Section 1: Secondary Prevention

Table 1.1 CAD: VF or Hemodynamically Unstable VT Associated With Acute (<48 hours) MI (Newly Diagnosed, No Prior Assessment of EF)

<table>
<thead>
<tr>
<th>Total Revascularization Completed After Cardiac Arrest</th>
<th>LVEF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥50%</td>
</tr>
<tr>
<td>1. Single episode VF or polymorphic VT during acute (&lt;48 hours) MI</td>
<td></td>
</tr>
</tbody>
</table>

2008 DEVICE-BASED THERAPY GUIDELINES:
CLASS III
- ICD therapy is not indicated for patients with ventricular tachyarrhythmias due to a completely reversible disorder in the absence of structural heart disease (e.g., electrolyte imbalance, drugs, or trauma). *(Level of Evidence: B)* *(2)*

2. Recurrent VF or polymorphic VT during acute (<48 hours) MI
Not addressed in guidelines

3. VF or polymorphic VT during acute (<48 hours) MI
   - NSVT 4 days post MI
   - Inducible VT/VF at EPS ≥4 days after revascularization

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
   CLASS I
- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. *(Level of Evidence: B)* *(2-4)*

<table>
<thead>
<tr>
<th>No Revascularization Indicated (i.e., No Significant CAD)</th>
<th>LVEF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥50%</td>
</tr>
<tr>
<td>4. Single episode VF or polymorphic VT during acute (&lt;48 hours) MI</td>
<td></td>
</tr>
</tbody>
</table>
| Not addressed in guidelines

5. Recurrent VF or polymorphic VT during acute (<48 hours) MI
Not addressed in guidelines

<table>
<thead>
<tr>
<th>Obstructive CAD With Coronary Not Amenable to Revascularization</th>
<th>LVEF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥50%</td>
</tr>
<tr>
<td>6. VF or polymorphic VT during acute (&lt;48 hours) MI</td>
<td></td>
</tr>
<tr>
<td>No EPS done</td>
<td></td>
</tr>
</tbody>
</table>
| Not addressed in guidelines

References:


---

Table 1.2 CAD: VF or Hemodynamically Unstable VT <48 Hours (Acute) Post-Elective Revascularization

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. No evidence for acute coronary occlusion, restenosis, preceding infarct, or other clearly reversible cause</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2008 DEVICE-BASED THERAPY GUIDELINES:

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS I

- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (Level of Evidence: A) (2-8)

---

References:


---

Table 1.3 CAD: VF or Hemodynamically Unstable VT [No Recent MI (≤40 days) Prior to VF/VT and/or No Recent Revascularization (≤3 Months) Prior to VF/VT]

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. No identifiable transient and completely reversible causes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No need for revascularization identified by cath performed following VF/VT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators

CLASS I
- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (Level of Evidence: A) (3-9)

CLASS IIa
- ICD implantation is reasonable for patients with sustained VT and normal or near-normal ventricular function. (Level of Evidence: C)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

CLASS I
- An implantable cardioverter-defibrillator is recommended as secondary prevention to prolong survival in patients with current or prior symptoms of HF and reduced LVEF who have a history of cardiac arrest, ventricular fibrillation, or Hemodynamically destabilizing ventricular tachycardia (10-12). (Level of Evidence: A)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
10. Heart Failure
Class I
- ICD therapy is recommended for secondary prevention of SCD in patients who survived VF or hemodynamically unstable VT, or VT with syncope and who have an LVEF less than or equal to 40%, who are receiving chronic optimal medical therapy, and who have a reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)

LVEF | ≥50% | 36-49% | ≤35%
---|---|---|---
9. No revascularization performed (significant CAD present at cath performed following VF/VT, but coronary anatomy not amenable to revascularization)

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators

CLASS I
- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (Level of Evidence: A) (3-9)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

CLASS I
- An implantable cardioverter-defibrillator is recommended as secondary prevention to prolong survival in patients with current or prior symptoms of HF and reduced LVEF who have a history of cardiac arrest, ventricular fibrillation, or Hemodynamically destabilizing ventricular tachycardia (10-12). (Level of Evidence: A)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction
Class I
- If coronary revascularization cannot be carried out and there is evidence of prior MI and significant LV dysfunction, the primary therapy of patients resuscitated from VF should be the ICD in patients who are receiving chronic optimal medical therapy and those who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)
10. Significant CAD identified at cath performed following VF/VT
Complete revascularization performed after cardiac arrest
Not addressed in guidelines

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
</table>

11. Significant CAD identified at cath performed following VF/VT
Incomplete revascularization performed after cardiac arrest
Not addressed in guidelines

References:


Table 1.4 CAD: VF or Hemodynamically Unstable VT During Exercise Testing Associated With Significant CAD

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
</table>

12. No revascularization performed (significant CAD present at cath performed following VF/VT, but coronary anatomy not amenable to revascularization)

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS I
- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (Level of Evidence: A) (3-9)
**2009 HEART FAILURE GUIDELINES:**

4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

CLASS I

- An implantable cardioverter-defibrillator is recommended as secondary prevention to prolong survival in patients with current or prior symptoms of HF and reduced LVEF who have a history of cardiac arrest, ventricular fibrillation, or Hemodynamically destabilizing ventricular tachycardia (10-12). *(Level of Evidence: A)*

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction

Class I

- If coronary revascularization cannot be carried out and there is evidence of prior MI and significant LV dysfunction, the primary therapy of patients resuscitated from VF should be the ICD in patients who are receiving chronic optimal medical therapy and those who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: A)*

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>Significant CAD identified at cath performed following VF/VT Complete revascularization performed after cardiac arrest</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Significant CAD identified at cath performed following VF/VT Incomplete revascularization performed after cardiac arrest</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References:


Table 1.5 NO CAD: VF or Hemodynamically Unstable VT

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dilated nonischemic cardiomyopathy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

9.1. Dilated Cardiomyopathy (Nonischemic)

Class I

- An ICD should be implanted in patients with nonischemic DCM and significant LV dysfunction who have sustained VT or VF, are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)

16. VT/VF associated with cocaine abuse

**2008 DEVICE-BASED THERAPY GUIDELINES:**

CLASS III

- ICD therapy is not indicated for patients with ventricular tachyarrhythmias due to a completely reversible disorder in the absence of structural heart disease (e.g., electrolyte imbalance, drugs, or trauma). (Level of Evidence: B) (3)

Severe Valvular Disease

VT/VF <48 Hours After Surgical Repair or Replacement of Aortic or Mitral Valve

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No evidence for post-operative valvular dysfunction</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS I

- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (Level of Evidence: A) (3-9)

**2009 HEART FAILURE GUIDELINES:**

4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

CLASS I

- An implantable cardioverter-defibrillator is recommended as secondary prevention to prolong survival in patients with current or prior symptoms of HF and reduced LVEF who have a history of cardiac arrest, ventricular fibrillation, or Hemodynamically destabilizing ventricular tachycardia (10-12). (Level of Evidence: A)

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

9.1. Dilated Cardiomyopathy (Nonischemic)

Class I

- An ICD should be implanted in patients with nonischemic DCM and significant LV dysfunction who have sustained VT or VF, are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)
10. Heart Failure

<table>
<thead>
<tr>
<th>Class I</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ICD therapy is recommended for secondary prevention of SCD in patients who survived VF or hemodynamically unstable VT, or VT with syncope and who have an LVEF less than or equal to 40%, who are receiving chronic optimal medical therapy, and who have a reasonable expectation of survival with a good functional status for more than 1 y. <em>(Level of Evidence: A)</em></td>
</tr>
</tbody>
</table>

VF/Hemodynamically Unstable VT Associated With Other Structural Heart Disease

18. Myocardial sarcoidosis

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

- **CLASS I**
  - ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. *(Level of Evidence: A)* *(3-9)*
  - **CLASS IIa**
  - ICD implantation is reasonable for patients with cardiac sarcoidosis, giant cell myocarditis, or Chagas disease. *(Level of Evidence: C)*

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

8.4.2. Infiltrative Cardiomyopathies

Class I

- In addition to managing the underlying infiltrative cardiomyopathy, life-threatening arrhythmias should be treated in the same manner that such arrhythmias are treated in patients with other cardiomyopathies, including the use of ICD and pacemakers in patients who are receiving chronic optimal medical therapy and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)*

19. Myocarditis; not giant cell myocarditis

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

- **CLASS I**
  - ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. *(Level of Evidence: A)* *(3-9)*

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

8.4.1. Myocarditis, Rheumatic Disease, and Endocarditis

Class IIa

- ICD implantation can be beneficial in patients with life-threatening ventricular arrhythmias who are not in the acute phase of myocarditis, as indicated in the ACC/AHA/NASPE 2002 Guideline Update for Implantation of Cardiac Pacemakers and Antiarrhythmia Devices *(13)*, who are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)*

Class III

- ICD implantation is not indicated during the acute phase of myocarditis. *(Level of Evidence: C)*
20. Giant cell myocarditis

2008 DEVICE-BASED THERAPY GUIDELINES:

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS I

• ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (Level of Evidence: A) (3-9)

CLASS IIa

• ICD implantation is reasonable for patients with cardiac sarcoidosis, giant cell myocarditis, or Chagas disease. (Level of Evidence: C)

21. Takatsubo cardiomyopathy (stress induced cardiomyopathy, apical ballooning syndrome)

≥48 hours of onset of symptoms

Not addressed in guidelines

References:


16. Cooper KT. Personal communication on giant cell myocarditis. March 12, 2012

Table 1.6 Genetic Diseases with Sustained VT/VF
<table>
<thead>
<tr>
<th><strong>22. Congenital Long QT</strong></th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

<table>
<thead>
<tr>
<th>3. Recommendations for Implantable Cardioverter Defibrillators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong></td>
</tr>
<tr>
<td>• ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. <em>(Level of Evidence: A)</em> (2-8)</td>
</tr>
</tbody>
</table>

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

<table>
<thead>
<tr>
<th>11.1.1. Long QT Syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class I</strong></td>
</tr>
<tr>
<td>• Implantation of an ICD along with use of beta blockers is recommended for LQTS patients with previous cardiac arrest and who have reasonable expectation of survival with a good functional status for more than 1 y. <em>(Level of Evidence: A)</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>23. Short QT</strong></th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

<table>
<thead>
<tr>
<th>3. Recommendations for Implantable Cardioverter Defibrillators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong></td>
</tr>
<tr>
<td>• ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. <em>(Level of Evidence: A)</em> (2-8)</td>
</tr>
</tbody>
</table>

| **CLASS IIa**                                                 |
| • ICD implantation is reasonable for patients with catecholaminergic polymorphic VT who have syncope and/or documented sustained VT while receiving beta blockers. *(Level of Evidence: C)* |

<table>
<thead>
<tr>
<th><strong>24. Catecholaminergic Polymorphic VT</strong></th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

<table>
<thead>
<tr>
<th>3. Recommendations for Implantable Cardioverter Defibrillators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong></td>
</tr>
<tr>
<td>• ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. <em>(Level of Evidence: A)</em> (2-8)</td>
</tr>
</tbody>
</table>

| **CLASS IIa**                                                 |
| • ICD implantation is reasonable for patients with catecholaminergic polymorphic VT who have syncope and/or documented sustained VT while receiving beta blockers. *(Level of Evidence: C)* |

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

<table>
<thead>
<tr>
<th>11.1.4. Catecholaminergic Polymorphic Ventricular Tachycardia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class I</strong></td>
</tr>
<tr>
<td>• Implantation of an ICD with use of beta blockers is indicated for patients with CPVT who are survivors of cardiac arrest and who have reasonable expectation of survival with a good functional status for more than 1 y. <em>(Level of Evidence: C)</em></td>
</tr>
</tbody>
</table>

| **Class IIa**                                                |
| • Implantation of an ICD with the use of beta blockers can be effective for affected patients with CPVT with syncope and/or documented sustained VT while receiving beta blockers and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)* |

<table>
<thead>
<tr>
<th><strong>25. Brugada syndrome</strong></th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

<table>
<thead>
<tr>
<th>3. Recommendations for Implantable Cardioverter Defibrillators</th>
</tr>
</thead>
</table>
### CLASS I
- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (Level of Evidence: A) (2-8)

### CLASS IIa
- ICD implantation is reasonable for patients with Brugada syndrome who have documented VT that has not resulted in cardiac arrest. (Level of Evidence: C)

#### 2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

**11.1.3. Brugada Syndrome**

**Class I**
- An ICD is indicated for Brugada syndrome patients with previous cardiac arrest receiving chronic optimal medical therapy and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: C)

**Class IIa**
- An ICD is reasonable for Brugada syndrome patients with documented VT that has not resulted in cardiac arrest and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: C)

### 2008 DEVICE-BASED THERAPY GUIDELINES:

**3. Recommendations for Implantable Cardioverter Defibrillators**

**CLASS I**
- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (Level of Evidence: A) (2-8)

### 2011 Hypertrophic Cardiomyopathy Guidelines

**Class I**
- ICD placement is recommended for patients with HCM with prior documented cardiac arrest, ventricular fibrillation, or hemodynamically significant VT (9-12). (Level of Evidence: B)

### References:


---

Table 1. No Structural Heart Disease (LVEF ≥50%) or Known Genetic Causes of Sustained VT/VF

<table>
<thead>
<tr>
<th>Pharmacologically Induced Sustained VT/VF</th>
</tr>
</thead>
<tbody>
<tr>
<td>30. Non-torsades de pointes VT/VF in the setting of antiarrhythmia drug use</td>
</tr>
</tbody>
</table>

