



**STANDARDS FOR INTERVENTIONAL ELECTROPHYSIOLOGY STUDY
AND CATHETER ABLATION IN ADULTS
January 2014**

1. INTRODUCTION

This document replaces the previous Heart Rhythm UK document "Standards for electrophysiological studies and catheter ablation" issued in September 2010. It has been compiled by a group of interventional cardiac electrophysiologists, cardiac physiologists and specialist arrhythmia nurses drawn from both secondary and tertiary centres and approved by the Council of the British Heart Rhythm Society (BHRS) in December 2013. This document will be reviewed by BHRS Council no later than December 2015.

The purpose of the document is to facilitate the provision of high quality, evidence-based electrophysiology (EP) assessment and intervention to all patients who may benefit. This includes the identification of patients with indications for intervention, a broad description of the range of procedures available and the means by which to provide them, patient and procedure follow up, data collection, storage and submission.

It includes the best available evidence and expert opinion on current practice. The source material for this evidence is listed in the reference section.

It is recognised that competency can only be defined effectively in terms of patient outcome. Numbers given in this document are indicative and should not be taken in isolation as evidence of competency or the ability to provide a safe, high quality service. This document is not intended to disrupt or disenfranchise existing, successful electrophysiology services. It should be regarded as a template for developing best practice when starting *de novo* and a recommendation to enable successful but inadequately resourced services to develop.

This document is not intended to replace Trust policies and other legislation e.g. data protection and codes of conduct that should be adhered to in addition to the recommendations of this document.

In summary, this document aims to:

- Deliver the highest possible standard of care for patients with arrhythmias
- Encourage strong links and active collaboration between primary care, secondary care EP units and tertiary centre EP units
- Ensure that procedures are performed by appropriately skilled operators in a suitably staffed and equipped environment achieving nationally acceptable success rates with minimised complication rates
- Ensure that patients have 24/7 access to specialist arrhythmia care and advice at regional level.

2. DEFINITIONS

The following definitions are used within this document. For the purposes of this document, as some Trusts cover multiple sites, an electrophysiology centre is taken to mean a single hospital site where invasive electrophysiology procedures are performed rather than the Trust as a whole. It is accepted that operators may work at more than one centre but each centre should conform to the standards within this document. Furthermore, as more non-cardiac surgical centres develop in-house interventional electrophysiology capabilities, it is appropriate to describe the scope of practice as *standard* catheter ablation and *complex* catheter ablation. BHRS recognises the difficulty in defining absolute requirements for this artificial distinction between intervention types and acknowledges that locally available systems of care and expertise will contribute critically to the scope of locally available electrophysiology practice.

Standard EP study / catheter ablation:

Invasive electrophysiology study
Ablation of the atrioventricular node
Ablation of atrioventricular nodal re-entrant tachycardia
Ablation of accessory pathways
Ablation of cavo-tricuspid isthmus dependent atrial flutter

Complex catheter ablation:

Ablation of atrial fibrillation (AF)
Ablation of non cavo-tricuspid isthmus-dependent atrial tachycardia
Ablation of ventricular tachycardia (VT) including idiopathic focal ventricular tachycardia
Ablation of atrial or ventricular arrhythmias via the pericardial route
Modification of the sinus node
Ablation in patients with congenital heart disease

First line treatment:

The therapy is offered as the treatment of first choice.

Second line treatment:

The therapy is offered after the patient has found other treatments unsuccessful, intolerable (antiarrhythmic medication, cardiac implantable devices) or contra-indicated.

Operator:

An operator is a clinician who is either the "first operator," i.e. the main individual performing the case (can be a trainee and/or accredited electrophysiologist) or is present throughout the procedure and is actively supervising the diagnostic and therapeutic decision-making (accredited electrophysiologist). For interventional EP procedures, there may be more than one operator for both standard and complex procedures.

Training Centres:

At present, there is no mechanism for designation of Training Centres in the UK although it is likely that a process of departmental accreditation in Training and Practice will be developed in the future. EHRA recognises a distinction between Basic Training Centres and Advanced Training centres.^{1, 2} Common to both are the requirements for (i) a full cardiology service, (ii) involvement in training for

cardiology, (iii) licensed to perform interventional arrhythmia/device procedures, (iv) recording procedural data and complications. Basic Training Centres are recommended to have at least 2 device or EP specialists while advanced centres in addition should have at least one dedicated EP/devices lab and a Training Program Supervisor. It is recommended that regional Basic and Advanced Training centres work in a collaborative and mutually supportive fashion.

