MASSACHUSETTS

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Medical Policy

Implantable Cardioverter Defibrillator

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Policy Number: 070

BCBSA Reference Number: 7.01.44
NCD/LCD: National Coverage Determination (NCD) for Implantable Automatic Defibrillators (20.4)

Related Policies

- Biventricular Pacemakers (Cardiac Resynchronization Therapy) for the Treatment of Heart Failure, #101
- Wearable Cardioverter Defibrillators, #042

Policy

Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity

Adults

The use of the automatic implantable cardioverter defibrillator (ICD) may be considered **MEDICALLY NECESSARY** in adults who meet the following criteria:

Primary Prevention

- Ischemic cardiomyopathy with New York Heart Association (NYHA) functional Class II or Class III symptoms, a history of myocardial infarction at least 40 days before ICD treatment and left-ventricular ejection fraction of 35% or less; or
- Ischemic cardiomyopathy(IDCM) with NYHA functional Class I symptoms, a history of myocardial infarction at least 40 days before ICD treatment, and left ventricular ejection fraction of 30% or less; or
- Non-ischemic dilated cardiomyopathy(NIDCM) and left ventricular ejection fraction of 35% or less, after reversible causes have been excluded, and the response to optimal medical therapy has been adequately determined; or
- Hypertrophic cardiomyopathy (HCM) with 1 or more major risk factors for sudden cardiac death (history of premature HCM-related sudden death in 1 or more first-degree relatives younger than 50 years; left ventricular hypertrophy greater than 30 mm; 1 or more runs of non-sustained ventricular tachycardia at heart rates of 120 beats per minute or greater on 24-hour Holter monitoring; prior

unexplained syncope inconsistent with neurocardiogenic origin) and judged to be at high risk for sudden cardiac death by a physician experienced in the care of patients with HCM.
- Diagnosis of any one of the following cardiac ion channelopathies and considered to be at high risk for sudden cardiac death:
    - congenital long QT syndrome; OR
    - Brugada syndrome; OR
    - short QT syndrome; OR
    - catecholaminergic polymorphic ventricular tachycardia.

Secondary Prevention
- Patients with a history of a life-threatening clinical event associated with ventricular arrhythmic events such as sustained ventricular tachyarrhythmia, after reversible causes (eg, acute ischemia) have been excluded.

The use of the ICD is considered **INVESTIGATIONAL** for primary prevention patients who meet the following:
- Have had an acute myocardial infarction (i.e., less than 40 days before ICD treatment); or
- Have NYHA Class IV congestive heart failure (unless patient is eligible to receive a combination cardiac resynchronization therapy ICD device); or
- Have had cardiac revascularization procedure in past 3 months (coronary artery bypass graft [CABG] or percutaneous transluminal coronary angioplasty [PTCA]) or are candidates for a cardiac revascularization procedure; or
- Have non-cardiac disease that would be associated with life expectancy less than 1 year.

The use of the ICD for secondary prevention is considered **INVESTIGATIONAL** for patients who do not meet the criteria for secondary prevention.

Pediatrics
The use of the ICD may be considered **MEDICALLY NECESSARY** in children who meet any of the following criteria:
- Survivors of cardiac arrest, after reversible causes have been excluded; or
- Symptomatic, sustained ventricular tachycardia in association with congenital heart disease in patients who have undergone hemodynamic and electrophysiologic evaluation, or
- Congenital heart disease with recurrent syncope of undetermined origin in the presence of either ventricular dysfunction or inducible ventricular arrhythmias.
- Hypertrophic cardiomyopathy (HCM) with 1 or more major risk factors for sudden cardiac death (history of premature HCM-related sudden death in 1 or more first-degree relatives younger than 50 years; massive left ventricular hypertrophy based on age-specific norms; prior unexplained syncope inconsistent with neurocardiogenic origin) and judged to be at high risk for sudden cardiac death by a physician experienced in the care of patients with HCM.
- Diagnosis of any one of the following cardiac ion channelopathies and considered to be at high risk for sudden cardiac death:
    - congenital long QT syndrome; OR
    - Brugada syndrome; OR
    - short QT syndrome; OR
    - catecholaminergic polymorphic ventricular tachycardia.

The use of the ICD is considered **INVESTIGATIONAL** for all other indications in pediatric patients.

Subcutaneous ICD

The use of a subcutaneous ICD may be considered **MEDICALLY NECESSARY** for adults or children who have an indication for ICD implantation for primary or secondary prevention for any of the above reasons and meet all of the following criteria:

- Have a contraindication to a transvenous ICD due to one or more of the following: (1) lack of adequate vascular access; (2) compelling reason to preserve existing vascular access (ie, need for chronic dialysis; younger patient with anticipated long-term need for ICD therapy); or (3) history of need for explantation of a transvenous ICD due to a complication, with ongoing need for ICD therapy.
- Have no indication for antibradycardia pacing; AND
- Do not have ventricular arrhythmias that are known or anticipated to respond to antitachycardia pacing.

The use of a subcutaneous ICD is considered **INVESTIGATIONAL** for individuals who do not meet the criteria outlined above.

Criteria for ICD Implantation in Patients with Cardiac Ion Channelopathies

Individuals with cardiac ion channelopathies may have a history of a life-threatening clinical event associated with ventricular arrhythmic events such as sustained ventricular tachyarrhythmia, after reversible causes, in which case they should be considered for ICD implantation for *secondary* prevention, even if they do not meet criteria for primary prevention.

