Simulation: Trauma

Title:

Learning Objectives:

1. Overall management of head injury in major trauma
2. Preparation of department for major trauma
3. Early recognition and management of oesophageal intubation
4. Display safe and effective airway management skills
5. Display effective Non-Technical Skills in management of a trauma patient

Take Home Points:

1. Traumatic Brain Injury Principles of Management
    a. Positioning
    b. Ventilation Strategies
    c. Seizure Prophylaxis
    d. Maintaining CPP
    e. Mannitol
2. Importance of ensuring Airway is protected – trusting nobody
3. NOACs as a risk factor

Sim Brief - Introduction, Familiarisation, Ground Rules, Basic Assumption

Case Stem (for participants)

43 yo male (John Hurt) involved in a workplace accident at a building site. Large steel bar dropped onto patient's head from 4 metres. Accident was witnessed by workmates who states John fell unconscious immediately. GCS 3/15 on arrival of paramedics. Intubated at scene. "Easy intubation. Grade 1 view". Obvious head and chest injuries. Placed in C-spine collar. BVM by paramedics on transfer.

Background Info (For instructors eyes only)

- 43 male.
- PMHx: HTN, Hypercholesterolaemia, AF, Gout
- Soc Hx: Smoker. Social Drinker.
- Medications: Allopurinol, Apixaban, Ramipril, Atorvastatin

Settings for SIM Man/Woman

- Moulage – bandage head with some blood to LHS.
- Abrasions to face and chest
- C-Spine collar on

Equipment required

- Cardiac monitor/Defib
- ECG printouts – Fast AF, Slow AF
- VBG/ABG printouts – hypokalaemia, hypocalcaemia – 2 VBGs
- Imaging printouts – CXR – with oesophageal intubation. With endotracheal intubation
- O2 +/- masks/NP
- IVC equipment
- Relevant specific medications – magnesium, roc/inhalers/nebulisers
- Relevant products - colloids/crystalloids/blood

Participants required

- ED Registrars – Team Lead, Airway, Circ/Defib
- Nursing Staff – at least airway + drugs, ideally defib. and scribe

Scenario Outline

Brief outline in table form of step-by-step progression of SIM
Include possible alternatives and end-points

Scenario Outline (Outline of what should occur at each stage)	Participant Response (Expected or ideal response)	Outcome (what do participants do, what happens to SIM mannequin)
Stem given to team	Role allocation. Plan of approach.	Team prepared and allocated prior to patient arriving

Patient arrives with Ambulance	Patient transferred over. Handover given to team. Begin to obtain a history	Mannequin makes some groaning noises. Obs should begin to be taken.
Assessment of patient	ABCDE approach ED Reg. reviews charts - Notices vital signs - Hypertensive 130/80 - HR 90 - Intubated Sats 94 - GCS 3/15	A: Intubated. Can bag pt. B: Muffled “not normal” sounds C: Hypertensive. HR 90 - IV access ensured - Bloods sent, ABG/VBG D: GCS 3/15 E: nil relevant
Initial Treatment Patient Deterioration	Notice: - Airway – oesophageal intubation and go about correcting this - Determine risk of head injury (GCS 3, L 5mm sluggish, R 3mm reactive) - Determine risk of anticoagulation and correct this Begin to take steps to remedy this	- Regardless, pt begins to progressively become more hypertensive, then slowly bradycardic - Sats continue to drop if no airway mx. etCO2 will be detectable but low - Pt. will seize if ongoing inadequate mx.
Resus	- Ongoing management of patient - Pt. will continue to seize and drop saturations until these issues are managed	- End points are when adequate head injury management is instituted, anticoag is managed and airway is protected and secondary survey done

	- Pt. will continue to bleed until coag factors are given	- Continue to seize and cone if inadequate management
Disposition Planning	- Neurosurgical intervention - Anaesthesia - Haematology if required - ICU	- End Sim

Debriefing Objectives:

- Cover technical areas
    - Intubation and airway protection
    - Head Injury Management
    - Anticoagulation in resuscitation
- Relevant Non-Technical Skills.

