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Introduction to complex pacemakers



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Arrhythmia Nurse
Specialist

AIM

Three things to know:

- how different types of pacemakers work
- key advice to give patients and family members
- how to manage potential problems



Electrical Conduction System

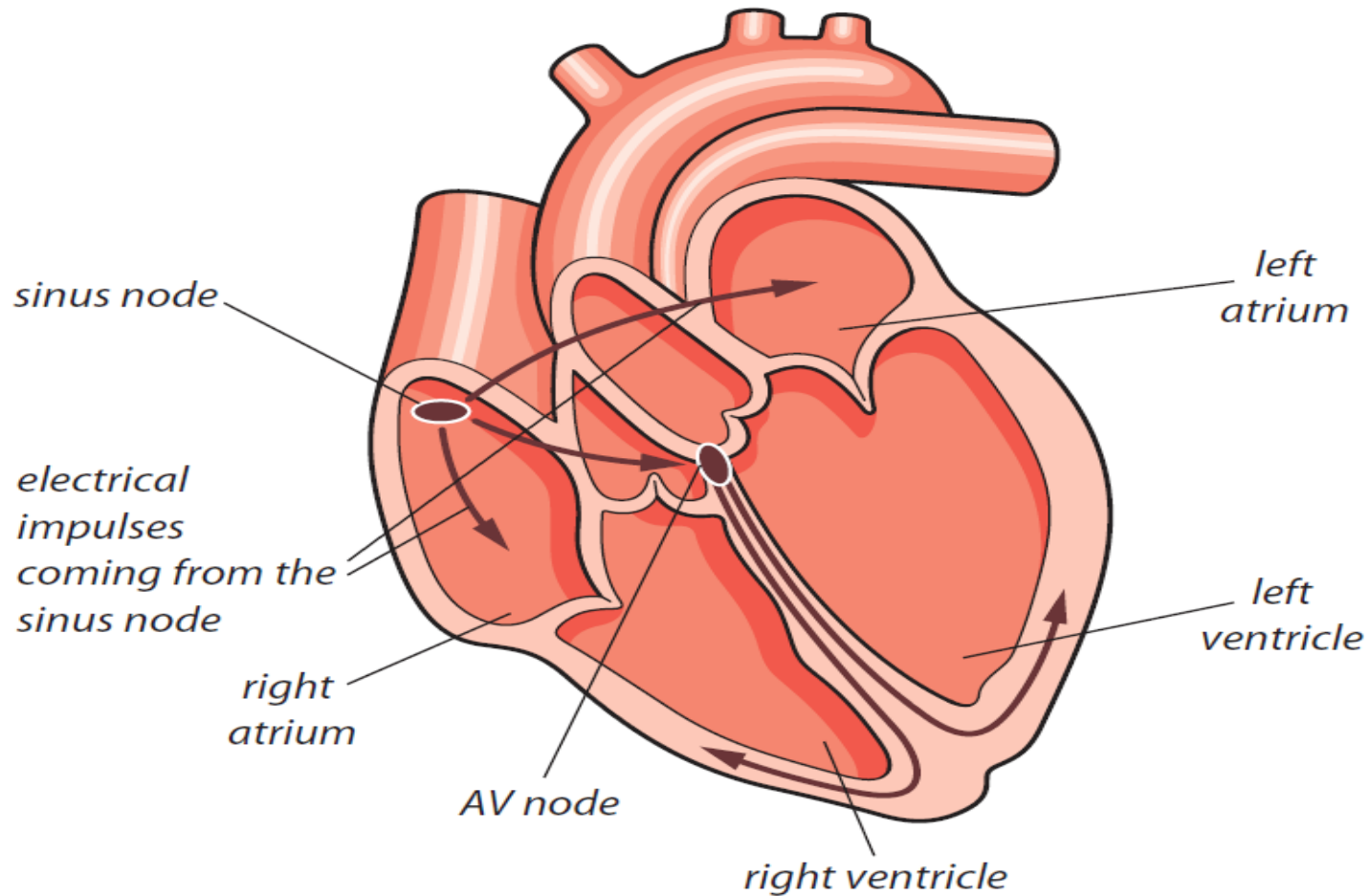


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Simple Pacemaker

