



CG016 Peri-arrest arrhythmias (Adults)

1. Key Recommendations for operational use

For use by: Medical teams **For information:** SAS. **Internet:** Yes

General principles

1	Initial	<ul style="list-style-type: none">• Titrate oxygen if required to target SpO₂ 94-98%.• Basic Monitoring: SpO₂, blood pressure, 3 lead ECG.• Perform 12 lead ECG as soon as feasible.• Standard ABC management as required.• IV access (or IO is an alternative if required).• During ABC management, assess for adverse features:<ul style="list-style-type: none">- Shock: hypotension (systolic BP<90mmHg, confusion, cool peripheries)- Syncope- Myocardial ischaemia: chest pain or ischaemic changes on 12 lead ECG
2	Assess Arrhythmia	<ul style="list-style-type: none">• Tachycardia OR Bradycardia.• Do not focus on the precise rhythm abnormality.• Decide if there is a time critical adverse feature requiring immediate intervention.• Consider potential causes of the arrhythmia, and any which may be reversible.
3	Specialist Advice	<ul style="list-style-type: none">• Have a low threshold for seeking specialist advice from a cardiologist along normal referral pathways.• Consult CG011 Drug infusions for drug and infusion preparation.



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Tachycardia with Adverse Features		
4	DC Cardioversion	<ul style="list-style-type: none">• Most likely required for ventricular tachycardia (VT).• Use a manual defibrillator with a synchronisation function.• Use procedural sedation or Emergency Anaesthesia (CG007) in conscious patients.• Apply synchronised biphasic DC shock at 100J.<ul style="list-style-type: none">- reassess rhythm & patient.• If no change, apply synchronised biphasic DC shock at 150J.<ul style="list-style-type: none">- reassess rhythm & patient.• If no change, apply synchronised biphasic DC shock at 200J.
5	Amiodarone	<ul style="list-style-type: none">• If 3 synchronised DC shocks fail to terminate arrhythmia:<ul style="list-style-type: none">- give IV Amiodarone 300mg in 250ml of 5% dextrose over 10 to 20 minutes.- consider IV Magnesium Sulphate 2g (4ml of 50% solution) in 50ml of 0.9% saline or 5% dextrose over 20mins.- follow this with one more synchronised DC shock at 150J.• If condition remains unchanged:<ul style="list-style-type: none">- start IV Amiodarone 900mg infusion over 24 hours (preferably through a large peripheral or central vein).• Seek expert advice before administering other anti-arrhythmic drugs.
6	Stimulant induced	<ul style="list-style-type: none">• Consider an IV benzodiazepine if evidence of stimulant drug ingestion.• Consider an IV beta-blocker if available and after expert opinion.
7	Torsade de Pointes	<ul style="list-style-type: none">• Cease any medicines known to prolong QT interval.• Do not use Amiodarone.• If feasible, measure serum potassium and correct hypokalaemia.• Administer IV Magnesium Sulphate 2g (4ml of 50% solution) in 50ml of 0.9% saline or 5% dextrose over 20mins.• Repeat the dose once if necessary.



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Bradycardia with Adverse Features		
8	Atropine	<ul style="list-style-type: none">• Give Atropine 500mcg IV.• Reassess rhythm & patient.• Review the effects of any rise in heart rate on myocardial ischaemia.• If no change, repeat Atropine 500mcg IV up to total dose of 3mg.
9	Inotropes	<ul style="list-style-type: none">• If no improvement after 3mg Atropine, consider either of:• Adrenaline infusion: 2 – 10 mcg per min IV (1.5 to 7.5 ml/hr of 4mg in 50ml preparation).• If a syringe driver is not available, 10mcg boluses of Adrenaline can be used to effect:<ul style="list-style-type: none">- dilute 1ml of 1:10 000 (eg from a pre-filled 10ml syringe, 100mcg/ml) to 10 ml in 0.9% saline, this gives 10mcg/ml.- use 1ml boluses• Isoprenaline 1-10 mcg per min IV (1.5 to 15ml/hr of 2mg in 50ml 5% glucose preparation).• Reassess rhythm and patient after each change in infusion rate.
10	Transcutaneous Pacing	<ul style="list-style-type: none">• If bradycardia with adverse features persists:<ul style="list-style-type: none">- seek expert advice.- commence transcutaneous pacing using a pacing capable defibrillator.• Consult appropriate user guide to the device being used to activate pacing mode.• The broad principles are:<ul style="list-style-type: none">- 4 lead ECG - lead II view or best lead view for R wave detection on screen- Anterior – Posterior pad position is best- pacers can be configured to Demand or Fixed delivery: Fixed mode will not be affected by movement artefact.- set pacer rate at 70 bpm• Swiftly increase pacer energy (look for chest muscle twitch) – assess for pacing markers:<ul style="list-style-type: none">- electrical capture - QRS complex should follow pacing spike on monitor- mechanical capture with a palpable pulse, arterial line waveform or echocardiography• Reassess and reduce energy to minimum that maintains mechanical capture• Provide analgesia or sedation as required.• Arrange transfer to cardiology centre



