

# 2021 Essential Messages from ESC Guidelines

Clinical Practice  
Guidelines Committee

## Cardiac Pacing

Guidelines on cardiac pacing and  
cardiac resynchronization therapy



**ESC**

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# Essential Messages

## 2021 Essential Messages from the ESC Guidelines on cardiac pacing and cardiac resynchronization therapy\*

Developed by the Task Force on cardiac pacing and cardiac resynchronization therapy of the European Society of Cardiology (ESC)

With the special contribution of the European Heart Rhythm Association (EHRA)

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Patient Forum

\*Adapted from the "2021 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy" of the European Society of Cardiology (European Heart Journal; 2021 - doi: 10.1093/eurheartj/ehab364).

# 2021 ESSENTIAL MESSAGES FROM THE ESC GUIDELINES ON CARDIAC PACING AND CARDIAC RESYNCHRONIZATION THERAPY

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# Key messages

1. In the evaluation of candidates for permanent pacemaker implantation, a thorough and detailed pre-operative evaluation is recommended. This should always include careful history taking and physical examination, laboratory testing, documentation of the type of bradyarrhythmia requiring treatment, and cardiac imaging. In selected cases, additional tests, EPS, and/or genetic testing are indicated.
2. Ambulatory ECG monitoring is useful in the evaluation of patients with suspected bradycardia or cardiac conduction disorder, to correlate rhythm disturbances with symptoms. Choice of type of monitoring should be based on frequency and nature of symptoms and patient preferences.
3. In patients with SND including those with bradycardia-tachycardia type of SND, when symptoms can clearly be attributed to bradyarrhythmia, cardiac pacing is indicated.
4. In patients with SR and permanent or paroxysmal third- or second-degree type 2 or high-degree AVB, cardiac pacing is indicated irrespective of symptoms. Advanced HF strategies (heart transplantation/MCS) may be appropriate in selected patients.
5. In patients with permanent AF and permanent or paroxysmal AVB, single-lead ventricular pacing is indicated.
6. In patients with syncope and unexplained falls, the diagnosis should be ascertained using the available diagnostic methods before pacemaker treatment is considered.
7. In patients with symptomatic HF and LVEF  $\leq 35\%$  despite OMT who are in SR and have LBBB QRS morphology, CRT is recommended when QRS duration is  $\geq 150$  ms, and should be considered when QRS duration is 130-149 ms. For patients with non-LBBB QRS morphology, evidence for benefit of CRT is less convincing, especially with normal PR and QRS duration  $< 150$  ms. CRT should not be used in patients with HF and QRS duration  $< 130$ ms, unless there is need for ventricular pacing.
8. Selection of patients for CRT based on imaging is limited to the measurement of LVEF, whereas the assessment of other factors, such as extent of myocardial scar, presence of mitral regurgitation, or RV systolic function, is important to anticipate potential non-responders who may need additional treatments (e.g. mitral valve intervention).
9. In patients with permanent AF, symptomatic HF, LVEF  $\leq 35\%$ , and QRS  $\geq 130$  ms who remain in NYHA class III or ambulatory IV despite OMT, CRT should be considered.
10. For patients with AF and CRT, AVJ ablation should be considered when at least 90-95% effective biventricular pacing cannot be achieved.

## Key messages

11. For patients with high-degree AVB and an indication for cardiac pacing who have HF<sub>r</sub>EF (LVEF < 40%), CRT rather than RV pacing is recommended.
12. HBP may result in normal or near-normal ventricular activation, and is an attractive alternative to RV pacing. To date, no data from randomized trials support that HBP is non-inferior to RV pacing with respect to safety and efficacy. Therefore, HBP may be considered for selected patients with AVB and LVEF > 40%, who are anticipated to have > 20% ventricular pacing.
13. In patients offered HBP, implantation of an RV lead used as 'backup' for pacing should be considered individually.
14. HBP may correct ventricular conduction in a subset of patients with LBBB and may therefore be used in lieu of biventricular pacing for HBP-based CRT in selected patients.
15. In patients treated with HBP, device programming tailored to specific requirements of HBP must be ensured.
16. Implanting a leadless pacemaker should be considered when no upper extremity venous access exists, when risk of device pocket infection is particularly increased, and in patients on haemodialysis.
17. Patients undergoing TAVI are at increased risk of developing AVB. Decisions regarding cardiac pacing after TAVI should be taken based upon pre-existing and new conduction disturbances. Ambulatory ECG monitoring for 7-30 days or EPS may be considered in patients post-TAVI with new LBBB or progression of pre-existing conduction anomaly, but not yet any indication for a pacemaker.
18. In patients undergoing surgery for endocarditis or tricuspid valve surgery who have or develop AVB under surgery, placement of epicardial pacing leads during surgery should be considered.
19. To reduce the risk of complications, pre-operative antibiotics must be administered before CIED procedures, chlorhexidine alcohol should be preferred for skin antisepsis, and cephalic or axillary vein access should be attempted as first choice.
20. Heparin bridging should be avoided in CIED procedures to minimize the risk of haematoma and pocket infection.
21. In patients undergoing a CIED reintervention procedure, using an antibiotic-eluting envelope may be considered to reduce the risk of infection.