3. TREATMENT INDICATIONS

Catheter ablation is primarily a therapy that improves quality of life although in certain situations may improve prognosis. Approximately 16,000 ablation procedures were performed in the United Kingdom in 2012 across 48 centres.³ The various indications for catheter ablation are clearly described in numerous international guidelines and consensus statements^{4, 5} and the National Service Framework for Coronary Heart Disease chapter 8 with some aspects of catheter ablation already examined and approved by NICE.⁶⁻⁸ It is not the purpose of this document to reinterpret peer reviewed, published guidance. It is recognised, however, that such guidance may not cover all patient groups and may not be appropriate in certain situations. Furthermore, clinical judgement based on published evidence should be used for indications not yet considered by NICE. It is important to demonstrate compliance with best practice and regular audit of procedure indications and outcomes is strongly recommended. It is essential that all interventional EP centres ensure accurate and timely procedure data submission to the national CRM database.

In summary, BHRS recommends that catheter ablation is offered as:

First line treatment for:

All regular supraventricular tachycardias (SVTs) including cavo-tricuspid isthmus dependent atrial flutter that are either causing symptoms or have potential to produce tachycardia-related cardiomyopathy

Second line treatment for:

Symptomatic AF

AF (symptomatic or asymptomatic) that has potential to produce or be associated with tachycardia cardiomyopathy (rate control with AV node ablation and pacing or rhythm control with AF ablation)

Symptomatic VT, VT storm or VT leading to intolerable or very frequent ICD therapy

VT with the potential to produce tachycardia-related cardiomyopathy

For complex ablation, the development of a multidisciplinary approach to patient selection, management and follow up is recommended. Involvement of physicians (interventional electrophysiologists, imaging and heart failure specialists), physiologists, specialist arrhythmia nurses to aid in assessment of suitability for ablation and follow up may lead to improved patient outcomes. BHRS recommends that the appropriate international guidelines be used to inform practice and that the reasons for practice outside well established and accepted guidelines and consensus statements be clearly justified.

4. REQUIREMENTS FOR PERFORMING CATHETER ABLATION

Safe invasive electrophysiology assessment and treatment requires the appropriate environment, equipment, trained personnel and culture.⁹ BHRS recommends that all centres and cardiologists performing EP studies should also have competency to proceed safely to catheter ablation if necessary including access to the left atrium and great vessels if required. All electrophysiology studies and ablations should be performed in units that meet or exceed the quality standards, with a minimum of two active consultant cardiac electrophysiologists per centre, one of whom should ideally hold BHRS, EHRA or IBHRE certification. Formal arrangements for handover, in-hours and out-of-hours expert cover and on-going care should be in place.

Cardiac arrhythmias are a major source of morbidity and mortality for patients with Adult Congenital Heart Disease (ACHD) and the optimal management strategy for many of these arrhythmias is as yet undetermined. BHRS recognises that advanced interventional EP training in ACHD is unlikely to be achieved within the 2 year subspecialty training programme and should be the focus of further training for appropriate individuals. These patients are often complex and their care should be coordinated through a multidisciplinary meeting including specialist electrophysiology input. Electrophysiology interventional procedures in ACHD patients should include an adult cardiac electrophysiologist trained in complex adult EP intervention. More in depth cross-training of electrophysiologists from both paediatrics and adult cardiology is needed to meet the special needs of these patients. It is reasonable to recommend that interventional arrhythmia procedures be performed at centres where the staff are experienced with the complex anatomy and distinctive arrhythmia substrates encountered in congenital heart defects.¹⁰ These procedures should not be performed in non-specialist centres or by individuals without the appropriate expertise in cardiac electrophysiology.

4.1 CARDIOLOGISTS – training requirements

This section refers to cardiologists performing standard and complex catheter ablation procedures.

- a. Trainees should have achieved a CCT in cardiology and completed a recognised EP training program in a Deanery-designated training centre. The programme should include at least 2 years of subspecialty training in heart rhythm management with dedicated time within that programme specialising in electrophysiology and ablation
- b. Trainees should have completed a log book of procedures
- c. Trainees should have been actively involved with at least 200 standard ablation procedures and performed 50 as first operator
- d. Trainees should have completed training in transseptal puncture and performed >20 transseptal punctures as first operator
- e. Trainees may also elect to train in more complex ablation techniques, the requirements for which are more exacting than for standard ablation.¹¹ To achieve the minimum standard for training, trainees should have performed:

- For complex atrial arrhythmias, to have been actively involved with at least 100 complex atrial ablation (primarily AF and left atrial tachycardia) with 50 as first operator
 - For ventricular arrhythmias in structural heart disease or involving 3D electroanatomic mapping – been actively involved with 20 ablations with 10 as first operator
 - For complex congenital heart disease – been actively involved with 20 ablations with 10 as first operator
 - For epicardial ablation, been actively involved with 10 “dry” pericardial punctures and to have performed 5 “dry” punctures as the first operator
- f. Trainees should not be permitted to perform procedures unsupervised until they have received a certificate of completion of specialist training. BHRS recognises that the level of supervision will appropriately vary according to the expertise of the individual trainee
 - g. Trainers should be in whole time employment and spend at least 80% of their working time involved in heart rhythm management. Cardiac electrophysiologists who are working part time can contribute to training but should not be the primary clinical or education supervisor
 - h. Trainers should be actively involved in heart rhythm audit and research
 - i. Trainers should achieve the standards required for maintenance of competence
 - j. Trainers should be aware of the recommendations by the professional bodies pertaining to the specialty, have annual appraisal and maintain a CPD diary