Blood Gas 1

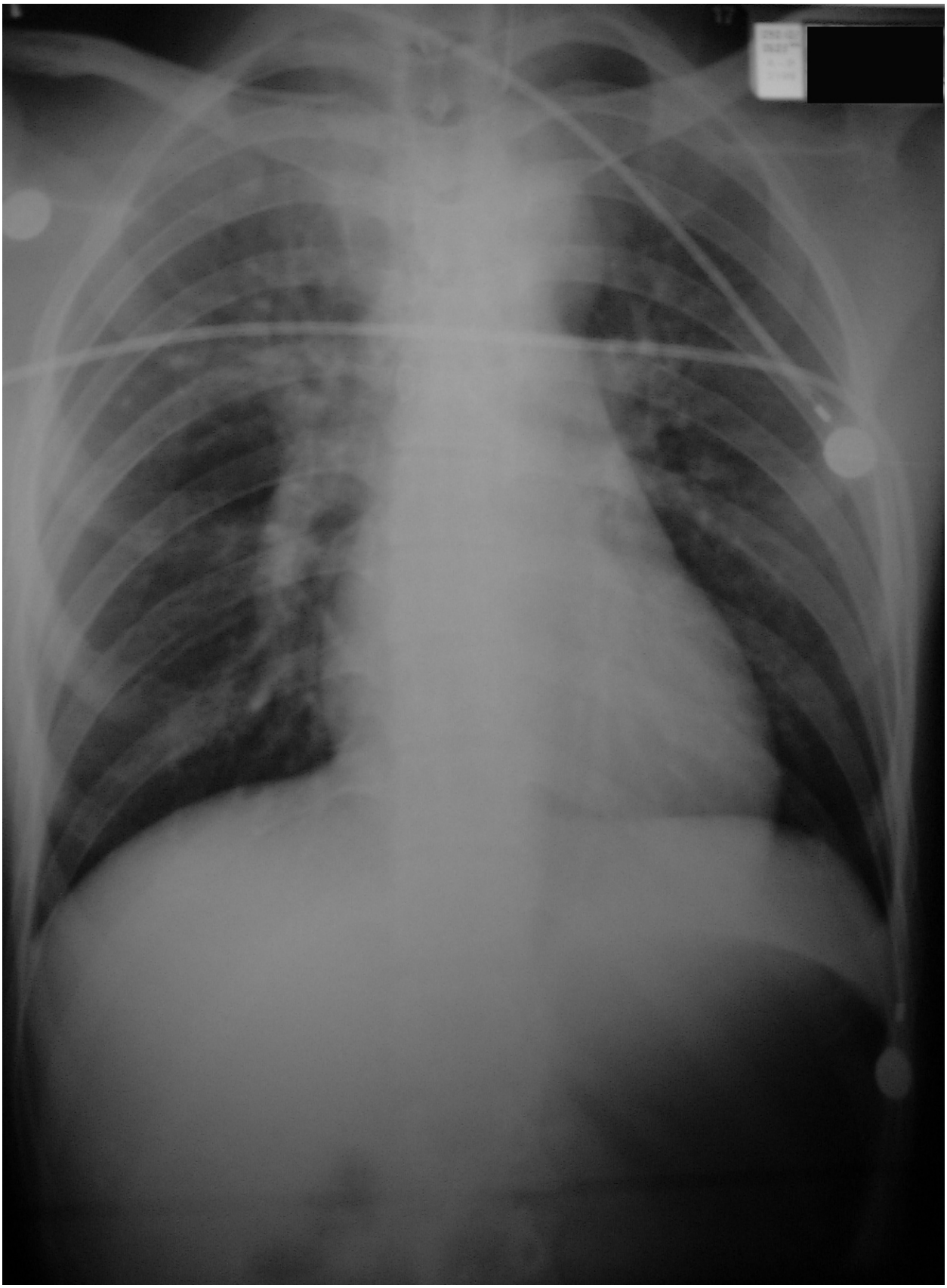
Sample (ABG/VBG)	Value	Reference Range
pH	7.35	7.35 - 7.45
pCO2	50	35 - 45 mmHg
pO2	50	75 - 100 mmHg (arterial)
HCO3-	23	22 - 26 mmol/L
Base Excess	0	-2 to +2 mmol/L
Hb	130	135 - 180 g/L
Na+	140	135 - 145 mEq/L
K+	4.8	3.5 - 5.0 mEq/L
iCa2+	0.90	0.90 - 1.15 mmol/L
Cl-	100	96 - 106 mmol/L
Anion Gap	24	22 - 26
Lactate	2	0.5 - 1.0 mmol/L
Bilirubin		
Creatinine	90	50 - 120 mmol/L