---

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators

CLASS III
- ICD therapy is not indicated for patients with ventricular tachyarrhythmias due to a completely reversible disorder in the absence of structural heart disease (e.g., electrolyte imbalance, drugs, or trauma). *(Level of Evidence: B)* *(2)*

---

31. Drug induced torsades de pointes

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators

CLASS III
- ICD therapy is not indicated for patients with ventricular tachyarrhythmias due to a completely reversible disorder in the absence of structural heart disease (e.g., electrolyte imbalance, drugs, or trauma). *(Level of Evidence: B)* *(2)*

---

Idiopathic VF With Normal Ventricular Function

| 32. No family history of sudden cardiac death |

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators

CLASS I
ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (*Level of Evidence: A*)

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

12.1. Idiopathic Ventricular Tachycardia

Class IIa

- ICD implantation can be effective therapy for the termination of sustained VT in patients with normal or near normal ventricular function and no structural heart disease who are receiving chronic optimal medical therapy and who have reasonable expectation of survival for more than 1 y. (*Level of Evidence: C*)

**2008 DEVICE-BASED THERAPY GUIDELINES:**

CLASS I

- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (*Level of Evidence: A*)

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

12.1. Idiopathic Ventricular Tachycardia

Class IIa

- ICD implantation can be effective therapy for the termination of sustained VT in patients with normal or near normal ventricular function and no structural heart disease who are receiving chronic optimal medical therapy and who have reasonable expectation of survival for more than 1 y. (*Level of Evidence: C*)

**Other Causes**

34. Bradycardia dependent VT/VF

Not addressed in guidelines

35. WPW syndrome with VT/VF

Pathway successfully ablated
Structurally normal heart

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS III

- ICD therapy is not indicated when VF or VT is amenable to surgical or catheter ablation (e.g., atrial arrhythmias associated with the Wolff-Parkinson-White syndrome, RV or LV outflow tract VT, idiopathic VT, or fascicular VT in the absence of structural heart disease). (*Level of Evidence: C*)

References:


### Table 1.8.1 Syncope in Patients Without Structural Heart Disease

<table>
<thead>
<tr>
<th>Unexplained Syncope With No Structural Heart Disease or Genetically Transmitted Ventricular Arrhythmias</th>
</tr>
</thead>
<tbody>
<tr>
<td>36. Normal ECG and structurally normal heart</td>
</tr>
<tr>
<td>Family history of sudden death</td>
</tr>
</tbody>
</table>

#### 2008 DEVICE-BASED THERAPY GUIDELINES:

3. Recommendations for Implantable Cardioverter Defibrillators

**CLASS III**

- ICD therapy is not indicated for syncpe of undetermined cause in a patient without inducible ventricular tachyarrhythmias and without structural heart disease. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>Unexplained Syncope in a Patient With RV or LV Outflow Tract Tachycardia (Idiopathic VT) With Normal LV and RV Function and Anatomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>38. Documented sustained monomorphic VT (LBBB/inferior axis) at the time of syncope</td>
</tr>
<tr>
<td>Ablation not yet attempted</td>
</tr>
</tbody>
</table>

#### 2008 DEVICE-BASED THERAPY GUIDELINES:

3. Recommendations for Implantable Cardioverter Defibrillators

**CLASS III**

- ICD therapy is not indicated for syncpe of undetermined cause in a patient without inducible ventricular tachyarrhythmias and without structural heart disease. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>Documented history of sustained monomorphic VT(LBBB/inferior axis) but not recorded at the time of syncope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ablation not yet attempted</td>
</tr>
</tbody>
</table>

#### 2008 DEVICE-BASED THERAPY GUIDELINES:

3. Recommendations for Implantable Cardioverter Defibrillators

**CLASS III**

- ICD therapy is not indicated when VF or VT is amenable to surgical or catheter ablation (e.g., atrial arrhythmias associated with the Wolff-Parkinson-White syndrome, RV or LV outflow tract VT, idiopathic VT, or fascicular VT in the absence of structural heart disease). *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>Documented history of sustained monomorphic VT(LBBB/inferior axis) but not recorded at the time of syncope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ablation not yet attempted</td>
</tr>
</tbody>
</table>
40. Documented sustained monomorphic VT (LBBB/inferior axis) at the time of syncope
   Ablation successful

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
   CLASS III
   • ICD therapy is not indicated when VF or VT is amenable to surgical or catheter ablation (e.g., atrial arrhythmias associated
   with the Wolff-Parkinson-White syndrome, RV or LV outflow tract VT, idiopathic VT, or fascicular VT in the absence of
   structural heart disease). (Level of Evidence: C)

Unexplained Syncope in a Patient With Long QT Syndrome

41. While on treatment with beta blockers

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
   CLASS IIa
   • ICD implantation is reasonable to reduce SCD in patients with long-QT syndrome who are experiencing syncope and/or VT
   while receiving beta blockers. (Level of Evidence: B) (3-8)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
11.1.1. Long QT Syndrome
   Class IIa
   • Implantation of an ICD with continued use of beta blockers can be effective to reduce SCD in LQTS patients experiencing
   syncope and/or VT while receiving beta blockers and who have reasonable expectation of survival with a good functional
   status for more than 1 y. (Level of Evidence: B)

42. Not being treated with beta blockers
   Not addressed in guidelines

Unexplained Syncope in a Patient With Brugada ECG Pattern

43. No EPS performed
   Not addressed in guidelines

44. EPS performed
   No ventricular arrhythmias induced
   Not addressed in guidelines

45. EPS performed
   Sustained VT/VF induced
   Not addressed in guidelines

Unexplained Syncope in a Patient With Catecholaminergic Polymorphic VT

46. While on treatment with beta blockers

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
   CLASS IIa
ICD implantation is reasonable for patients with catecholaminergic polymorphic VT who have syncope and/or documented sustained VT while receiving beta blockers. (Level of Evidence: C)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
11.1.4. Catecholaminergic Polymorphic Ventricular Tachycardia
Class IIa
- Implantation of an ICD with the use of beta blockers can be effective for affected patients with CPVT with syncope and/or documented sustained VT while receiving beta blockers and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: C)

47. Not being treated with beta blockers
Not addressed in guidelines

References:

Table 1.8.2 Syncope in Patients With Coronary Artery Disease

<table>
<thead>
<tr>
<th>Unexplained Syncope With Coronary Heart Disease and No Acute MI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LVEF ≥50%</strong></td>
</tr>
<tr>
<td>48. Electrophysiology study and noninvasive investigations failed to define a cause of syncope</td>
</tr>
<tr>
<td>No prior MI</td>
</tr>
<tr>
<td>Nonobstructive CAD; revascularization not indicated</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unexplained Syncope With Prior MI and No Acute MI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LVEF 36-49%</strong></td>
</tr>
<tr>
<td>50. Electrophysiology study failed to define a cause of syncope</td>
</tr>
<tr>
<td>No prior MI</td>
</tr>
<tr>
<td>Nonobstructive CAD; revascularization not indicated</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>
51. Electrophysiology study failed to define a cause of syncope
Obstructive CAD; not amenable to revascularization

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS IIb
• ICD therapy may be considered in patients with syncope and advanced structural heart disease in whom thorough invasive
  and noninvasive investigations have failed to define a cause. (Level of Evidence: C)

52. Electrophysiology study revealed inducible sustained VT/VF
Not addressed in guidelines

Unexplained Syncope With Prior MI and No Acute MI
LVEF ≤35%

53. EPS not performed

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
Class I
• ICD therapy is indicated in patient with LVEF less than or equal to 35% due to prior MI who are at least 40 days post-MI
  and are in NYHA functional Class II or III (Level of Evidence: A).
• ICD therapy is indicated in patients with LV dysfunction due to prior MI who are at least 40 days post-MI, have an LVEF less
  than or equal to 30%, and are in NYHA functional Class I (Level of Evidence: A).
Class IIa
• ICD implantation is reasonable for patients with unexplained syncope, significant LV dysfunction, and nonischemic DCM.
  (Level of Evidence: C)
CLASS IIb
• ICD therapy may be considered in patients with syncope and advanced structural heart disease in whom thorough invasive
  and noninvasive investigations have failed to define a cause. (Level of Evidence: C)

54. Inducible VT/VF at EPS

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
Class I
• ICD therapy is indicated in patients with syncope of undetermined origin with clinically relevant, hemodynamically
  significant sustained VT or VF induced at electrophysiological study. (Level of Evidence: B) (2-3)

55. Not inducible at EPS

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
Class I
• ICD therapy is indicated in patient with LVEF less than or equal to 35% due to prior MI who are at least 40 days post-MI
  and are in NYHA functional Class II or III (Level of Evidence: A).
• ICD therapy is indicated in patients with LV dysfunction due to prior MI who are at least 40 days post-MI, have an LVEF less
  than or equal to 30%, and are in NYHA functional Class I (Level of Evidence: A).
CLASS IIb
• ICD therapy may be considered in patients with syncope and advanced structural heart disease in whom thorough invasive
and noninvasive investigations have failed to define a cause. (Level of Evidence: C)

References:

Table 1.8.3 Syncope in Patients With Nonischemic Structural Heart Disease

<table>
<thead>
<tr>
<th>Unexplained Syncope in a Patient With Left Ventricular Hypertrophy Without Criteria for Hypertrophic Cardiomyopathy</th>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>56. Left ventricular hypertrophy/hypertensive heart disease</td>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unexplained Syncope in a Patient With Nonischemic Cardiomyopathy</th>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>57. Nonischemic dilated cardiomyopathy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
   Class IIa
   • ICD implantation is reasonable for patients with unexplained syncope, significant LV dysfunction, and nonischemic DCM. (Level of Evidence: C)

2006 VENTRICULAR ARRYTHMIA GUIDELINES:
9.1. Dilated Cardiomyopathy (Nonischemic)
   Class IIa
   • ICD implantation can be beneficial for patients with unexplained syncope, significant LV dysfunction, and nonischemic DCM who are receiving chronic optimal medical therapy and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: C)
   CLASIIib
   • ICD therapy may be considered in patients with syncope and advanced structural heart disease in whom thorough invasive and noninvasive investigations have failed to define a cause. (Level of Evidence: C)

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>58. Left ventricular non-compaction</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
   Class IIa
   • ICD implantation is reasonable for patients with unexplained syncope, significant LV dysfunction, and nonischemic DCM
59. **Hypertrophic cardiomyopathy**

**2008 DEVICE-BASED THERAPY GUIDELINES:**
Class IIa
- ICD implantation is reasonable for patients with HCM who have 1 or more major risk factors for SCD (*Level of Evidence: C*).

**2011 HYPERTROPHIC CARDIOMYOPATHY GUIDELINES:**
2.14. Selection of Patients for ICDs—Recommendations
Class IIa
- It is reasonable to recommend an ICD for patients with HCM with:
  a. Sudden death presumably caused by HCM in 1 or more first-degree relatives. (5) (*Level of Evidence: C*)
  b. A maximum LV wall thickness greater than or equal to 30 mm. (6-9) (*Level of Evidence: C*)
  c. One or more recent, unexplained syncopal episodes. (10) (*Level of Evidence: C*)

60. **Cardiac amyloidosis**
Not addressed in guidelines

61. **Tetrology of Fallot with prior corrective surgery**

**2008 Device Based Therapy Guidelines**
CLASS IIa
- ICD implantation is reasonable for patients with congenital heart disease with recurrent syncope of undetermined origin in the presence of either ventricular dysfunction or inducible ventricular arrhythmias at electrophysiological study. (*Level of Evidence: B*) (11)

CLASS IIb
- ICD implantation may be considered for patients with recurrent syncope associated with complex congenital heart disease and advanced systemic ventricular dysfunction when thorough invasive and noninvasive investigations have failed to define a cause. (*Level of Evidence: C*) (12)

**Unexplained Syncope in a Patient With Arrhythmogenic Right Ventricular Cardiomyopathy**

62. **No EPS performed**

**2008 DEVICE-BASED THERAPY GUIDELINES:**
3. Recommendations for Implantable Cardioverter Defibrillators
Class IIa
- ICD implantation is reasonable for the prevention of SCD in patients with ARVD/C who have 1 or more risk factors for SCD (*Level of Evidence: C*).

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**
9.3. Arrhythmogenic Right Ventricular Cardiomyopathy
Class IIa
- ICD implantation can be effective for the prevention of SCD in patients with ARVC with extensive disease, including those with LV involvement, 1 or more affected family member with SCD, or undiagnosed syncope when VT or VF has not been excluded as the cause of syncpe, who are receiving chronic optimal medical therapy, and who have reasonable
expectation of survival with a good functional status for more than 1 y. *Level of Evidence: C*

<table>
<thead>
<tr>
<th>63. No inducible VT/VF at EPS</th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**
3. Recommendations for Implantable Cardioverter Defibrillators

**Class IIa**
- ICD implantation is reasonable for the prevention of SCD in patients with ARVD/C who have 1 or more risk factors for SCD *(Level of Evidence: C)*.

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**
9.3. Arrhythmogenic Right Ventricular Cardiomyopathy

**Class IIa**
- ICD implantation can be effective for the prevention of SCD in patients with ARVC with extensive disease, including those with LV involvement, 1 or more affected family member with SCD, or undiagnosed syncope when VT or VF has not been excluded as the cause of syncope, who are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>64. Inducible VT/VF at EPS</th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**
3. Recommendations for Implantable Cardioverter Defibrillators

**Class I**
- ICD therapy is indicated in patients with syncope of undetermined origin with clinically relevant, hemodynamically significant sustained VT or VF induced at electrophysiological study. *(Level of Evidence: B)* (2,4)

**Class IIa**
- ICD implantation is reasonable for the prevention of SCD in patients with ARVD/C who have 1 or more risk factors for SCD *(Level of Evidence: C)*.

