1. Which is correct regarding transcutaneous pacing in emergency?
    a) Pads should be placed anteroapical one to the right of the sternum below clavicle and the other lateral to apex around anterior axillary line
    b) Overdrive pacing should never be done via transcutaneous route
    c) There is a high risk of electrical injury to health care workers if the patient is touched during transcutaneous pacing
    d) The same pads and electrodes are used for pacing, cardioversion and defibrillation in most newer defibrillator units

2. Transcutaneous pacing should have…
    a) Pacing pads placed 2-3 cm from defib pads if separate pads are used
    b) Capture usually between 10 and 50 mA
    c) Pacing set to at least 1.5 times the threshold of initial electrical capture
    d) Pacing set to minimal voltage as clinically significant myocardial damage may occur

3. Transvenous pacing should have…
    a) The tip ideally placed next to the AV node
    b) Capture only when voltage is >5 mA
    c) An electrode that has ECG tracing to help localize the position of the catheter tip
    d) The Initial rate set between 60 and 80 bpm

4. Regarding defibrillation with a permanent pacemaker which is **incorrect**
    a) Pads should be placed at least 10 cm from the pulse generator
    b) Problems include pacemaker inhibition, reprogramming, circuit damage and myocardial damage via current transmission through the electrodes
    c) A chest xray is not useful post resus to check for pacemaker integrity
    d) Global myocardial ischaemia increases pacing threshold and can produce failure to capture

5. Which is true regarding pacemaker malfunctions
    a) Dual chamber pacemakers are more likely to suffer from pacemaker syndrome (simultaneous atrial and ventricular pacing)
    b) Undersensing can produce pacing spikes within QRS complexes
    c) Oversensing produces pacing spikes without QRS complexes following
    d) Failure to capture can occur if pacemaker incorrectly detects pectoral muscle movements as native electrical output

6. Which of the following is **not** a cause of failure to capture in a malfunctioning pacemaker?
    a) Electrode displacement or fracture
    b) Exit block
    c) Electrolyte disturbance
    d) Flat battery

7. Regarding implantable defibrillators ICDs which is correct
    a) ST segment elevation or depression due to shock will resolve within 15 minutes
    b) A magnet should never be placed over an implantable defibrillator
    c) If the ICD discharges it can be dangerous to any staff touching the patient
    d) If a patient arrests and defibrillation is required, Pads should not be placed if an ICD is already insitu

8. Regarding Defibrillation which is correct
    a) Defibrillation should be done in a shocked unstable patient with rapid AF
    b) Defibrillation is contraindicated in asystole and PEA arrests
    c) Defibrillation repolarizes the myocardium to allow normal electrical activity to resume
    d) If defibrillation occurs at the start of a T wave, VF can result

9. Which is **incorrect** regarding defibrillation
    a) Larger (12cm) electrodes have better outcomes than smaller (8cm) electrodes
    b) Initial Joules for biphasic can be as low as 150J whilst for monophasic should be 360 J
    c) Internal defibrillation should begin at 10 J
    d) Paediatric defibrillation should be given at 2J/kg

10. In pericardial tamponade which is correct
    a) There is higher mortality from stabbing than gunshot wounds causing tamponade
    b) The survival rates for cardiac tamponade following blunt trauma is high and pericardiocentesis should be attempted if injury causes an arrest
    c) As little as 50ml of fluid removed from pericardium can increase stroke volume
    d) Beck's triad includes pulses paradoxus, muffled heart sounds and elevated jugular venous distension

11. Which is **not** a typical cause of pulsus paradoxus?
    a) Mitral regurgitation
    b) Obesity
    c) Severe asthma
    d) Congestive cardiac failure

12. Which is **not** suggestive of a pericardial effusion
    a) ECG findings of electrical alternans, low voltage of QRS and tachycardia
    b) CXR showing globular heart shadow
    c) Echocardiogram showing Right atrial and ventricular collapse
    d) VT arrest

13. With regards to pericardiocentesis which is correct
    a) Blind technique is subxiphoid ideally directed towards left shoulder
    b) Blind technique has a 6% mortality
    c) Ultrasound guided technique has a 5% mortality
    d) Ultrasound guided technique has a 20% morbidity

Answers

1. D (Pads placed AP anterior over apex and posterior over infrascapular, overdrive pacing can be done but limited by max pacing rate 180 and risk of accelerating VT and inducing VF, risk to health staff is minimal)
2. A (capture usually between 50 to 100 mA, pace at 1.25 times threshold capture, correctly performed pacing has no evidence of clinically significant myocardial damage)
3. C (tip placed ideally in RV apex, capture should occur at < 2mA, initial rate set between 80 and 100 bpm)
4. C
5. B (pacemaker syndrome more likely with single chamber pacemaker, undersensing can produce asynchronous pacing, oversensing can be pacemaker detecting muscle movement as native rhythm and may have minimal ECG evidence or long pauses, failure to capture is a pacing spike without a QRS following. LITFL Pacemaker Malfunction)
6. D (flat battery should produce no pacing spikes)
7. A (Magnets can stop an ICD discharging inappropriately, ICD discharging can cause a small electric shock that is neither uncomfortable nor dangerous, pads should not be placed over the ICD but can be used.)
8. B (Cardioversion is indicated in a perfusing rhythm that is unstable, Defib depolarizes myocardium, defib on mid and terminal phases of T wave can result in VF)

9. D (APLS suggests 4J/kg, Advanced Paediatric Life Support: The Practical Approach 5th Edition, March 2012)
10. C (Tamponade does cause pulses paradoxus but Beck's triad: hypotension; distended neck veins; muffled heart sounds. The mortality for trauma to the chest stabbing 15%, gunshot 81%, blunt trauma necessitating an ED thoracotomy 97.5% to 100%
    [2006 data, http://www.trauma.org/index.php/main/article/361/])
11. A (other causes: mitral stenosis, tense ascites, COPD, massive PE)
12. D (tends to be PEA, may have bradycardia prior to arrest)
13. B (blind technique is ideally aimed at right shoulder, it has a morbidity of 20% and mortality as high as 6%, US guided technique has a complication rate of <5%)