Blood Gas 1a

Sample (ABG/VBG)	Value	Reference Range
pH	7.28	7.35 - 7.45
pCO2	60	35 - 45 mmHg
pO2	50	75 - 100 mmHg (arterial)
HCO3-	21	22 - 26 mmol/L
Base Excess	2	-2 to +2 mmol/L
Hb	125	135 - 180 g/L
Na+	140	135 - 145 mEq/L
K+	5	3.5 - 5.0 mEq/L
iCa2+	0.90	0.90 - 1.15 mmol/L
Cl-	100	96 - 106 mmol/L
Anion Gap	24	22 - 26
Lactate	2.5	0.5 - 1.0 mmol/L
Bilirubin		
Creatinine	96	50 - 120 mmol/L

Blood Gas 2

Sample (ABG/VBG)	Value	Reference Range
pH	7.40	7.35 - 7.45
pCO2	35	35 - 45 mmHg
pO2	50	75 - 100 mmHg (arterial)
HCO3-	24	22 - 26 mmol/L
Base Excess	0	-2 to +2 mmol/L
Hb	120	135 - 180 g/L
Na+	143	135 - 145 mEq/L
K+	4.0	3.5 - 5.0 mEq/L
iCa2+	1.10	0.90 - 1.15 mmol/L
Cl-	100	96 - 106 mmol/L
Anion Gap	24	22 - 26
Lactate	1.5	0.5 - 1.0 mmol/L
Bilirubin		
Creatinine	98	50 - 120 mmol/L



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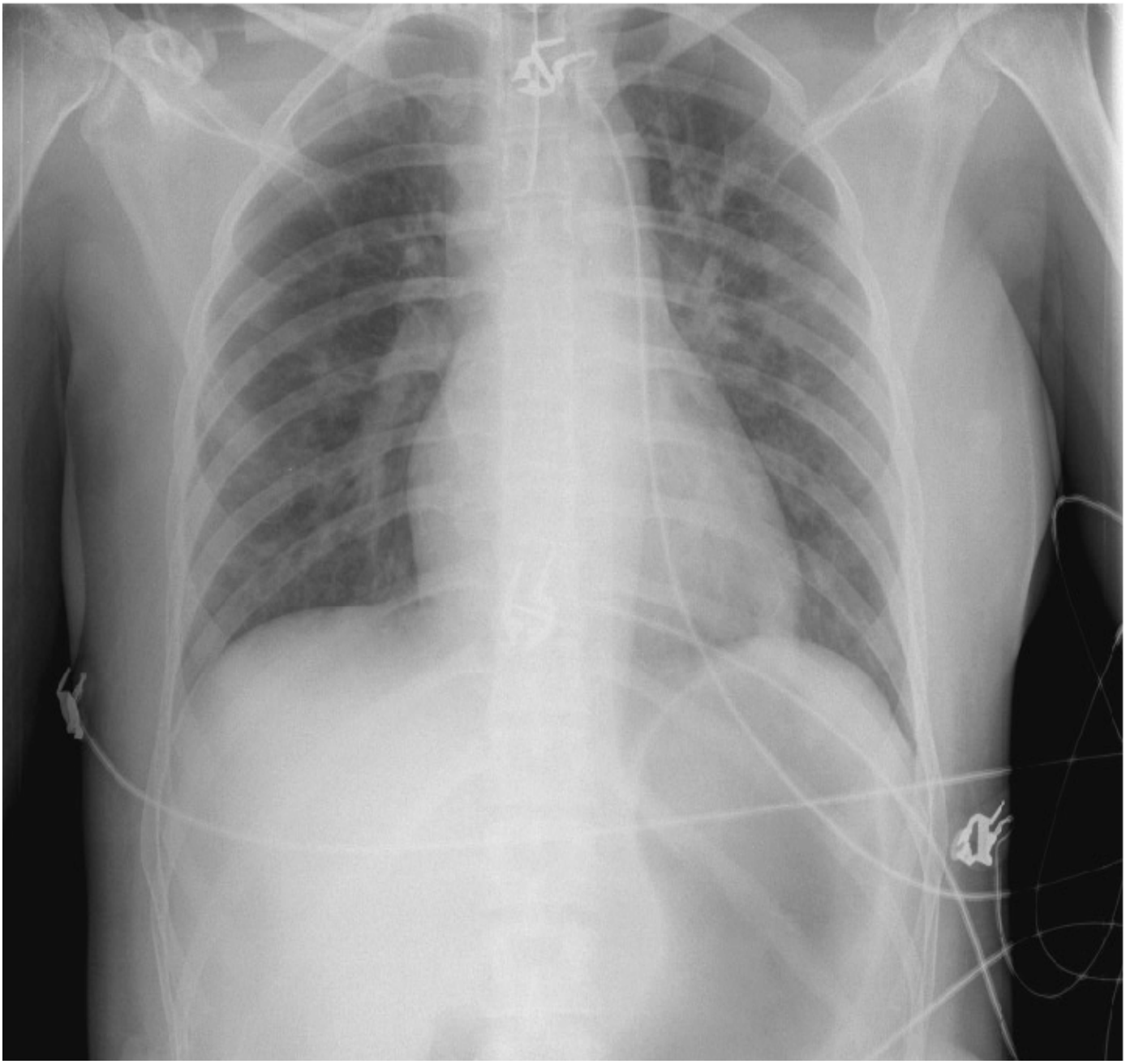