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**
9.3. Arrhythmogenic Right Ventricular Cardiomyopathy

**Class IIa**
- ICD implantation can be effective for the prevention of SCD in patients with ARVC with extensive disease, including those with LV involvement, 1 or more affected family member with SCD, or undiagnosed syncope when VT or VF has not been excluded as the cause of syncope, who are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>65. Inducible VT/VF at EPS</th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**
3. Recommendations for Implantable Cardioverter Defibrillators

**Class I**
- ICD therapy is indicated in patients with syncope of undetermined origin with clinically relevant, hemodynamically significant sustained VT or VF induced at electrophysiological study. *(Level of Evidence: B)* (2,4)

**Class IIa**
- ICD implantation is reasonable for the prevention of SCD in patients with ARVD/C who have 1 or more risk factors for SCD *(Level of Evidence: C)*.

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**
9.3. Arrhythmogenic Right Ventricular Cardiomyopathy

Class IIa

- ICD implantation can be effective for the prevention of SCD in patients with ARVC with extensive disease, including those with LV involvement, 1 or more affected family member with SCD, or undiagnosed syncope when VT or VF has not been excluded as the cause of syncope, who are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: C)

References:


Table 1.9 Sustained Hemodynamically Stable Monomorphic VT Associated With Structural Heart Disease

<table>
<thead>
<tr>
<th>LVEF</th>
<th>≥50%</th>
<th>36-49%</th>
<th>≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>66.</td>
<td>CAD and prior MI</td>
<td>Not addressed in guidelines</td>
<td></td>
</tr>
<tr>
<td>67.</td>
<td>CAD and prior MI</td>
<td>All inducible VTs successfully ablated</td>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>68.</td>
<td>CAD and prior MI</td>
<td>Troponin elevation thought to be secondary to VT All inducible VTs successfully ablated</td>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>
69. Nonischemic dilated cardiomyopathy
   Not addressed in guidelines

70. Nonischemic dilated cardiomyopathy
   All inducible VTs successfully ablated
   Not addressed in guidelines

71. Bundle branch reentry successfully ablated in a patient with nonischemic cardiomyopathy

**2008 Device Based Therapy Guidelines**

**Class III**
- ICD therapy is not indicated when VF or VT is amenable to surgical or catheter ablation (e.g., atrial arrhythmias associated with the Wolff-Parkinson-White syndrome, RV or LV outflow tract VT, idiopathic VT, or fascicular VT in the absence of structural heart disease). *(Level of Evidence: C)*

Reference:

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**Section 2: Primary Prevention**

**Table 2.1.1 Post Acute Myocardial Infarction (≤40 Days) LVEF ≤30%**

<table>
<thead>
<tr>
<th>Plan for Revascularization (Not Yet Performed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>72. No NSVT</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Revascularized After Acute MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>73. No NSVT</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>74. Asymptomatic NSVT (&gt;4 days post MI)</td>
</tr>
<tr>
<td>No EPS performed</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>75. Asymptomatic NSVT (&gt;4 days post MI)</td>
</tr>
<tr>
<td>EPS with inducible sustained VT (EPS performed after revascularization, within 30 days of MI)</td>
</tr>
</tbody>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

**CLASS I**
- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. *(Level of Evidence: B)* (2-4)
<table>
<thead>
<tr>
<th>76. Asymptomatic NSVT (&gt;4 days post MI)</th>
<th>EPS with inducible sustained VT (EPS performed after revascularization, between 30 and 40 days after MI)</th>
</tr>
</thead>
</table>

### 2008 DEVICE-BASED THERAPY GUIDELINES:

<table>
<thead>
<tr>
<th>3. Recommendations for Implantable Cardioverter Defibrillators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong></td>
</tr>
<tr>
<td>- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. <em>(Level of Evidence: B)</em> <em>(2-4)</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>77. Asymptomatic NSVT (&gt;4 days post MI)</th>
<th>EPS without inducible VT (EPS performed after revascularization, within 30 days after MI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>78. Asymptomatic NSVT (&gt;4 days post MI)</th>
<th>EPS without inducible VT (EPS performed after revascularization, between 30 and 40 days after MI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
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</tbody>
</table>

### Not Revascularized

<table>
<thead>
<tr>
<th>Obstructive CAD With Coronary Anatomy Not Amenable to Revascularization</th>
</tr>
</thead>
<tbody>
<tr>
<td>79. No NSVT</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>80. Asymptomatic NSVT (&gt;4 days post MI)</th>
<th>No EPS performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>81. Asymptomatic NSVT (&gt;4 days post MI)</th>
<th>EPS with inducible sustained VT (EPS performed within 30 days of MI)</th>
</tr>
</thead>
</table>

### 2008 DEVICE-BASED THERAPY GUIDELINES:

<table>
<thead>
<tr>
<th>3. Recommendations for Implantable Cardioverter Defibrillators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong></td>
</tr>
<tr>
<td>- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. <em>(Level of Evidence: B)</em> <em>(2-4)</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>82. Asymptomatic NSVT (&gt;4 days post MI)</th>
<th>EPS with inducible sustained VT (EPS performed between 30 and 40 days after MI)</th>
</tr>
</thead>
</table>

### 2008 DEVICE-BASED THERAPY GUIDELINES:

<table>
<thead>
<tr>
<th>3. Recommendations for Implantable Cardioverter Defibrillators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong></td>
</tr>
<tr>
<td>- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. <em>(Level of Evidence: B)</em> <em>(2-4)</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>83. Asymptomatic NSVT (&gt;4 days post MI)</th>
<th>EPS without inducible VT (EPS performed within 30 days of MI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>84. Asymptomatic NSVT (&gt;4 days post MI)</th>
<th>EPS without inducible VT (EPS performed between 30 and 40 days after MI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
</tr>
</tbody>
</table>
References:


Table 2.1.2 Post Acute Myocardial Infarction (≤40 Days) LVEF 31-40%

<table>
<thead>
<tr>
<th>Revascularized for Acute MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>85.  No NSVT</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>86.  Asymptomatic NSVT (&gt;4 days post MI)</td>
</tr>
<tr>
<td>No EPS performed</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>87.  Asymptomatic NSVT (&gt;4 days post MI)</td>
</tr>
<tr>
<td>EPS with inducible sustained VT (EPS performed after revascularization, within 30 days of MI)</td>
</tr>
</tbody>
</table>

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS I
- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. ([Level of Evidence: B]) (2-4)

88.  Asymptomatic NSVT (>4 days post MI) |
     EPS with inducible sustained VT (EPS performed after revascularization, between 30 and 40 days after MI) |

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS I
- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. ([Level of Evidence: B]) (2-4)

89.  Asymptomatic NSVT (>4 days post MI) |
     EPS without inducible VT (EPS performed after revascularization, within 30 days of MI) |

Not addressed in guidelines

90.  Asymptomatic NSVT (>4 days post MI) |
     EPS without inducible VT (EPS performed after revascularization, between 30 and 40 days after MI) |

Not addressed in guidelines
References:


Table 2.1.3 Post Acute Myocardial Infarction (≤40 days) and Pre-Existing Chronic Cardiomyopathy (≥3 Months)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
</table>
| 91. | LVEF ≤30% due to old infarction  
NYHA Class I  
Not addressed in guidelines |
| 92. | LVEF ≤35% due to old infarction  
NYHA Class II-III  
Not addressed in guidelines |
| 93. | LVEF ≤35% due to nonischemic causes  
NYHA Class II-III  
Not addressed in guidelines |

References: None

Table 2.1.4 Post Myocardial Infarction (≤40 days) and Need for Guideline-Directed Pacemaker Therapy Post-MI (e.g., SSS, CHB, or Other Indications for Permanent Pacemaker)

<p>| | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
</table>
| 94. | LVEF ≤35%  
2004 STEMI GUIDELINES:  
7.7.3.2.3. Pacing Mode Selection in STEMI Patients  
Class I  
• All patients who have an indication for permanent pacing after STEMI should be evaluated for ICD indications. (Level of Evidence: C) |
| 95. | LVEF 36-40%  
2004 STEMI GUIDELINES:  
7.7.3.2.3. Pacing Mode Selection in STEMI Patients  
Class I  
• All patients who have an indication for permanent pacing after STEMI should be evaluated for ICD indications. (Level of Evidence: C) |

Reference:

Table 2.2. Post Myocardial Infarction (>40 days) With Ischemic Cardiomyopathy

<table>
<thead>
<tr>
<th>LVEF ≤30%</th>
<th>NYHA Class</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>96.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS I
- ICD therapy is indicated in patients with LVEF less than or equal to 35% due to prior MI who are at least 40 days post-MI and are in NYHA functional Class II or III. *(Level of Evidence: A) (4-5)*
- ICD therapy is indicated in patients with LV dysfunction due to prior MI who are at least 40 days post-MI, have an LVEF less than or equal to 30%, and are in NYHA functional Class I. *(Level of Evidence: A) (4,6)*

**2009 HEART FAILURE GUIDELINES:**

4.2. Patients With Cardiac Structural Abnormalities or Remodeling Who Have Not Developed Heart Failure Symptoms (Stage B)

CLASS IIa
- Placement of an ICD is reasonable in patients with ischemic cardiomyopathy who are at least 40 days post-MI, have an LVEF of 30% or less, are NYHA functional class I on chronic optimal medical therapy, and have reasonable expectation of survival with a good functional status for more than 1 year. *(Level of Evidence: B)*

4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

CLASS I
- Implantable cardioverter-defibrillator therapy is recommended for primary prevention of sudden cardiac death to reduce total mortality in patients with non-ischemic dilated cardiomyopathy or ischemic heart disease at least 40 days post-MI, a LVEF less than or equal to 35%, and NYHA functional class II or III symptoms while receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 year. *(Level of Evidence: A)*

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction

Class I
- ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with LV dysfunction due to prior MI who are at least 40 d post-MI, have an LVEF less than or equal to 30% to 40%, are NYHA functional class II or III, are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: A)*

**2004 STEMI GUIDELINES:**

7.7.1.5. Implantable Cardioverter Defibrillator Implantation in Patients After STEMI

Class IIa
- If there is reduced LVEF (0.30 or less) at least 1 month post-STEMI and 3 months after coronary artery revascularization, it is reasonable to implant an ICD in post-STEMI patients without spontaneous VF or sustained VT more than 48 hours after STEMI. *(Level of Evidence: B)*

<table>
<thead>
<tr>
<th>LVEF 31-35%</th>
<th>NYHA Class</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>97.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS I
• ICD therapy is indicated in patients with LVEF less than or equal to 35% due to prior MI who are at least 40 days post-MI and are in NYHA functional Class II or III. (Level of Evidence: A) (4-5)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction
CLASS I
• Implantable cardioverter-defibrillator therapy is recommended for primary prevention of sudden cardiac death to reduce total mortality in patients with non-ischemic dilated cardiomyopathy or ischemic heart disease at least 40 days post-MI, a LVEF less than or equal to 35%, and NYHA functional class II or III symptoms while receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 year (1, 5, 7-12). (Level of Evidence: A)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction
Class I
• ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with LV dysfunction due to prior MI who are at least 40 d post-MI, have an LVEF less than or equal to 30% to 40%, are NYHA functional class II or III, are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)

2004 STEMI GUIDELINES:
7.7.1.5. Implantable Cardioverter Defibrillator Implantation in Patients After STEMI
Class IIb
• The usefulness of an ICD is not well established in STEMI patients without spontaneous VF or sustained VT more than 48 hours after STEMI who have a reduced LVEF (0.31 to 0.40) at least 1 month after STEMI but who have no additional evidence of electrical instability (e.g., nonsustained VT). (Level of Evidence: B)

98. LVEF 36-40%
Asymptomatic NSVT
No EPS

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
Class I
• ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. (Level of Evidence: B)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction
Class I
• ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with LV dysfunction due to prior MI who are at least 40 d post-MI, have an LVEF less than or equal to 30% to 40%, are NYHA functional class II or III, are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)

2004 STEMI GUIDELINES:
7.7.1.5. Implantable Cardioverter Defibrillator Implantation in Patients After STEMI
Class IIb

- The usefulness of an ICD is not well established in STEMI patients without spontaneous VF or sustained VT more than 48 hours after STEMI who have a reduced LVEF (0.31 to 0.40) at least 1 month after STEMI and additional evidence of electrical instability (e.g., nonsustained VT) but who do not have inducible VF or sustained VT on EP testing. (Level of Evidence: B)

99. LVEF 36-40%
Asymptomatic NSVT
EPS without inducible VT/VF

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction
Class I
- ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with LV dysfunction due to prior MI who are at least 40 d post-MI, have an LVEF less than or equal to 30% to 40%, are NYHA functional class II or III, are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)

2004 STEMI GUIDELINES:
7.7.1.5. Implantable Cardioverter Defibrillator Implantation in Patients After STEMI
Class IIb
- The usefulness of an ICD is not well established in STEMI patients without spontaneous VF or sustained VT more than 48 hours after STEMI who have a reduced LVEF (0.31 to 0.40) at least 1 month after STEMI and additional evidence of electrical instability (e.g., nonsustained VT) but who do not have inducible VF or sustained VT on EP testing. (Level of Evidence: B)

100. LVEF 36-40%
Asymptomatic NSVT
EPS with inducible sustained VT/VF

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS I
- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. (Level of Evidence: B) (4,13-14)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction
Class I
- ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with LV dysfunction due to prior MI who are at least 40 d post-MI, have an LVEF less than or equal to 30% to 40%, are NYHA functional class II or III, are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)

