleagues and co-operation
- CC21 Guidelines & Evidence-based care
- HMP5 Unconscious patient
- HAP15 Fits/seizure
- HAP25 Poisoning

INFORMATION FOR FACULTY

LEARNING OBJECTIVES

By the end of the session, the trainee should have:

- Correctly identified the Anticholinergic Toxidrome as the most likely diagnosis
- Instigated resuscitation/treatment
- Explored appropriate strategies for preventing further escalation of the situation (both parent and patient)
- Explained the diagnosis to the patient and mother in layman's terms
- Explored the concerns of the mother and addressed these directly
- Prioritised patient safety over other priorities
- Identified the instability of the patient and need for on-going critical care
- Facilitated handover/referral to ICU by telephone

SCENE SETTING

Location: Resuscitation room, Emergency Department

Expected duration of scenario: 15mins Expected duration of debrief: 45mins

EQUIPMENT AND CONSUMABLES

Monitoring
 Clinical props (See appendices 1-4)
 Oxygen mask already on Penny's face
 Bedside chair for mother to sit on
 Already should have IVA
 Giving set x2
 Simulated Drugs
 Crystalloid fluid
 8.4% 50ml Sodium Bicarbonate x2

PERSONNEL-IN-SCENARIO

Mother - SP
 Penny - SP
 Nurse chaperone - participant
 Doctor - participant
 Voice of ICU Reg - faculty

PARTICIPANT BRIEFING

A 16 yr old girl, Penny, has been brought to the ED by her mum as she is semi-conscious. Mum reports that she came home from school upset and tearful, wouldn't 'talk about it' and asked to be left alone. When mum went to check on her 30 minutes later, she was found her semi-consciousness on the floor in her bedroom so dialled 999 for an ambulance.

FACULTY BRIEFING

PATIENT BRIEFING

DAUGHTER – Penny Tapp

Age: 16 years old

Background

- Your dad died in a car crash about a year ago; everything has changed since:
 - You had to move house (you have lost touch with all your friends)
 - You started a new school
 - Having been really close with mum, you now argue all the time.
- You are struggling to fit in at the new school and haven't made any new friends
- You have been feeling low for several weeks, struggling to sleep and have lost your appetite.

Events leading to attending the Emergency Department

- It is the anniversary of your dad fatal car crash next week and you have been struggling not to think about him.
- At lunch-time, Simon (your ex-boyfriend) texted you to say that he was seeing someone else; you had been pinning your hopes on getting back with him.
- When you get home, your mum sees how upset you are and tried to talk things through with you. But, this only seemed to make things worse.
- Instead, you argued and eventually asked to have some time to yourself.
- Impulsively, rather than go to your room you went to the bathroom cabinet, found some tablets (not sure of quantity) in the medicine cabinet and took them (you didn't realise they were your mum's antidepressants).

Responses/reactions:

- Initially awake
 - Upset
 - Mildly confused, not sure what time it is but know where you are and recognise your mum.
- In addition to the confusion, you feel like you
 - need to urinate
 - are really thirsty
 - can't focus properly and have blurry vision.
- With time (over next 5-10 minutes), you should gradually become more and more sleepy and eventually lose consciousness.
- If you are made to feel judged or you feel the doctor is being insensitive, clam up and be defensive

Information Given Freely:

- Admit to taking some tablets when you got home
- 1st overdose
- No alcohol at time
- No paracetamol taken
- Not vomited since overdose

Information if Specifically asked for:

- If asked where you got the tablets, you should explain that they were your mother's and you found them in the medicine cabinet in the bathroom.
- Not sure how many you consumed but they were mum's antidepressants.