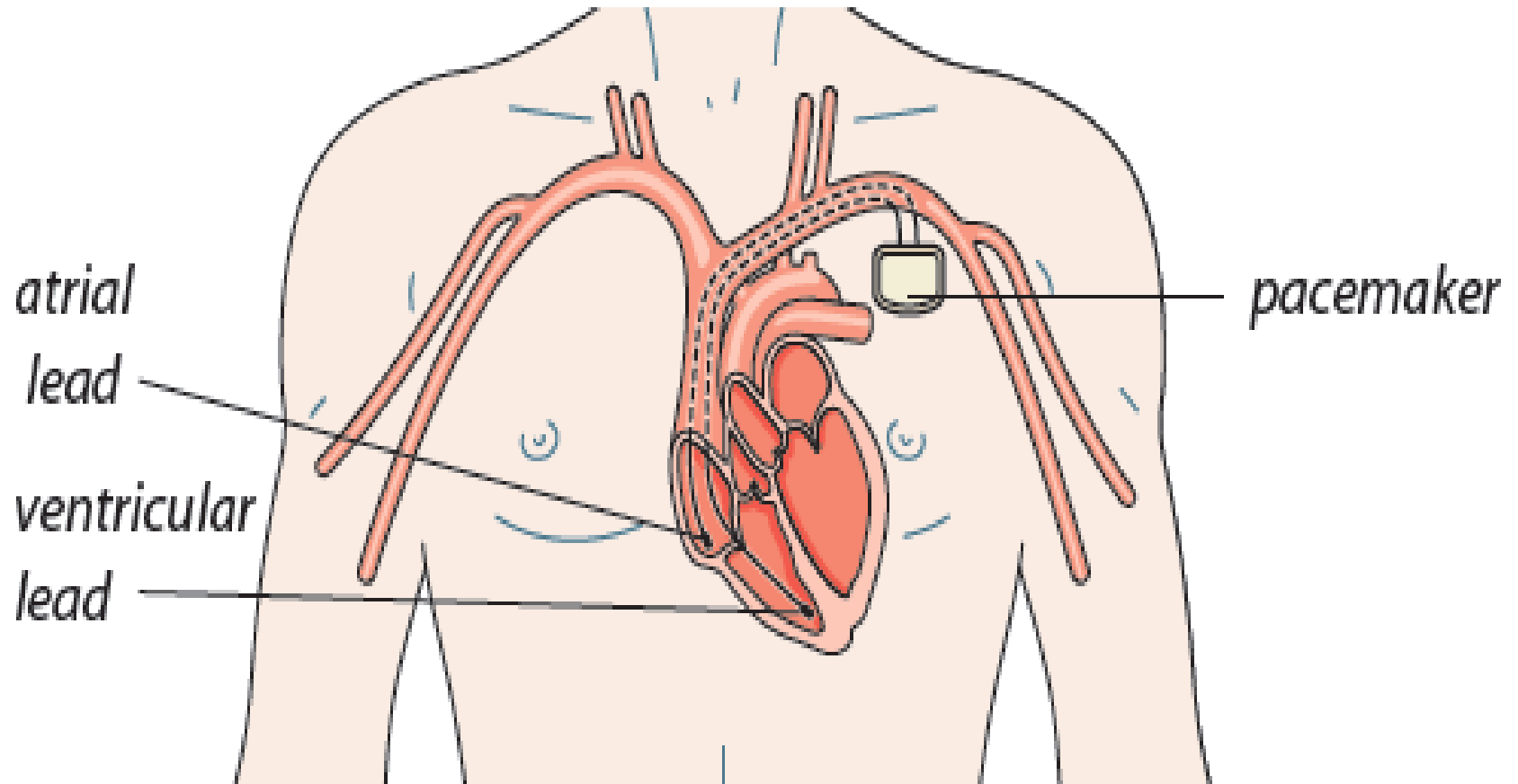


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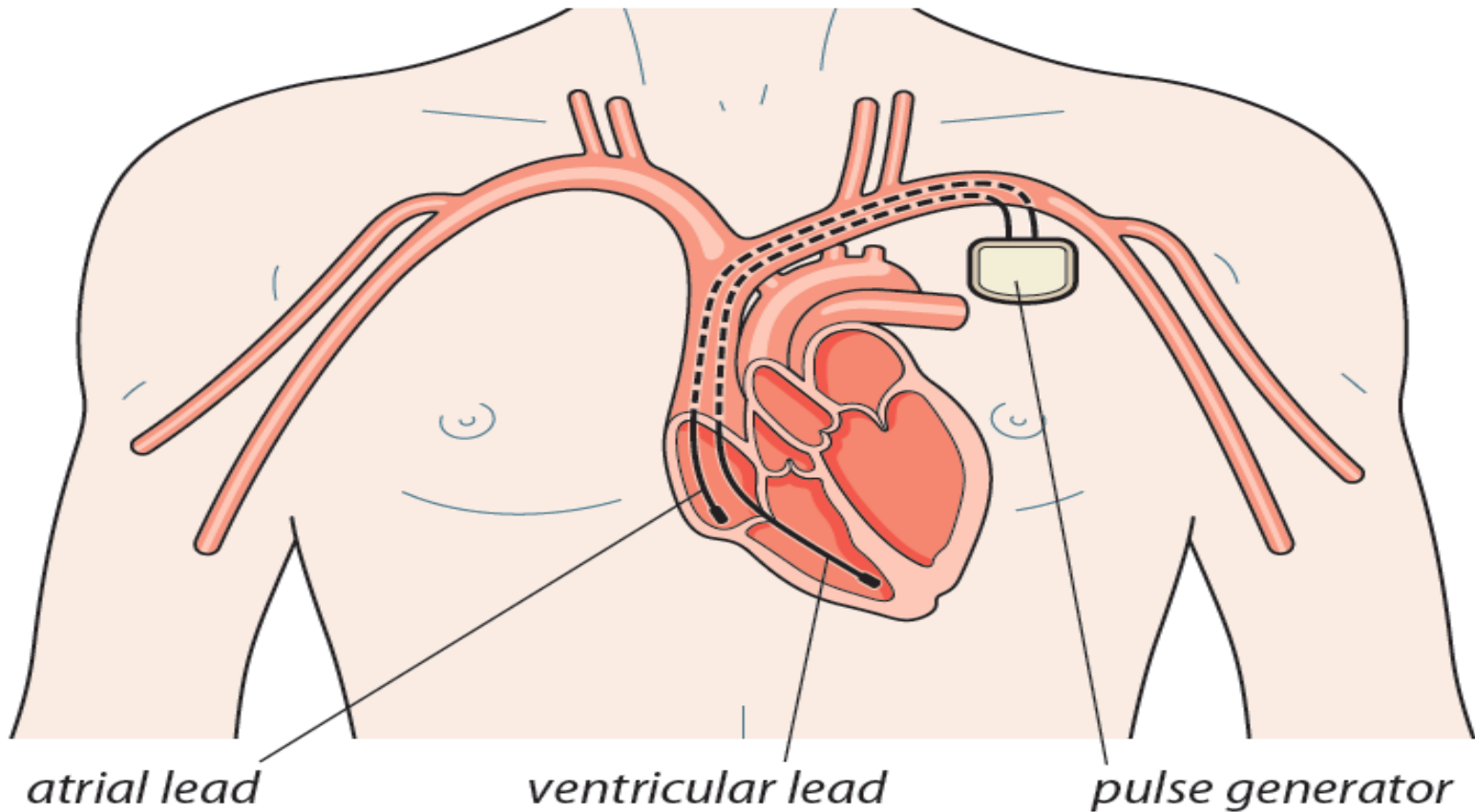
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The ICD system

(Implantable Cardioverter Defibrillator)



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Functions of a standard ICD Summary

- Bradycardia pacing
- Monitoring/recording episodes of fast atrial and ventricular rates
- Discriminates as to whether a tachycardia is coming from the atria or ventricles
- Anti-tachycardia pacing
- ICD Shock

NB: subcutaneous ICD's (rarely implanted) are designed to deliver shock therapy for lethal arrhythmias, not anti-tachycardia/bradycardia pacing (except for 30 seconds of post-shock back-up pacing)



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An ICD in action!

[You Tube Clip](#)



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What is Dysynchrony?