2004 STEMI GUIDELINES:
7.7.1.5. Implantable Cardioverter Defibrillator Implantation in Patients After STEMI
Class I
- An ICD is indicated for patients without spontaneous VF or sustained VT more than 48 hours after STEMI whose STEMI occurred at least 1 month previously, who have an LVEF between 0.31 and 0.40, demonstrate additional evidence of electrical instability (e.g., nonsustained VT), and have inducible VF or sustained VT on EP testing. (Level of Evidence: B)
Recent PCI or CABG (≤3 Months)

<table>
<thead>
<tr>
<th>101.</th>
<th>No known pre-existing cardiomyopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LVEF ≤35%</td>
</tr>
</tbody>
</table>

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 3. Recommendations for Implantable Cardioverter Defibrillators

**CLASS I**

- ICD therapy is indicated in patients with LVEF less than or equal to 35% due to prior MI who are at least 40 days post-MI and are in NYHA functional Class II or III. *(Level of Evidence: A)* (4-5)
- ICD therapy is indicated in patients with LV dysfunction due to prior MI who are at least 40 days post-MI, have an LVEF less than or equal to 30%, and are in NYHA functional Class I. *(Level of Evidence: A)* (4,6)

### 2009 HEART FAILURE GUIDELINES:

#### 4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

**CLASS I**

- Implantable cardioverter-defibrillator therapy is recommended for primary prevention of sudden cardiac death to reduce total mortality in patients with non-ischemic dilated cardiomyopathy or ischemic heart disease at least 40 days post-MI, a LVEF less than or equal to 35%, and NYHA functional class II or III symptoms while receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 year (1, 5 7-12). *(Level of Evidence: A)*

<table>
<thead>
<tr>
<th>102.</th>
<th>Pre-existing documented cardiomyopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LVEF ≤35% on guideline-directed medical therapy &gt;3 months prior to PCI/CABG</td>
</tr>
</tbody>
</table>

### 2008 DEVICE-BASED THERAPY GUIDELINES:

**Recommendations for Implantable Cardioverter Defibrillators**

**CLASS I**

- ICD therapy is indicated in patients with LVEF less than or equal to 35% due to prior MI who are at least 40 days post-MI and are in NYHA functional Class II or III. *(Level of Evidence: A)* (4-5)
- ICD therapy is indicated in patients with LV dysfunction due to prior MI who are at least 40 days post-MI, have an LVEF less than or equal to 30%, and are in NYHA functional Class I. *(Level of Evidence: A)* (4,6)

### 2009 HEART FAILURE GUIDELINES:

#### 4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

**CLASS I**

- Implantable cardioverter-defibrillator therapy is recommended for primary prevention of sudden cardiac death to reduce total mortality in patients with non-ischemic dilated cardiomyopathy or ischemic heart disease at least 40 days post-MI, a LVEF less than or equal to 35%, and NYHA functional class II or III symptoms while receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 year (1, 5 7-12). *(Level of Evidence: A)*

### 2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

#### 8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction

**Class IIa**

- Implantation of an ICD is reasonable in patients with LV dysfunction due to prior MI who are at least 40 d post-MI, have an LVEF of less than or equal to 30% to 35%, are NYHA functional class I on chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: B)*

<table>
<thead>
<tr>
<th>103.</th>
<th>LVEF ≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Need for ppm post-revascularization (e.g., SSS, CHB, or other guideline-directed indications for permanent pacemaker)</td>
</tr>
</tbody>
</table>
**2008 DEVICE-BASED THERAPY GUIDELINES:**

Recommendations for Implantable Cardioverter Defibrillators

**CLASS I**

- ICD therapy is indicated in patients with LVEF less than or equal to 35% due to prior MI who are at least 40 days post-MI and are in NYHA functional Class II or III. *(Level of Evidence: A) (4-5)*
- ICD therapy is indicated in patients with LV dysfunction due to prior MI who are at least 40 days post-MI, have an LVEF less than or equal to 30%, and are in NYHA functional Class I. *(Level of Evidence: A) (4,6)*

**2009 HEART FAILURE GUIDELINES:**

4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

**CLASS I**

- Implantable cardioverter-defibrillator therapy is recommended for primary prevention of sudden cardiac death to reduce total mortality in patients with non-ischemic dilated cardiomyopathy or ischemic heart disease at least 40 days post-MI, a LVEF less than or equal to 35%, and NYHA functional class II or III symptoms while receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 year (1, 5 7-12). *(Level of Evidence: A)*

**2004 STEMI GUIDELINES:**

7.7.3.2.3. Pacing Mode Selection in STEMI Patients

**Class I**

- All patients who have an indication for permanent pacing after STEMI should be evaluated for ICD indications. *(Level of Evidence: C)*

104. LVEF 36-40%

Need for ppm post-revascularization (e.g., SSS, CHB, or other guideline-directed indications for permanent pacemaker)

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

10. Heart Failure

**Class I**

- ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with LV dysfunction due to prior MI who are at least 40 d post-MI, have an LVEF less than or equal to 30% to 40%, are NYHA functional class II or III receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: A)*

**2004 STEMI GUIDELINES:**

7.7.3.2.3. Pacing Mode Selection in STEMI Patients

**Class I**

- All patients who have an indication for permanent pacing after STEMI should be evaluated for ICD indications. *(Level of Evidence: C)*

References:


Table 2.3 Duration of Guideline-Directed Medical Therapy for Ischemic Cardiomyopathy Without Recent MI (Revascularization Not Indicated)

<table>
<thead>
<tr>
<th>LVEF ≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>On guideline-directed medical therapy for &lt;3 months</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>

105. LVEF ≤35%

106. LVEF ≤35%

2008 DEVICE-BASED THERAPY GUIDELINES:
Recommendations for Implantable Cardioverter Defibrillators
CLASS I

- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF less than or equal to 40%, and inducible VF or sustained VT at electrophysiological study. (Level of Evidence: B) (3,6-7)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction
Implantable cardioverter-defibrillator therapy is recommended for primary prevention of sudden cardiac death to reduce total mortality in patients with non-ischemic dilated cardiomyopathy or ischemic heart disease at least 40 days post-MI, a LVEF less than or equal to 35%, and NYHA functional class II or III symptoms while receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 year (1, 4, 8-12). (Level of Evidence: A)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

8.1. Left Ventricular Dysfunction Due to Prior Myocardial Infarction

Class I

ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with LV dysfunction due to prior MI who are at least 40 d post-MI, have an LVEF less than or equal to 30% to 40%, are NYHA functional class II or III, are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: A)

References:

Table 2.4 Nonischemic Cardiomyopathy

<table>
<thead>
<tr>
<th>LVEF ≤30%</th>
<th>NYHA Class</th>
<th>I</th>
<th>II-III</th>
<th>IV</th>
</tr>
</thead>
</table>

2008 DEVICE-BASED THERAPY GUIDELINES:

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS I
• ICD therapy is indicated in patients with nonischemic DCM who have an LVEF less than or equal to 35% and who are in NYHA functional Class II or III. (*Level of Evidence: B*) (3-6)

**CLASS IIb**

• ICD therapy may be considered in patients with nonischemic heart disease who have an LVEF of less than or equal to 35% and who are in NYHA functional Class I. (*Level of Evidence: C*)

### 2008 DEVICE-BASED THERAPY GUIDELINES:

3. **Recommendations for Implantable Cardioverter Defibrillators**

**CLASS I**

• ICD therapy is indicated in patients with nonischemic DCM who have an LVEF less than or equal to 35% and who are in NYHA functional Class II or III. (*Level of Evidence: B*) (3-6)

**CLASS IIb**

• ICD therapy may be considered in patients with nonischemic heart disease who have an LVEF of less than or equal to 35% and who are in NYHA functional Class I. (*Level of Evidence: C*)

### 2008 DEVICE-BASED THERAPY GUIDELINES:

3. **Recommendations for Implantable Cardioverter Defibrillators**

**CLASS I**

• ICD therapy is indicated in patients with nonischemic DCM who have an LVEF less than or equal to 35% and who are in NYHA functional Class II or III. (*Level of Evidence: B*) (3-6)

**CLASS IIb**

• ICD therapy may be considered in patients with nonischemic heart disease who have an LVEF of less than or equal to 35% and who are in NYHA functional Class I. (*Level of Evidence: C*)

### 2009 HEART FAILURE GUIDELINES:

4.2. **Patients With Cardiac Structural Abnormalities or Remodeling Who Have Not Developed Heart Failure Symptoms (Stage B)**

**CLASS IIb**

• Placement of an ICD might be considered in patients without HF who have nonischemic cardiomyopathy and an LVEF less than or equal to 30% who are in NYHA functional class I with chronic optimal medical therapy and have a reasonable expectation of survival with good functional status for more than 1 year. (*Level of Evidence: C*)

4.3.1. **Patients With Reduced Left Ventricular Ejection Fraction**

**CLASS I**

• Implantable cardioverter-defibrillator therapy is recommended for primary prevention of sudden cardiac death to reduce total mortality in patients with non-ischemic dilated cardiomyopathy or ischemic heart disease at least 40 days post-MI, a LVEF less than or equal to 35%, and NYHA functional class II or III symptoms while receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 year (1, 4, 9-12). (*Level of Evidence: A*)

### 2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

9.1. **Dilated Cardiomyopathy (Nonischemic)**

**Class I**

• ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with
**2008 DEVICE-BASED THERAPY GUIDELINES:**

### 3. Recommendations for Implantable Cardioverter Defibrillators

| CLASS I | ICD therapy is indicated in patients with nonischemic DCM who have an LVEF less than or equal to 35% and who are in NYHA functional Class II or III. *(Level of Evidence: B)* (3-6) |
| CLASS IIb | ICD therapy may be considered in patients with nonischemic heart disease who have an LVEF of less than or equal to 35% and who are in NYHA functional Class I. *(Level of Evidence: C)* |

**2009 HEART FAILURE GUIDELINES:**

### 4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

| CLASS I | Implantable cardioverter-defibrillator therapy is recommended for primary prevention of sudden cardiac death to reduce total mortality in patients with non-ischemic dilated cardiomyopathy or ischemic heart disease at least 40 days post-MI, a LVEF less than or equal to 35%, and NYHA functional class II or III symptoms while receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 year *(1, 4, 9-12).* *(Level of Evidence: A)* |

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

### 9.1. Dilated Cardiomyopathy (Nonischemic)

| Class I | ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in SCD in patients with nonischemic DCM who have an LVEF less than or equal to 30% to 35%, are NYHA functional class II or III, who are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: B)* |

---

**Specific Etiologies**

<table>
<thead>
<tr>
<th>EF ≤35%</th>
<th>&gt;35%</th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

### 3. Recommendations for Implantable Cardioverter Defibrillators

<p>| CLASS IIa | ICD implantation is reasonable for patients with cardiac sarcoidosis, giant cell myocarditis, or Chagas disease. <em>(Level of Evidence: C)</em> |</p>
<table>
<thead>
<tr>
<th>115. Myotonic dystrophy</th>
<th>EF</th>
<th>≤35%</th>
<th>&gt;35%</th>
</tr>
</thead>
</table>

**2008 DEVICE BASED THERAPY GUIDELINES:**

2.1.2 Acquired atrioventricular block in adults

Class I
- Permanent pacemaker implantation is indicated for third-degree and advanced second-degree AV block at any anatomic level associated with neuromuscular diseases with AV block, such as myotonic muscular dystrophy, Kearns-Sayre syndrome, Erb dystrophy (limb-girdle muscular dystrophy), and peroneal muscular atrophy, with or without symptoms. (Level of Evidence: B) (13-19)

<table>
<thead>
<tr>
<th>116. Chagas disease</th>
<th>EF</th>
<th>≤35%</th>
<th>&gt;35%</th>
</tr>
</thead>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS IIa
- ICD implantation is reasonable for patients with cardiac sarcoidosis, giant cell myocarditis, or Chagas disease. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>117. Amyloidosis with heart failure</th>
<th>EF</th>
<th>≤35%</th>
<th>&gt;35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>118. Acute lymphocytic myocarditis</th>
<th>EF</th>
<th>≤35%</th>
<th>&gt;35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newly diagnosed (&lt;3 months ago)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

8.4.1. Myocarditis, Rheumatic Disease, and Endocarditis

Class III
- ICD implantation is not indicated during the acute phase of myocarditis. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>119. Giant cell myocarditis</th>
<th>EF</th>
<th>≤35%</th>
<th>&gt;35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS IIa
- ICD implantation is reasonable for patients with cardiac sarcoidosis, giant cell myocarditis, or Chagas disease. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>120. Peripartum cardiomyopathy</th>
<th>EF</th>
<th>≤35%</th>
<th>&gt;35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persists &gt;3 months postpartum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References:


9. 2011 HYPERTROPHIC CARDIOMYOPATHY GUIDELINES:

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS IIa

• ICD implantation is reasonable for patients with HCM who have 1 or more major risk factors for SCD. (Level of Evidence: C)

Table 2.5 Genetic Conditions (Excludes Syncope and Sustained VT, Covered in Section 1)

| 121. Hypertrophic cardiomyopathy with 1 or more risk factors |  |

2008 DEVICE-BASED THERAPY GUIDELINES:

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS IIa

• ICD implantation is reasonable for patients with HCM who have 1 or more major risk factors for SCD. (Level of Evidence: C)

2011 HYPERTROPHIC CARDIOMYOPATHY GUIDELINES:
### 2.14. Selection of Patients for ICDs—Recommendations

**Class IIa**

- It is reasonable to recommend an ICD for patients with HCM with:
  - a. Sudden death presumably caused by HCM in 1 or more first-degree relatives. (4) *(Level of Evidence: C)*
  - b. A maximum LV wall thickness greater than or equal to 30 mm. (5-8) *(Level of Evidence: C)*
  - c. One or more recent, unexplained syncopal episodes. (9) *(Level of Evidence: C)*