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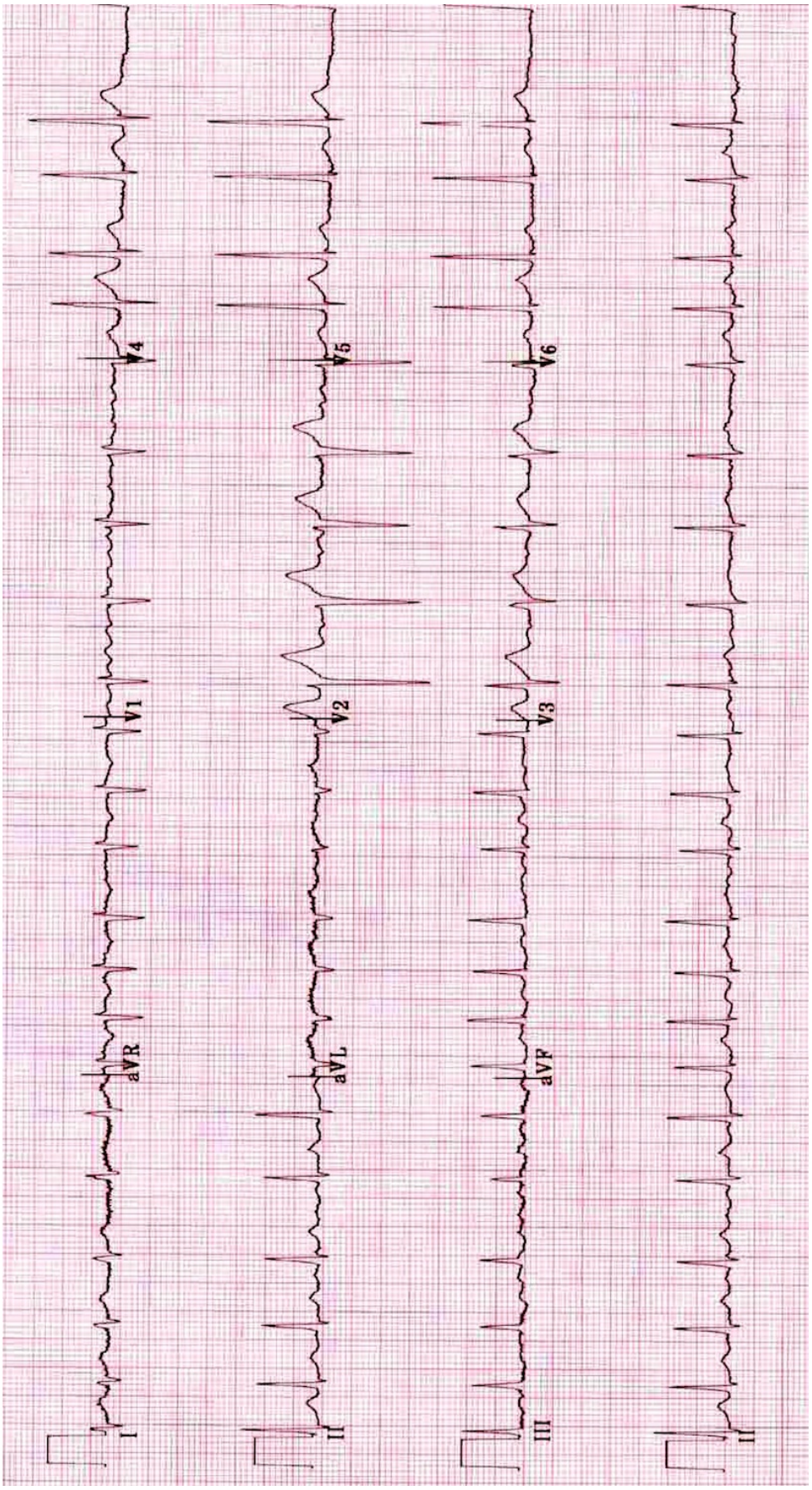
SCGH ED Trauma Sim



