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**Clinical Guidance**

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**Deactivating Implantable Cardioverter Defibrillators (ICDs)**

**Summary**

*This document provides guidance on the management of implantable cardioverter defibrillators (ICDs) towards the end of life and after death.*

Document Detail	
Document Type	Clinical Guideline
Document name	Deactivating Implantable Cardioverter Defibrillators (ICDs)
Document location	GTi Clinical Guidance Database
Version	1.0
Effective from	<i>February 2019</i>
Review date	<i>January 2022</i>
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Approved by, date	
Superseded documents	Guidelines for deactivating implantable cardioverter defibrillators (ICDs) in people nearing the end of their life. March 2013 South London Cardiovascular and Stroke network
Related documents	
Keywords	Implantable Cardioverter Defibrillator, ICD, magnet, reprogramming, end of life, dying, heart failure, palliative care
Relevant external law, regulation, standards	<ul style="list-style-type: none"> <li>• DH (2008) End of life care strategy: promoting high quality care for all adults at the end of their life</li> <li>• Mental Capacity Act 2005</li> </ul>

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## **Introduction**

### **1.1 Introduction**

Deactivation of implantable cardioverter defibrillators (ICDs) towards the end of life is a key component of advance care planning. Failure to discuss ICD deactivation in a timely and sensitive manner is a significant potential cause of harm in this patient group, potentially cause pain to the dying patient and distress to their family and friends.

This document provides guidance on the management of implantable cardioverter defibrillators (ICDs) towards the end of life, during cardiorespiratory arrest, and after death. It has been written by doctors, nurses, and physiologists to improve the dialogue with patients about end of life care care, facilitate better end of life experiences for patients and their relatives, and to improve understanding for patients, relatives and healthcare professionals.

This guidance applies to patients aged 18 years or older.

### **1.2 What is an ICD?**

An ICD is an implantable cardioverter defibrillator that is implanted to prevent symptoms and/or sudden death by treating ventricular tachycardia and ventricular fibrillation. It works by identifying an abnormal rhythm and treating it by either attempting to 'override' the speed of the heart in controlled bursts (known as 'antitachycardia pacing' or 'overdrive pacing') or by delivering an electric shock to the heart to reset or restore normal rhythm.

When the device is implanted in a patient, physiologists and doctors will program the device appropriately according to the indication for implant. Algorithms are selected to instruct the device to deliver appropriate therapy based on the type of ventricular rhythm it identifies.

An ICD can either inserted as a single lead (right atrial or right ventricular) or dual lead (both right atrial and right ventricular) or as a CRTD – cardiac resynchronization therapy defibrillator (right atrial, right ventricular and left ventricular through the coronary sinus). A CRT is a cardiac resynchronization therapy pacemaker without the defibrillator (often known as CRTP, the P indicating pacing). A CRTD has a defibrillator coil. A newer type of ICD (subcutaneous ICD) has a lead that is placed underneath the skin rather than within the heart.

	Pacemaker	ICD	CRT	Implantable loop recorder
<b>What are they?</b>	Device that delivers electrical pulses to your heart to keep it beating regularly	Device that can deliver a shock to the heart to 'reset' it so it can beat normally	Device that improves efficiency of the heart by coordinating left and right side of heart. May have an ICD	Records heart rhythms
<b>Why are they implanted?</b>	If heart rate is too slow or there is a block between atria and ventricles	If the patient's heart has stopped before (secondary prevention) or thought to be at risk of heart stopping (primary prevention)	If the patient has symptoms of heart failure and dyssynchronous heart contraction. ICD is decided before implant in patients at risk of heart stopping who are likely to live over a year	If the patient has palpitations or collapses, and the aim is to record the heart beat
<b>What happens if I cover it with a magnet?</b>	A magnet will change device to asynchronous mode with fixed pacing rate and risk of malignant rhythm	A magnet will deactivate the device (i.e. stop if from delivering shocks or ATP)	If there is an ICD, a magnet will deactivate the device (i.e. stop if from delivering shocks)	A magnet will not do anything but may interfere with the recording
<b>Do I need to deactivate this device</b>	No. At end of life, patients may stop having their PPM checked.	Yes	If there is an ICD then yes	No – this is a monitoring device and so does not deliver therapies