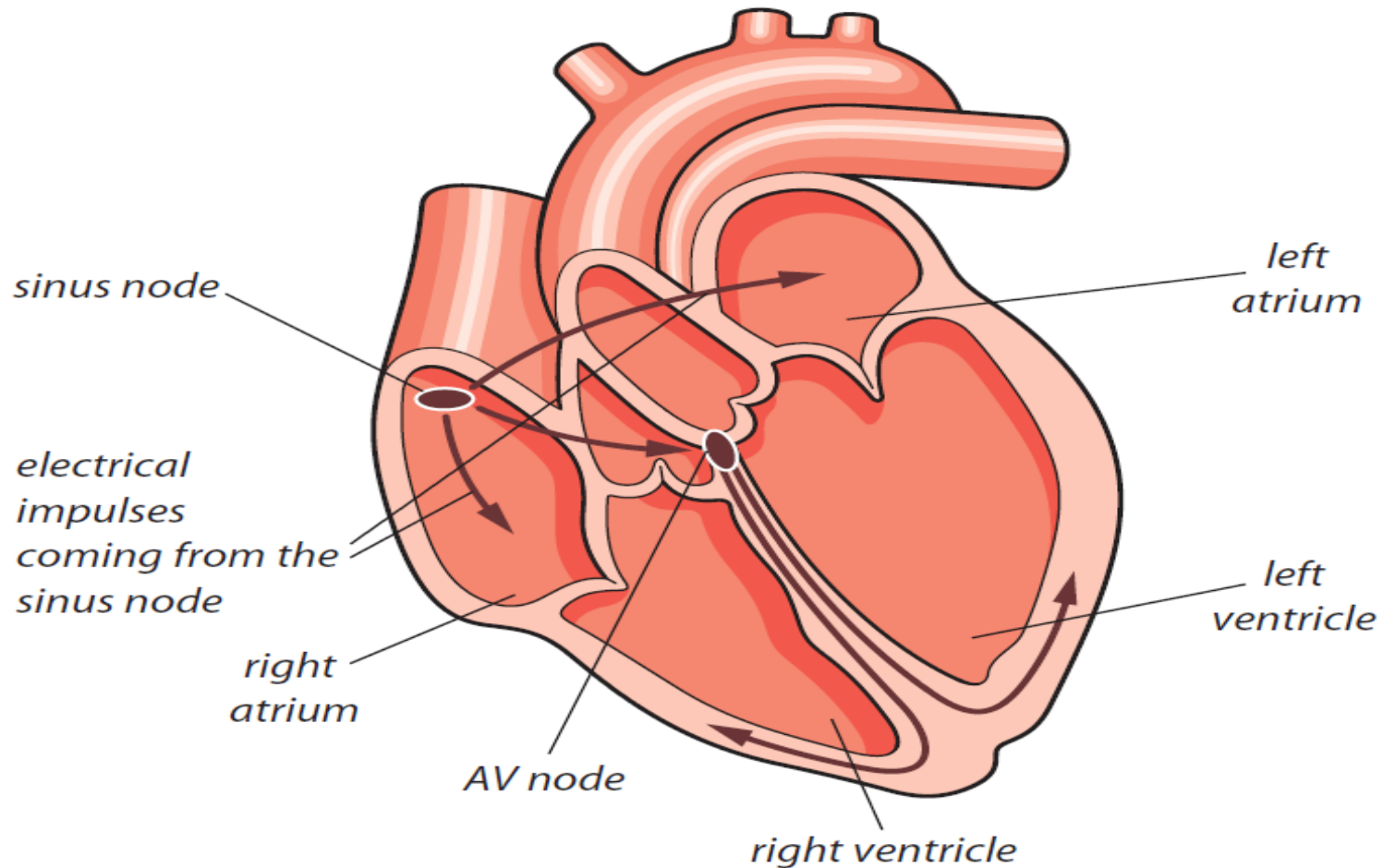


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