4.2 CARDIOLOGISTS – maintenance of competence

- a. There should be a minimum of 2 active interventional cardiac electrophysiologists per centre¹¹ (one of whom should ideally be BHRS, EHRA or IBHRE certified), with formal support from larger centres encouraged for centres establishing de novo invasive EP services. Although it is possible to perform catheter ablation in a centre with one competent specialist, this is not a sustainable model of care for the development of a high quality, comprehensive heart rhythm service
- b. Complex ablation should not be performed in single operator centres
- c. All interventional electrophysiologists should perform at least 50 catheter ablation procedures per year as an “operator” (as defined above). For those undertaking complex ablation, a minimum of 25 procedures should be complex, however, 50 is desirable. Those undertaking less than 25 AF ablations per year have a demonstrably higher complication rate.¹² An operator performing more than 50 complex ablations per year will be deemed to have met the minimum requirements for simple and complex ablations. The association between complications and case volume is acknowledged by BHRS and is the justification behind these minimum basic requirements.¹² BHRS recognises the changing case mix encountered during both training and consultant practice and encourages

all electrophysiologists to maintain their skills and knowledge in both simple and complex cases.¹³

- d. If a cardiologist does not perform this number of procedures per year then competence should be independently assessed in accordance with current StR training guidelines* (a structured report should be obtained from the trainer/assessor on competency for "sign off." This report should include the number of cases performed and the level of competency as assessed by the trainer/assessor. Assessment should consist of successful completion of 6 DOPS in catheter ablation at level 3 by at least 2 assessors)
- e. All cardiologists performing catheter ablation must undertake appropriate CPD in electrophysiology including implications for driving
- f. All electrophysiologists must audit their personal complications and share these within their centre at least quarterly and through the national CRM database for clinical governance purposes. If an operator's complications were to exceed accepted limits¹³, practice should be reviewed locally by the appropriate clinical governance structures already in place and if necessary, advice sought from elsewhere within the UK. Operators performing fewer than 50 procedures per year may need to average their figures over 2 or more years to account for random variation. For consultants engaged in a supervising role, complications occurring during a procedure will be ascribed to the consultant responsible for the patient for the purposes of data returns.

4.3 CARDIAC PHYSIOLOGISTS / HEALTH CARE SCIENTISTS (HCSs)

- a. There should be at least 2 cardiac physiologists / HCSs actively involved in interventional electrophysiology where these procedures are performed
- b. Each physiologist / HCS must have had appropriate training in the execution of electrophysiology studies and catheter ablation
- c. At least 1 physiologist / HCS should have current accreditation in catheter ablation and electrophysiology (BHRS, EHRA or IBHRE)
- d. All physiologists / HCSs must undertake appropriate continuing professional development in catheter ablation and resources made available for them to do so
- e. Each physiologist / HCS should be actively involved in at least 30 electrophysiology procedures per year. If a physiologist / HCS does not perform this number of procedures in a 12 month period then competence should be independently reassessed.

4.4 SPECIALIST ARRHYTHMIA NURSES

- a. Hospitals delivering specialist cardiac arrhythmia care are expected to develop the role of Cardiac Arrhythmia Nurse Specialist at an appropriate (and sustainable) level as recommended in the NSF Chapter 8⁶. Ideally, at least 2 nurses per centre should be denoted as specialist arrhythmia

* Operators performing fewer than 50 procedures per year may need to average their figures over 2 years to account for random variation, however, the necessity to do this should be seen as an exception

nurses to allow continuity of care during periods of absence and can be achieved if necessary by nurses taking up dual or part time roles

- b. Cardiac arrhythmia nurses should receive training appropriate to their involvement in the CRM team and should work according to protocols developed within their centre and nationally
- c. Nurses should undertake appropriate CPD in heart rhythm management and resources made available for them to do so. Nurses should be encouraged and supported to undertake BHRS certification
- d. Where nurses are running outpatient clinics independently, they should have same day direct telephone access to a consultant and the opportunity to meet with the supervising consultant at least fortnightly to discuss clinical cases

4.5 CENTRES

In order to comply with the requirements for individual operators, centres performing catheter ablation procedures should undertake a minimum of 50 standard ablations per year plus a minimum of 50 complex ablations per year (if they undertake these procedures). This should be regarded as a minimum and if centres undertake training of SpRs or others, it would be expected that they would undertake significantly more procedures (see EHRA recommendations below)*.