*Figure 1: Differences between pacemakers, ICD, CRT and implantable loop recorders  
ATP antitachycardia pacing, CRTD Cardiac Resynchronization therapy Defibrillator*

## ICD deactivation

### 2.1 ICD deactivation – when to discuss it

Discussion about ICD deactivation is a core component of Cardiology care and Advance Care Planning (ACP), and should be discussed before ICD insertion takes place. Further discussions relating to ICD deactivation can also occur at any stage of the person's illness, including during ACP discussions and in relation to discussions about cardiopulmonary resuscitation (CPR).

In some situations, particularly if ICD deactivation has not been previously discussed with the patient and/or those important to them, the first discussion about ICD deactivation may need to take place around the time of an acute deterioration in the patient's clinical condition, by a healthcare team that were not directly involved in the insertion of the device. These discussions should be supplemented with senior support from the relevant cardiology and specialist palliative care services as required – support is available 24 hours a day in the hospital and community setting.

Sensitive discussions about personalised end of life care can be initiated by any health care professional at any stage of a person's illness (see Figure 2). These need to be shared decisions with the person, those important to them, and all relevant healthcare professionals.

**Advice on initiating ICD deactivation discussions, when they should occur and who needs to be included in these conversations**

Who could discuss/initiate ICD deactivation?	When to discuss ICD deactivation?	Who needs to know about the ICD deactivation?
Physiologists	Pre device discussion	Patient/family
Clinicians	Consenting for device	Physiologists
Palliative Care	Insertion of device	Clinicians
GPs	Routine Review	Heart Failure Nurses
Heart Failure Nurses	Hospitalisation	Palliative Care Team
	Deterioration of symptoms	GP and Community team
	End of battery life	Bereavement team/ Mortuary

Appropriate training, support and time is needed to facilitate these discussions

*Figure 2: Who and when should ICD deactivation be discussed?*

**2.2 ICD deactivation – how to discuss it**

It is important that the decision to deactivate an ICD is communicated effectively between the team, and that everyone understands how deactivation has taken place. Deactivating an ICD is not the same as completing a DNACPR order. Deactivating an ICD does not mean the patient will die instantly, or at a set time. It means that the device will not detect and treat fast ventricular rhythms that may result in cardiac arrest. The patient is dying due to the underlying disease, and withdrawing an ICD is analogous to withdrawing renal replacement therapy or artificial ventilation. It is crucial that the bereavement team and mortuary are aware that the patient has an ICD in place and are aware if it has been deactivated.

Examples of phrases may include:

- “The pacemaker continues to work as always but we prevent the shock part that may never have activated before from delivering a shock in an inappropriate circumstance”
- “The part of the device that monitors for rhythm disturbances is no longer suitable so rather than have it shock you unnecessarily we can ensure the pacemaker continues working without it”
- “There may come a time in the future when the part of the device that monitors you if you need a shock is no longer required as it will not benefit you. At that point we may wish to adjust the settings”
- “Delivery of shocks near the end of life may be ineffective, painful and distressing to the patient”
- “Turning off the ICD will not cause death or be painful”
- “Dying may be less painful if the device is turned off”

- “If the patient’s circumstances change following the deactivation, the patient or medical team can request re-activation”
- “Deactivating an ICD can either be done using a magnet or by reprogramming the device. We would like to reprogram the device at your usual hospital and will organise an appointment to have this done over the next few days”

### 2.3 ICD deactivation – gaining consent

Figure 3 outlines the process for obtaining consent for ICD deactivation. The process is underpinned by the principles contained in the Mental Capacity Act (2005). If a patient lacks capacity to share in decision making, then the decision to deactivate an ICD needs to be made in the patient’s best interests, according to the law in that jurisdiction and involve those with the legal power to make these decisions. We recommend referring to Trust guidance on Mental Capacity and best interest decision making.