Indications for consideration for ICD implantation for each cardiac ion channelopathy are as follows:

- Long QT syndrome (LQTS):
    - Patients with a diagnosis of LQTS who are survivors of cardiac arrest.
    - Patients with a diagnosis of LQTS who experience recurrent syncopal events while on betablocker therapy.
- Brugada syndrome (BrS):
    - Patients with a diagnosis of BrS who are survivors of cardiac arrest.
    - Patients with a diagnosis of BrS who have documented spontaneous sustained ventricular tachycardia (VT) with or without syncope.
    - Patients with a spontaneous diagnostic type 1 ECG who have a history of syncope, seizure, or nocturnal agonal respiration judged to be likely caused by ventricular arrhythmias (after noncardiac causes have been ruled out).
    - Patients with a diagnosis of BrS who develop ventricular fibrillation (VF) during programmed electrical stimulation.
- Catecholaminergic polymorphic ventricular tachycardia (CPVT):
    - Patients with a diagnosis of CPVT who are survivors of cardiac arrest.
    - Patients with a diagnosis of CPVT who experience recurrent syncope or polymorphic/bidirectional ventricular tachycardia (VT) despite optimal medical management, and/or left cardiac sympathetic denervation.
- Short QT syndrome (SQTS):
    - Patients with a diagnosis of SQTS who are survivors of cardiac arrest.
    - Patients with a diagnosis of SQTS who are symptomatic and have documented spontaneous VT with or without syncope.
    - Patients with a diagnosis of SQTS or are asymptomatic or symptomatic and have a family history of sudden cardiac death.

Medicare HMO Blue[SM] and Medicare PPO Blue[SM] Members

Medical necessity criteria and coding guidance can be found through the link below.

National Coverage Determination (NCD) for Implantable Automatic Defibrillators (20.4)

Prior Authorization Information

Inpatient

- For services described in this policy, precertification/preauthorization **IS REQUIRED** for all products if the procedure is performed **inpatient**.

Outpatient

- For services described in this policy, see below for products where prior authorization **might be required** if the procedure is performed **outpatient**.

	Outpatient
Commercial Managed Care (HMO and POS)	Prior authorization is **not required**.
Commercial PPO and Indemnity	Prior authorization is **not required**.
Medicare HMO Blue℠	Prior authorization is **not required**.
Medicare PPO Blue℠	Prior authorization is **not required**.

CPT Codes / HCPCS Codes / ICD Codes

Inclusion or exclusion of a code does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage as it applies to an individual member.

Providers should report all services using the most up-to-date industry-standard procedure, revenue, and diagnosis codes, including modifiers where applicable.

The following codes are included below for informational purposes only; this is not an all-inclusive list.

The above medical necessity criteria MUST be met for the following codes to be covered for Commercial Members: Managed Care (HMO and POS), PPO and Indemnity:

CPT Codes

CPT codes:	Code Description
33216	Insertion of transvenous electrode; single chamber (one electrode) permanent pacemaker or single chamber pacing cardioverter-defibrillator
33217	Dual chamber (two electrodes) permanent pacemaker or dual chamber pacing cardioverter-defibrillator
33240	Insertion of pacing cardioverter-defibrillator pulse generator only; with existing single lead
33218	Repair of single transvenous electrode, permanent pacemaker or pacing cardioverter-defibrillator
33220	Repair of 2 transvenous electrodes for permanent pacemaker or pacing cardioverter-defibrillator
33223	Relocation of skin pocket for cardioverter-defibrillator
33240	Insertion of pacing cardioverter-defibrillator pulse generator only; with existing single lead
33230	Insertion of pacing cardioverter defibrillator pulse generator only; with existing dual leads
33231	Insertion of pacing cardioverter-defibrillator pulse generator only; with existing multiple leads
33241	Removal of pacing cardioverter-defibrillator pulse generator only

33262	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; single lead system
33263	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; dual lead system
33264	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; multiple lead system
33243	Removal of single or dual chamber pacing cardioverter-defibrillator electrode(s); by thoracotomy
33244	Removal of single or dual chamber pacing cardioverter-defibrillator electrode(s); by transvenous extraction
33249	Insertion or replacement of permanent pacing cardioverter-defibrillator system with transvenous lead(s), single or dual chamber
33262	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; single lead system
33263	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; dual lead system
33264	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; multiple lead system
33270	Insertion or replacement of permanent subcutaneous implantable defibrillator system, with subcutaneous electrode, including defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters, when performed
33271	Insertion of subcutaneous implantable defibrillator electrode
93260	Programming device evaluation (in person) with iterative adjustment of the implantable device to test the function of the device and select optimal permanent programmed values with analysis, review and report by a physician or other qualified health care professional; implantable subcutaneous lead defibrillator system
93261	Interrogation device evaluation (in person) with analysis, review and report by a physician or other qualified health care professional, includes connection, recording and disconnection per patient encounter; implantable subcutaneous lead defibrillator system
93644	Electrophysiologic evaluation of subcutaneous implantable defibrillator (includes defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters)

HCPCS Codes

HCPCS codes:	**Code Description**
C1721	Cardioverter-defibrillator, dual chamber (implantable)
C1722	Cardioverter-defibrillator, single chamber (implantable
C1882	Cardioverter-defibrillator, other than single or dual chamber (implantable)

The following ICD Diagnosis Codes are considered medically necessary when submitted with the CPT and/or HCPCS codes above if <u>medical necessity criteria</u> are met:

ICD-10-CM Diagnosis Codes

ICD-10-CM diagnosis codes:	Code Description
I25.5	Ischemic cardiomyopathy
I25.6	Silent myocardial ischemia
I25.89	Other forms of chronic ischemic heart disease
I25.9	Chronic ischemic heart disease, unspecified
I42.1	Obstructive hypertrophic cardiomyopathy
I42.2	Other hypertrophic cardiomyopathy
I42.0	Dilated cardiomyopathy
I42.5	Other restrictive cardiomyopathy
I45.81	Long QT syndrome
I45.89	Other specified conduction disorders
I47.0	Re-entry ventricular arrhythmia
I47.2	Ventricular tachycardia
I49.01	Ventricular fibrillation
I49.8	Other specified cardiac arrhythmias
I49.9	Cardiac arrhythmia, unspecified
Q24.8	Other specified congenital malformations of heart
T82.110A	Breakdown (mechanical) of cardiac electrode, initial encounter
T82.111A	Breakdown (mechanical) of cardiac pulse generator (battery), initial encounter
T82.118A	Breakdown (mechanical) of other cardiac electronic device, initial encounter
T82.119A	Breakdown (mechanical) of unspecified cardiac electronic device, initial encounter
T82.121A	Displacement of cardiac pulse generator (battery), initial encounter
T82.128A	Displacement of other cardiac electronic device, initial encounter
T82.129A	Displacement of unspecified cardiac electronic device, initial encounter
T82.190A	Other mechanical complication of cardiac electrode, initial encounter
T82.191A	Other mechanical complication of cardiac pulse generator (battery), initial encounter
T82.198A	Other mechanical complication of other cardiac electronic device, initial encounter
T82.199A	Other mechanical complication of unspecified cardiac device, initial encounter
T82.110D	Breakdown (mechanical) of cardiac electrode, subsequent encounter
T82.110S	Breakdown (mechanical) of cardiac electrode, sequela
T82.111D	Breakdown (mechanical) of cardiac pulse generator (battery), subsequent encounter
T82.111S	Breakdown (mechanical) of cardiac pulse generator (battery), sequela
T82.118D	Breakdown (mechanical) of other cardiac electronic device, subsequent encounter
T82.118S	Breakdown (mechanical) of other cardiac electronic device, sequela
T82.120D	Displacement of cardiac electrode, subsequent encounter
T82.120S	Displacement of cardiac electrode, sequela
T82.121D	Displacement of cardiac pulse generator (battery), subsequent encounter
T82.121S	Displacement of cardiac pulse generator (battery), sequela
T82.128D	Displacement of other cardiac electronic device, subsequent encounter
T82.128S	Displacement of other cardiac electronic device, sequela
T82.129D	Displacement of unspecified cardiac electronic device, subsequent encounter
T82.129S	Displacement of unspecified cardiac electronic device, sequela
T82.190D	Other mechanical complication of cardiac electrode, subsequent encounter
T82.190S	Other mechanical complication of cardiac electrode, sequela

T82.191D	Other mechanical complication of cardiac pulse generator (battery), subsequent encounter
T82.191S	Other mechanical complication of cardiac pulse generator (battery), sequela
T82.198D	Other mechanical complication of other cardiac electronic device, subsequent encounter
T82.198S	Other mechanical complication of other cardiac electronic device, sequela
T82.199D	Other mechanical complication of unspecified cardiac device, subsequent encounter
T82.199S	Other mechanical complication of unspecified cardiac device, sequela

Description

VENTRICULAR ARRHYTHMIA AND SUDDEN CARDIAC DEATH

The risk of ventricular arrhythmia and sudden cardiac death (SCD) may be significantly increased in various cardiac conditions such as individuals with ischemic cardiomyopathy, particularly when associated with reduced left ventricular ejection fraction (LVEF) and prior myocardial infarction; nonischemic dilated cardiomyopathy with reduced LVEF; hypertrophic cardiomyopathy and additional risk factors; congenital heart disease, particularly with recurrent syncope; and cardiac ion channelopathies.

Treatment

Implantable cardioverter defibrillators (ICDs) monitor a patient's heart rate, recognize ventricular fibrillation (VF) or ventricular tachycardia (VT), and deliver an electric shock to terminate these arrhythmias to reduce the risk of SCD. Indications for ICD placement can be broadly subdivided into (1) secondary prevention, ie, use in patients who have experienced a potentially life-threatening episode of VT (near SCD); and (2) primary prevention, ie, use in patients who are considered at high risk for SCD but who have not yet experienced life-threatening VT or VF.

The standard ICD placement surgery involves placement of a generator in the subcutaneous tissue of the chest wall. Transvenous leads are attached to the generator and threaded intravenously into the endocardium. The leads sense and transmit information on cardiac rhythm to the generator, which analyzes the rhythm information and produces an electrical shock when a malignant arrhythmia is recognized.

A subcutaneous implantable cardioverter defibrillator (S-ICD) has been developed. It does not use transvenous leads and thus avoids the need for venous access and complications associated with the insertion of venous leads. Rather, the S-ICD uses a subcutaneous electrode implanted adjacent to the left sternum. The electrodes sense the cardiac rhythm and deliver countershocks through the subcutaneous tissue of the chest wall.

Several automatic ICDs have been approved by the U.S. Food and Drug Administration (FDA) through the premarket approval process. FDA-labeled indications generally include patients who have experienced life-threatening VT associated with cardiac arrest or VT associated with hemodynamic compromise and resistance to pharmacologic treatment. In addition, devices typically have approval in the secondary prevention setting for patients with a previous myocardial infarction and reduced injection fraction.

Summary

Transvenous ICDs

For individuals who have a high risk of SCD due to ischemic or to nonischemic cardiomyopathy in adulthood who receive TV-ICD placement for primary prevention, the evidence includes multiple well-designed and well-conducted RCTs as well as systematic reviews of these trials. Relevant outcomes are overall survival, morbid events, quality of life, and treatment-related mortality and morbidity. Multiple, well-done RCTs have shown a benefit in overall mortality for patients with ischemic cardiomyopathy and

reduced ejection fraction. RCTs assessing early ICD use following recent myocardial infarction did not support a benefit for immediate vs delayed implantation for at least 40 days. For nonischemic cardiomyopathy, there is less clinical trial data, but pooled estimates of available evidence from RCTs enrolling patients with nonischemic cardiomyopathy and from subgroup analyses of RCTs with mixed populations have supported a survival benefit for this group. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have a high risk of SCD due to HCM in adulthood who receive TV-ICD placement for primary prevention, the evidence includes several large registry studies. Relevant outcomes are overall survival, morbid events, quality of life, and treatment-related mortality and morbidity. In these studies, the annual rate of appropriate ICD discharge ranged from 3.6% to 5.3%. Given the long-term high risk of SCD in patients with HCM, with the assumption that appropriate shocks are life-saving, these rates are considered adequate evidence to support the use of ICDs in patients with HCM. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have a high risk of SCD due to an inherited cardiac ion channelopathy who receive TV-ICD placement for primary prevention, the evidence includes small cohort studies of patients with these conditions treated with ICDs. Relevant outcomes are overall survival, morbid events, quality of life, and treatment-related mortality and morbidity. The limited evidence for patients with long QT syndrome, catecholaminergic polymorphic ventricular tachycardia, and Brugada syndrome has reported high rates of appropriate shocks. No studies were identified on the use of ICDs for patients with short QT syndrome.

Studies comparing outcomes between patients treated and untreated with ICDs are not available. However, given the relatively small patient populations with these channelopathies and the high risk of cardiac arrhythmias, clinical trials are unlikely. Given the long-term high risk of SCD in patients with inherited cardiac ion channelopathy, with the assumption that appropriate shocks are life-saving, these rates are considered adequate evidence to support the use of TV-ICDs in patients with inherited cardiac ion channelopathy. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have had symptomatic life-threatening sustained VT or VF or who have been resuscitated from sudden cardiac arrest (secondary prevention) who receive TV-ICD placement, the evidence includes multiple well-designed and well-conducted RCTs as well as systematic reviews of these trials. Relevant outcomes are overall survival, morbid events, quality of life, and treatment-related mortality and morbidity. Systematic reviews of RCTs have demonstrated a 25% reduction in mortality for ICD compared with medical therapy. Analysis of data from a large administrative database has confirmed that this mortality benefit is generalizable to the clinical setting. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Subcutaneous ICDs

For individuals who need an ICD and have a contraindication to a TV-ICD but no indications for antibradycardia pacing and no antitachycardia pacing-responsive arrhythmias who receive S-ICD placement, the evidence includes nonrandomized studies and case series. Relevant outcomes are overall survival, morbid events, quality of life, and treatment-related mortality and morbidity. Nonrandomized controlled studies have reported success rates in terminating laboratory-induced VF that are similar to TV-ICD. Case series have reported high rates of detection and successful conversion of VF, and inappropriate shock rates in the range reported for TV-ICD. Given the need for ICD placement in this population at risk for SCD, with the assumption that appropriate shocks are life-saving, these rates are considered adequate evidence to support the use of S-ICDs in patients with contraindication to TV-ICD. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have need for an ICD and have no contraindication to TV-ICD but no indications for antibradycardia pacing and no antitachycardia pacing-responsive arrhythmias who receive S-ICD placement, the evidence includes nonrandomized studies and case series. Relevant outcomes are overall survival, morbid events, quality of life, and treatment-related mortality and morbidity. Nonrandomized controlled studies have reported success rates in terminating laboratory-induced VF that are similar to TV-ICD. However, there is scant evidence on comparative clinical outcomes of both types of ICD over longer periods. Case series have reported high rates of detection and successful conversion of ventricular tachycardia, and inappropriate shock rates in the range reported for TV-ICD. This evidence does not support conclusions on whether there are small differences in efficacy between the 2 types of devices, which may be clinically important due to the nature to the disorder being treated. Also, adverse event rates are uncertain, with variable rates reported. At least 1 RCT is currently underway comparing S-ICD with TV-ICD. The evidence is insufficient to determine the effects of the technology on health outcomes.

Policy History

Date	Action
6/2018	New references added from BCBSA National medical policy. Background and summary clarified.
1/2018	Clarified coding information.
7/2017	New references added from BCBSA National medical policy.
7/2016	New references added from BCBSA National medical policy.
4/2016	BCBSA National medical policy review. Policy statement added that the ICD is considered investigational for secondary prevention patients who do not meet medical necessity criteria for secondary prevention. Effective 4/1/2016.
3/2016	BCBSA National medical policy review. ICD medically necessary for patients with cardiac ion channelopathies with conditions; S-ICD medically necessary in limited situations. Effective 3/1/2016.
1/2015	Clarified coding information.
6/2014	Updated Coding section with ICD10 procedure and diagnosis codes, effective 10/2015.
5/2014	BCBSA National medical policy review. Policy statement on secondary prevention in adults clarified. Effective 5/1/2014.
1/2014	Coverage added for subcutaneous implantable cardiac defibrillators for Medicare Advantage based on NCD 20.4. Effective immediately 1/7/2014.
4/2013	BCBSA National medical policy review. New investigational indications described. Effective 4/1/2013.
11/2011-4/2012	Medical policy ICD 10 remediation: Formatting, editing and coding updates. No changes to policy statements.
1/1/2012	Reviewed 4/2011 Medical Policy Group – Cardiology and Pulmonology. No changes to policy statements.
4/2010	Reviewed - Medical Policy Group - Cardiology and Pulmonology. No changes to policy statements.
3/2010	BCBS Association National Policy Review No changes to policy statements.
4/2009	Reviewed - Medical Policy Group - Cardiology and Pulmonology. No changes to policy statements.
2/2009	BCBS Association National Policy Review No changes to policy statements.
12/2008	New policy describing covered and non-covered indications. Effective 12/2008.

Information Pertaining to All Blue Cross Blue Shield Medical Policies

Click on any of the following terms to access the relevant information:

Medical Policy Terms of Use
Managed Care Guidelines
Indemnity/PPO Guidelines
Clinical Exception Process
Medical Technology Assessment Guidelines

References

1. Rome BN, Kramer DB, Kesselheim AS. FDA approval of cardiac implantable electronic devices via original and supplement premarket approval pathways, 1979-2012. *JAMA.* Jan 22-29 2014;311(4):385-391. PMID 24449317
2. Moss AJ, Hall WJ, Cannom DS, et al. Improved survival with an implanted defibrillator in patients with coronary disease at high risk for ventricular arrhythmia. Multicenter Automatic Defibrillator Implantation Trial Investigators. *N Engl J Med.* Dec 26 1996;335(26):1933-1940. PMID 8960472
3. Moss AJ, Zareba W, Hall WJ, et al. Prophylactic implantation of a defibrillator in patients with myocardial infarction and reduced ejection fraction. *N Engl J Med.* Mar 21 2002;346(12):877-883. PMID 11907286
4. Bigger JT, Jr. Prophylactic use of implanted cardiac defibrillators in patients at high risk for ventricular arrhythmias after coronary-artery bypass graft surgery. Coronary Artery Bypass Graft (CABG) Patch Trial Investigators. *N Engl J Med.* Nov 27 1997;337(22):1569-1575. PMID 9371853
5. Buxton AE, Lee KL, Fisher JD, et al. A randomized study of the prevention of sudden death in patients with coronary artery disease. Multicenter Unsustained Tachycardia Trial Investigators. *N Engl J Med.* Dec 16 1999;341(25):1882-1890. PMID 10601507
6. Bardy GH, Lee KL, Mark DB, et al. Amiodarone or an implantable cardioverter-defibrillator for congestive heart failure. *N Engl J Med.* Jan 20 2005;352(3):225-237. PMID 15659722
7. Hohnloser SH, Kuck KH, Dorian P, et al. Prophylactic use of an implantable cardioverter-defibrillator after acute myocardial infarction. *N Engl J Med.* Dec 09 2004;351(24):2481-2488. PMID 15590950
8. Steinbeck G, Andresen D, Seidl K, et al. Defibrillator implantation early after myocardial infarction. *N Engl J Med.* Oct 8 2009;361(15):1427-1436. PMID 19812399
9. Raviele A, Bongiorni MG, Brignole M, et al. Early EPS/ICD strategy in survivors of acute myocardial infarction with severe left ventricular dysfunction on optimal beta-blocker treatment. The BEta-blocker STrategy plus ICD trial. *Europace.* Jul 2005;7(4):327-337. PMID 16028343
10. Kadish A, Dyer A, Daubert JP, et al. Prophylactic defibrillator implantation in patients with nonischemic dilated cardiomyopathy. *N Engl J Med.* May 20 2004;350(21):2151-2158. PMID 15152060
11. Bristow MR, Saxon LA, Boehmer J, et al. Cardiac-resynchronization therapy with or without an implantable defibrillator in advanced chronic heart failure. *N Engl J Med.* May 20 2004;350(21):2140-2150. PMID 15152059
12. Strickberger SA, Hummel JD, Bartlett TG, et al. Amiodarone versus implantable cardioverter-defibrillator:randomized trial in patients with nonischemic dilated cardiomyopathy and asymptomatic nonsustained ventricular tachycardia--AMIOVIRT. *J Am Coll Cardiol.* May 21 2003;41(10):1707-1712. PMID 12767651
13. Bansch D, Antz M, Boczor S, et al. Primary prevention of sudden cardiac death in idiopathic dilated cardiomyopathy: the Cardiomyopathy Trial (CAT). *Circulation.* Mar 26 2002;105(12):1453-1458. PMID 11914254
14. Kober L, Thune JJ, Nielsen JC, et al. Defibrillator implantation in patients with nonischemic systolic heart failure. *N Engl J Med.* Sep 29 2016;375(13):1221-1230. PMID 27571011
15. Woods B, Hawkins N, Mealing S, et al. Individual patient data network meta-analysis of mortality effects of implantable cardiac devices. *Heart.* Nov 2015;101(22):1800-1806. PMID 26269413
16. Wolff G, Lin Y, Karathanos A, et al. Implantable cardioverter/defibrillators for primary prevention in dilated cardiomyopathy post-DANISH: an updated meta-analysis and systematic review of randomized controlled trials. *Clin Res Cardiol.* Jul 2017;106(7):501-513. PMID 28213711

17. Stavrakis S, Asad Z, Reynolds D. Implantable cardioverter defibrillators for primary prevention of mortality in patients with non-ischemic cardiomyopathy: a meta-analysis of randomized controlled trials. *J Cardiovasc Electrophysiol.* Jun 2017;28(6):659-665. PMID 28316104
18. Akel T, Lafferty J. Implantable cardioverter defibrillators for primary prevention in patients with nonischemic cardiomyopathy: A systematic review and meta-analysis. *Cardiovasc Ther.* Jun 2017;35(3). PMID 28129469
19. Golwala H, Bajaj NS, Arora G, et al. Implantable cardioverter-defibrillator for nonischemic cardiomyopathy: an updated meta-analysis. *Circulation.* Jan 10 2017;135(2):201-203. PMID 27993908
20. Earley A, Persson R, Garlitski AC, et al. Effectiveness of implantable cardioverter defibrillators for primary prevention of sudden cardiac death in subgroups a systematic review. *Ann Intern Med.* Jan 21 2014;160(2):111121. PMID 24592496
21. Fontenla A, Martinez-Ferrer JB, Alzueta J, et al. Incidence of arrhythmias in a large cohort of patients with current implantable cardioverter-defibrillators in Spain: results from the UMBRELLA Registry. *Europace.* Nov 2016;18(11):1726-1734. PMID 26705555
22. Schinkel AF, Vriesendorp PA, Sijbrands EJ, et al. Outcome and complications after implantable cardioverter defibrillator therapy in hypertrophic cardiomyopathy: systematic review and meta-analysis. *Circ Heart Fail.* Sep 01 2012;5(5):552-559. PMID 22821634
23. Magnusson P, Gadler F, Liv P, et al. Hypertrophic cardiomyopathy and implantable defibrillators in Sweden: inappropriate shocks and complications requiring surgery. *J Cardiovasc Electrophysiol.* Oct 2015;26(10):10881094. PMID 26178879
24. Horner JM, Kinoshita M, Webster TL, et al. Implantable cardioverter defibrillator therapy for congenital long QT syndrome: a single-center experience. *Heart Rhythm.* Nov 2010;7(11):1616-1622. PMID 20816872
25. Hernandez-Ojeda J, Arbelo E, Borras R, et al. Patients With Brugada syndrome and implanted cardioverter-defibrillators: long-term follow-up. *J Am Coll Cardiol.* Oct 17 2017;70(16):1991-2002. PMID 29025556
26. Conte G, Sieira J, Ciconte G, et al. Implantable cardioverter-defibrillator therapy in Brugada syndrome: a 20-year single-center experience. *J Am Coll Cardiol.* Mar 10 2015;65(9):879-888. PMID 25744005
27. Dores H, Reis Santos K, Adragao P, et al. Long-term prognosis of patients with Brugada syndrome and an implanted cardioverter-defibrillator. *Rev Port Cardiol.* Jun 2015;34(6):395-402. PMID 26028488
28. Roses-Noguer F, Jarman JW, Clague JR, et al. Outcomes of defibrillator therapy in catecholaminergic polymorphic ventricular tachycardia. *Heart Rhythm.* Jan 2014;11(1):58-66. PMID 24120999
29. The Antiarrhythmics Versus Implantable Defibrillators (AVID) Investigators. A comparison of antiarrhythmic-drug therapy with implantable defibrillators in patients resuscitated from near-fatal ventricular arrhythmias. *N Engl J Med.* Nov 27 1997;337(22):1576-1583. PMID 9411221
30. Kuck KH, Cappato R, Siebels J, et al. Randomized comparison of antiarrhythmic drug therapy with implantable defibrillators in patients resuscitated from cardiac arrest : the Cardiac Arrest Study Hamburg (CASH).
Circulation. Aug 15 2000;102(7):748-754. PMID 10942742
31. Connolly SJ, Gent M, Roberts RS, et al. Canadian implantable defibrillator study (CIDS): a randomized trial of the implantable cardioverter defibrillator against amiodarone. *Circulation.* Mar 21 2000;101(11):1297-1302. PMID 10725290
32. Nademanee K, Veerakul G, Mower M, et al. Defibrillator Versus beta-Blockers for Unexplained Death in Thailand (DEBUT): a randomized clinical trial. *Circulation.* May 06 2003;107(17):2221-2226. PMID 12695290
33. Wever EF, Hauer RN, van Capelle FL, et al. Randomized study of implantable defibrillator as first-choice therapy versus conventional strategy in postinfarct sudden death survivors. *Circulation.* Apr 15 1995;91(8):2195-2203. PMID 7697849
34. Lee DS, Green LD, Liu PP, et al. Effectiveness of implantable defibrillators for preventing arrhythmic events and death: a meta-analysis. *J Am Coll Cardiol.* May 07 2003;41(9):1573-1582. PMID 12742300
35. National Institute for Health and Care Excellence (NICE). Overview: Implantable cardioverter defibrillators for the treatment of arrhythmias and cardiac resynchronisation therapy for the treatment of heart failure (Review of TA95 and TA120). 2013;

https://www.nice.org.uk/guidance/TA314/documents/arrythmias-icds-heart-failure-cardiac-resynchronisation-evaluation-report4. Accessed April 25, 2018.
36. Connolly SJ, Hallstrom AP, Cappato R, et al. Meta-analysis of the implantable cardioverter defibrillator secondary prevention trials. AVID, CASH and CIDS studies. Antiarrhythmics vs Implantable Defibrillator study. Cardiac Arrest Study Hamburg. Canadian Implantable Defibrillator Study. *Eur Heart J.* Dec 2000;21(24):20712078. PMID 11102258
37. Betts TR, Sadarmin PP, Tomlinson DR, et al. Absolute risk reduction in total mortality with implantable cardioverter defibrillators: analysis of primary and secondary prevention trial data to aid risk/benefit analysis. *Europace.* Jun 2013;15(6):813-819. PMID 23365069
38. Chan PS, Hayward RA. Mortality reduction by implantable cardioverter-defibrillators in high-risk patients with heart failure, ischemic heart disease, and new-onset ventricular arrhythmia: an effectiveness study. *J Am Coll Cardiol.* May 03 2005;45(9):1474-1481. PMID 15862422
39. Berul CI, Van Hare GF, Kertesz NJ, et al. Results of a multicenter retrospective implantable cardioverter-defibrillator registry of pediatric and congenital heart disease patients. *J Am Coll Cardiol.* Apr 29 2008;51(17):1685-1691. PMID 18436121
40. Silka MJ, Kron J, Dunnigan A, et al. Sudden cardiac death and the use of implantable cardioverter-defibrillators in pediatric patients. The Pediatric Electrophysiology Society. *Circulation.* Mar 1993;87(3):800-807. PMID 8443901
41. Alexander ME, Cecchin F, Walsh EP, et al. Implications of implantable cardioverter defibrillator therapy in congenital heart disease and pediatrics. *J Cardiovasc Electrophysiol.* Jan 2004;15(1):72-76. PMID 15028076
42. Lewandowski M, Sterlinski M, Maciag A, et al. Long-term follow-up of children and young adults treated with implantable cardioverter-defibrillator: the authors' own experience with optimal implantable cardioverter-defibrillator programming. *Europace.* Sep 2010;12(9):1245-1250. PMID 20650939
43. Persson R, Earley A, Garlitski AC, et al. Adverse events following implantable cardioverter defibrillator implantation: a systematic review. *J Interv Card Electrophysiol.* Aug 2014;40(2):191-205. PMID 24948126
44. Ezzat VA, Lee V, Ahsan S, et al. A systematic review of ICD complications in randomised controlled trials versus registries: is our 'real-world' data an underestimation? *Open Heart.* Mar 2015;2(1):e000198. PMID 25745566
45. Kirkfeldt RE, Johansen JB, Nohr EA, et al. Complications after cardiac implantable electronic device implantations: an analysis of a complete, nationwide cohort in Denmark. *Eur Heart J.* May 2014;35(18):11861194. PMID 24347317
46. van Rees JB, de Bie MK, Thijssen J, et al. Implantation-related complications of implantable cardioverter-defibrillators and cardiac resynchronization therapy devices: a systematic review of randomized clinical trials. *J Am Coll Cardiol.* Aug 30 2011;58(10):995-1000. PMID 21867832
47. Olde Nordkamp LR, Postema PG, Knops RE, et al. Implantable cardioverter-defibrillator harm in young patients with inherited arrhythmia syndromes: A systematic review and meta-analysis of inappropriate shocks and complications. *Heart Rhythm.* Feb 2016;13(2):443-454. PMID 26385533
48. Food and Drug Administration. Premature Insulation Failure in Recalled Riata Implantable Cardioverter Defibrillator (ICD) Leads Manufactured by St. Jude Medical, Inc.: FDA Safety Communication. 2014; https://wayback.archive-it.org/7993/20170722215745/https://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm314930.htm. Accessed April 26, 2018.
49. Hauser RG, Katsiyiannis WT, Gornick CC, et al. Deaths and cardiovascular injuries due to device-assisted implantable cardioverter-defibrillator and pacemaker lead extraction. *Europace.* Mar 2010;12(3):395-401. PMID 19946113
50. Providencia R, Kramer DB, Pimenta D, et al. Transvenous implantable cardioverter-defibrillator (ICD) lead performance: a meta-analysis of observational studies. *J Am Heart Assoc.* Nov 2015;4(11). PMID 26518666
51. Birnie DH, Parkash R, Exner DV, et al. Clinical predictors of Fidelis lead failure: report from the Canadian Heart Rhythm Society Device Committee. *Circulation.* Mar 13 2012;125(10):1217-1225. PMID 22311781
52. Hauser RG, Maisel WH, Friedman PA, et al. Longevity of Sprint Fidelis implantable cardioverter-defibrillator leads and risk factors for failure: implications for patient management. *Circulation.* Feb 1 2011;123(4):358-363. PMID 21242478

53. Gould PA, Gula LJ, Champagne J, et al. Outcome of advisory implantable cardioverter-defibrillator replacement: one-year follow-up. *Heart Rhythm.* Dec 2008;5(12):1675-1681. PMID 19084804
54. Poole JE, Gleva MJ, Mela T, et al. Complication rates associated with pacemaker or implantable cardioverter-defibrillator generator replacements and upgrade procedures: results from the REPLACE registry. *Circulation.* Oct 19 2010;122(16):1553-1561. PMID 20921437
55. Ricci RP, Pignalberi C, Magris B, et al. Can we predict and prevent adverse events related to high-voltage implantable cardioverter defibrillator lead failure? *J Interv Card Electrophysiol.* Jan 2012;33(1):113-121. PMID 21882010
56. Cheng A, Wang Y, Curtis JP, et al. Acute lead dislodgements and in-hospital mortality in patients enrolled in the national cardiovascular data registry implantable cardioverter defibrillator registry. *J Am Coll Cardiol.* Nov 9 2010;56(20):1651-1656. PMID 21050975
57. Faulknier BA, Traub DM, Aktas MK, et al. Time-dependent risk of Fidelis lead failure. *Am J Cardiol.* Jan 1 2010;105(1):95-99. PMID 20102898
58. Smit J, Korup E, Schonheyder HC. Infections associated with permanent pacemakers and implanted cardioverter-defibrillator devices. A 10-year regional study in Denmark. *Scand J Infect Dis.* Sep 2010;42(9):658664. PMID 20465488
59. Nery PB, Fernandes R, Nair GM, et al. Device-related infection among patients with pacemakers and implantable defibrillators: incidence, risk factors, and consequences. *J Cardiovasc Electrophysiol.* Jul 2010;21(7):786-790. PMID 20102431
60. Sohail MR, Hussain S, Le KY, et al. Risk factors associated with early- versus late-onset implantable cardioverter-defibrillator infections. *J Interv Card Electrophysiol.* Aug 2011;31(2):171-183. PMID 21365264
61. Chua JD, Wilkoff BL, Lee I, et al. Diagnosis and management of infections involving implantable electrophysiologic cardiac devices. *Ann Intern Med.* Oct 17 2000;133(8):604-608. PMID 11033588
62. Borleffs CJ, Thijssen J, de Bie MK, et al. Recurrent implantable cardioverter-defibrillator replacement is associated with an increasing risk of pocket-related complications. *Pacing Clin Electrophysiol.* Aug 2010;33(8):1013-1019. PMID 20456647
63. Daubert JP, Zareba W, Cannom DS, et al. Inappropriate implantable cardioverter-defibrillator shocks in MADIT II: frequency, mechanisms, predictors, and survival impact. *J Am Coll Cardiol.* Apr 8 2008;51(14):1357-1365. PMID 18387436
64. Tan VH, Wilton SB, Kuriachan V, et al. Impact of programming strategies aimed at reducing nonessential implantable cardioverter defibrillator therapies on mortality: a systematic review and meta-analysis. *Circ Arrhythm Electrophysiol.* Feb 2014;7(1):164-170. PMID 24446023
65. Sterns LD, Meine M, Kurita T, et al. Extended detection time to reduce shocks is safe in secondary prevention patients: The secondary prevention substudy of PainFree SST. *Heart Rhythm.* Jul 2016;13(7):1489-1496. PMID 26988379
66. Auricchio A, Schloss EJ, Kurita T, et al. Low inappropriate shock rates in patients with single- and dual/triple-chamber implantable cardioverter-defibrillators using a novel suite of detection algorithms: PainFree SST trial primary results. *Heart Rhythm.* May 2015;12(5):926-936. PMID 25637563
67. Lee DS, Krahn AD, Healey JS, et al. Evaluation of early complications related to De Novo cardioverter defibrillator implantation insights from the Ontario ICD database. *J Am Coll Cardiol.* Feb 23 2010;55(8):774-782. PMID 20170816
68. Furniss G, Shi B, Jimenez A, et al. Cardiac troponin levels following implantable cardioverter defibrillation implantation and testing. *Europace.* Feb 2015;17(2):262-266. PMID 25414480
69. Mithani AA, Kath H, Hunter K, et al. Characteristics and early clinical outcomes of patients undergoing totally subcutaneous vs. transvenous single chamber implantable cardioverter defibrillator placement. *Europace.* Feb 1 2018;20(2):308-314. PMID 28383717
70. Honarbakhsh S, Providencia R, Srinivasan N, et al. A propensity matched case-control study comparing efficacy, safety and costs of the subcutaneous vs. transvenous implantable cardioverter defibrillator. *Int J Cardiol.* Feb 01 2017;228:280-285. PMID 27865198
71. Kobe J, Hucklenbroich K, Geisendorfer N, et al. Posttraumatic stress and quality of life with the totally subcutaneous compared to conventional cardioverter-defibrillator systems. *Clin Res Cardiol.* May 2017;106(5):317-321. PMID 27878381