IN-SCENARIO PERSONNEL BRIEFING (MOTHER)**'MUM'****Name:** Angela Tapp**Age:** 40 years old**Occupation:** Office temp**Background**

- John, your husband, died in a car crash a year ago (it is the anniversary today)
- Unfortunately, you couldn't afford the mortgage repayments alone so you and Penny have had to downsize/move to a new neighbourhood.
- To support you both, you returned to work. However, so far, the only work you can get is as an office temp. As a result, you tend to work odd hours (when the work is available) and often may not see Penny for days at a time.
- Penny is worrying you. Until the move, you were really close; she always confided in you when there were problems. Now, she hardly talks to you. She doesn't seem to have any friends, hardly ever goes out and spends most of her time in her room. You know her grades have been suffering at school.
- When you tried to sit down and talk to her, a shouting match ensued and she told you to 'back off'.

Events leading to attending the ED

- Penny came home from school upset and looked as if she had been crying.
- You tried to talk to her but it just seemed to make things worse.
- When she went up to her room, you hoped it would give her a chance to calm down.
- You suspect it has something to do with the upcoming anniversary of your husband's fatal car crash.
- After a while, you decided to check on Penny in her room and try to make up. However, initially didn't get a response so, concerned something might have happened, you went to find her sleepy and confused on the floor. Initially, you suspected she may have been smoking cannabis and/or drinking but you couldn't detect any alcohol on her breath nor the smell of cannabis on her clothes.
- Worried, you called for the ambulance that took Penny to the ED.

Reactions and Responses

- You are beside yourself with worry and blame yourself for what has happened. Maybe if you hadn't argued earlier.....
- If the doctor tries to talk to Penny directly, you should initially try to interject to 'help' by answering for her.
- If a sympathetic, sensitive approach is taken, you can be calmed, will step away from the bedside but will insist on being seated nearby.
- Unless a chaperone is allocated to keep you informed by the participants, you will gradually become more and more distressed and repeatedly question what is going on/interfere, seeking reassurances that "she's going to be okay, isn't she?"

Information given freely

- Penny's medical history - none
- Medication – oral contraceptive pill
- Smoked cannabis in the past but nothing else
- No allergies

Information given if specifically asked/appropriate to be disclosed

- While you were waiting for the ambulance, you noticed there was an empty blister pack on the floor next to the bin in her room. You had assumed that it was her contraceptive.
- You checked all her usual 'hiding places' – there were no drugs or alcohol there.
- If asked about access to other medication, mention that you keep your medication in the bathroom cabinet (AMITRIPTYLINE – say 'amee-trip-til-ene')

IN-SCENARIO PERSONNEL BRIEFING (NURSE CHAPERONE)

To be played by one of the participants

- Ad lib in response to the mother's anxiety/worries.
- Calms her to allow the gathering of information pertaining to the overdose

IN-SCENARIO PERSONNEL BRIEFING (CRITICAL CARE SPR/CONSULTANT)