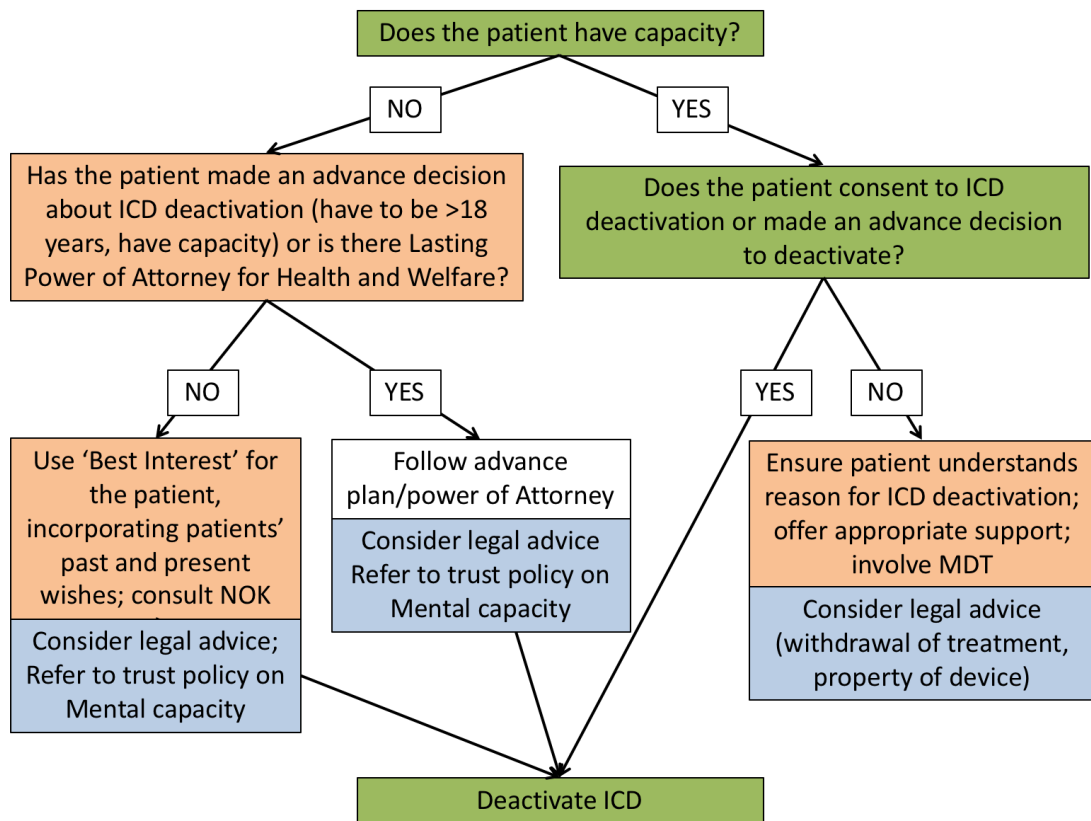


Figure 3: Consenting the patient for ICD deactivation  
NOK Next of Kin

### 2.4 Support for complex decision making

It is accepted that in occasional situations, patients’ health may improve and decisions relating to ICD deactivation may be reversed. It is recommended that such cases are discussed at the most appropriate multidisciplinary team meeting with the relevant health care professionals present.

## 2.5 Psychological support for patients with ICDs

Talking about turning off the device can be distressing for some patients and those important to them, and may be associated with anxiety. The cardiology team will be able to provide support with discussions as well as sign-posting to ICD support group and specialist psychological support.

## How to deactivate an ICD

### 3.1 ICD deactivation

Local templates should be used for documentation of decisions, ideally stored on the electronic patient record (EPR) that include the patients' details, reasons for deactivating the device, and the name of the Consultant in charge of the patient's care who has been involved in these discussions. See Appendix 2 for an example template.

An ICD can be deactivated in a planned way (by resetting the device) or can be deactivated in a more urgent situation by placing a magnet over the device.