## Key messages

22. In the majority of patients with a pacemaker or CRT, a wellindicated MRI can be performed if no epicardial leads, abandoned or damaged leads, or lead adaptors/extendors are present, and certain precautions are taken.
23. Radiation therapy can be offered to patients with a pacemaker or CRT if an individualized treatment planning and risk stratification is done beforehand and the device is interrogated as recommended around the period of radiation therapy.
24. Remote device management is valuable for earlier detection of clinical problems and technical issues, and may allow longer spacing between in-office follow-ups.
25. The principles of patient-centred care and shared decision-making should be used in the consultation both pre-operatively and during follow-up for patients considered for or living with a pacemaker or CRT.

# Main gaps in evidence and areas for future research

Clinicians responsible for managing pacemaker and CRT candidates, and patients, must frequently make treatment decisions without adequate evidence or consensus of expert opinion. The following is a short list of selected, common issues that deserve to be addressed in future clinical research.

1. Best pre-implant evaluation programme, including when to apply advanced imaging methods to ensure optimal choice of CIED for each patient.
2. Benefit of implementing genetic testing of CIED patients and their relatives when conduction tissue disease is diagnosed.
3. Whether use of rate-adaptive pacing in general is beneficial in patients with SND.
4. Whether catheter ablation of AF without pacemaker implantation is non-inferior to pacemaker implantation with respect to freedom from bradycardia-related symptoms in patients with symptomatic conversion pauses after AF.
5. In patients with reflex syncope, studies of which pacing mode is superior are needed.
6. In patients with an indication for VVI pacing, the long-term efficacy and safety of choosing leadless pacing need to be documented in RCTs.
7. In patients with HF, it remains to be shown that CRT improves outcome in patients without LBBB.
8. In patients with permanent/persistent AF, HF, and BBB, any beneficial effects of CRT remain to be proven in RCTs.
9. There is a lack of RCTs documenting the effect of CRT in patients with HF treated with novel HF drugs including sacubitril/valsartan, ivabradine, and sodiumglucose co-transporter-2 inhibitors.
10. The beneficial effects of upgrading to CRT from a standard pacemaker or ICD in patients with HF and a high frequency of RV pacing need to be documented.
11. When implanting the LV electrode, it is unknown whether targeting the latest local activation mechanically or electrically causes an improved effect of CRT and a better patient outcome.

## Gaps in evidence

12. It is unknown whether employing any type of pre-implant imaging to decide about LV and RV lead placement in CRT may cause better a patient outcome.
13. In patients with an indication for permanent pacing and need for a high frequency of RV pacing because of AVB, it is not known which patient and treatment characteristics predict development of pacing-induced cardiomyopathy or HF.
14. In patients with AVB and an indication for cardiac pacing, the long-term efficacy and safety of HBP as an alternative to RV pacing need to be proven in RCTs. In addition, the selection of patients most likely to benefit from HBP is not yet defined.
15. In patients with HF and an indication for CRT, the long-term efficacy and safety of implementing HBP as an alternative to or element of CRT with biventricular pacing need to be proven in RCTs. In addition, the selection of CRT candidates who are most likely to benefit from HBP is not yet defined.
16. Further studies are needed to determine whether HBP could be used to improve response in CRT non-responders.
17. The efficacy and safety of left bundle branch area pacing remain to be documented.
18. Superiority of a specific location for the RV lead (i.e. septal, outflow tract, or apical) has not been documented for standard pacing indicated for bradycardia or for CRT.
19. Better prediction of who will develop AVB after TAVI is needed.
20. In symptomatic patients with end-stage HCM and LBBB, there is a need to better define the criteria for CRT implantation and document the clinical features associated with sustained benefit from the procedure.
21. Optimal treatment including cardiac pacing for patients with congenital AVB should be investigated.
22. In pacemaker candidates with cardiomyopathies with > 1 year expected survival who do not fulfil standard criteria for ICD implantation, criteria for ICD instead of pacemaker implantation should be better defined.
23. The optimal pre-operative handling in CIED implantations and potential use of pre-operative skin disinfection and/or prehospitalization decolonization in *S. aureus* carriers remains to be determined.

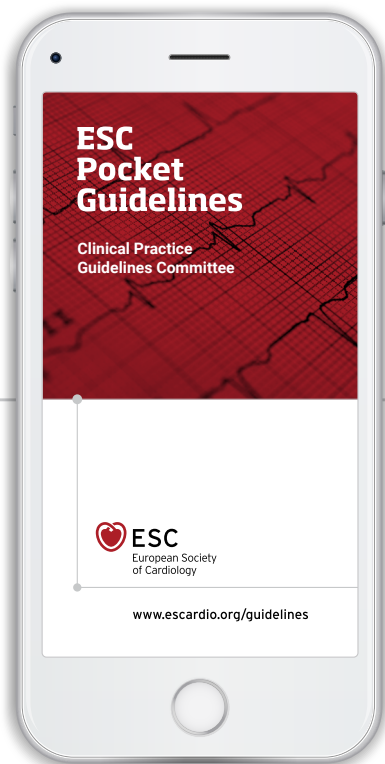


## Gaps in evidence

24. The optimal approach for the different operational procedure elements in CIED implantations, especially for choice of venous access, active or passive fixation leads in right-sided chambers, specific pacing sites, use of haemostatic agents in the pocket, choice of suture types, and application of pressure dressing at the end of the procedure remains to be determined.
25. Patients with a need for immediate cardiac pacing occasionally present with fever and infection; typically, treatment includes temporary transvenous pacing and antibiotics, followed by implantation of a permanent pacemaker after the infection has resolved. It is unknown whether immediate implantation of a permanent pacemaker after initiation of antibiotics would be inferior.
26. The role of patient education, patient-centred care, and shared decision-making should be studied in CIED populations.

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