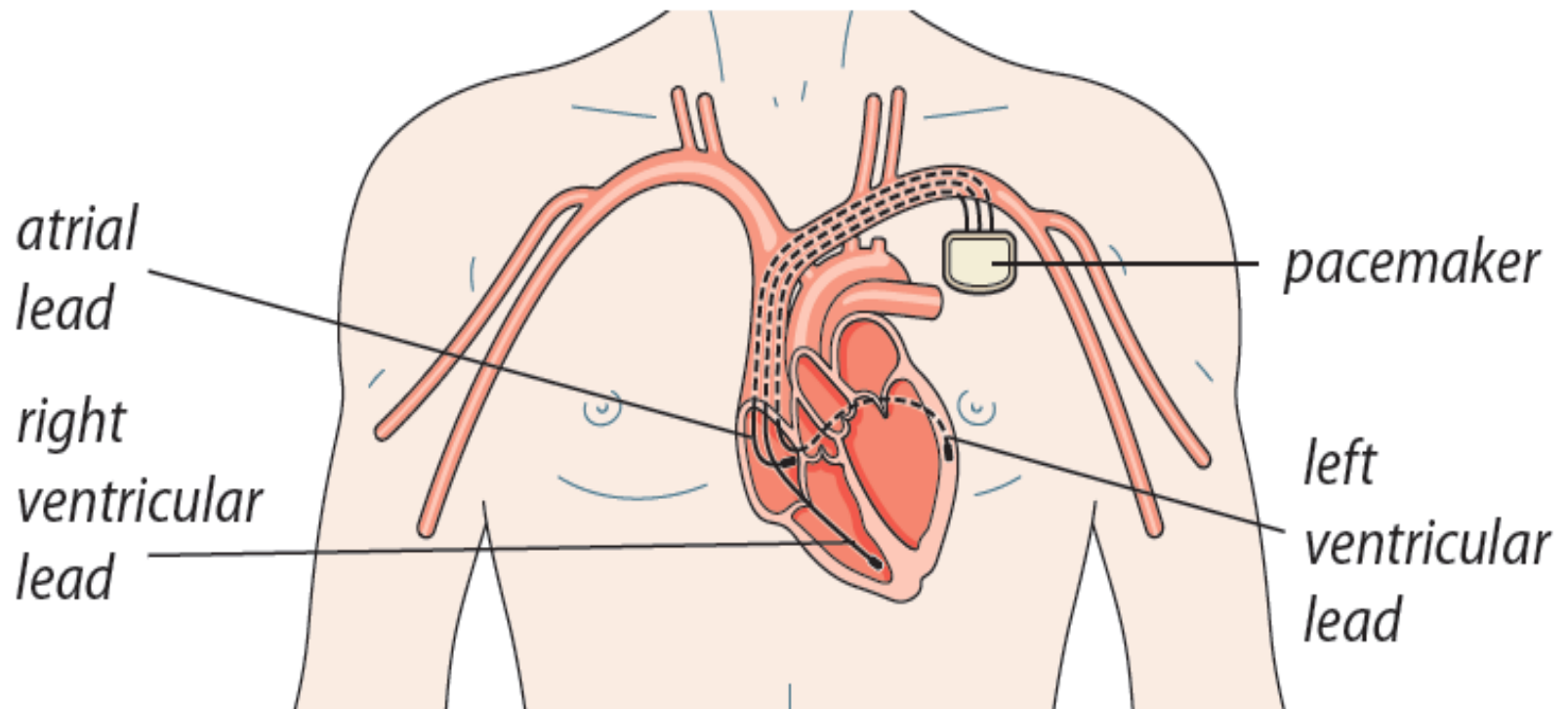