72. Pedersen SS, Mastenbroek MH, Carter N, et al. A comparison of the quality of life of patients with an entirely subcutaneous implantable defibrillator system versus a transvenous system (from the EFFORTLESS S-ICD Quality of Life Substudy). *Am J Cardiol.* Aug 15 2016;118(4):520-526. PMID 27353211
73. Brouwer TF, Yilmaz D, Lindeboom R, et al. Long-term clinical outcomes of subcutaneous versus transvenous implantable defibrillator therapy. *J Am Coll Cardiol.* Nov 08 2016;68(19):2047-2055. PMID 27810043
74. Friedman DJ, Parzynski CS, Varosy PD, et al. Trends and in-hospital outcomes associated with adoption of the subcutaneous implantable cardioverter defibrillator in the United States. *JAMA Cardiol.* Nov 01 2016;1(8):900911. PMID 27603935
75. Kobe J, Reinke F, Meyer C, et al. Implantation and follow-up of totally subcutaneous versus conventional implantable cardioverter-defibrillators: a multicenter case-control study. *Heart Rhythm.* Jan 2013;10(1):29-36. PMID 23032867
76. Lambiase PD, Barr C, Theuns DA, et al. Worldwide experience with a totally subcutaneous implantable defibrillator: early results from the EFFORTLESS S-ICD Registry. *Eur Heart J.* Jul 1 2014;35(25):1657-1665. PMID 24670710
77. Olde Nordkamp LR, Brouwer TF, Barr C, et al. Inappropriate shocks in the subcutaneous ICD: Incidence, predictors and management. *Int J Cardiol.* Sep 15 2015;195:126-133. PMID 26026928
78. Boersma L, Barr C, Knops R, et al. Implant and midterm outcomes of the Subcutaneous Implantable Cardioverter-Defibrillator Registry: The EFFORTLESS Study. *J Am Coll Cardiol.* Aug 15 2017;70(7):830-841. PMID 28797351
79. Weiss R, Knight BP, Gold MR, et al. Safety and efficacy of a totally subcutaneous implantable-cardioverter defibrillator. *Circulation.* Aug 27 2013;128(9):944-953. PMID 23979626
80. Burke MC, Gold MR, Knight BP, et al. Safety and efficacy of the totally subcutaneous implantable defibrillator: 2-year results from a pooled analysis of the IDE Study and EFFORTLESS Registry. *J Am Coll Cardiol.* Apr 28 2015;65(16):1605-1615. PMID 25908064
81. Boersma L, Burke MC, Neuzil P, et al. Infection and mortality after implantation of a subcutaneous ICD after transvenous ICD extraction. *Heart Rhythm.* Jan 2016;13(1):157-164. PMID 26341604
82. Lambiase PD, Gold MR, Hood M, et al. Evaluation of subcutaneous ICD early performance in hypertrophic cardiomyopathy from the pooled EFFORTLESS and IDE cohorts. *Heart Rhythm.* May 2016;13(5):1066-1074. PMID 26767422
83. Bardy GH, Smith WM, Hood MA, et al. An entirely subcutaneous implantable cardioverter-defibrillator. *N Engl J Med.* Jul 1 2010;363(1):36-44. PMID 20463331
84. Theuns DA, Crozier IG, Barr CS, et al. Longevity of the subcutaneous implantable defibrillator: long-term follow-up of the European Regulatory Trial cohort. *Circ Arrhythm Electrophysiol.* Oct 2015;8(5):1159-1163. PMID 26148819
85. Olde Nordkamp LR, Dabiri Abkenari L, Boersma LV, et al. The entirely subcutaneous implantable cardioverter-defibrillator: initial clinical experience in a large Dutch cohort. *J Am Coll Cardiol.* Nov 6 2012;60(19):1933-1939. PMID 23062537
86. Kooiman KM, Knops RE, Olde Nordkamp L, et al. Inappropriate subcutaneous implantable cardioverter-defibrillator shocks due to T-wave oversensing can be prevented: implications for management. *Heart Rhythm.* Mar 2014;11(3):426-434. PMID 24321235
87. Epstein AE, DiMarco JP, Ellenbogen KA, et al. 2012 ACCF/AHA/HRS focused update incorporated into the ACCF/AHA/HRS 2008 guidelines for device-based therapy of cardiac rhythm abnormalities: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol.* Jan 22 2013;61(3):e6-75. PMID 23265327
88. Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol.* Oct 24 2017. PMID 29097294
89. Kusumoto FM, Calkins H, Boehmer J, et al. HRS/ACC/AHA expert consensus statement on the use of implantable cardioverter-defibrillator therapy in patients who are not included or not well represented in clinical trials. *J Am Coll Cardiol.* Sep 16 2014;64(11):1143-1177. PMID 24820349

90. Baddour LM, Epstein AE, Erickson CC, et al. Update on cardiovascular implantable electronic device infections and their management: a scientific statement from the American Heart Association. *Circulation.* Jan 26 2010;121(3):458-477. PMID 20048212
91. Priori SG, Blomstrom-Lundqvist C, Mazzanti A, et al. 2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: The Task Force for the Management of Patients with Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) Endorsed by: Association for European Paediatric and Congenital Cardiology (AEPC). *Eur Heart J.* Nov 1 2015;36(41):2793-2867. PMID 26320108
92. Priori SG, Wilde AA, Horie M, et al. HRS/EHRA/APHRS expert consensus statement on the diagnosis and management of patients with inherited primary arrhythmia syndromes: document endorsed by HRS, EHRA, and APHRS in May 2013 and by ACCF, AHA, PACES, and AEPC in June 2013. *Heart Rhythm.* Dec 2013;10(12):1932-1963. PMID 24011539
93. Khairy P, Van Hare GF, Balaji S, et al. PACES/HRS expert consensus statement on the recognition and management of arrhythmias in adult congenital heart disease: developed in partnership between the Pediatric and Congenital Electrophysiology Society (PACES) and the Heart Rhythm Society (HRS). Endorsed by the governing bodies of PACES, HRS, the American College of Cardiology (ACC), the American Heart Association (AHA), the European Heart Rhythm Association (EHRA), the Canadian Heart Rhythm Society (CHRS), and the International Society for Adult Congenital Heart Disease (ISACHD). *Can J Cardiol.* Oct 2014;30(10):e1-e63. PMID 25262867
94. National Institute for Health and Care Excellence (NICE). Implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure [TA314]. 2014; https://www.nice.org.uk/guidance/ta314. Accessed April 25, 2018.
95. Centers for Medicare & Medicaid Services. National Coverage Determination (NCD) for Implantable Automatic Defibrillators (20.4). 2018; https://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=288. Accessed April 25, 2018.