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

#### 9.2. Hypertrophic Cardiomyopathy

**Class IIa**

- ICD implantation can be effective for primary prophylaxis against SCD in patients with HCM who have 1 or more major risk factor for SCD and who are receiving chronic optimal medical therapy and in patients who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)*

#### 9.3. Arrhythmogenic Right Ventricular Cardiomyopathy

**Class IIa**

- ICD implantation can be effective for the prevention of SCD in patients with ARVC with extensive disease, including those with LV involvement, 1 or more affected family member with SCD, or undiagnosed syncope when VT or VF has not been excluded as the cause of syncope, who are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)*

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 3. Recommendations for Implantable Cardioverter Defibrillators

**CLASS IIa**

- ICD implantation is reasonable for the prevention of SCD in patients with ARVD/C who have 1 or more risk factors for SCD. *(Level of Evidence: C)*

#### 2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

#### 9.3. Arrhythmogenic Right Ventricular Cardiomyopathy

**Class IIa**

- ICD implantation can be effective for the prevention of SCD in patients with ARVC with extensive disease, including those with LV involvement, 1 or more affected family member with SCD, or undiagnosed syncope when VT or VF has not been excluded as the cause of syncope, who are receiving chronic optimal medical therapy, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)*

### Congenital Long QT Syndrome With 1 or More Risk Factors

#### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 3. Recommendations for Implantable Cardioverter Defibrillators

**CLASS IIb**

- ICD therapy may be considered for patients with long-QT syndrome and risk factors for SCD. *(Level of Evidence: B)* [2,10-15]

#### 2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

#### 11.1.1. Long QT Syndrome

**Class IIb**

- ICD therapy may be considered for patients with long-QT syndrome and risk factors for SCD. *(Level of Evidence: B)* [2,10-15]
- Implantation of an ICD with the use of beta blockers may be considered for prophylaxis of SCD for patients in categories possibly associated with higher risk of cardiac arrest such as LQT2 and LQT3 and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: B)*

<table>
<thead>
<tr>
<th>Catecholaminergic Polymorphic VT With Nonsustained VT (Without Syncope)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125. Not receiving beta blockers, flecainide, or propafenone</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>126. Receiving beta blockers</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>127. Not tolerating or breakthrough nonsustained ventricular arrhythmias on beta blockers</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incidentally Discovered Brugada by ECG (Type I ECG Pattern) In the Absence of Symptoms or Family History of Sudden Cardiac Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>128. No EPS</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>129. Inducible VT or VF at EPS</td>
</tr>
</tbody>
</table>

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

11.1.3 Brugada Syndrome

Class IIb

- EP testing may be considered for risk stratification in asymptomatic Brugada syndrome patients with spontaneous ST elevation with or without a mutation in the SCN5A gene *(Level of Evidence: C)*.

<table>
<thead>
<tr>
<th>Incidentally Discovered Brugada by ECG (Type I ECG Pattern) In the Absence of Symptoms or Family History of Sudden Cardiac Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>130. No inducible VT or VF at EPS</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Familial Dilated/Nonischemic Cardiomyopathy (RV/LV) Associated With Sudden Cardiac Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>131. Evidence of structural cardiac disease but LVEF &gt;35%</td>
</tr>
</tbody>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS IIb

- ICD therapy may be considered in patients with a familial cardiomyopathy associated with sudden death. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>Familial Dilated/Nonischemic Cardiomyopathy (RV/LV) Associated With Sudden Cardiac Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>132. Normal ECG and echo but carrying the implicated gene</td>
</tr>
</tbody>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS IIb

- ICD therapy may be considered in patients with a familial cardiomyopathy associated with sudden death. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>Familial Dilated/Nonischemic Cardiomyopathy (RV/LV) Associated With Sudden Cardiac Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>133. LV non-compaction with LVEF &gt;35%</td>
</tr>
</tbody>
</table>
3. Recommendations for Implantable Cardioverter Defibrillators

CLASS IIb

- ICD therapy may be considered in patients with a familial cardiomyopathy associated with sudden death. *(Level of Evidence: C)*
- ICD therapy may be considered in patients with LV noncompaction. *(Level of Evidence: C)*

References:


Section 3. Comorbidities

It should be noted that the scenarios in this section refer to ICDs implanted for PRIMARY PREVENTION.

Table 3.1 Special Conditions/Comorbidities in Patients for Primary Prevention (Meeting Indications of ICD Implant Related to HF Diagnosis With EF ≤30% on Guideline-Directed Medical Therapy >3 Months)

<table>
<thead>
<tr>
<th>Life Expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>134. Life expectancy &lt;1 year from cardiac or noncardiac conditions</td>
</tr>
</tbody>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

3. Recommendations for Implantable Cardioverter Defibrillators

CLASS III

- ICD therapy is not indicated for patients who do not have a reasonable expectation of survival with an acceptable functional status for at least 1 year, even if they meet ICD implantation criteria specified in the Class I, IIa, and IIb recommendations above. (Level of Evidence: C)

**2009 HEART FAILURE GUIDELINES:**

4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

7. End-of-Life Considerations

CLASS III

- Aggressive procedures performed within the final days of life (including intubation and implantation of a cardioverter-defibrillator in patients with NYHA functional class IV symptoms who are not anticipated to experience clinical improvement from available treatments) are not appropriate. (Level of Evidence: C)

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

13.3. Elderly Patients

Class III

- Elderly patients with projected life expectancy less than 1 y due to major comorbidities should not receive ICD therapy. (Level of Evidence: C)

135. Noncardiac disease with life expectancy 1-2 years

Not addressed in guidelines

<table>
<thead>
<tr>
<th>Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>136. 80-89 years old</td>
</tr>
</tbody>
</table>

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

13.3. Elderly Patients

Class III

- Elderly patients with projected life expectancy less than 1 y due to major comorbidities should not receive ICD therapy. (Level of Evidence: C)
### 2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

#### 13.3. Elderly Patients

**Class III**

- Elderly patients with projected life expectancy less than 1 y due to major comorbidities should not receive ICD therapy.  
  *(Level of Evidence: C)*

### Cognitive Impairment

- **138.** Not able to understand or provide informed consent  
  Health care proxy consents to ICD

Not addressed in guidelines

- **139.** Not able to understand or provide informed consent  
  No health care proxy can be identified

Not addressed in guidelines

### Advanced Psychiatric Impairment

- **140.** Significant psychiatric illnesses that may be aggravated by device implantation or that may preclude regular follow-up

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 3. Recommendations for Implantable Cardioverter Defibrillators

**CLASS III**

- ICD therapy is not indicated in patients with significant psychiatric illnesses that may be aggravated by device implantation or that may preclude systematic follow-up. *(Level of Evidence: C)*

### Renal Disease

- **141.** Severe symptomatic peripheral vascular disease (e.g., peripheral interventions or clinical claudication)

Not addressed in guidelines

- **142.** Chronic kidney disease on dialysis  
  Not a candidate for renal transplant

### 2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

#### 8.4.4. End-Stage Renal Failure

**Class I**

- Life-threatening ventricular arrhythmias, especially in patients awaiting renal transplantation, should be treated conventionally, including the use of ICD and pacemaker as required, in patients who are receiving chronic optimal medical therapy and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: C)*

- **143.** Chronic kidney disease with CrCl <30 cc, not yet on dialysis but candidate for dialysis

### 2006 VENTRICULAR ARRHYTHMIA GUIDELINES:

#### 8.4.4. End-Stage Renal Failure

**Class I**

- Life-threatening ventricular arrhythmias, especially in patients awaiting renal transplantation, should be treated...
conventionally, including the use of ICD and pacemaker as required, in patients who are receiving chronic optimal medical therapy and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: C)

Other Comorbidities

144. IV drug abuse (ongoing)
Not addressed in guidelines

145. Unresolved infection associated with risk for hematogenous seeding
Not addressed in guidelines

146. Non-compliance with medical therapy and follow-up
Not addressed in guidelines

Class IV Heart Failure

147. On waiting list for heart transplant

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS IIa
• ICD implantation is reasonable for non hospitalized patients awaiting transplantation. (Level of Evidence: C)

148. Not candidate for cardiac transplantation, CRT, or VAD
Refractory symptoms on oral therapy

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS III
• ICD therapy is not indicated for NYHA Class IV patients with drug-refractory congestive heart failure who are not candidates for cardiac transplantation or CRT-D. (Level of Evidence: C)

2009 HEART FAILURE GUIDELINES:
7. End-of-Life Considerations
CLASS III
• Aggressive procedures performed within the final days of life (including intubation and implantation of a cardioverter-defibrillator in patients with NYHA functional class IV symptoms who are not anticipated to experience clinical improvement from available treatments) are not appropriate. (Level of Evidence: C)

149. Patient with a VAD
Not addressed in guidelines

150. Not a candidate for transplant or VAD
Does not meet CRT criteria
Planned outpatient continuous intravenous inotropic therapy for palliation

2008 DEVICE-BASED THERAPY GUIDELINES:
3. Recommendations for Implantable Cardioverter Defibrillators
CLASS III
ICD therapy is not indicated for NYHA Class IV patients with drug-refractory congestive heart failure who are not candidates for cardiac transplantation or CRT-D. (Level of Evidence: C)

References:


## Table 4.1 Primary Prevention ICD at Initial Implant

<table>
<thead>
<tr>
<th>No Clinically Relevant Ventricular Arrhythmias on ICD Since Implant</th>
<th>Replace with ICD</th>
<th>Replace with Pacemaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>151. Patient received primary prevention ICD when LVEF was ≤35%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVEF now unchanged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>152. Patient received primary prevention ICD when LVEF was ≤35%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVEF now 36-49%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>153. Patient received primary prevention ICD when LVEF was ≤35%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVEF now ≥50% (normalized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Clinically Relevant Ventricular Arrhythmias on ICD Since Implant (Now Has Prognosis &lt;1 Year)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>154. Patient received primary prevention ICD Pacemaker dependent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace with ICD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace with Pacemaker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>155. Patient received primary prevention ICD Pacemaker dependent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not pacemaker dependent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinically Relevant Ventricular Arrhythmias on ICD Since Implant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>156. Patient received primary prevention ICD when LVEF was ≤35%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVEF now unchanged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>157. Patient received primary prevention ICD when LVEF was ≤35%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVEF now 36-49%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>158. Patient received primary prevention ICD when LVEF was ≤35%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVEF now ≥50% (normalized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>159. Patient received primary prevention ICD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Now has prognosis &lt;1 year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References:
**Table 4.2 Secondary Prevention ICD at Initial Implant**

| 160. Patient received secondary prevention ICD | No ventricular arrhythmia since initial implant | Not addressed in guidelines |
| 161. Patient received secondary prevention ICD | Had ventricular tachyarrhythmias in the monitor zone lasting >30 seconds, but no treated ventricular arrhythmias since initial implant | Not addressed in guidelines |
| 162. Patient received secondary prevention ICD | Had ventricular arrhythmias receiving ICD therapy since implant | Not addressed in guidelines |

**References:**

**Table 4.3 Primary Prevention at Initial Implant: Replacement of CRT-ICD for ERI**

| Primary Prevention at Initial Implant: Replacement of CRT-ICD for ERI | Replace With CRT-ICD | Replace With CRT-Pacemaker |
| 163. Patient got a CRT-ICD when LVEF was ≤35% | LVEF now unchanged (despite clinical improvement) | Not addressed in guidelines |
| 164. Patient got a CRT-ICD when LVEF was ≤35% | LVEF now 36-49% | Not addressed in guidelines |
| 165. Patient got a CRT-ICD when LVEF was ≤35% | LVEF now ≥50% (normalized) | Not addressed in guidelines |

**References:**

**Table 4.4 Secondary Prevention at Initial Implant: Replacement of CRT-ICD for ERI**

| Secondary Prevention at Initial Implant: Replacement of CRT-ICD for ERI | Replace With CRT-ICD | Replace With CRT-Pacemaker |
| 166. Patient got a CRT-ICD when LVEF was ≤35% | LVEF now unchanged (despite clinical improvement) | Not addressed in guidelines |
Not addressed in guidelines

167. Patient got a CRT-ICD when LVEF was ≤35%
LVEF now 36-49%
Not addressed in guidelines

168. Patient got a CRT-ICD when LVEF was ≤35%
LVEF now ≥50% (normalized)
Not addressed in guidelines

References:

Section 5. Dual Chamber ICD
(as opposed to single chamber ICD for patients who meet criteria for ICD implantation)

It should be noted that there are no specific guidelines for single versus dual chamber pacing in patients undergoing ICD implantation. The device guidelines below refer to indications for permanent pacemaker implantation. It is assumed that patients who meet indications for dual chamber pacemaker implantation would also meet criteria for dual chamber ICDs.