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Cardiac Re-Synchronisation pacemaker (CRT-P)



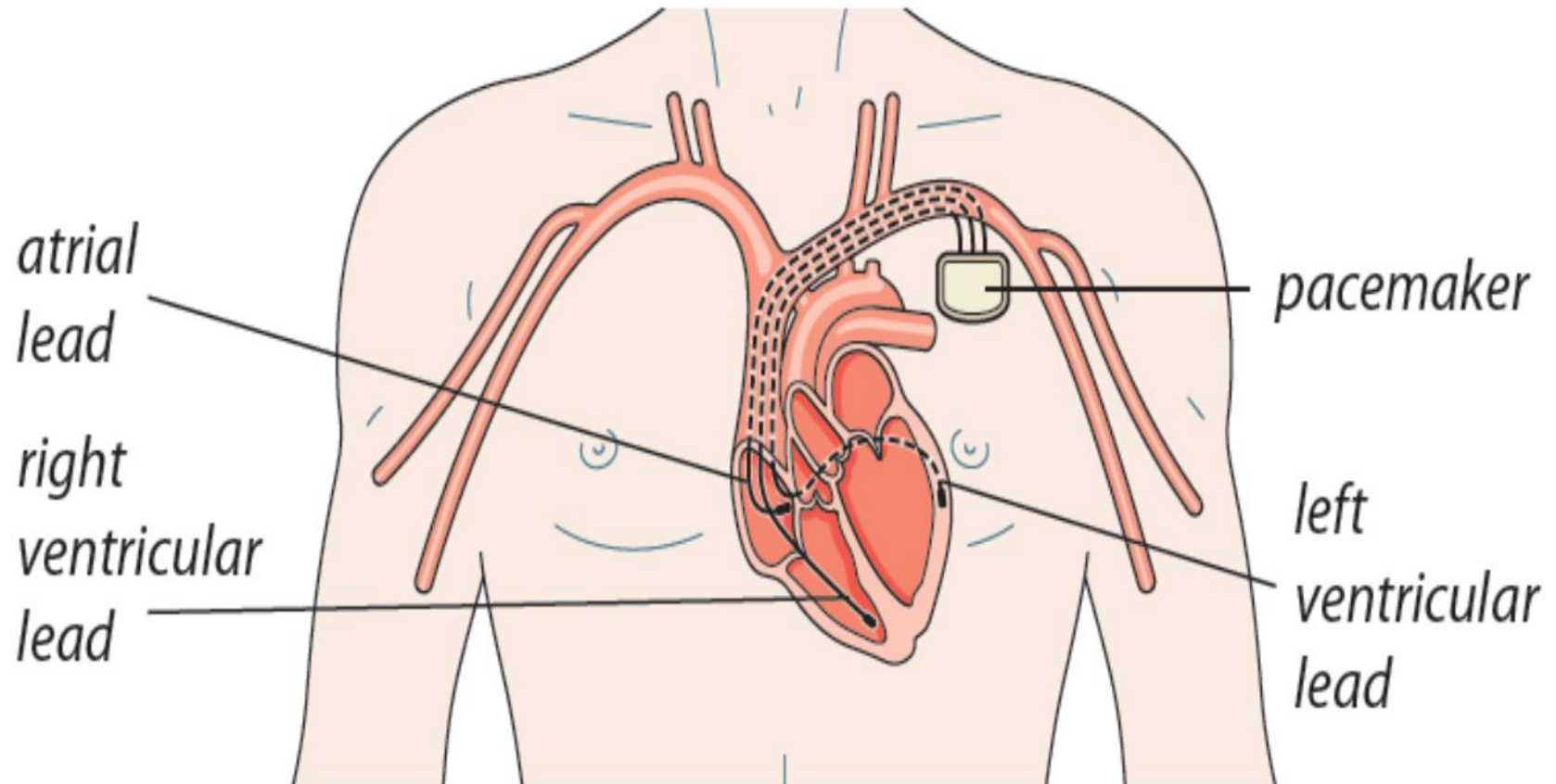


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Cardiac Re-Synchronisation Therapy with defibrillator (CRTD)