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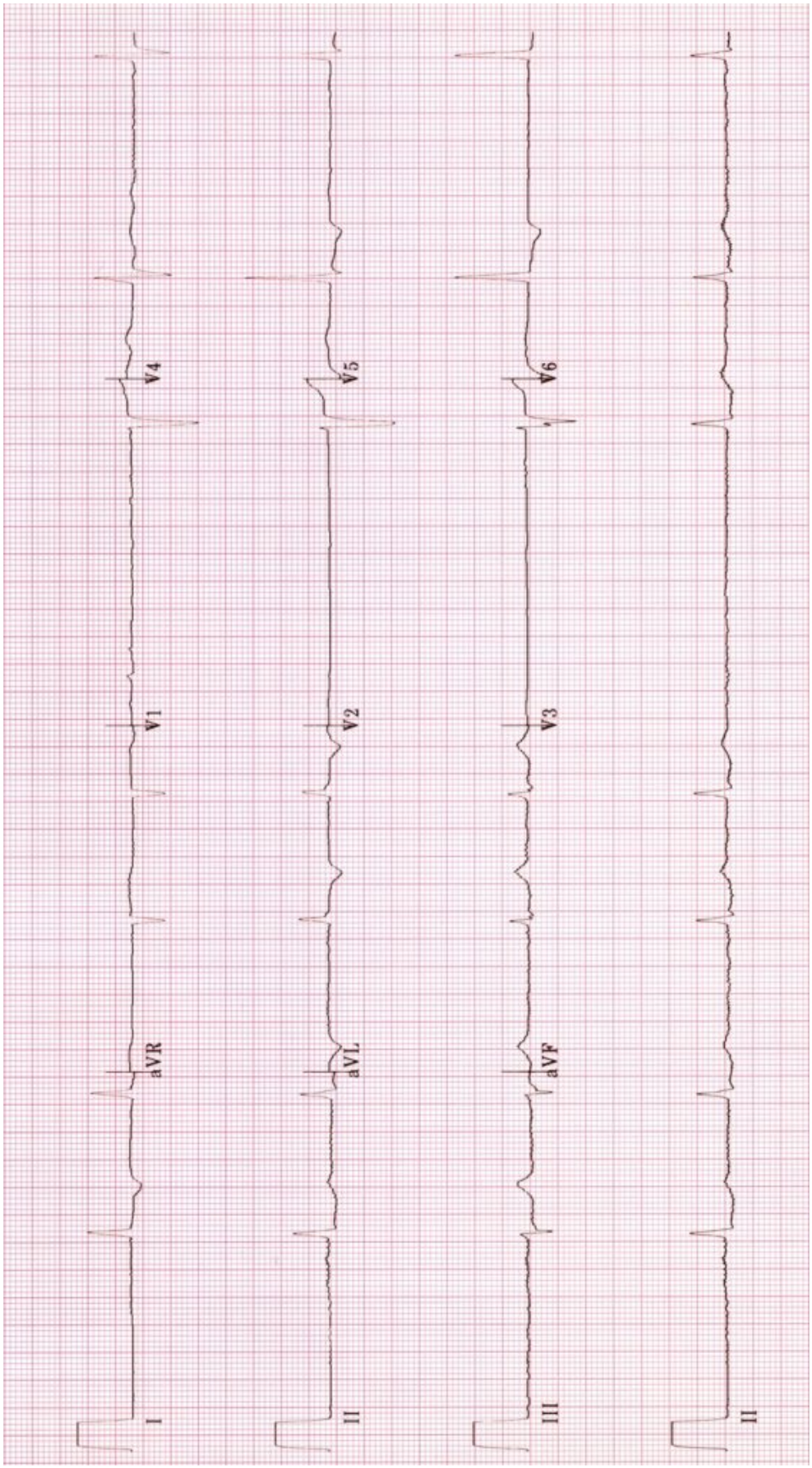
SCGH ED Trauma Sim