Table 5.1 Conduction System Abnormalities

<table>
<thead>
<tr>
<th>Conduction System Abnormalities</th>
<th>Patient With Sinus Node Dysfunction Who Meets Criteria for ICD</th>
</tr>
</thead>
<tbody>
<tr>
<td>169. Sinus node dysfunction (includes sinus pauses, chronotropic</td>
<td>Symptomatic</td>
</tr>
<tr>
<td>incompetence, or marked sinus bradycardia that results from drug</td>
<td></td>
</tr>
<tr>
<td>therapy required to treat other conditions)</td>
<td></td>
</tr>
</tbody>
</table>

2008 DEVICE-BASED THERAPY GUIDELINES:

2.1.1 Recommendations for Permanent Pacing in Sinus Node Dysfunction

CLASS I
- Permanent pacemaker implantation is indicated for SND with documented symptomatic bradycardia, including frequent sinus pauses that produce symptoms. (Level of Evidence: C) (3-5)
- Permanent pacemaker implantation is indicated for symptomatic chronotropic incompetence. (Level of Evidence: C) (3-7)
- Permanent pacemaker implantation is indicated for symptomatic sinus bradycardia that results from required drug therapy for medical conditions. (Level of Evidence: C)

170. Resting sinus bradycardia (resting heart rate <50 bpm)
Asymptomatic

2008 DEVICE-BASED THERAPY GUIDELINES:

2.1.1 Recommendations for Permanent Pacing in Sinus Node Dysfunction

CLASS III
- Permanent pacemaker implantation is not indicated for SND in asymptomatic patients. (Level of Evidence: C)
• Permanent pacemaker implantation is not indicated for SND in patients for whom the symptoms suggestive of bradycardia have been clearly documented to occur in the absence of bradycardia. *(Level of Evidence: C)*

<table>
<thead>
<tr>
<th>Conduction System Abnormalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient With AV Conduction Disease Who Meets Criteria for ICD (Narrow QRS &lt;120 msec)</td>
</tr>
<tr>
<td>171. Third degree AV block or advanced second degree AV block (Mobitz II AV block or high degree AV block)</td>
</tr>
<tr>
<td>Symptomatic CRT not indicated</td>
</tr>
</tbody>
</table>

**2008 DEVICE-BASED THERAPY GUIDELINES:**

2.1.2 Recommendations for Acquired Atrioventricular Block in Adults

**CLASS I**

- Permanent pacemaker implantation is indicated for third-degree and advanced second-degree AV block at any anatomic level associated with bradycardia with symptoms (including heart failure) or ventricular arrhythmias presumed to be due to AV block. *(Level of Evidence: C)* *(8-11)*
- Permanent pacemaker implantation is indicated for third-degree and advanced second-degree AV block at any anatomic level associated with arrhythmias and other medical conditions that require drug therapy that results in symptomatic bradycardia. *(Level of Evidence: C)* *(8-11)*

**CLASS IIa**

- Permanent pacemaker implantation is reasonable for asymptomatic type II second-degree AV block with a narrow QRS. When type II second-degree AV block occurs with a wide QRS, including isolated right bundle-branch block, pacing becomes a Class I recommendation. *(See Section 2.1.3, “Chronic Bifascicular Block.”)* *(Level of Evidence: B)* *(10-11,15-16)*
- Permanent pacemaker implantation is reasonable for persistent third-degree AV block with an escape rate greater than 40 bpm in asymptomatic adult patients without cardiomegaly. *(Level of Evidence: C)* *(8-11,17-18)*

172. Third degree AV block or advanced second degree AV block (Mobitz II AV block or high degree AV block)

Asymptomatic CRT not indicated

**2008 DEVICE-BASED THERAPY GUIDELINES:**

2.1.2 Recommendations for Acquired Atrioventricular Block in Adults

**CLASS III**

- Permanent pacemaker implantation is not indicated for asymptomatic type I second-degree AV block at the supra-His (AV node) level or that which is not known to be intra- or infra-Hisian. *(Level of Evidence: C)* *(19)*

174. First degree AV block (PR <300 msec)

Asymptomatic
2008 DEVICE-BASED THERAPY GUIDELINES:
2.1.2 Recommendations for Acquired Atrioventricular Block in Adults
CLASS III
- Permanent pacemaker implantation is not indicated for asymptomatic first-degree AV block. *(Level of Evidence: B) (20)*
  (See Section 2.1.3, “Chronic Bifascicular Block.”)

175. First degree AV block (PR ≥300 msec)
   Asymptomatic

**Conduction System Abnormalities**

**Bundle Branch Block**

176. Sinus rhythm with normal PR interval
   LBBB
   CRT not indicated

2008 DEVICE-BASED THERAPY GUIDELINES:
2.1.3 Recommendations for Permanent Pacing in Chronic Bifascicular Block
CLASS III
- Permanent pacemaker implantation is not indicated for fascicular block without AV block or symptoms. *(Level of Evidence: B) (21-24)*
- Permanent pacemaker implantation is not indicated for fascicular block with first-degree AV block without symptoms. *(Level of Evidence: B) (21-24)*

177. Sinus rhythm with first degree AV block
   LBBB
   CRT not indicated

2008 DEVICE-BASED THERAPY GUIDELINES:
2.1.3 Recommendations for Permanent Pacing in Chronic Bifascicular Block
CLASS III
- Permanent pacemaker implantation is not indicated for fascicular block without AV block or symptoms. *(Level of Evidence: B) (21-24)*
- Permanent pacemaker implantation is not indicated for fascicular block with first-degree AV block without symptoms. *(Level of Evidence: B) (21-24)*

178. Sinus rhythm with normal PR interval
   Bifascicular block (RBBB/LAFB or RBBB/LPFB)
   CRT not indicated

2008 DEVICE-BASED THERAPY GUIDELINES:
2.1.3 Recommendations for Permanent Pacing in Chronic Bifascicular Block
CLASS III
- Permanent pacemaker implantation is not indicated for fascicular block without AV block or symptoms. *(Level of Evidence: B) (21-24)*
- Permanent pacemaker implantation is not indicated for fascicular block with first-degree AV block without symptoms. *(Level of Evidence: B) (21-24)*
179. Sinus rhythm with first degree AV block
   Bifascicular block (RBBB/LAFB or RBBB/LPFB)
   CRT not indicated

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 2.1.3 Recommendations for Permanent Pacing in Chronic Bifascicular Block

**CLASS III**
- Permanent pacemaker implantation is not indicated for fascicular block without AV block or symptoms. *(Level of Evidence: B)* [21-24]
- Permanent pacemaker implantation is not indicated for fascicular block with first-degree AV block without symptoms. *(Level of Evidence: B)* [21-24]

180. Alternating RBBB and LBBB
   CRT not indicated

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 2.1.3 Recommendations for Permanent Pacing in Chronic Bifascicular Block

**CLASS I**
- Permanent pacemaker implantation is indicated for alternating bundle-branch block. *(Level of Evidence: C)* [25]

### Conduction System Abnormalities

#### Acute MI or Ischemic Event

<table>
<thead>
<tr>
<th>Transient AV block thought to be secondary to ischemia</th>
<th>Narrow QRS (&lt;120 msec)</th>
<th>Chronic Wide QRS (≥120 msec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status-post successful revascularization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 2.1.4. Recommendations for Permanent Pacing After the Acute Phase of Myocardial Infarction

**CLASS I**
- Permanent ventricular pacing is indicated for transient advanced second- or third-degree infranodal AV block and associated bundle-branch block. If the site of block is uncertain, an electrophysiological study may be necessary. *(Level of Evidence: B)* [26-27]

**CLASS III**
- Permanent ventricular pacing is not indicated for transient AV block in the absence of intraventricular conduction defects. *(Level of Evidence: B)* [26]
- Permanent ventricular pacing is not indicated for transient AV block in the presence of isolated left anterior fascicular block. *(Level of Evidence: B)* [28]

182. Transient AV block thought to be secondary to ischemia
   Not amenable to revascularization
   Narrow QRS (<120 msec) | Chronic Wide QRS (≥120 msec)

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 2.1.4. Recommendations for Permanent Pacing After the Acute Phase of Myocardial Infarction

**CLASS I**
- Permanent ventricular pacing is indicated for transient advanced second- or third-degree infranodal AV block and associated bundle-branch block. If the site of block is uncertain, an electrophysiological study may be necessary. *(Level of Evidence: B)* [26-27]

**CLASS III**
- Permanent ventricular pacing is not indicated for transient AV block in the absence of intraventricular conduction defects. *(Level of Evidence: B)* [26]
- Permanent ventricular pacing is not indicated for transient AV block in the presence of isolated left anterior fascicular block. *(Level of Evidence: B)* [28]

### Conduction System Abnormalities

#### Cardiac Valve Surgery
183. Transient AV block
Narrow QRS (<120 msec)
Not addressed in guidelines

184. New LBBB and first degree AV block
Not addressed in guidelines

References:

Table 5.2 No Conduction Abnormalities

<table>
<thead>
<tr>
<th>Meets Criteria for ICD (Narrow QRS &lt;120 msec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>185. Sinus rhythm with normal PR interval</td>
</tr>
<tr>
<td>Asymptomatic</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>

References: None

Table 5.3 Tachyarrhythmias

<table>
<thead>
<tr>
<th>Atrial Arrhythmias or “SVT” and No Standard Pacing Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>186. Paroxysmal atrial arrhythmias</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>187. Underlying structural heart disease (e.g., ischemic or nonischemic CM)</td>
</tr>
<tr>
<td>No known paroxysmal atrial arrhythmias/VT</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>188. Structurally normal heart</td>
</tr>
<tr>
<td>No known paroxysmal atrial arrhythmias/VT</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
<tr>
<td>189. Long-standing persistent or permanent atrial fibrillation or atrial flutter</td>
</tr>
<tr>
<td>No plans for cardioversion or rhythm control</td>
</tr>
</tbody>
</table>

2004 STEMI GUIDELINES:
7.7.3.2.3. Pacing Mode Selection in STEMI Patients
Class IIa
- It is reasonable to implant a permanent dual-chamber pacing system in STEMI patients who need permanent pacing and are in sinus rhythm. It is reasonable that patients in permanent AF or atrial flutter receive a single-chamber ventricular device. (Level of Evidence: C)

<table>
<thead>
<tr>
<th>Slow Ventricular Arrhythmias Known</th>
</tr>
</thead>
<tbody>
<tr>
<td>190. Active patient</td>
</tr>
<tr>
<td>Known “slow VT” that overlaps with sinus tachycardia rate</td>
</tr>
<tr>
<td>Not addressed in guidelines</td>
</tr>
</tbody>
</table>

References:

Table 5.4 Other Disorders

<table>
<thead>
<tr>
<th>Genetic Disorders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Genetic Disorders</strong></td>
</tr>
<tr>
<td>191. Congenital Long QT Syndrome</td>
</tr>
<tr>
<td>ICD for secondary prevention</td>
</tr>
<tr>
<td><strong>2008 DEVICE-BASED THERAPY GUIDELINES:</strong></td>
</tr>
<tr>
<td><strong>2.3.2 Recommendations for Pacing to Prevent Trachycardia</strong></td>
</tr>
<tr>
<td>Class I</td>
</tr>
<tr>
<td>• Permanent pacing is indicated for sustained pause-dependent VT, with or without QT prolongation (<strong>Level of Evidence:</strong> C)</td>
</tr>
<tr>
<td>Class IIa</td>
</tr>
<tr>
<td>• Permanent pacing is reasonable for high-risk patients with congenital long-QT syndrome (<strong>Level of Evidence:</strong> C)</td>
</tr>
</tbody>
</table>

| 192. Congenital Long QT Syndrome |
| ICD for primary prevention |
| **2008 DEVICE-BASED THERAPY GUIDELINES:** |
| **2.3.2 Recommendations for Pacing to Prevent Trachycardia** |
| Class I |
| • Permanent pacing is indicated for sustained pause-dependent VT, with or without QT prolongation (**Level of Evidence:** C) |
| Class IIa |
| • Permanent pacing is reasonable for high-risk patients with congenital long-QT syndrome (**Level of Evidence:** C) |

| 193. HCM |
| Narrow QRS (<120 msec) |
| No standard bradycardia pacing indications |
| **2011 HYPERTROPHIC CARDIOMYOPATHY GUIDELINES:** |
| **6.2.2.6 Pacing** |
| Class IIb |
| • Permanent pacing may be considered in medically refractory symptomatic patients with obstructive HCM who are suboptimal candidates for septal reduction therapy. (**Level of Evidence:** B) |

| 194. HCM |
| Wide QRS (≥120 msec) |
| No standard bradycardia pacing indications |
6.2.2.6 Pacing

Class IIb

- Permanent pacing may be considered in medically refractory symptomatic patients with obstructive HCM who are suboptimal candidates for septal reduction therapy. *(Level of Evidence: B)*

References:


### Section 6. CRT – No Prior Implant

The ACC/AHA/HRS 2008 Guidelines for device-based therapy designate a Class I indication for CRT implantation to include patients who have LVEF ≤35%, a QRS duration ≥120 msec, and sinus rhythm with NYHA functional Class III or ambulatory Class IV heart failure symptoms despite optimal medical therapy. Newer information has been obtained from the MADIT-CRT trial that demonstrates a benefit of CRT therapy for patients with LVEF ≤30%, QRS ≥130 msec and NYHA Class I or II heart failure, though the majority of patients had baseline LBBB and a main exclusion criteria was atrial fibrillation within 1 month of enrollment. It is anticipated that the results of this trial will soon be incorporated into the updated Guidelines for device-based therapy. A pre-specified subgroup analysis from this trial also demonstrated that patients with a QRS ≥150 msec derived benefit from CRT, while those with QRS <150 msec did not demonstrate benefit with respect to the endpoint of risk of death or heart failure events, with two treatment interactions identified in this analysis (i.e., QRS duration and sex). It should be noted that this trial included patients with ischemic cardiomyopathy (NYHA class I or II) or nonischemic cardiomyopathy (NYHA class II only), and results of this trial cannot necessarily be extrapolated to nonischemic patients with NYHA class I heart failure.

A variety of different QRS durations have been utilized for eligibility criteria in different studies and, therefore, for the purpose of this AUC document, the QRS duration has been classified as follows: (a) QRS <120 msec (normal duration); (b) QRS 120-149 msec; (c) 120-149 msec; (d) ≥150 msec; For the purpose of Section 4.0 in this AUC document, it is assumed that the QRS duration of 130 msec and the results of this trial will apply to the second category of QRS 120-150 msec, even though patients with a QRS duration of 120-129 msec were not specifically included in this trial.