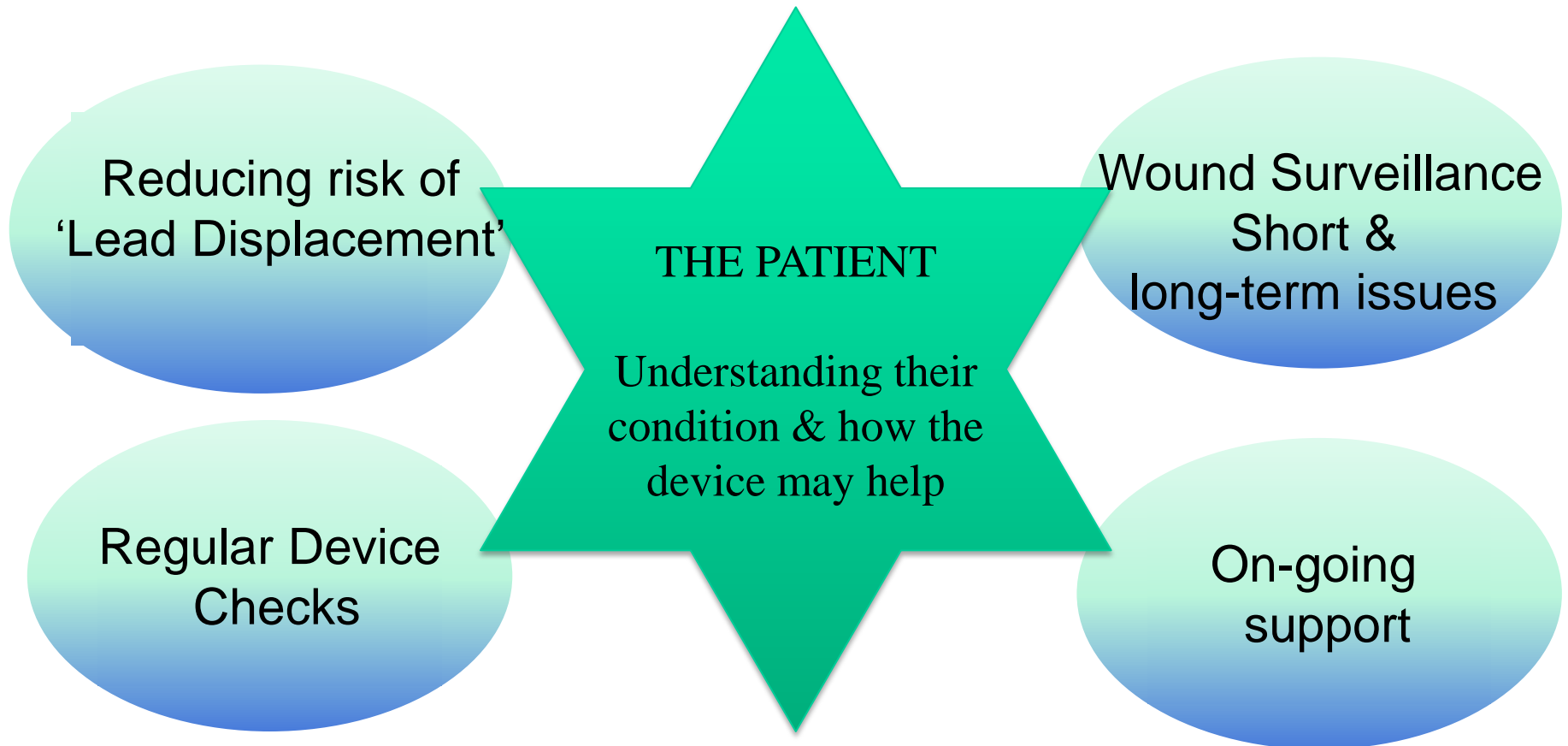


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Over-view

DEVICE	BRADY PACIN G	TACHY RECORDI NG	ANTI- TACHY PACING	DEFIB' SHOCK	BIVENT' PACING
PACEMAKER	✓	✓	✗	✗	✗
CRT-P (biventricular Pacemaker)	✓	✓	✗	✗	✓
ICD	✓	✓	✓	✓	✗
Sub-cutaneous ICD	✗ Except 30 seconds post shock pacing	✓	✗	✓	✗
CRT-D (biventricular ICD)	✓	✓	✓	✓	✓

What support is needed? Post-Implant



POST SHOCK ADVICE

Usually go to Emergency Department

However

- If a patient felt some symptoms (e.g. palpitations/dizziness) then had a shock and felt better – their implant centre may say that they can call them for a ‘next working day’ ICD check
- Help patients/partners ‘de-brief’

ALL PATIENTS SHOULD STOP DRIVING POST ICD SHOCK!

Frequently Asked Question/Concerns

- Will I know if I have a shock?
- Is my battery running out?
- I have a twitching in my abdomen whenever I lie down; is it dangerous?
- Will I feel ATP?
- Can I stop taking medication?
- Will my device shock me if I get angry or upset?
- Will defibrillator therapy always work?



Electromagnetic Interference

- **What is it?**

- **Why is it important?**

No Problem	Caution/May not be possible	Avoid
Most everyday household/office equipment	Induction hobs	MRI scans
	Metal detectors	Diathermy
Dental drills	Bench mounted tools	Electronic body mass scales
Dental ultrasonic cleaning probes	Welding equipment	Magnetic mattress pad/pillow
X-Ray		

If in doubt – Check with the Implant Centre or with the manufacturers' Help Line

Travelling with Device

- Fitness to fly/travel is determined by health status
- Adequate travel insurance
- Nearest ICD centre

No Problem	Avoid
Airport body scanners (backscatter s-ray & millimetre wave scanner)	Hand-Held 'wands' (where possible)
Airport metal detector arch (but will 'alarm')	
Planning and pacing the journey	
Enjoying the holiday!	

DVLA – ICD Driving Guidance

Group 2 Entitlement (Vocational - LGV/PCV)

Permanent loss of license

Group 1 Entitlement

Depends on whether ICD is primary or secondary prevention

Updated six Monthly:

<https://www.gov.uk/government/publications/at-a-glance>



DVLA – ICD Driving Guidance

Primary Prevention	Secondary Prevention
<ul style="list-style-type: none">• Patients can drive one month after implant*• Advised to notify DVLA• Patients are advised to inform their car insurance company	<ul style="list-style-type: none">• Cannot drive for 6 months post implant• Must notify DVLA and re-apply when eligible• Patients are advised to inform their car insurance company

* providing that no ICD shock or symptomatic ATP (anti-tachycardia pacing) has been delivered

Driving: post shock and/or symptomatic ATP

REASON FOR THERAPY	DRIVING ADVICE
Therapy was delivered appropriately but steps have been taken to avoid recurrence	May drive after six months in the absence of further symptomatic therapy
Therapy was delivered appropriately no further steps available to avoid recurrence	May drive after two years in the absence of further symptomatic therapy
Therapy was delivered inappropriately	May drive after one month providing the programming issues have been resolved to the satisfaction of the cardiologist



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**If in doubt.....discuss with
implant centre**