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2. Document History			
Reference Number	CG016		
Version	1		
Writing group (Chair in bold)	Niall McMahon	Emergency Physician	EMRS (W)
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Date for review	April 2023		
Distribution	BASICS Scotland		✓
	Medic 1		X
	Mountain rescue teams		X
	Referring centres via service websites		✓
	Rural GPs Association of Scotland		✓
	SAS	Air Ambulance Division	for information
		Specialist Services Desk	X
	ScotSTAR	EMRS (West)	✓
		EMRS (North)	✓
		Paediatric	X
Neonatal		X	
Tayside Trauma Team		X	





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3. Scope and purpose

- Overall objectives:

Peri arrest arrhythmias can lead to critical underperfusion and possibly cardiac arrest if immediate treatment is not administered. Such arrhythmias may also present in patients who have initially achieved Return Of Spontaneous Circulation (ROSC) following cardiac arrest. It is of paramount importance that these conditions are recognised and treated accordingly. This guideline summarises the stepwise approach to treatment in the remote and rural healthcare setting.

- Statement of intent:

This guideline is not intended to be construed or to serve as a standard of care. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. Clinicians using this guideline should work within their skill sets and usual scope of practice.

- Feedback:

Comments on this guideline can be sent to: scotamb.CPG@nhs.net

- Equality Impact Assessment:

Applied to the ScotSTAR Clinical Standards group processes.

- Guideline process endorsed by the Scottish Trauma Network Prehospital, Transfer and Retrieval group.





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4. Explanatory Statements		
4.1. Initial	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • Titrate oxygen if required to target SpO₂ 94-98% • Basic Monitoring: SpO₂, blood pressure, 3 lead ECG. • Perform 12 lead ECG as soon as feasible • Standard ABC management as required. • IV access (or IO is an alternative if required) • During ABC management, assess for adverse features: <ul style="list-style-type: none"> - Shock: hypotension (systolic BP<90mmHg, confusion, cool peripheries) - Syncope - Myocardial Ischaemia: chest pain or ischaemic changes on 12 lead ECG 	Strong	Guideline (1)
4.2. Assess arrhythmia	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • Tachycardia OR Bradycardia. • Do not focus on the precise rhythm abnormality. • Decide if there is a time critical adverse feature requiring immediate intervention. • Consider potential causes of the arrhythmia, and any which may be reversible. 	Strong	Guideline (1)
4.3. Specialist Advice	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • Have a low threshold for seeking specialist advice from a cardiologist along normal referral pathways. • Consult CG011 Drug infusions for drug and infusion preparation. 	GPP	
4.4. DC Cardioversion	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • Most likely to be needed for ventricular tachycardia (VT). 	GPP	
<ul style="list-style-type: none"> • Use procedural sedation or Emergency Anaesthesia (CG007) in patients who are conscious 	Strong	Guideline (1)
<ul style="list-style-type: none"> • Use a manual defibrillator with a synchronisation function. • Apply synchronised biphasic DC shock at 100J. <ul style="list-style-type: none"> - reassess rhythm & patient. • If no change, apply synchronised biphasic DC shock at 150J. <ul style="list-style-type: none"> - reassess rhythm & patient. • If no change, apply synchronised biphasic DC shock at 200J. 	Strong	Guideline (1)



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4.5. Amiodarone	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> If 3 synchronised DC shocks fail to terminate arrhythmia: <ul style="list-style-type: none"> give IV Amiodarone 300mg in 250ml of 5% dextrose over 10 to 20 minutes. 	Strong	Guidelines (1,4)
<ul style="list-style-type: none"> consider IV Magnesium Sulphate 2g (4ml of 50% solution) in 50ml of 0.9% saline or 5% dextrose over 20mins. 	GPP	(7)
<ul style="list-style-type: none"> follow this with one more synchronised DC shock at 150J. 	Strong	Guideline (1)
<ul style="list-style-type: none"> If condition remains unchanged: <ul style="list-style-type: none"> give IV Amiodarone 900mg infusion over 24 hours (preferably through a large peripheral or central vein). 	Strong	Guideline (1)
<ul style="list-style-type: none"> Seek expert advice before administering other anti-arrhythmic drugs. 	Strong	Guideline (1)

4.6. Stimulant induced	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Consider an IV benzodiazepine if evidence of stimulant drug ingestion Consider an IV beta-blocker if available and after expert opinion <p>Patients who present with symptomatic tachycardia along with associated evidence of a drug (stimulant) cause are less likely to respond to DC cardioversion. Consider administering an IV Benzodiazepine as first line treatment and consult the National Poisons Information Service for further advice (http://www.npis.org/). A reliable and accurate clinical history may be difficult in this cohort of patients.</p>	Conditional	Guideline (3)