**Deactivation requests should be made using the contact details in Appendix 1.**

In an urgent situation, please contact the relevant Cardiology team and involve the local Palliative Care team.

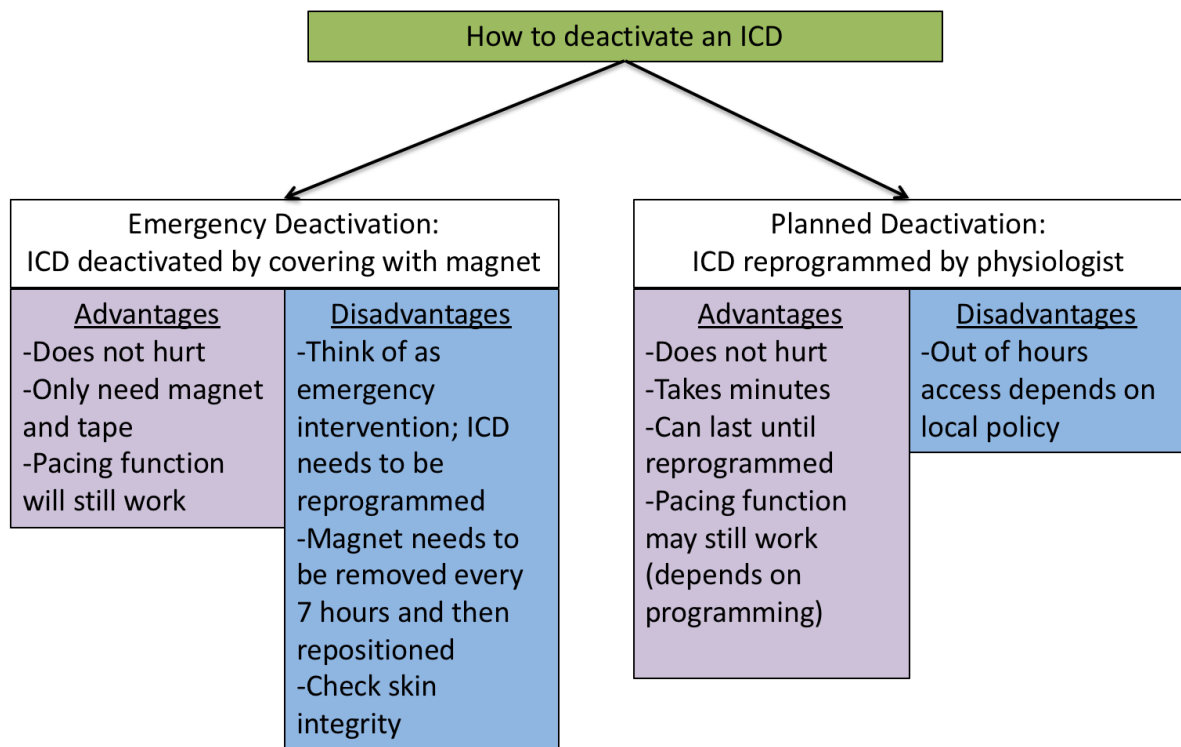


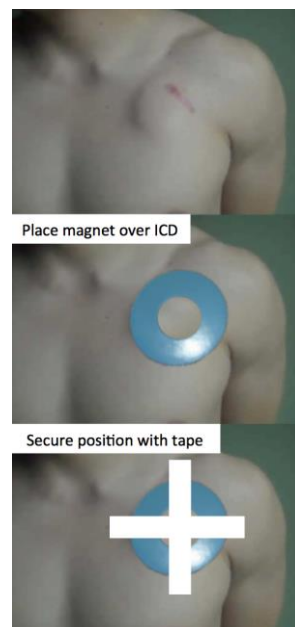
Figure 4: How to deactivate an ICD

### 3.2 Use of magnets to temporarily deactivate an ICD

When a magnet is used it is positioned over the device and taped in place (see Figure 5). This can be useful in an emergency situation pending permanent deactivation of the device by trained staff.

A magnet temporarily stops the ICD delivering shock therapies whilst in position over the ICD. Normal function is restored as soon as it is removed. Applying a magnet stops shocks occurring if the patient has an arrhythmia. Applying a magnet also does not stop any pacing function of the device, this will continue as normal.

Magnets for temporary deactivation of ICDs are held by cardiology departments as well as the community palliative care teams at GSTT and at St Christopher's Hospice. The magnet is safe for all staff to use. It does not affect staff or relatives who may have active pacemakers. It is safe to touch a patient whilst the ICD is delivering shocks – no shock will be transmitted to the person touching the patient. You will just feel a twitch but try to avoid touching their chest close to the ICD just in case.



*Figure 5: Using a magnet to deactivate an ICD*

If the skin is damaged, the patient may prefer gauze under the magnet for comfort. Similarly, some patients and relatives may prefer the magnet to be covered.

The magnet must remain in place until the physiologist has deactivated the device, even after the patient has died. This means it must remain in place when the patient is transferred to the mortuary.

It is possible for the magnet function to be deactivated using the programmer, although in practice this function is rarely used, and if used, should be documented clearly in the patients' records.



## **Cardiac Arrest**

### **4.1 What to do if the patient is in cardiac arrest?**

There are no special precautions needed when a patient with an ICD has a cardiac arrest. There will be occasions when it is not clear what type of device the patient has in situ. If the patient has a shockable rhythm during an arrest, the ICD is expected to deliver a sequence of shocks to terminate the rhythm. If this is not the case, or the rhythm persists, external defibrillation should be attempted. The pads for external defibrillation should not be placed over or close to the implanted ICD. Interrogation of the device is recommended after a cardiac arrest.

## **After death**

### **5.1 What should happen after the patient has died?**

If a patient with an ICD has suffered an unexpected sudden death, interrogating the device after death may help to establish the mechanism and cause of death as it may show you the cardiac rhythm and what the device has done beforehand.

Once a patient has died the ICD needs to be deactivated by the physiologist before the device is removed or an autopsy is performed. This is to ensure that the person carrying out the procedure is not at risk. All implantable devices must be removed before cremation, as they will explode. Physiology departments have established links with the mortuary to ensure safe disposal of devices after death.

After death all ICDs deactivated using a magnet will require subsequent deactivation by a cardiac physiologist using a programmer prior to post mortem, burial or cremation. The deactivated ICD will also need to be removed prior to cremation (normally done by the funeral home / undertaker). Please note that if the patient is in the community the Cardiac Physiologist may not always be able to make visits outside the hospital. There may be a need to arrange for the patient to be brought to local hospital. Early notice will also minimise delays in the funeral arrangements as post mortem and burial cannot be arranged until the ICD has been turned off. If the deceased person is to be cremated, the funeral home will remove the ICD beforehand as standard practice.

## 6. Related Documents and references

Pitcher D, Soar J, Hogg K, et al. *Cardiovascular implanted electronic devices in people towards the end of life, during cardiopulmonary resuscitation and after death: guidance from the Resuscitation Council (UK), British Cardiovascular Society and National Council for Palliative Care* Heart 2016; 102: A1–A17.

Guidance from the Resuscitation Council (UK), British Cardiovascular Society and National Council for Palliative Care *Cardiovascular implanted electronic devices in people towards the end of life, during cardiopulmonary resuscitation and after death* March 2015

South London Cardiovascular and Stroke Network, National Council for Palliative Care; Guidelines for deactivating implantable cardioverter defibrillators (ICDs) in people nearing the end of their life.

ICD deactivation at the end of life: Principles and practice. A discussion document for healthcare professionals. British Heart Foundation.

Carter C. Dying grandfather 'shocked back to life' 30 times.  
<http://www.telegraph.co.uk/health/healthnews/10991824/Dying-grandfather-shocked-back-to-life-30-times.html> (accessed Dec 2018)

Nambisan V, Chao D, *Dying and Defibrillation: a shocking experience* Palliative Medicine 2004; 18: 482-483

### List of Appendices

**Appendix 1** Contact details of ICD centres to arrange deactivation

**Appendix 2** Referral request for ICD deactivation – example template

## Appendix 1 Contact details of ICD centres to arrange deactivation

All patients should have a card or leaflet with details of their ICD, including the manufacturer and the hospital at which it was implanted. If you call a department, it is useful to have this information to hand.

ICD deactivation should ideally be scheduled at the hospital where the ICD was implanted.

If the implant details are not known, contact the hospital most conveniently located listed below:

<b>South East London</b>		
Guy's & St Thomas' Hospital Monday – Friday	9.00am - 5.00pm	Pacing/ICD clinic Tel: 0207 401 9249 (diverts to the senior physiologist's mobile if not answered in 15 seconds) Out of hours: cardiology registrar through switchboard or Coronary Care Unit
King's College Hospital Monday – Friday	9.00am - 5.00pm	Pacing/ICD clinic Tel: 0203 299 8167 / 8165 Email: kch-tr.CRMDevicesKCH@nhs.net Out of hours: cardiology registrar through switchboard or Coronary Care Unit
Queen Elizabeth Hospital Monday – Friday	9.00am - 5.00pm	Cardiac department Tel: 0208 836 4343
<b>South West London</b>		
St. Georges Hospital Monday – Friday	8.30am - 5.00pm	Pacing ICD Clinic Tel: 020 8725 1372/3597 Out of hours: Cardiac Physiologist on call
Croydon University Hospital Monday – Friday	9.00am - 5.00pm	Cardiology department Tel: 020 8401 3046 Out of hours: Coronary Care Unit
Epsom Hospital Monday – Friday	9.00am - 5.00pm	ECG department Tel: 01372 735735 ext: 6054 Out of hours: Coronary Care Unit
Kingston Hospital Monday – Friday	9.00am - 5.00pm	Cardiology Tel: 020 8934 3854 Out of hours: Coronary Care Unit
St Helier Hospital Monday – Friday	8.30am - 5.00pm	ECG department Tel: 020 8296 2575 Out of hours: Coronary Care Unit

Should the local centre have a system in place for electronic ICD deactivation requests please following the appropriate protocols.

**Appendix 2** Referral request for ICD deactivation – example template

<b>Request for Deactivation of Implantable Cardioverter Defibrillator (ICD)</b>	
<b>ICD Details (most patients will have a card/leaflet with this information)</b>	
<b>Manufacturer:</b> .....	<b>Implant centre:</b> .....
<b>Patient Name:</b> .....	
<b>DOB:</b> .....	<b>MRN:</b> .....
Address patient is currently located: .....	
Normal Address: .....	
GP Details: .....	
<b>Date of request</b> .....	<b>Time of request</b> .....
<b>Reason for Deactivation:</b> .....	
.....	
.....	
<b>Name of authorising Consultant / Physician (BLOCK CAPITALS)</b> .....	
<b>Signature of authorising Consultant / Physician</b> .....	
<b>Authorisation</b>	
<b>Patient</b>	
I understand the reasons for deactivating my ICD and that the decision to de-activate can be reviewed if necessary (please tick). <input type="checkbox"/>	
I agree to the deactivation of my device. Signature of patient ..... Date .....	
<b>If patient is determined not to have capacity for authorisation, then on behalf of patient:</b>	
I understand the reasons for deactivating the ICD of the patient named above and that the decision to de-activate can be reviewed if necessary (please tick) <input type="checkbox"/>	
I agree to the deactivation of their device. Signature ..... Date .....	
Relationship to patient. Please circle: Next of kin / Relative / Carer	
<b>Deactivation</b>	
<b>Date of Deactivation:</b> .....	<b>Time of Deactivation:</b> .....
Tachy therapies have been disable (please tick) <input type="checkbox"/>	Alarms off (please tick) <input type="checkbox"/>
Any other comments: .....	
Name of Cardiac Physiologist (BLOCK CAPITALS) .....	
Signature of Cardiac Physiologist .....	