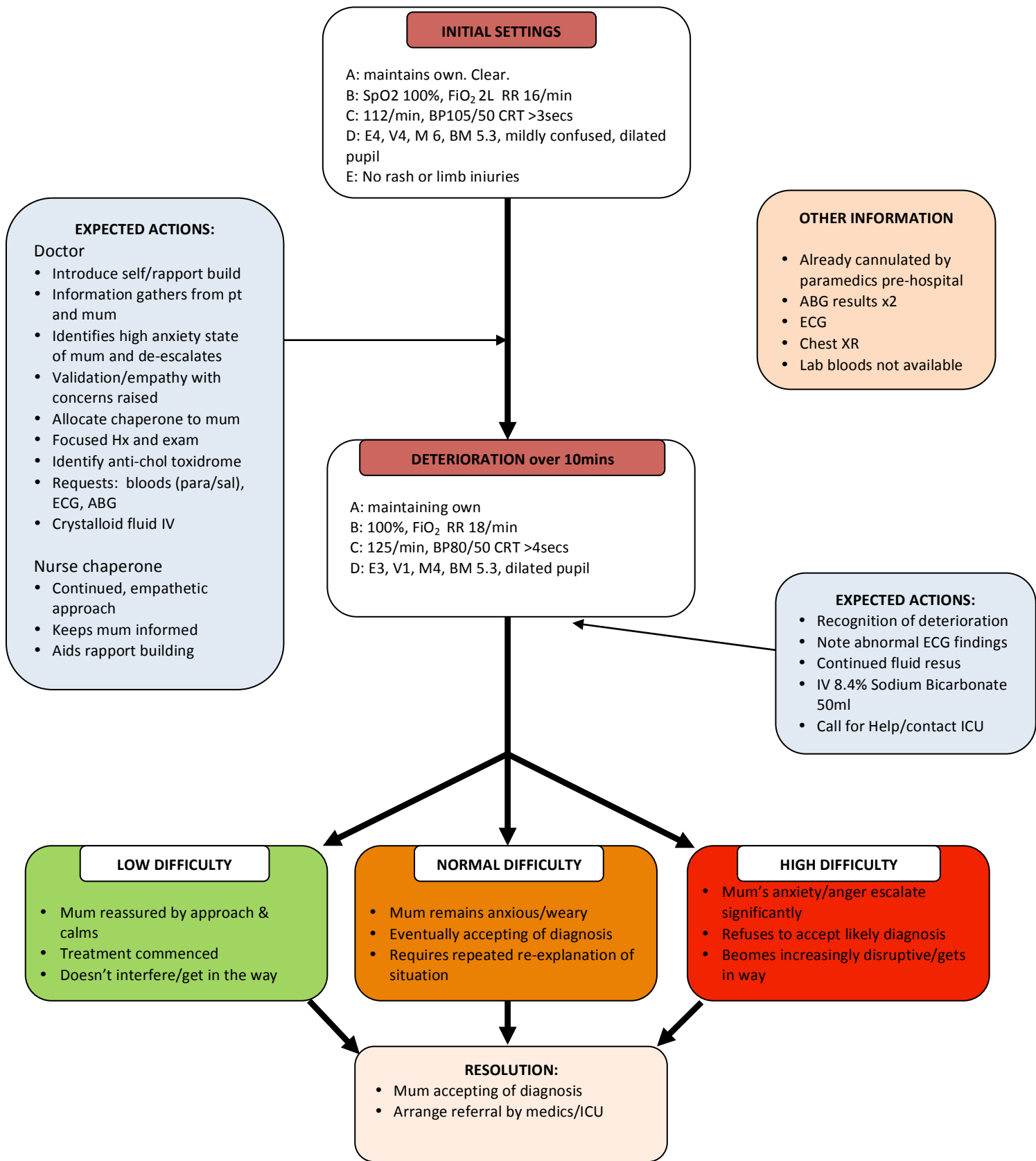
The role should be played by a member of faculty.

Ideally, this should be a telephone conversation that forces the participating doctor to succinctly summarise events and condition of Penny. Initially, the response should be less than enthusiastic, forcing the doctor to put his/her case for your involvement. However, if an appropriate summary is relayed this will change with the referral being accepted.

ADDITIONAL INFORMATION

1. APPENDIX 1 – BLOOD GAS RESULTS
2. APPENDIX 2 – NEAR-SIDE & LAB RESULTS
3. APPENDIX 3 – 12 lead ECG
4. APPENDIX 4 – Chest X-ray

CONDUCT OF SCENARIO



DEBRIEFING – REFLECTION & FEEDBACK

SUGGESTED POINTS FOR FURTHER DISCUSSION

Communication Skills:

1. Importance of approach/rapport building
2. Allowing relatives in resuscitation room during resuscitation
3. Managing relatives in the resuscitation room
4. Team management/delegation
5. Effective use of a chaperone
6. Effective telephone communication

Clinical:

1. Need for focused Hx and Examination
2. Early identification TCA toxidrome /haemodynamic instability
3. ECG changes associated with TCA overdose
4. Mechanism of action of NaHCO₃
5. Anticipation
6. Knowledge of other toxidromes

DEBRIEFING RESOURCES

1. Toxbase – clinical management of Amitriptyline OD
www.toxbase.org
2. GEMNET, College of Emergency medicine
www.collemergencymed.ac.uk/asp/document.asp?ID=5075
3. Henry Morris powerpoint presentation on TOXIDROMES
https://secure.collemergencymed.ac.uk/CEM/CPD/Presentations/Henry_Morriss-cpd-presentation.pdf
4. Boehnert MT. Value of the QRS duration versus the serum drug level in predicting seizures and ventricular arrhythmias after an acute overdose of tricyclic antidepressants. *N Engl J Med* 1985 Aug 22; 313(8):474-9
5. Hoffman JR. Effect of hypertonic sodium bicarbonate in the treatment of moderate-to-severe cyclic antidepressant overdose. *Am J Emerg Med* 1993 Jul; 11(4):336-41.
6. Hutchinson MD, Traub, SJ. Tricyclic antidepressant poisoning. In: UpToDate, Basow, DS (Ed), UpToDate, Waltham, MA, 2009.
7. Jacob J. Toxicity, Antidepressant. *eMedicine* [Internet]. 2008 Nov [cited 2009 Jan]; [15 p.]. Available from:
8. <http://www.imeedicine.com/printtopic.asp?bookid=3&topic=37#References>.
9. Liebelt EL, Francis PD, Woolf AD. ECG lead aVR versus QRS interval in predicting seizures and arrhythmias in acute tricyclic antidepressant toxicity. *Ann Emerg Med*. Aug 1995;26(2):195-201.
10. Tran TP, Panacek EA, Rhee KJ, et al. Response to dopamine vs norepinephrine in tricyclic antidepressant-induced hypotension. *Acad Emerg Med*. Sep 1997;4(9):864-8.

EMERGENCY MEDICINE > HUMAN FACTORS > SCENARIO 6

INFORMATION FOR PARTICIPANTS

KEY POINTS

TRICYCLIC ANTIDEPRESSANT OVERDOSE GUIDANCE

A partial list of potential **signs and symptoms** suggestive of TCA overdose include:

- Known or suspected ingestion
- Coma
- Seizure
- Acidosis
- Hypotension (SBP < 90)
- Tachycardia

ECG Changes

- Prolonged PR interval
- Prolonged QRS greater than 0.1 seconds
- Prolonged QT interval
- Rightward shift of the terminal 40 milliseconds of the frontal plane QRS vector
- Deep S wave in Lead 1 along with large R wave - greater than 3 mm height - in aVR
(sensitivity 0.83; specificity 0.63)
- Ventricular arrhythmias

Anticholinergic signs/symptoms or TOXIDROME

- Dry mouth
- Mydriasis
- Urinary retention
- Ileus
- Confusion

TREATMENT

- 1. Maintain airway and breathing**
- 2. Gastric Lavage**
If substantial amount ingested (>20-30mg/kg) within 1 hour
Beware of risk of pushing contents beyond pylorus and enhancing absorption!
Do not wash out conscious pt as large absorption clearly already taken place
- 3. Activated Charcoal**
Via mouth or NG tube (50g for adult) if >10mg/kg taken in last hour.
In severe toxicity consider second dose of charcoal after 2 hours.
- 4. If agitated** use Diazepam IV
- 5. If seizures:** use Lorazepam IV
- 6. Cardiac Monitoring:**
Essential if significant ingestion has taken place – usually for first 24 hours.
- 7. Sodium Bicarbonate**
50mls of 8.4% IV should be given IV (even in absence of acidosis) in all patients with QRS prolongation, arrhythmias or hypotension. Give repeat doses by bolus aiming to keep pH between 7.45 and 7.55.(Action: increasing extracellular sodium concentrations and by increasing pH)

(NB: Measurement of plasma level of TCA not readily available or particularly helpful)

RELEVANCE TO THE CURRICULUM

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HMP5	Unconscious patient

WORKPLACE-BASED ASSESSMENTS

HAP15	Fits/seizure
HAP25	Poisoning

FURTHER RESOURCES

- Toxbase – clinical management of Amitriptyline OD
www.toxbase.org
- GEMNET, College of Emergency medicine
www.collemergencymed.ac.uk/asp/document.asp?ID=5075
- Henry Morris powerpoint presentation on TOXIDROMES
https://secure.collemergencymed.ac.uk/CEM/CPD/Presentations/Henry_Morriss-cpd-presentation.pdf
- Boehnert MT. Value of the QRS duration versus the serum drug level in predicting seizures and ventricular arrhythmias after an acute overdose of tricyclic antidepressants. *N Engl J Med* 1985 Aug 22; 313(8):474-9
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APPENDIX 1 – INITIAL ABG PRIOR TO INTUBATION

RADIOMETER ABL 9000 SERIES			
ABL900 ED		00:00:00	08-12-2010
PATIENT REPORT	Syringe	S195uL	Sample# 901234
Patient ID	Q1234567		
Patient First Name	PENNY		
Patient Last Name	TAP		
Date of Birth	16.08.1997		
Sample type	Arterial		
Fi O ₂	60%		
Department	ED		
Operator	unknown		
Blood Gas Values			
pH	7.25		[7.340 - 7.450]
pCO ₂	5.4	kPa	[4.70 - 6.00]
pO ₂	3.1	kPa	[10.0 - 13.3]
Oximetry Values			
ctHb	13.1	g/dL	[12.0 - 16.0]
sO ₂	98	%	[95.0 - 98.0]
fO ₂ Hb		%	[94.0 - 99.0]
fCOHb	1.6	%	[- -]
fHHb		%	[- -]
fmetHb		%	[0.02 - 0.06]
Hctc		%	
Electrolyte Values			
cK+	3.0	mmol/L	[3.0 - 5.0]
cNa+	135	mmol/L	[136 - 146]
cCa ²⁺	1.19	mmeq/L	[1.15 - 1.29]
cCl-	102	mmol/L	[98 - 106]
Metabolite Values			
cGlu	5.8	mmol/L	[3.5 - 10.0]
cLac	3.4	mmol/L	[0.5 - 1.6]
Acid Base Status			
cBase(Ecf)c	-9	mmol/L	
cHCO ₃ ⁻ (P,st)c	22	mmol/L	
Notes			
↑	Value (s) above reference range		
↓	Value (s) below reference range		
c	Calculated Value (s)		
e	Estimated Value (s)		

APPENDIX 2 – INITIAL LAB RESULTS

NAME : PENNY TAP

DoB : 16.08.1997
PID/Ref : Q1234567

Lab Number : : please quote if consulting Lab
COLLECTED
REPORTED

Requested for :

Patient seen at :

***** TEST RESULTS *****

: SODIUM	135	mmo1/L	(134 -145)
: POTASSIUM	3.0	mmo1/L	(3.6 - 5.3)
: UREA	20	mmo1/L	(2.8 - 7)
: CREATININE	121	umo1/L	(44 - 80)
: eGFR	65	mL/min/1	
: Glucose (random)	5.8	mmol/L	(3.5 – 10.1)

TOXICOLOGY

: Paracetamol <10
: Salicylates <40

Lab Comment:

eGFR- If of Afro-Caribbean origin multiply by 1.2

Authorised:

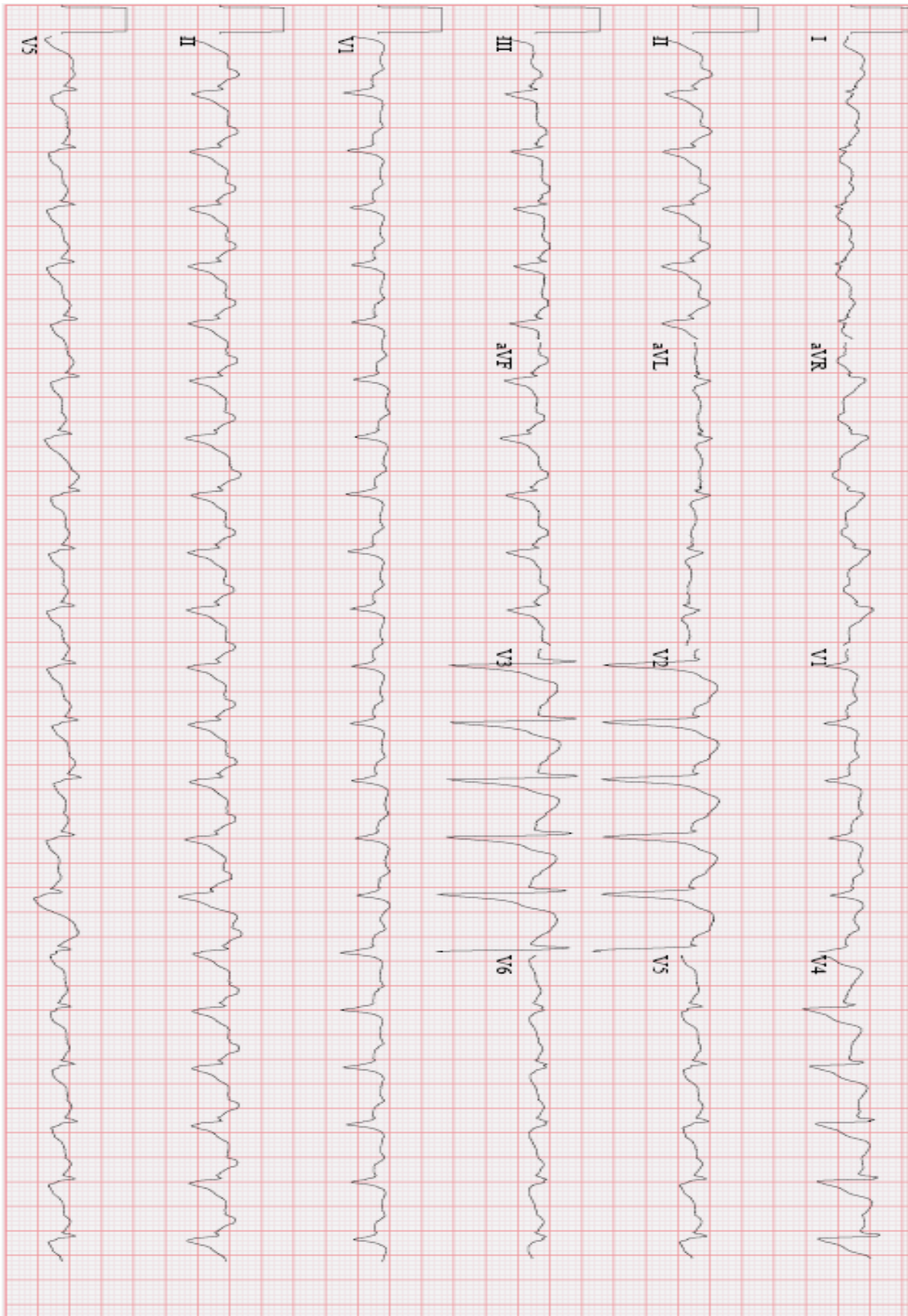
Urinary HCG: negative

If relevant for participating hospital:

Urine 'drug-of-abuse' screen + Tricyclic acid

Serum toxicology + Tricyclic acid

APPENDIX 3 – INITIAL ECG



APPENDIX 4 – INITIAL CXR



PARTICIPANT REFLECTION

What have you learned from this experience? (Please try and 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	<input type="checkbox"/>
Secondary Participant (e.g. 'Call for Help' responder)	<input type="checkbox"/>
Other health care professional (e.g. nurse/ODP)	<input type="checkbox"/>
Other role (please specify):	<input type="checkbox"/>
Observer	<input type="checkbox"/>

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
I found this scenario useful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I understand more about the scenario subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have more confidence to deal with this scenario	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The material covered was relevant to me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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?