4.7. Torsade de Points	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Cease any medicines known to prolong QT interval. Do not use Amiodarone If feasible, measure serum potassium and correct hypokalaemia. Administer IV Magnesium Sulphate 2g (4ml of 50% solution) in 50ml of 0.9% saline or 5% dextrose over 20mins. Repeat the dose once if necessary <p>This rhythm may be self limiting but can frequently reoccur. Treatment should be expedited as the arrhythmia may deteriorate into VF. Further expert advice may be required once the arrhythmia has been corrected to prevent relapse.</p>	Strong	Guideline (1,6)



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4.8. Atropine	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • give Atropine 500 mcg IV. • reassess rhythm & patient. • review the effects of any rise in heart rate on myocardial ischaemia. • if no change, repeat Atropine 500 mcg IV up to total dose of 3mg. <p>Broad complex third degree AV block is unlikely to respond to Atropine.</p>	Strong	Guideline (1)
4.9. Inotropes	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • If no improvement after 3mg Atropine, consider either of: • Adrenaline infusion: 2 – 10 mcg per min IV. (1.5 to 7.5 ml/hr of 4mg in 50ml preparation). 	Conditional	Guidelines [1,5]
<ul style="list-style-type: none"> - if a syringe driver is not available, 10mcg boluses can be used to effect. - dilute 1ml of 1:10 000 (eg from a pre-filled 10ml syringe, 100mcg/ml) to 10 ml 0.9% saline, this gives 10mcg/ml. 	GPP	
<ul style="list-style-type: none"> • Isoprenaline 1-10 mcg per min IV (1.5 to 15ml/hr of 2mg in 50ml 5% glucose preparation) • Reassess rhythm and patient after each change in infusion rate. <p>An inotrope infusion may be required to maintain a satisfactory hear rate and blood pressure. This in turn may mitigate certain clinical adverse features however; consider effects of any rise in heart rate on myocardial ischaemia. A minimum of non-invasive blood pressure, SpO2 and ECG monitoring will be required and, if possible, intra-arterial blood pressure monitoring should be established.</p>	Conditional	Guidelines [1,6]



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4.10. Transcutaneous Pacing	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none">• <i>If bradycardia with adverse features persists:</i><ul style="list-style-type: none">- <i>seek expert advice</i>- <i>commence transcutaneous pacing using a pacing capable defibrillator</i>• <i>Consult appropriate user guide to the device being used to activate pacing mode.</i>• <i>The broad principles are:</i><ul style="list-style-type: none">- <i>4 lead ECG - lead II view or best lead view for R wave detection on screen</i>- <i>Anterior – Posterior pad position is best</i>- <i>Pacers can be configured to Demand or Fixed delivery: Fixed mode will not be affected by movement artefact.</i>- <i>Set pacer rate at 70 bpm</i>• <i>Swiftly increase pacer energy (look for chest muscle twitch) – assess for pacing markers:</i><ul style="list-style-type: none">- <i>electrical capture - QRS complex should follow pacing spike on monitor</i>- <i>mechanical capture with a palpable pulse, arterial line waveform or echocardiography</i>• <i>Reassess and reduce energy to minimum that maintains mechanical capture</i>• <i>Provide analgesia or sedation as required.</i>• <i>Arrange transfer to cardiology centre</i> <p>Transcutaneous Pacing is unlikely to provide consistent and reliable ventricular stimulation for a long period of time. Should this be the only successful treatment to raise the patient's heart rate then Transvenous Pacing will likely be required.</p>	Strong	Guidelines [1,6]



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5. References

1. Resuscitation Council (UK). <https://www.resus.org.uk/resuscitation-guidelines/peri-arrest-arrhythmias/>
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3. NICE-British National Formulary. Poisoning, emergency treatment. (July 2019) <https://bnf.nice.org.uk/treatment-summary/poisoning-emergency-treatment.html>
4. NICE-British National Formulary. Amiodarone Hydrochloride. (July 2019) <https://bnf.nice.org.uk/drug/amiodarone-hydrochloride.html>
5. NICE Clinical Guideline (CG 187). Acute Heart Failure: Diagnosing and managing acute heart failure in adults. (August 2014)<https://www.nice.org.uk/guidance/cg187/evidence/full-guideline-pdf-193260781>
6. SIGN Clinical Guideline (152). Cardiac arrhythmias in coronary heart disease: A national clinical guideline. (September 2018)<https://www.sign.ac.uk/assets/sign152.pdf>
7. NICE-British National Formulary. Magnesium Sulphate. (Nov 2019) <https://bnf.nice.org.uk/drug/magnesium-sulfate.html>