#### Table 6.1 Ischemic Cardiomyopathy

<table>
<thead>
<tr>
<th>LVEF ≤30%</th>
<th>NYHA Class</th>
<th>I</th>
<th>II</th>
<th>III-amb IV</th>
</tr>
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<tbody>
<tr>
<td>195. QRS &lt;120 msec</td>
<td>Sinus rhythm</td>
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<tr>
<td>196. QRS 120-149 msec</td>
<td>LBBB</td>
<td>Sinus rhythm</td>
<td></td>
<td></td>
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<tr>
<td>197. QRS ≥150 msec</td>
<td>LBBB</td>
<td>Sinus rhythm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DRAFT 2012 DEVICE-BASED THERAPY UPDATE:

#### Recommendations for CRT in Patients with Systolic Heart Failure

**Class III**

- CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec (4-6). *(Level of Evidence: B)*

**Class IIa**

- CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration 120 to 149 msec, and NYHA functional class II, III or ambulatory IV symptoms on GDMT. (4-5,7-10) *(Level of Evidence: A)*

**Class IIb**

- CRT may be considered for patients who have LVEF less than 30%, ischemic etiology of heart failure, sinus rhythm, LBBB.
with a QRS duration of greater than or equal to 150 msec, and NYHA functional class I symptoms on GDMT (4-5). *(Level of Evidence: B)*

<table>
<thead>
<tr>
<th>198. QRS 120-149 msec</th>
<th>Non-LBBB</th>
<th>Sinus rhythm</th>
</tr>
</thead>
</table>

### DRAFT 2012 DEVICE-BASED THERAPY UPDATE:

#### Recommendations for CRT in Patients with Systolic Heart Failure

<table>
<thead>
<tr>
<th>Class IIb</th>
<th>CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with QRS duration 120 to 149 msec, and NYHA functional class III/ambulatory class IV on GDMT (4,6). <em>(Level of Evidence: B)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Class III</td>
<td>CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec (4-6). <em>(Level of Evidence: B)</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>199. QRS ≥150 msec</th>
<th>Non-LBBB</th>
<th>Sinus rhythm</th>
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</thead>
</table>

### DRAFT 2012 DEVICE-BASED THERAPY UPDATE:

#### Recommendations for CRT in Patients with Systolic Heart Failure

<table>
<thead>
<tr>
<th>Class IIa</th>
<th>CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with a QRS greater than or equal to 150 msec, and NYHA functional class III/ambulatory class IV symptoms on GDMT (4, 7-9). <em>(Level of Evidence: A)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Class IIb</td>
<td>CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II symptoms on GDMT (4-5). <em>(Level of Evidence: B)</em></td>
</tr>
</tbody>
</table>

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure

<table>
<thead>
<tr>
<th>CLASS I</th>
<th>For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and sinus rhythm, CRT with or without an ICD is indicated for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms with optimal recommended medical therapy. <em>(Level of Evidence: A)</em> (7-9,11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLASS IIa</td>
<td>For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. <em>(Level of Evidence: B)</em> (11-12)</td>
</tr>
<tr>
<td>CLASS III</td>
<td>CRT is not indicated for asymptomatic patients with reduced LVEF in the absence of other indications for pacing <em>(Level of Evidence: B)</em>.</td>
</tr>
</tbody>
</table>

### 2009 HEART FAILURE GUIDELINES:

#### 4.3.1 Patients With Reduced Left Ventricular Ejection Fraction

| CLASS I | Patients with LVEF of less than or equal to 35%, sinus rhythm, and NYHA functional class III ambulatory class IV symptoms despite recommended optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than or equal to 0.12 seconds, should receive cardiac resynchronization therapy, with or without an ICD, unless contraindicated (6-7,13-26). *(Level of Evidence: A)* |

### 2006 VENTRICULAR ARHYTHMIA GUIDELINES:

#### 10. Heart Failure
Class IIa
- ICD therapy combined with biventricular pacing can be effective for primary prevention to reduce total mortality by a reduction in SCD in patients with NYHA functional class III or IV, are receiving optimal medical therapy, in sinus rhythm with a QRS complex of at least 120 ms, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: B)*
- Biventricular pacing in the absence of ICD therapy is reasonable for the prevention of SCD in patients with NYHA functional class III or IV HF, an LVEF less than or equal to 35%, and a QRS complex equal to or wider than 160 ms (or at least 120 ms in the presence of other evidence of ventricular dyssynchrony) who are receiving chronic optimal medical therapy and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: B)*

<table>
<thead>
<tr>
<th>LVEF 31-35%</th>
<th>NYHA Class</th>
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<th>II</th>
<th>III-amb IV</th>
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<td>200. QRS &lt;120 msec</td>
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<tr>
<td>201. QRS 120-149 msec</td>
<td>LBBB</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>202. QRS ≥150 msec</td>
<td>LBBB</td>
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<td></td>
</tr>
</tbody>
</table>

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**
**Recommendations for CRT in Patients with Systolic Heart Failure**  
Class III
- CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec *(4-6). (Level of Evidence: B)*

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**
**Recommendations for CRT in Patients with Systolic Heart Failure**  
Class IIa
- CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration 120 to 149 msec, and NYHA functional class II, III or ambulatory IV symptoms on GDMT *(4-5,7-10) (Level of Evidence: A)*

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**
**Recommendations for CRT in Patients with Systolic Heart Failure**  
Class I
- CRT is indicated for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II, III, or ambulatory IV symptoms on GDMT *(4-5,7-11) (Level of Evidence: A)*

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**
**Recommendations for CRT in Patients with Systolic Heart Failure**  
Class IIb
- CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with QRS duration 120 to 149 msec, and NYHA functional class III/ambulatory class IV on GDMT *(4,6) (Level of Evidence: B)*

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**
**Recommendations for CRT in Patients with Systolic Heart Failure**  
Class III
- CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec *(4-6). (Level of Evidence: B)*
### Non-LBBB Sinus rhythm

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**

**Recommendations for CRT in Patients with Systolic Heart Failure**

**Class IIa**
- CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with a QRS greater than or equal to 150 msec, and NYHA functional class III/ambulatory class IV symptoms on GDMT (4, 7-9). *(Level of Evidence: A)*

**Class IIb**
- CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II symptoms on GDMT (4-5). *(Level of Evidence: B)*

**2008 DEVICE-BASED THERAPY GUIDELINES:**

2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure

**CLASS I**
- For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and sinus rhythm, CRT with or without an ICD is indicated for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms with optimal recommended medical therapy. *(Level of Evidence: A)* (7-9,11)

**CLASS IIa**
- For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. *(Level of Evidence: B)* (11-12)

**2009 HEART FAILURE GUIDELINES:**

4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

**CLASS I**
- Patients with LVEF of less than or equal to 35%, sinus rhythm, and NYHA functional class III ambulatory class IV symptoms despite recommended optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than or equal to 0.12 seconds, should receive cardiac resynchronization therapy, with or without an ICD, unless contraindicated (6-7,13-26). *(Level of Evidence: A)*

**2006 VENTRICULAR ARRHYTHMIA GUIDELINES:**

10. Heart Failure

**Class IIa**
- ICD therapy combined with biventricular pacing can be effective for primary prevention to reduce total mortality by a reduction in SCD in patients with NYHA functional class III or IV, are receiving optimal medical therapy, in sinus rhythm with a QRS complex of at least 120 ms, and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: B)*

- Biventricular pacing in the absence of ICD therapy is reasonable for the prevention of SCD in patients with NYHA functional class III or IV HF, an LVEF less than or equal to 35%, and a QRS complex equal to or wider than 160 ms (or at least 120 ms in the presence of other evidence of ventricular dyssynchrony) who are receiving chronic optimal medical therapy and who have reasonable expectation of survival with a good functional status for more than 1 y. *(Level of Evidence: B)*

**References:**


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### Table 6.2 Nonischemic Cardiomyopathy

<table>
<thead>
<tr>
<th>LVEF ≤30%</th>
<th>NYHA Class</th>
<th>I</th>
<th>II</th>
<th>III-amb IV</th>
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<tbody>
<tr>
<td>205. QRS &lt;120 msec</td>
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<tr>
<td>Sinus rhythm</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>DRAFT 2012 DEVICE-BASED THERAPY UPDATE:</strong> Recommendations for CRT in Patients with Systolic Heart Failure</td>
<td></td>
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<tr>
<td>Class III</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>• CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec (4-6). (Level of Evidence: B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 206. QRS 120-149 msec | | | | |
| LBBB | | | | |
| Sinus rhythm | | | | |
| **DRAFT 2012 DEVICE-BASED THERAPY UPDATE:** Recommendations for CRT in Patients with Systolic Heart Failure |
| Class IIa | | | | |
| • CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration 120 to 149 msec, and NYHA functional class II, III or ambulatory IV symptoms on GDMT. (4-5,7-10) (Level of Evidence: A) | | | | |

| 207. QRS ≥150 msec | | | | |
| LBBB | | | | |
| Sinus rhythm | | | | |
| **DRAFT 2012 DEVICE-BASED THERAPY UPDATE:** Recommendations for CRT in Patients with Systolic Heart Failure |
| Class I | | | | |
| • CRT is indicated for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II, III, or ambulatory IV symptoms on GDMT (4-5,7-11). (Level of Evidence: A) | | | | |
| Class IIb | | | | |
| • CRT may be considered for patients who have LVEF less than 30%, ischemic etiology of heart failure, sinus rhythm, LBBB with a QRS duration of greater than or equal to 150 msec, and NYHA functional class I symptoms on GDMT (4-5). (Level of Evidence: B) | | | | |

| 208. QRS 120-149 msec | | | | |
| Non-LBBB | | | | |
| Sinus rhythm | | | | |
| **DRAFT 2012 DEVICE-BASED THERAPY UPDATE:** Recommendations for CRT in Patients with Systolic Heart Failure |
| Class IIb | | | | |
| • CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with QRS duration 120 to 149 msec, and NYHA functional class III/ambulatory class IV on GDMT (4,6). (Level of Evidence: B) | | | | |
| Class III | | | | |
| • CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec (4-6). (Level of Evidence: B) | | | | |

| 209. QRS ≥150 msec | | | | |
| Non-LBBB | | | | |
| Sinus rhythm | | | | |

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DRAFT 2012 DEVICE-BASED THERAPY UPDATE:
Recommendations for CRT in Patients with Systolic Heart Failure

Class IIa
- CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with a QRS greater than or equal to 150 msec, and NYHA functional class III/ambulatory class IV symptoms on GDMT (4, 7-9). (Level of Evidence: A)

Class IIb
- CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II symptoms on GDMT (4-5). (Level of Evidence: B)

2008 DEVICE-BASED THERAPY GUIDELINES:
2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure
CLASS I
- For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and sinus rhythm, CRT with or without an ICD is indicated for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms with optimal recommended medical therapy. (Level of Evidence: A) (7-9,11)

CLASS IIa
- For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. (Level of Evidence: B) (11-12)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction
CLASS I
- Patients with LVEF of less than or equal to 35%, sinus rhythm, and NYHA functional class III ambulatory class IV symptoms despite recommended optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than or equal to 0.12 seconds, should receive cardiac resynchronization therapy, with or without an ICD, unless contraindicated (6-7,13-26). (Level of Evidence: A)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
10. Heart Failure
Class IIa
- ICD therapy combined with biventricular pacing can be effective for primary prevention to reduce total mortality by a reduction in SCD in patients with NYHA functional class III or IV, are receiving optimal medical therapy, in sinus rhythm with a QRS complex of at least 120 ms, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: B)
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<table>
<thead>
<tr>
<th>LVEF 31-35%</th>
<th>NYHA Class</th>
<th>I</th>
<th>II</th>
<th>III-amb IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>210. QRS &lt;120 msec</td>
<td>Sinus rhythm</td>
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<td></td>
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</tbody>
</table>

DRAFT 2012 DEVICE-BASED THERAPY UPDATE:
Recommendations for CRT in Patients with Systolic Heart Failure

Class III
- CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec (4-6). (Level of Evidence: B)
<table>
<thead>
<tr>
<th>211.</th>
<th>QRS 120-149 msec</th>
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<tr>
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<td></td>
<td>Sinus rhythm</td>
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</table>

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**

**Recommendations for CRT in Patients with Systolic Heart Failure**

**Class IIa**
- CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration 120 to 149 msec, and NYHA functional class II, III or ambulatory IV symptoms on GDMT. (4-5,7-10) *(Level of Evidence: A)*

<table>
<thead>
<tr>
<th>212.</th>
<th>QRS ≥150 msec</th>
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<td></td>
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<td>Sinus rhythm</td>
</tr>
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</table>

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**

**Recommendations for CRT in Patients with Systolic Heart Failure**

**Class I**
- CRT is indicated for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II, III, or ambulatory IV symptoms on GDMT (4-5,7-11). *(Level of Evidence: A)*

<table>
<thead>
<tr>
<th>213.</th>
<th>QRS 120-149 msec</th>
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<tbody>
<tr>
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<td>Non-LBBB</td>
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<td></td>
<td>Sinus rhythm</td>
</tr>
</tbody>
</table>

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**

**Recommendations for CRT in Patients with Systolic Heart Failure**

**Class IIb**
- CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with QRS duration 120 to 149 msec, and NYHA functional class III/ambulatory class IV on GDMT (4,6). *(Level of Evidence: B)*

**Class III**
- CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec (4-6). *(Level of Evidence: B)*

<table>
<thead>
<tr>
<th>214.</th>
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<td>Non-LBBB</td>
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<td>Sinus rhythm</td>
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**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**