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Remote Monitoring

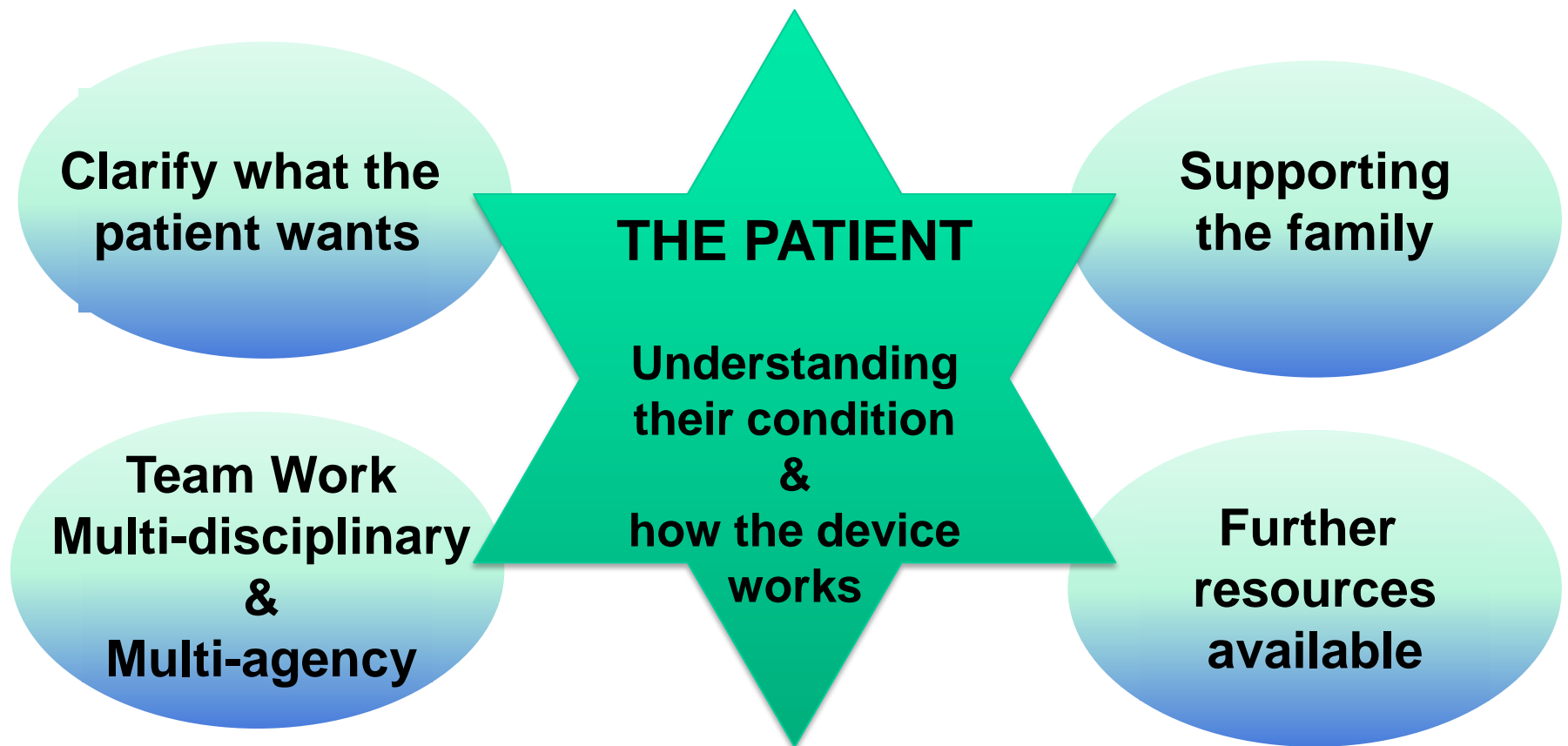


<http://googlesystem.blogspot.co.uk/2009/06/find-creative-commons-images-in-google.html>

Managing potential problems

- 'VT storms'
- anxiety and depression
- wound problems
- syncope/pre-syncope
- worsening heart failure symptoms
- discussing end of life issues

Deactivation of ICD therapies





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<https://www.bhf.org.uk>

<https://www.resus.org.uk/defibrillators/cardiovascular-implanted-electronic-devices/>

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Other Sources of Help

- BHF help-line:
 - **Heart Helpline - 0300 330 3311**
 - **BHF ICD booklet for patients and carers**
 - <http://www.bhf.org.uk/heart-health/how-we-help/support/heart-helpline.aspx>
- BHF for Healthcare professionals:
 - <http://www.bhf.org.uk/healthcare-professionals.aspx>
- Arrhythmia alliance website/link to ICD support groups:
 - ❑ <http://www.arrhythmiaalliance.org.uk>
 - ❑ **24hr HELPLINE - +44 (0)1789450787**
- DVLA 'At a glance guide': <http://www.dft.gov.uk/dvla/medical/aag.aspx>

Other Sources of Help

- Check the patient's ID card/paperwork to find out the manufacturer/manufacturer's website
- Make contact with your nearest implant centre:





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British Heart Foundation

HEART HELPLINE

0300 330 3311

community.bhf.org.uk

Information & support about your heart condition & keeping your heart healthy.

FIGHT FOR EVERY HEARTBEAT
bhf.org.uk

Phone lines open 9am to 5pm Monday to Friday.
Similar cost to 01 or 02 numbers. Registered charity numbers (225971) & (SC039426).



BHF Resources



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Summary

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- how complex pacemakers work
- key advice to give patients and family members
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ANY QUESTIONS?

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