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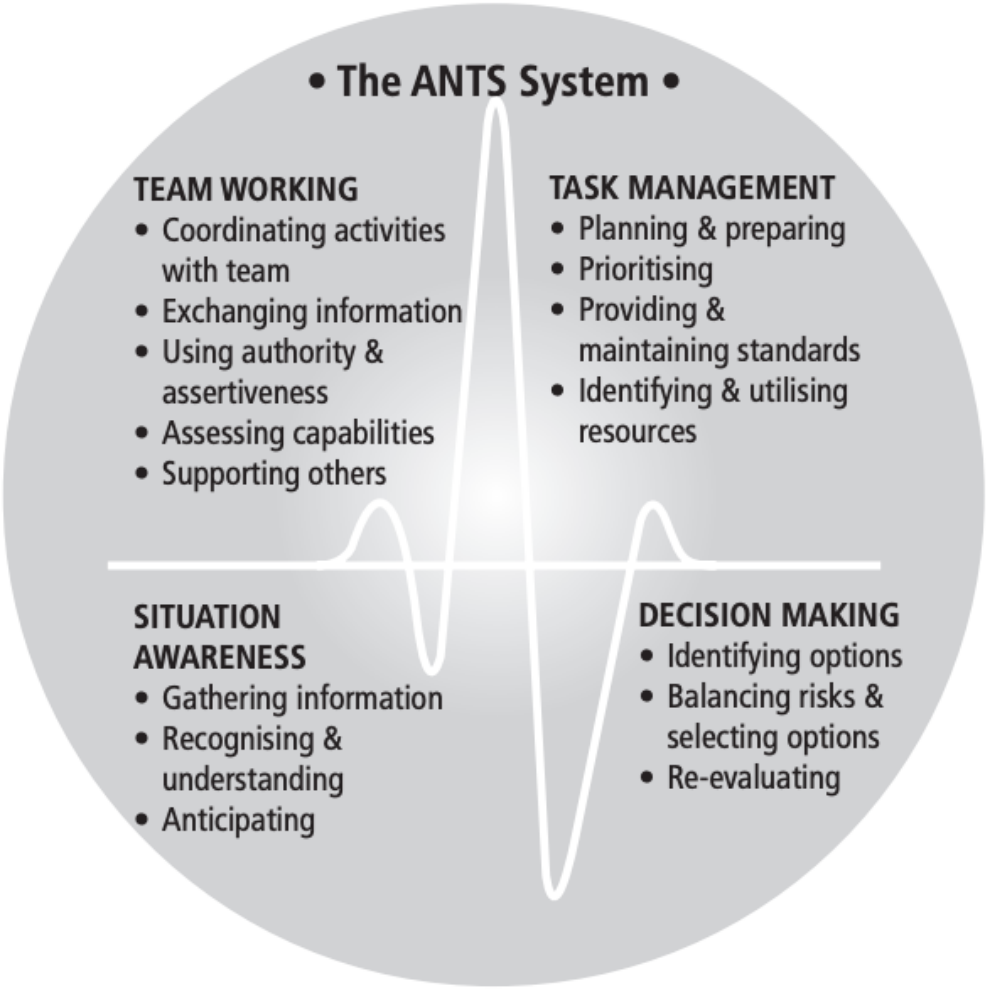
Non-Technical Skills

It is suggested to implement a consistent, frequent and repeated teaching of non-technical skills during SIM in order to entrain these skills.
The ANTS system is a suggested framework that can be applied for the observation of SIM.
See below for a brief screenshot of the framework, and a link to the ANTS handbook for further information.



ANTS Framework
https://www.abdn.ac.uk/iprc/documents/ANTS%20Handbook%202012.pdf