Basic requirements – standard ablation:

Centres performing catheter ablation procedures must have a minimum set of equipment to safely carry out these procedures. These should include:

- a. Wards with bedside cardiac monitoring equipment including effective rhythm alarm systems and capable of storing 24 hours of continuous ECG data
- b. Nursing staff experienced in care and management of patients with cardiac arrhythmias
- c. Facilities for cardiopulmonary resuscitation, temporary and permanent pacing
- d. A catheter laboratory equipped with modern X-ray equipment and the appropriate patient and operator radiation monitoring systems in place
- e. Facilities for anaesthesia and ventilation within the laboratory in the event that they are needed
- f. A modern digital electrophysiology recording and storage system and haemodynamic monitoring; a programmable stimulator; a radiofrequency generator specifically for EP procedures
- g. Equipment for pericardiocentesis

* As an indicator of the current European perspective on training centres, EHRA uses case load as one metric to distinguish between basic and advanced training centres. Under this metric, a basic centre should perform ≥ 100 cardiac device implants, ≥ 100 EP studies and ≥ 50 ablations per year. An advanced training centre should perform ≥ 50 CRTD/P implants, ≥ 50 ICDs and ≥ 100 pacemakers per year; ≥ 250 EP studies, ≥ 200 standard ablations and ≥ 100 LA ablations (atrial fibrillation and atrial tachycardia).

h. Echocardiography

Additional requirements – complex ablation:

For centres undertaking complex ablation procedures, BHRS advises that there should be on site access to emergency cardiothoracic surgery or arrangements in place for immediate transfer. While acknowledging that this will be rarely employed, as the scope increases of complex left atrial, ventricular and epicardial procedures, it is crucial that optimum patient safety measures are in place to manage rare but severe complications. Where not available on-site, an agreed written protocol must be in place with the local cardiac surgical centre and local ambulance service to provide emergency transfer and surgical cover. In addition, the time taken for a patient to thoracotomy should be of a similar order to that possible with on-site surgical facilities where a surgical team is not on stand-by. Centres undertaking complex ablation should have ready access to the following:

- a. Electroanatomic mapping hardware
- b. Haemodynamic assist devices (intra-aortic balloon pump, mechanical assist devices) for VT ablation in structural heart disease
- c. Intensive Therapy Unit availability for planned high-risk cases

5. POST PROCEDURE FOLLOW UP STANDARDS

Standard ablation:

All patients who undergo catheter ablation should be followed up at least once in a clinic supervised by the operator to allow audit of the outcomes of the ablation performed. Some centres may choose to do this using remote follow up but time must be set aside to talk to patients (even by phone), examine their follow up data (ECG/Holter arranged locally) and log the outcome in a database. Follow up must also be consistent with national database requirements.

Complex ablation:

BHRS endorses the 2012 HRS/EHRA/ECAS expert consensus statement on catheter and surgical ablation of atrial fibrillation.¹⁴ Some points deserve special mention:

- a. ECG confirmation of the diagnosis of AF is mandatory prior to recommending catheter ablation as a treatment
- b. Cardiac imaging to assess cardiac structure and function is recommended prior to catheter ablation
- c. Anticoagulation is recommended following catheter ablation, tailored to the stroke risk of the patient rather than to the anticipated effect on frequency of atrial fibrillation. The CHA₂DS₂-VASc scoring system should be used in preference to the CHADS₂ score
- d. Following successful catheter ablation, patients should be followed up for at least 1 year in the outpatient setting
- e. Patient related outcome measures (PROMS) should be collected following catheter ablation of AF

- f. Patients who have undergone ablation should be provided with a contact number at the ablating centre to report symptoms occurring within the first six weeks following ablation. Atrio-oesophageal fistula is likely under-reported and fatal if not recognised and treated early.¹⁵ Diagnostic delay following post-procedure presentation to a non-ablation centre can be reduced by early communication with the ablation centre. Protocols should be in place for the diagnosis and management of this rare but catastrophic complication.

6. AUDIT

Complications associated with catheter ablation typically occur at the time of the procedure or shortly thereafter i.e. within six weeks. There are also occasional advice and safety notices from manufacturers and the MHRA which necessitate timely action.

- a. All ablation centres must collect data on their patients, procedures and follow-up which is immediately available and facilitates audit. It is mandatory that all hospitals performing catheter ablation submit accurate and timely procedural data to the national CRM database. This is a national quality requirement and is audited by the Care Quality Commission
- b. In addition, the audit data should be presented and discussed in a multidisciplinary team meeting at least quarterly. Attendance should be mandatory for trainers and trainees alike.

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