**Recommendations for CRT in Patients with Systolic Heart Failure**

**Class IIa**
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**Class IIb**
- CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II symptoms on GDMT (4-5). *(Level of Evidence: B)*

**2008 DEVICE-BASED THERAPY GUIDELINES:**

**2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure**

**CLASS I**
- For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and sinus rhythm, CRT with or without an ICD is indicated for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms with optimal recommended medical therapy. *(Level of Evidence: A)* (7-9,11)
• For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. (Level of Evidence: B) (11-12)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction
CLASS I
• Patients with LVEF of less than or equal to 35%, sinus rhythm, and NYHA functional class III ambulatory class IV symptoms despite recommended optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than or equal to 0.12 seconds, should receive cardiac resynchronization therapy, with or without an ICD, unless contraindicated (6-7,13-26). (Level of Evidence: A)

2006 VENTRICULAR ARRHYTHMIA GUIDELINES:
10. Heart Failure
Class Ila
• ICD therapy combined with biventricular pacing can be effective for primary prevention to reduce total mortality by a reduction in SCD in patients with NYHA functional class III or IV, are receiving optimal medical therapy, in sinus rhythm with a QRS complex of at least 120 ms, and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: B)
• Biventricular pacing in the absence of ICD therapy is reasonable for the prevention of SCD in patients with NYHA functional class III or IV HF, an LVEF less than or equal to 35%, and a QRS complex equal to or wider than 160 ms (or at least 120 ms in the presence of other evidence of ventricular dyssynchrony) who are receiving chronic optimal medical therapy and who have reasonable expectation of survival with a good functional status for more than 1 y. (Level of Evidence: B)

References:

Table 6.3.1 LVEF >35% of Any Etiology (ICD Indicated)

<table>
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<th>NYHA Class</th>
<th>I-II</th>
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<td>215. QRS &lt;120 msec Sinus rhythm</td>
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<td>216. QRS 120-149 msec LBBB Sinus rhythm</td>
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<td>217. QRS ≥150 msec LBBB Sinus rhythm</td>
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<td>218. QRS 120-149 msec</td>
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<td>219. QRS ≥150 msec</td>
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<td>sinus rhythm</td>
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References:


Table 6.3.2 LVEF ≤35% of Any Etiology

<table>
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<tr>
<th>NYHA Class IV On Intravenous Inotropic Support</th>
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220. QRS 120-149 msec
- LBBB

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**

Recommendations for CRT in Patients with Systolic Heart Failure

Class IIa
- CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration 120 to 149 msec, and NYHA functional class II, III or ambulatory IV symptoms on GDMT (3-9). *(Level of Evidence: A)*

221. QRS ≥150 msec
- LBBB

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**

Recommendations for CRT in Patients with Systolic Heart Failure

Class I
- CRT is indicated for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II, III, or ambulatory IV symptoms on GDMT (3-9). *(Level of Evidence: A)*

222. QRS 120-149 msec
- Non-LBBB

**DRAFT 2012 DEVICE-BASED THERAPY UPDATE:**

Recommendations for CRT in Patients with Systolic Heart Failure

Class IIb
- CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with QRS duration 120 to 149 msec, and NYHA functional class III/ambulatory class IV on GDMT (3, 10). *(Level of Evidence: B)*

223. QRS ≥150 msec
- Non-LBBB
DRAFT 2012 DEVICE-BASED THERAPY UPDATE:
Recommendations for CRT in Patients with Systolic Heart Failure
Class IIa
- CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with a QRS greater than or equal to 150 msec, and NYHA functional class III/ambulatory class IV symptoms on GDMT (3, 5-7). (Level of Evidence: A)

References:

Table 6.4 Preexisting or Anticipated RV Pacing With a Clinical Indication for ICD or Pacemaker Implantation

<table>
<thead>
<tr>
<th>Intrinsic Narrow QRS, LVEF ≤35%</th>
<th>NYHA Class</th>
<th>I-II</th>
<th>III-amb IV</th>
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</thead>
<tbody>
<tr>
<td>RV pacing anticipated ≤40%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RV pacing anticipated &gt;40%</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

DRAFT 2012 DEVICE-BASED THERAPY UPDATE:
Recommendations for CRT in Patients with Systolic Heart Failure
Class IIa
- CRT can be useful for patients on GDMT who have LVEF less than or equal to 35%, and are undergoing device placement with anticipated requirement for significant ventricular pacing (2-5). (Level of Evidence: C)

2008 DEVICE-BASED THERAPY GUIDELINES:
2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure
CLASS IIa
- For patients with LVEF less than or equal to 35% with NYHA functional Class III or ambulatory Class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable (6). (Level of Evidence: C)
• For patients with LVEF less than or equal to 35% with NYHA functional Class I or II symptoms who are receiving optimal recommended medical therapy and who are undergoing implantation of a permanent pacemaker and/or ICD with anticipated frequent ventricular pacing, CRT may be considered (6). (Level of Evidence: C)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction
CLASS IIa
• For patients with LVEF of less than or equal to 35% with NYHA functional class III or ambulatory class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable (6). (Level of Evidence: C)

<table>
<thead>
<tr>
<th>Intrinsic Narrow QRS, LVEF &gt;35%</th>
<th>NYHA Class</th>
<th>I-II</th>
<th>III-amb IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>226. RV pacing anticipated ≤40%</td>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>227. RV pacing anticipated &gt;40%</td>
<td>Not addressed in guidelines</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References:

Table 6.5 Refractory Class III/IV CHF <3 Months Post Revascularization and/or ≤40 Days Post MI

<table>
<thead>
<tr>
<th>No Other Indication for Ventricular Pacing</th>
<th>LVEF ≤35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>228. QRS 120-149 msec</td>
<td>LBBB</td>
</tr>
</tbody>
</table>

DRAFT 2012 DEVICE-BASED THERAPY UPDATE:
Recommendations for CRT in Patients with Systolic Heart Failure
Class IIa
• CRT can be useful for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration 120 to 149 msec, and NYHA functional class II, III or ambulatory IV symptoms on GDMT (4-9). (Level of Evidence: A)

2008 DEVICE-BASED THERAPY GUIDELINES:
2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure
CLASS IIa
For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. (Level of Evidence: B) (10-11)

For patients with LVEF less than or equal to 35% with NYHA functional Class III or ambulatory Class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable. (Level of Evidence: C) (10)

CLASS IIb

For patients with LVEF less than or equal to 35% with NYHA functional Class I or II symptoms who are receiving optimal recommended medical therapy and who are undergoing implantation of a permanent pacemaker and/or ICD with anticipated frequent ventricular pacing, CRT may be considered. (Level of Evidence: C) (10)

### 2009 HEART FAILURE GUIDELINES:

#### 4.3.1. Patients With Reduced Left Ventricular Ejection Fraction

**CLASS I**

- Patients with LVEF of less than or equal to 35%, sinus rhythm, and NYHA functional class III or IV symptoms despite recommended optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than or equal to 0.12 seconds, should receive cardiac resynchronization therapy, with or without an ICD, unless contraindicated (4-6,12-24). (Level of Evidence: A)

**CLASS IIa**

- For patients with LVEF of less than or equal to 35% with NYHA functional class III or IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable (10). (Level of Evidence: C)

### 2004 STEMI GUIDELINES:

#### 7.7.3.2.3. Pacing Mode Selection in STEMI Patients

**Class IIa**

- It is reasonable to evaluate all patients who have an indication for permanent pacing after STEMI for biventricular pacing (cardiac resynchronization therapy). (Level of Evidence: C)

229. QRS ≥150 msec

LBBB

### DRAFT 2012 DEVICE-BASED THERAPY UPDATE:

#### Recommendations for CRT in Patients with Systolic Heart Failure

**Class I**

- CRT is indicated for patients who have LVEF less than or equal to 35%, sinus rhythm, LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II, III, or IV symptoms on GDMT (4-8,10). (Level of Evidence: A)

**Class IIb**

- CRT may be considered for patients who have LVEF less than 30%, ischemic etiology of heart failure, sinus rhythm, LBBB with a QRS duration of greater than or equal to 150 msec, and NYHA functional class I symptoms on GDMT (7-8). (Level of Evidence: B)

### 2008 DEVICE-BASED THERAPY GUIDELINES:

#### 2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure

**CLASS IIa**

- For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. (Level of Evidence: B) (10-11)

- For patients with LVEF less than or equal to 35% with NYHA functional Class III or ambulatory Class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is
CLASS IIb
• For patients with LVEF less than or equal to 35% with NYHA functional Class I or II symptoms who are receiving optimal recommended medical therapy and who are undergoing implantation of a permanent pacemaker and/or ICD with anticipated frequent ventricular pacing, CRT may be considered. (Level of Evidence: C) (10)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction
CLASS I
• Patients with LVEF of less than or equal to 35%, sinus rhythm, and NYHA functional class III ambulatory class IV symptoms despite recommended optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than or equal to 0.12 seconds, should receive cardiac resynchronization therapy, with or without an ICD, unless contraindicated (4-6,12-24). (Level of Evidence: A)
CLASS IIa
• For patients with LVEF of less than or equal to 35% with NYHA functional class III or ambulatory class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable (10). (Level of Evidence: C)

2004 STEMI GUIDELINES:
7.7.3.2.3. Pacing Mode Selection in STEMI Patients
Class IIa
• It is reasonable to evaluate all patients who have an indication for permanent pacing after STEMI for biventricular pacing (cardiac resynchronization therapy). (Level of Evidence: C)

DRAFT 2012 DEVICE-BASED THERAPY UPDATE:
Recommendations for CRT in Patients with Systolic Heart Failure
Class IIa
• CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB pattern with QRS duration 120 to 149 msec, and NYHA functional class III/ambulatory class IV on GDMT (7,25). (Level of Evidence: B)
Class III
• CRT is not recommended for patients with NYHA functional class I or II symptoms and non-LBBB with QRS less than 150 msec (7-8,25). (Level of Evidence: B)

2008 DEVICE-BASED THERAPY GUIDELINES:
2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure
CLASS IIa
• For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. (Level of Evidence: B) (10-11)
• For patients with LVEF less than or equal to 35% with NYHA functional Class III or ambulatory Class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable. (Level of Evidence: C) (10)
CLASS IIb
• For patients with LVEF less than or equal to 35% with NYHA functional Class I or II symptoms who are receiving optimal recommended medical therapy and who are undergoing implantation of a permanent pacemaker and/or ICD with anticipated frequent ventricular pacing, CRT may be considered. (Level of Evidence: C) (10)
2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction
CLASS I
- Patients with LVEF of less than or equal to 35%, sinus rhythm, and NYHA functional class III ambulatory class IV symptoms despite recommended optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than or equal to 0.12 seconds, should receive cardiac resynchronization therapy, with or without an ICD, unless contraindicated (4-6,12-24). (Level of Evidence: A)

CLASS IIa
- For patients with LVEF of less than or equal to 35% with NYHA functional class III or ambulatory class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable (10). (Level of Evidence: C)

2004 STEMI GUIDELINES:
7.7.3.2.3. Pacing Mode Selection in STEMI Patients
Class IIa
- It is reasonable to evaluate all patients who have an indication for permanent pacing after STEMI for biventricular pacing (cardiac resynchronization therapy). (Level of Evidence: C)

231. QRS ≥150 msec
Non-LBBB

DRAFT 2012 DEVICE-BASED THERAPY UPDATE:
Recommendations for CRT in Patients with Systolic Heart Failure
Class IIa
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Class IIb
- CRT may be considered for patients who have LVEF less than or equal to 35%, sinus rhythm, a non-LBBB with a QRS duration greater than or equal to 150 msec, and NYHA functional class II symptoms on GDMT (7-8). (Level of Evidence: B)

2008 DEVICE-BASED THERAPY GUIDELINES:
2.4.1 Recommendations for Cardiac Resynchronization Therapy in Patients With Severe Systolic Heart Failure
CLASS IIa
- For patients who have LVEF less than or equal to 35%, a QRS duration greater than or equal to 0.12 seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA functional Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. (Level of Evidence: B) (10-11)

- For patients with LVEF less than or equal to 35% with NYHA functional Class III or ambulatory Class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable. (Level of Evidence: C) (10)

CLASS IIb
- For patients with LVEF less than or equal to 35% with NYHA functional Class I or II symptoms who are receiving optimal recommended medical therapy and who are undergoing implantation of a permanent pacemaker and/or ICD with anticipated frequent ventricular pacing, CRT may be considered. (Level of Evidence: C) (10)

2009 HEART FAILURE GUIDELINES:
4.3.1. Patients With Reduced Left Ventricular Ejection Fraction
CLASS I
- Patients with LVEF of less than or equal to 35%, sinus rhythm, and NYHA functional class III ambulatory class IV symptoms despite recommended optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than or equal to 0.12 seconds, should receive cardiac resynchronization therapy, with or without an ICD,
CLASS IIa
• For patients with LVEF of less than or equal to 35% with NYHA functional class III or ambulatory class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable (10) (Level of Evidence: C)

2004 STEMI GUIDELINES:
7.7.3.2.3. Pacing Mode Selection in STEMI Patients
Class IIa
• It is reasonable to evaluate all patients who have an indication for permanent pacing after STEMI for biventricular pacing (cardiac resynchronization therapy). (Level of Evidence: C)

<table>
<thead>
<tr>
<th>No Other Indication for Ventricular Pacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVEF 36-50%</td>
</tr>
</tbody>
</table>

232. QRS 120-149 msec
LBBB
Not addressed in guidelines

233. QRS ≥150 msec
LBBB
Not addressed in guidelines

234. QRS 120-149 msec
Non-LBBB
Not addressed in guidelines

235. QRS ≥150 msec
Non-LBBB
Not addressed in guidelines

References: