Cardiac Catheter Ablation

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Link to Codes

MCG Health
Inpatient & Surgical Care
30th Edition

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Care Planning - Inpatient Admission and Alternatives

Clinical Indications for Procedure

- Electrophysiologic study and intracardiac catheter ablation are indicated for **1 or more** of the following(1)(2)(3)(4)(5):NNN
  - Pre-excitation syndrome (eg, Wolff-Parkinson-White)(1)(19)
  - Re-entrant atrial tachycardia (AV node or bundle branch)(1)(3)(4)(5)
  - Accessory pathway tachycardia(3)(4)(5)
  - Focal or multifocal atrial tachycardia(3)(4)(5)
  - Atrial flutter(1)(3)(4)(5)
  - Junctional tachycardia when medical therapy is ineffective or contraindicated(5)

- Atrial fibrillation, as indicated by **ALL** of the following(1)(2):
  - Catheter ablation or repeat ablation[A] is appropriate, as indicated by **1 or more** of the following:
    - Ventricular rate not controlled adequately with medications[B](1)(2)
    - Heart failure and biventricular pacing percentage cannot be achieved with pharmacologic therapy.(1)
    - Intolerance to rate control medications(2)
    - Tachycardia-mediated cardiomyopathy suspected[C](1)(2)
    - Accessory pathway identified(1)
    - Hypertrophic cardiomyopathy, and rhythm control with medication has failed, is contraindicated, is not tolerated, or is not preferred.(2)(20)
    - Tachy-brady syndrome[D](2)
    - Heart failure with reduced or preserved ejection fraction with reasonable expectation of benefit from catheter ablation[E](1)(2)(8)(11)(21)
    - Observed or inducible supraventricular tachycardia implicated as a trigger for atrial fibrillation (eg, AV nodal re-entry tachycardia, AV re-entry tachycardia, focal atrial tachycardia)(2)
    - Symptomatic atrial fibrillation (eg, palpitations, chest pain, dyspnea) and **ALL** of the following(1)(2):
      - Rhythm control desired
      - Rhythm control is judged to be feasible (eg, ablation has reasonable chance of success).[E]
      - Antiarrhythmic medication has failed, is not tolerated, or is not preferred.[F]
  - Reversible cause of atrial fibrillation absent (eg, hyperthyroidism)
  - Patient able to be anticoagulated during procedure and for at least 3 months afterward[G]
- Ventricular arrhythmia, as indicated by **1 or more** of the following(4)(9):
  - Ischemic heart disease (ischemic cardiomyopathy or prior myocardial infarction), as indicated by **1 or more** of the following:
    - Recurrent sustained (lasting 30 seconds or more) monomorphic ventricular tachycardia, and antiarrhythmic therapy and ICD interventions (eg, shock, pacing) have failed, are not tolerated, or are not preferred.
    - First episode of monomorphic sustained (lasting 30 seconds or more) ventricular tachycardia in patient with ICD to reduce risk of recurrent ventricular tachycardia or ICD intervention (eg, shock, pacing)
    - Prior myocardial infarction with recurrent episodes of symptomatic sustained (lasting 30 seconds or more) ventricular tachycardia and **ALL** of the following:
      - Prior endocardial catheter ablation not successful
      - Evidence of subepicardial substrate (eg, from ECG, mapping, or imaging)
  - Nonischemic cardiomyopathy with recurrent sustained (lasting 30 seconds or more) monomorphic ventricular tachycardia, and antiarrhythmic therapy has failed, is not tolerated, or is not preferred.
  - Nonischemic cardiomyopathy with electrical storm (3 or more episodes of ventricular arrhythmia or appropriate ICD intervention within 24-hour period), and antiarrhythmic therapy has failed or is not tolerated.(22)
  - Nonischemic cardiomyopathy and suspected epicardial substrate or circuit
  - Arrhythmogenic right ventricular cardiomyopathy with recurrent sustained (lasting 30 seconds or more) ventricular tachycardia or frequent appropriate ICD interventions (eg, shock or pacing), and antiarrhythmic therapy has failed, is not tolerated, or is not preferred.
  - Brugada syndrome with recurrent sustained (lasting 30 seconds or more) ventricular tachycardia or frequent appropriate ICD interventions (eg, shock or pacing)
  - Lamin A/C mutation with recurrent ventricular tachycardia
  - Hypertrophic obstructive cardiomyopathy with recurrent sustained (lasting 30 seconds or more) monomorphic ventricular tachycardia or recurrent appropriate ICD interventions (eg, shock or pacing), and antiarrhythmic therapy has failed, is not tolerated, or is not preferred.(20)
  - Frequent premature ventricular contractions (eg, greater than 15% of beats) suspected to be contributing to cardiomyopathy (eg, reduced ejection fraction), and antiarrhythmic therapy has failed, is not tolerated, or is not preferred.

- Nonresponder to cardiac resynchronization therapy with frequent unifocal premature ventricular contractions limiting optimal biventricular pacing despite pharmacologic therapy
- Symptomatic frequent premature ventricular contractions (eg, greater than 15% of beats) originating from the right ventricular outflow tract in otherwise normal heart
- Focally triggered ventricular fibrillation refractory to antiarrhythmic medications triggered by a similar premature ventricular contraction
- Idiopathic symptomatic (outflow tract or non-outflow tract) ventricular arrhythmia in otherwise normal heart, and antiarrhythmic medications are ineffective, not tolerated, or not preferred.
- Re-entrant ventricular tachycardia (eg, bundle branch, His-Purkinje, or fascicular)
- Congenital heart disease with recurrent sustained (lasting 30 seconds or more) ventricular tachycardia or recurrent appropriate ICD shocks(23)
- Sarcoidosis with recurrent ventricular tachycardia refractory to medical therapy (eg, immunosuppressive and antiarrhythmic medications)[H](24)

Alternatives to Procedure

- Alternatives include(1)(3)(4)(5)(8)(9)(10)(23)(25)(26):
  - Valsalva maneuvers for supraventricular tachycardia(27)(28)
  - Drug therapy for rate or rhythm control
  - Electrical cardioversion
  - Percutaneous epicardial ablation procedure[I](9)(29)(30)
  - Surgical ablation (eg, for sustained monomorphic ventricular tachycardia with failure of antiarrhythmic medications or catheter ablation, or for focal resectable source (eg, tumor, scar tissue))(31)(32)
  - For cardiac sarcoidosis: immunosuppression, antiarrhythmic drugs, and catheter ablation(33)
  - Cardiac sympathetic denervation. See Sympathectomy by Thoracoscopy or Laparoscopy ISC guideline.
  - Wearable (external) cardioverter-defibrillator[J](26)(34)(35)
  - Implantable cardioverter-defibrillator. See Cardioverter-Defibrillator Insertion ISC guideline.

Operative Status Criteria

Goal Length of Stay: Ambulatory

Note: The definition of an ambulatory procedure depends on payer-provider contractual agreement or regulatory language (eg, CMS' Two-Midnight Rule). An ambulatory procedure may include one postoperative overnight stay in a facility; therefore, MCG's ambulatory Goal Length of Stay (GLOS) attainment calculation reports the sum of same-day and next-day postoperative discharges. Depending on various patient and procedural factors, some patients undergoing a procedure with an ambulatory GLOS require inpatient care (eg, medical necessity for hospital-based care across 2 or more postoperative midnights). Some of these factors are described in the Extended Stay section of this guideline.

- Ambulatory
- Inpatient (eg, medical necessity for hospital-based care across 2 or more postoperative midnights)
- Inpatient (Medicare patient, and specific procedure is on CMS Inpatient Only List)

Hospitalization

Optimal Recovery Course

Day	Level of Care	Clinical Status	Activity	Routes	Interventions	Medications
1	• Catheterization lab to ICU,[K] intermediate care, or telemetry, then discharge • Social Determinants of Health Assessment • Discharge planning	• **Hemodynamic stability** • **Dangerous arrhythmia absent** • **Stable puncture site postoperatively** • **Discharge plans and education understood**	• **Ambulatory post procedure or acceptable for next level of care[L]**	• **Oral hydration[M]** • **Oral medications or regimen acceptable for next level of care** • **Oral diet or acceptable for next level of care** • IV fluids, medications for procedure	• Cardiac monitoring	• Anticoagulants • Possible rate and rhythm control medications

(1)(3)(4)(5)(23)(32)(36)(37)(38)

Recovery Milestones are indicated in **bold**.

Goal Length of Stay: Ambulatory

Note: Goal Length of Stay assumes optimal recovery, decision making, and care. Patients may be discharged to a lower level of care (either later than or sooner than the goal) when it is appropriate for their clinical status and care needs.

Extended Stay

Minimal (a few hours to 1 day), Brief (1 to 3 days), Moderate (4 to 7 days), and Prolonged (more than 7 days).

- Inpatient stay (eg, need for hospital-based care beyond postoperative day 1) may be needed for(3)(32)(39)(40):
  - Failure to meet discharge criteria (recovery milestones in Optimal Recovery Course)
    - Expect brief stay extension.
  - Extended monitoring of patient on telemetry needed (eg, discontinuing antiarrhythmic agents before electrophysiologic study, dangerous arrhythmia or conduction defect detected or suspected, initiation of antiarrhythmic medication that has significant proarrhythmic potential (eg, dofetilide, sotalol, procainamide))
    - Expect brief stay extension.
  - Inpatient care required prior to or after ablation due to unstable rhythm or Hemodynamic instability (eg, need for vasopressor agent or mechanical support due to electrical storm)(22)(40)
    - Expect brief stay extension.
  - Inpatient care required prior to or after ablation due to unstable comorbidity (eg, heart failure, myocardial ischemia, trauma-related injury due to fall due to arrhythmia)(40)
    - Expect brief stay extension.
  - Procedural complications, including arrhythmias, thromboembolic event, shock, aortic valve injuries, air embolism, cardiac arrest, cardiac perforation, esophageal injury or perforation, phrenic nerve injury, coronary artery occlusion, cardiac conduction block, major bleeding at vascular access site, stroke, pneumothorax, and cardiac tamponade(1)(2)(9)(40)(41)(42)(43)(44)
    - Cardiac or esophageal perforation may require surgical intervention.(44)

- Thromboembolic events may require thrombectomy or thrombolytic therapy.(2)
- Stay extension varies.

See Common Complications and Conditions ISC for further information.

Discharge

Discharge Planning

- Discharge planning includes[N]:
  - Assessment of needs and planning for care, including(46)(47):
    - Develop and modify treatment plan (involving multiple providers) as needed.
    - Evaluate and address preadmission functioning as needed.
    - Evaluate and address psychosocial status issues as indicated. See Psychosocial Assessment SR for further information.
    - Evaluate and address social determinants of health (eg, housing, food). See Social Determinants of Health Screening Tool SR for further information.(48)(49)
    - Evaluate and address patient or caregiver preferences as indicated.
    - Identify skilled services needed at next level of care, with specific attention to:
      - Cardiovascular status assessment(50)
      - Heart monitor management(51)
      - Medication management, adherence instruction, and side effects assessment(52)
      - Wound or dressing management(50)
  - Early identification of anticipated discharge destination; options include(47)(53):
    - Home; considerations include:
      - Home safety assessment. See Home Safety Assessment SR for further information.
      - Patient safe to go home; examples include(54)(55)(56):
        - Medical status stable for patient's condition
        - Functional care can safely be provided with available resources.
        - Mental status stable for patient's condition
        - Medication availability confirmed and reconciliation complete
        - Patient/caregiver education completed with written discharge instructions provided
        - Community resources identified and referrals made, as needed
        - Home care arranged, if indicated
        - Necessary medical equipment delivery arranged or available in home, if indicated
        - Necessary medical supplies ordered, or patient/caregiver can obtain, if indicated
      - Access to follow-up care
      - Self-management ability if appropriate. See Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) Assessment SR for further information.
      - Caregiver need, ability, and availability
    - Post-acute skilled care or custodial care as indicated. See Discharge Planning Tool SR for further information.
  - Transitions of care plan complete, including(47)(53)(57):
    - Patient and caregiver education complete.

- See Teach-Back Tool SR for further information.
- See Cardiac Catheter Ablation: Patient Education for Clinicians SR for further information.

Medication reconciliation completion includes(52)(58):

- Compare patient's discharge list of medications (prescribed and over-the-counter) against provider's admission or transfer orders.
- Assess each medication for correlation to disease state or medical condition.
- Report medication discrepancies to prescribing provider, attending physician, and primary care provider, and ensure accurate medication order is identified.
- Provide reconciled medication list to all treating providers.
- Confirm that patient or caregiver can acquire medication.
- Educate patient and caregiver.
  - Provide complete medication list to patient and caregiver.
  - Importance of presenting personal medication list to all providers at each care transition, including all provider appointments
  - Reason, dosage, and timing of medication (eg, use "teach-back" techniques)(59)
- Encourage communication between patient, caregiver, and pharmacy for obtaining prescriptions, setting up home medication delivery, and reviewing for drug-drug interactions.
- See Medication Reconciliation Tool SR for further information.

- Plan communicated to patient, caregiver, and all members of care team, including(60):
  - Inpatient care and service providers
  - Primary care provider
  - All post-discharge care and service providers
- Appointments planned or scheduled, which may include:
  - Primary care provider(61)
  - Cardiologist(31)(62)
  - Cardiothoracic surgeon(31)(62)
  - Other
- Outpatient testing and procedure plans made, which may include:
  - Laboratory testing(1)
  - Other
- Referrals made for assistance or support, which may include:
  - Alcohol and other drug abuse or dependence treatment(62)
  - Financial, for follow-up care, medication, and transportation
  - Tobacco use treatment(63)(64)
  - Other
- Medical equipment and supplies coordinated (ie, delivered or delivery confirmed), which may include:
  - Heart monitor(51)
  - Wound care equipment and supplies(65)
  - Other

Discharge Destination

- Post-hospital levels of admission may include:
  - Home.

- Home healthcare. See Home Care Indications for Admission Section HC in Cardiac Catheter Ablation guideline in Home Care.

Evidence Summary

Background

Catheter ablation may be done via radiofrequency alternating current, cryoablation, laser, selective pulse field ablation, or alcohol ablation.(2)(3)(6)(7) **(EG 2)**

Criteria

The evidence for the clinical indications found in this guideline includes 17 published peer reviewed articles, 5 specialty society or other evidence-based guidelines, and 2 book sections.

Specialty society guidelines state that catheter ablation is the primary rhythm control therapy for most recurrent or symptomatic supraventricular tachycardias (eg, atrial flutter, re-entrant tachycardia, accessory pathway tachycardia) and is indicated in some patients with ventricular arrhythmia, such as those with recurrent or sustained ventricular tachycardia despite antiarrhythmic therapy in the setting of ischemic heart disease, nonischemic cardiomyopathy, inherited arrhythmia syndromes (eg, arrhythmogenic right ventricular cardiomyopathy, Brugada syndrome), or hypertrophic cardiomyopathy.(5)(8)(9)(10) **(EG 2)**

A specialty society guideline recommends a trial of rhythm control in atrial fibrillation patients with reduced left ventricular function.(1) **(EG 2)** This same guideline also states that an initial rhythm control strategy (rather than solely rate control) is an option for patients with symptomatic atrial fibrillation, especially in the setting of recent-onset atrial fibrillation, younger age, higher symptom burden, difficult to control heart rate, a nondilated left atrium, or significant aortic valve regurgitation.(1) **(EG 2)** A study of 194 patients (mean age 64 years) with atrial fibrillation and end-stage heart failure randomized to catheter ablation with guideline-directed medical therapy (GDMT) or GDMT alone found that the ablation group had a lower primary composite endpoint of all-cause mortality, need for left ventricular assist device, or urgent heart transplant (8% vs 30%, hazard ratio (HR) 0.24 (95% confidence interval (CI) 0.11 to 0.52)) at 18-month follow-up, as well as a lower secondary endpoint of all-cause mortality alone (6% vs 20%, HR 0.29 (95% CI 0.12 to 0.72)); these findings led to early termination of the study for efficacy.(11) **(EG 1)** In the same study, ablation with GDMT provided a greater reduction in atrial fibrillation burden (31.4% vs 8.6% at 12 months) and a greater increase in left ventricular ejection fraction (7.8% vs 1.4% at 12 months) than GDMT alone.(11) **(EG 1)** A study of 203 patients (mean age 60 years) with atrial fibrillation and obesity randomized to catheter ablation or antiarrhythmic drugs with lifestyle modification (weight loss and exercise) found that, despite greater weight loss and metabolic improvements in the lifestyle modification group, the catheter ablation group had a greater percentage of patients with freedom from atrial fibrillation at 12 months (73% vs 35%, HR 2.79 (95% CI 1.91 to 4.07)).(12) **(EG 1)** A meta-analysis of 12 studies, encompassing 2465 patients (mean age 65 years) with heart failure (New York Heart Association class II or greater) and atrial fibrillation randomized to either catheter ablation or medical rate or rhythm control found that, for patients with heart failure with reduced ejection fraction, catheter ablation was associated with lower risks for heart failure events (composite outcome of heart failure hospitalization, clinical worsening, or unscheduled clinician visits; 19.1% vs 32.5%, risk ratio (RR) 0.59 (95% CI 0.48 to 0.72)), cardiovascular death (7.0% vs 15.1%, RR 0.49 (95% CI 0.34 to 0.70)), and all-cause mortality (12.2% vs 20.3%, RR 0.63 (95% CI 0.47 to 0.86)) than medical therapy; however, no benefit over medical rate or rhythm therapy was seen in those with heart failure with preserved ejection fraction.(13) **(EG 1)** In the same meta-analysis, catheter ablation was associated with greater improvement in left ventricular ejection fraction (5.79%, 95% CI 3.37% to 8.21%) and in heart failure quality-of-life scores than medical rate or rhythm therapy.(13) **(EG 1)**

An open-label randomized study of 144 patients (median age 70 years) with AICD placement due to ischemic cardiomyopathy and recent symptomatic ventricular tachycardia compared catheter ablation with antiarrhythmic drug therapy and found that the ablation group had a lower rate of the composite primary outcome of cardiovascular death, appropriate ICD shock, unplanned hospitalization for heart failure, or severe treatment-related complication (hazard ratio (HR) 0.52 (95% confidence interval (CI) 0.30 to 0.90)).(14) **(EG 1)** This finding was driven by the difference in severe treatment-related complications (eg, slow undetected ventricular tachycardia) favoring ablation (9.9% vs 28.8%).(14) **(EG 1)** A study of 121 patients (median age 55 years) with ischemic, nonischemic, or arrhythmogenic cardiomyopathy randomized patients to ICD placement alone or ICD placement with concurrent catheter ablation and found, at 31 months' follow-up, that the ICD

plus ablation group had a lower rate of ventricular tachycardia recurrence (31.7% vs 50.8%) and fewer ICD shocks (10.0% vs 24.6%) or antitachycardia pacing events (16.7% vs 32.8%).(15) **(EG 1)** A study of 259 patients (mean age 69 years) with previous myocardial infarction, ICD implant, and drug-refractory ventricular tachycardia randomized to catheter ablation or escalated antiarrhythmic therapy found, over a 24-month follow-up, that the catheter ablation group experienced both a lower shock-treated ventricular tachycardia burden (138 vs 218, HR 0.60 (95% CI 0.38 to 0.95)) and a lower appropriate shock burden (169 vs 266, HR 0.61 (95% CI 0.37 to 0.96)); however, no significant difference was seen in the cumulative incidence of ventricular tachycardia events (1144 events in the ablation arm vs 1337 events in the escalated therapy arm, HR 0.80 (95% CI 0.51 to 1.26)).(16) **(EG 1)** A study of 416 patients (mean age 68 years) with previous myocardial infarction and ICD placement, and clinically significant ventricular tachycardia (eg, ventricular tachycardia storm, appropriate ICD shock or pacing, or sustained ventricular tachycardia treated emergently) randomized to catheter ablation or antiarrhythmic drug therapy found that catheter ablation had a lower risk of the 4-year composite endpoint of all-cause mortality, ventricular tachycardia storm, ICD shock, or sustained ventricular tachycardia below the ICD detection level requiring treatment (50.7% vs 60.6%, HR 0.75 (95% CI 0.58 to 0.97)).(17) **(EG 1)** This finding was predominantly driven by a difference in treated sustained ventricular tachycardia below the ICD detection level (4.4% vs 35%, HR 0.26 (95% CI 0.13 to 0.55)).(17) **(EG 1)** A study of 50 patients (mean age 44 years) with symptomatic Brugada syndrome (eg, aborted cardiac arrest, documented ventricular fibrillation, symptoms suspicious for arrhythmia) and previous ICD placement randomized to catheter ablation or no ablation was terminated early due to efficacy at interim analysis (approximately 3 years), with a lower rate of recurrent ventricular fibrillation in the ablation group (20% vs 52%, HR 0.29 (95% CI 0.10 to 0.81)).(18) **(EG 1)**

Alternatives

Single or infrequent episodes of mildly symptomatic supraventricular tachycardia can be managed without ablation, using medication daily or only when symptoms arise ("pill in the pocket").(5)(10) **(EG 2)**

Length of Stay

Analysis of 139,391 patients (median age 67 years) undergoing ablation for atrial fibrillation from the National Cardiovascular Data Registry reported 37% with same-day discharge and another 56% with overnight hospitalization of less than 24 hours.(36) **(EG 2)** Analysis of 2322 patients (mean age 67 years) undergoing radiofrequency ablation for atrial fibrillation using a same-day clinical pathway protocol reported 73% with successful same-day discharge.(37) **(EG 2)** Analysis of procedure data for a commercially insured pediatric population shows 95% of patients undergoing catheter ablation were discharged the day of or the day after surgery.(38) **(EG 3)** Analysis of procedure data for a commercially insured adult population shows 92% of patients undergoing catheter ablation were discharged the day of or the day after surgery.(38) **(EG 3)** Analysis of procedure data for a Medicare-insured population shows 86% of patients undergoing catheter ablation were discharged the day of or the day after surgery.(38) **(EG 3)**

Rationale

Use of this MCG care guideline helps the clinician identify, for a given procedure, which patient-specific factors and clinical conditions are appropriate for that procedure. The evidence-based clinical criteria assist the clinician in the decision to appropriately perform a procedure, evaluating whether the potential benefits of a procedure outweigh the potential risks. For Medicare enrollees, surgical MCG care guidelines also identify which procedures CMS has designated as inpatient only.

Use of these evidence-based clinical criteria to support decision making around the need for a given procedure is of benefit to the patient, as all procedures come with inherent risk that must be balanced by anticipated clinical benefit. Utilizing evidence-based clinical criteria enables a more accurate and patient-specific decision-making process. In addition, the use of evidence-based guidelines can help reduce unwarranted variation in care, such as divergent clinical thresholds to perform a procedure for clinically similar patients that vary across geographic regions, between facilities, and among individual clinicians.

Related CMS Coverage Guidance

This guideline supplements but does not replace, modify, or supersede existing Medicare regulations or applicable National Coverage Determinations (NCDs) or Local Coverage Determinations (LCDs).

Code of Federal Regulations (CFR): 42 CFR 412.3(66); 42 CFR 419.22(67); 42 CFR 422.101(68)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(69); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(70); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(71); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(72)

Medicare Coverage Determinations: Medicare Coverage Database(73)

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Footnotes

[A] A specialty society guideline states that, in patients with recurrent symptomatic atrial fibrillation after ablation, repeat catheter ablation is useful to improve symptoms and increase the likelihood of rhythm control.(1) [A in Context Link 1]

[B] Catheter ablation can be utilized in pursuit of rhythm control (eg, pulmonary vein isolation), or alternatively, atrioventricular nodal ablation (AVNA) can be employed (in conjunction with permanent pacemaker insertion) to achieve rate control in patients with poor rate control with medications alone.(1) [B in Context Link 1]

[C] A specialty society guideline states that, in atrial fibrillation patients with a new diagnosis of heart failure with reduced ejection fraction, arrhythmia-induced cardiomyopathy should be suspected and an early and aggressive approach to rhythm control is recommended.(1) [C in Context Link 1]

[D] A specialty society guideline suggests ablation as reasonable for patients with episodic atrial fibrillation who have symptomatic bradycardia or prolonged pauses when atrial fibrillation terminates, in order to avoid permanent pacemaker placement.(2) [D in Context Link 1]

[E] A specialty society guideline lists criteria that describe heart failure patients more likely to benefit from catheter ablation, including atrial fibrillation-mediated cardiomyopathy suspected, earlier stage of heart failure (not severe advanced heart failure), no significant ventricular scar, atrial fibrosis, myopathy or dilation absent or mild, atrial fibrillation not longstanding, younger patient age, and fewer significant comorbidities.(1) An interventional cardiology guideline similarly lists characteristics that are associated with improved left ventricular ejection fraction following ablation, including New York Heart Association class I or II, nonischemic cause of heart failure, persistent (as opposed to paroxysmal) atrial fibrillation, absence of atrial or ventricular fibrosis on cardiac MRI, improvement following cardioversion, absence of severe atrial dilatation, and atrial fibrillation that preceded or occurred simultaneously with the onset of heart failure.(2) However, a subsequent study showed that end-stage heart failure patients can also benefit; this study of 194 participants with atrial fibrillation and end-stage heart failure randomized to catheter ablation with guideline-directed medical therapy (GDMT) or GDMT alone found that the ablation group had a lower composite endpoint of all-cause mortality, need for left ventricular assist device, or urgent heart transplant as well as a lower secondary endpoint of all-cause mortality alone.(11) Example situations that render ablation unlikely to be successful include infiltrative cardiomyopathies (eg, amyloid), severe mitral stenosis or regurgitation, and cor pulmonale.(1) [E in Context Link 1, 2]

[F] A specialty society guideline states that, in symptomatic atrial fibrillation patients who have not responded to an antiarrhythmic medication (high burden of recurrent atrial fibrillation or adverse effects from the medication), randomized controlled trials have consistently demonstrated lower risk for recurrent symptomatic atrial fibrillation after ablation as compared with a trial with a second antiarrhythmic medication.(1) A specialty society guideline recommends ablation as first-line treatment for patients with recurrent symptomatic paroxysmal atrial fibrillation and as a reasonable intervention for symptomatic patients with persistent atrial fibrillation.(2) [F in Context Link 1]

[G] Ablation should not be performed to obviate the need for anticoagulation, as most patients will remain on anticoagulation long-term.(1) Atrial fibrillation patients who have undergone ablation should be anticoagulated long-term according to standard risk assessments, in the same manner as patients who have not undergone ablation.(1) [G in Context Link 1]

[H] Evidence regarding the efficacy of catheter ablation for preventing recurrent ventricular tachycardia in cardiac sarcoidosis is limited to retrospective cohort studies. A meta-analysis of 15 studies (401 patients with refractory ventricular tachycardia) showed ventricular tachycardia recurrence rates of 55% after a single ablation and 37% following multiple ablations.(24) [H in Context Link 1]

[I] Percutaneous epicardial ablation is indicated for focal ventricular arrhythmias caused by epicardial scars or scar-related ventricular arrhythmia with an epicardial exit site.(29) Conditions known to predispose to arrhythmias of epicardial origin include Chagas disease, arrhythmogenic right ventricular cardiomyopathy/dysplasia, Brugada syndrome, and certain nonischemic cardiomyopathies.(29) [I in Context Link 1]

[J] A wearable cardioverter-defibrillator may be used as a bridge to permanent ICD insertion for heart failure with low ejection fraction, or as a temporary measure for a patient whose risk for sudden death is anticipated to improve (eg, myocarditis, untreated heart failure meeting ICD criteria but with the expectation of improvement following therapy).(34)(35) [J in Context Link 1]

[K] ICU care may be needed for complicated ventricular tachycardia ablations, pericardial tamponade, hemodynamic instability, thromboembolic stroke, aortic or mitral valve injury, vascular injuries, esophageal perforation, severe arrhythmia, air embolism, pneumothorax, hemothorax, need for postprocedure invasive hemodynamic monitoring, or other severe complication. See Intensive, Intermediate, and Telemetry Care Guidelines ISC for further information.(23)(32) [K in Context Link 1]

[L] Patient is ambulatory or near baseline activity for age and development. [L in Context Link 1]

[M] Some patients may have their hydration needs met via alternative means (eg, percutaneous endoscopic gastrostomy tube). [M in Context Link 1]

[N] Discharge instructions should be given in the patient's and caregiver's native language using trained language interpreters whenever possible.(45) [N in Context Link 1]

Definitions

Altered mental status

- Altered mental status (ie, different from baseline), as indicated by **1 or more** of the following(1)(2)(3)(4):
  - Confusional state (eg, disorientation, difficulty following commands, deficit in attention)
  - Lethargy (eg, awake or arousable, but with drowsiness; reduced awareness of self and environment)
  - Obtundation (ie, arousable only with strong stimuli, lessened interest in environment, slowed responses to stimulation)
  - Stupor (ie, may be arousable but patient does not return to normal baseline level of awareness)
  - Coma (ie, not arousable)

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Dangerous arrhythmia absent

- Dangerous arrhythmia absent, as indicated by absence of **ALL** of the following(1)(2)(3)(4)(5)(6)(7)(8)(9)(10):
  - Resuscitated ventricular fibrillation or cardiac arrest
  - Ventricular escape rhythm

- Sustained ventricular tachycardia (30 seconds or more of ventricular rhythm at greater than 100 beats per minute)
- Nonsustained ventricular tachycardia with myocarditis or ischemia
- Type II second-degree atrioventricular block
- Third-degree atrioventricular block
- New-onset left bundle branch block with suspected myocardial ischemia
- Heart rhythms of concern due to association with Hypotension, Respiratory distress, or other significant symptoms (eg, syncope)

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Hemodynamic instability

- Hemodynamic instability, as indicated by **1 or more** of the following:
  - Vital sign abnormality not corrected by appropriate treatment, as indicated by **1 or more** of the following[A]:
    - Tachycardia that persists despite appropriate treatment (eg, treatment of underlying cause, despite observation care)[A]
    - Hypotension that persists despite appropriate treatment (eg, treatment of underlying cause, despite observation care)[A]
    - Orthostatic hypotension that persists despite appropriate treatment (eg, treatment of underlying cause, despite observation care)[A]
  - Severe hypotension in adult patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure less than 80 mm Hg(1)[A]
    - Shock index greater than 1.0 (shock index is the heart rate divided by systolic blood pressure)[A](2)(3)(4)
    - Mean arterial pressure[B] less than 65 mm Hg MAP Calculator[A](1)(6)
    - IV inotropic or vasopressor medication required to maintain adequate blood pressure or perfusion(3)(6)
    - Hypoperfusion due to hypotension, as indicated by **ALL** of the following:

- Hypotension
- Evidence of hypoperfusion, as indicated by **1 or more** of the following:
  - Lactate of 2.0 mmol/L (18 mg/dL) or more secondary to hypotension (ie, hypoperfusion)[C](3)(6)(8)
  - Metabolic acidosis (arterial or venous[D] pH less than 7.35) not otherwise explained(3)(6)(8)
  - Significant end organ dysfunction due to hypotension (eg, Altered mental status, myocardial ischemia, 2-fold or higher acute increase in serum creatinine)(3)(6)

- Severe hypotension in pediatric patient, as indicated by **1 or more** of the following:
  - Systolic blood pressure less than 80 mm Hg in child 6 to 17 years of age[A](14)
  - Systolic blood pressure less than 75 mm Hg in child 6 months to 5 years of age[A](14)
  - Shock index greater than 0.9 in child 13 to 17 years of age (shock index is the heart rate divided by systolic blood pressure)[A](2)(15)
  - Shock index greater than 1.0 in child 7 to 12 years of age (shock index is the heart rate divided by systolic blood pressure)[A](2)(15)
  - Shock index greater than 1.2 in child 4 to 6 years of age (shock index is the heart rate divided by systolic blood pressure)[A](2)(15)
  - IV inotropic or vasopressor medication required to maintain adequate blood pressure or perfusion(5)(6)
  - Hypoperfusion due to hypotension, as indicated by **ALL** of the following:
    - Hypotension
    - Evidence of hypoperfusion, as indicated by **1 or more** of the following:
      - Lactate of 2.0 mmol/L (18 mg/dL) or more secondary to hypotension (ie, hypoperfusion)[C](6)(8)
      - Metabolic acidosis (arterial or venous pH less than 7.35) not otherwise explained[D](5)(6)(14)
      - Significant end organ dysfunction due to hypotension (eg, Altered mental status, myocardial ischemia, 2-fold or higher acute increase in serum creatinine)(5)(6)(14)

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Footnotes

A. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.
B. The mean arterial pressure (MAP) takes into account both SBP and DBP readings.(3)(5)
C. There are numerous causes of an elevated lactate level. The most common are cardiogenic or hypovolemic shock, severe heart failure, severe trauma, or sepsis. However, there are also other etiologies to consider such as vigorous exercise, seizures, liver disease, or medication use (eg, metformin, beta2-agonists); therefore, interpretation of elevated lactate levels requires consideration of the clinical context (eg, well-appearing post exercise vs hypotensive). The severity and persistence of the elevation can sometimes be helpful in this differentiation. In most instances of lactic acidosis, blood pH is less than 7.35, with a serum bicarbonate level of 20 mEq/L (mmol/L) or lower. However, a coexisting respiratory or metabolic alkalosis can mask these findings.(7)(8)
D. Analyses have concluded that venous and arterial pH measurements are highly correlated, with small differences between them that are usually not clinically significant.(9)(10)(11)(12)(13) If a mixed acid-base disorder is suspected, an arterial blood gas is indicated.(10)

Hemodynamic stability

- Hemodynamic stability, as indicated by **1 or more** of the following:
  - Hemodynamic abnormalities at baseline or acceptable for next level of care
  - Patient hemodynamically stable, as indicated by **ALL** of the following(1)(2):
    - Tachycardia absent
    - Hypotension absent
    - No evidence of inadequate perfusion (eg, no myocardial ischemia)
    - No other hemodynamic abnormalities (eg, no Orthostatic hypotension)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Ramgopal S, Sepanski RJ, Martin-Gill C. Empirically derived age-based vital signs for children in the out-of-hospital setting. Annals of Emergency Medicine 2023;81(4):402-412. DOI: 10.1016/j.annemergmed.2022.09.019.

Hypotension

- Hypotension, as indicated by **1 or more** of the following:
  - Hypotension in adult patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure less than 90 mm Hg[A][B](1)

- Mean arterial pressure[C] less than 70 mm Hg[A][B] MAP Calculator(1)(2)
- Decrease in baseline systolic blood pressure of 30 mm Hg or more, with significant signs or symptoms due to lower blood pressure (eg, near syncope, syncope, chest pain)[A][B](1)

- Hypotension in pediatric patient, as indicated by **1 or more** of the following:
  - Systolic blood pressure less than 110 mm Hg in child 13 to 17 years of age[A][D](3)
  - Systolic blood pressure less than 100 mm Hg in child 6 to 12 years of age[A][D](3)
  - Systolic blood pressure less than 95 mm Hg in child 3 to 5 years of age[A][D](3)
  - Systolic blood pressure less than 90 mm Hg in child 1 or 2 years of age[A][D](3)
  - Systolic blood pressure less than 80 mm Hg in infant 6 to 11 months of age[A][D](3)
  - Systolic blood pressure less than 70 mm Hg in infant 3 to 5 months of age[A][D](3)
  - Systolic blood pressure less than 65 mm Hg in infant 1 or 2 months of age[A][D](3)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Puskarich MA, Jones AE. Shock. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:34-41.e1.
3. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.
B. Interpretation of blood pressure requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline blood pressure, medications, and clinical impact. For example, an elderly patient with heart failure may be prescribed medication with the intentional goal of a reduced pressure. If the patient's baseline SBP is 92 mm Hg to 96 mm Hg, absent signs or symptoms of hypotension, an emergency department SBP of 86 mm Hg should not automatically be categorized as hypotensive. This would hold for mean arterial pressure (MAP) as well. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term hypotension. Whether a blood pressure below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.
C. The mean arterial pressure (MAP) takes into account both SBP and DBP readings.
D. Interpretation of blood pressure requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline blood pressure, medications, and clinical impact. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term hypotension. Whether a blood pressure below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

Hypotension absent

- Hypotension absent,[A] as indicated by **1 or more** of the following:
  - Hypotension absent in adult patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure greater than or equal to 90 mm Hg[A](1)
    - Mean arterial pressure[B] greater than or equal to 70 mm Hg MAP Calculator[A](1)(2)

- Blood pressure at patient's baseline (eg, healthy adult with low systolic blood pressure), at intentional therapeutic goal (eg, patient with heart failure), or acceptable for next level of care (eg, blood pressure stable and no significant signs or symptoms due to low blood pressure)

- Hypotension absent in pediatric patient, as indicated by **1 or more** of the following:
  - Systolic blood pressure greater than or equal to 110 mm Hg in child 13 to 17 years of age[A](3)
  - Systolic blood pressure greater than or equal to 100 mm Hg in child 6 to 12 years of age[A](3)
  - Systolic blood pressure greater than or equal to 95 mm Hg in child 3 to 5 years of age[A](3)
  - Systolic blood pressure greater than or equal to 90 mm Hg in child 1 or 2 years of age[A](3)
  - Systolic blood pressure greater than or equal to 80 mm Hg in infant 6 to 11 months of age[A](3)
  - Systolic blood pressure greater than or equal to 70 mm Hg in infant 3 to 5 months of age[A](3)
  - Systolic blood pressure greater than or equal to 65 mm Hg in infant 1 or 2 months of age[A](3)
  - Blood pressure at patient's baseline (eg, healthy child with low systolic blood pressure), at intentional therapeutic goal, or acceptable for next level of care (eg, blood pressure stable and no significant signs or symptoms due to low blood pressure)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Puskarich MA, Jones AE. Shock. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:34-41.e1.
3. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. The mean arterial pressure (MAP) takes into account both SBP and DBP readings.

Hypoxemia

- Hypoxemia, as indicated by **1 or more** of the following(1):
  - Patient without baseline need for supplemental oxygen with oxygen saturation (SpO_2) of less than 90% or arterial blood gas partial pressure of oxygen (PaO_2) of less than 60 mm Hg (8.0 kPa) on room air[A][B]
  - Patient without baseline need for supplemental oxygen who now requires supplemental oxygen to keep SpO_2 greater than 89% or PaO_2 greater than 59 mm Hg (7.9 kPa)[A]
  - Patient with baseline need for supplemental oxygen who now requires increased supplemental oxygen to maintain oxygenation at baseline or acceptable level

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Jamali H, et al. Racial disparity in oxygen saturation measurements by pulse oximetry: evidence and implications. Annals of the American Thoracic Society 2022;19(12):1951-1964. DOI: 10.1513/AnnalsATS.202203-270CME.

3. Rojas-Camayo J, et al. Reference values for oxygen saturation from sea level to the highest human habitation in the Andes in acclimatised persons. Thorax 2018;73(8):776-778. DOI: 10.1136/thoraxjnl-2017-210598.

Footnotes

A. Pulse oximetry (SpO_2) may underestimate arterial saturation (SaO_2), especially in people with dark skin pigmentation, thick skin, cold body temperature, or who are wearing colored nail polish, and thus may not accurately detect hypoxemia.(2) Where appropriate, pulse oximetry should be measured after warming fingers or removing nail polish. Pulse oximetry results should be assessed within the context of the patient's clinical presentation, and performance of an arterial blood gas considered for a more accurate assessment of oxygenation if indicated.(2) Specific target values may require adjustment when care is delivered at high altitude.(3)

B. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

Orthostatic hypotension

- Orthostatic hypotension,[A][B] as indicated by **1 or more** of the following(1)(2)(3):
  - Fall in SBP of 20 mm Hg or more 1 to 3 minutes after patient sits or stands from recumbent position
  - Fall in DBP of 10 mm Hg or more 1 to 3 minutes after patient sits or stands from recumbent position

References

1. Shibao C, Lipsitz LA, Biaggioni I, American Society of Hypertension Writing Group. Evaluation and treatment of orthostatic hypotension. Journal of the American Society of Hypertension 2013 Jul-Aug;7(4):317-324. DOI: 10.1016/j.jash.2013.04.006.
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3. Fang JC, O'Gara PT. History and physical examination: an evidence-based approach. In: Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD, editors. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 12th ed. Elsevier; 2022:123-140.

Footnotes

A. Concomitant measurements of the heart rate are important to measure to help diagnose subtypes of orthostatic hypotension (eg, the lack of a compensatory increase in heart rate is typical of autonomic failure and an exaggerated tachycardia may be reflective of volume depletion). However, the heart rate is not a component of the definition of orthostatic hypotension, which relies upon blood pressure alone.(1)(2)(3)

B. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

Respiratory distress

- Respiratory distress, as indicated by **ALL** of the following(1)(2)(3)(4):
  - Patient with **1 or more** of the following:

- Dyspnea (difficulty breathing)
- Tachypnea
- Abnormal breathing pattern (eg, chest retractions)
- Other evidence of difficulty breathing

- Evidence of respiratory compromise, as indicated by **1 or more** of the following:
  - Hypoxemia
  - Altered mental status
  - Other evidence of respiratory compromise (eg, respiratory acidosis)

References

1. Braithwaite SA, Wessel AL. Dyspnea. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:194-201.e2.
2. Naureckas ET, Solway J. Disturbances of respiratory function. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2133-2139.
3. Matthay MA, Ware LB. Acute respiratory failure. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:642-652.
4. Rakoczy K. Acute respiratory failure. In: Gershel JC, Rauch DA, editors. Caring for the Hospitalized Child: A Handbook of Inpatient Pediatrics. 3rd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2023:749-754.

Social Determinants of Health Assessment

- Risk of poor health outcomes may be increased by the presence of **1 or more** of the following social determinants of health(1)(2)(3):
  - Housing insecurity, as indicated by **1 or more** of the following:
    - Individual or caregiver's current living situation is **1 or more** of the following(4):
      - Does not have own housing (eg, staying in a hotel, shelter, or with others)
      - Has own housing (eg, house, apartment), but at risk of losing it in the future (ie, behind on rent or mortgage)
      - Has own housing (eg, house, apartment), but has lived in 3 or more places in past year
    - Current housing has **1 or more** of the following:
      - Electrical appliances (eg, stove, refrigerator) not working or unavailable
      - Insufficient heating or cooling
      - Insufficient ventilation
      - Lead paint or pipes
      - Mold
      - Pests (eg, bugs) or rodents
      - Smoke detectors not working or unavailable
  - Food insecurity, as indicated by **1 or more** of the following(5):
    - In the past year, individual or caregiver ran out of food and did not have money to buy more food.
    - In the past year, individual or caregiver worried that they would run out of food before they received money to buy more food.
  - Insufficient transportation, as indicated by **1 or more** of the following(6):
    - In the past year, individual or caregiver missed medical appointments or could not get medications due to lack of transportation.
    - In the past year, individual or caregiver missed nonmedical activities, work, or could not get things needed for daily living due to lack of transportation.
  - Insufficient utilities, as indicated by **1 or more** of the following(7):
    - Utilities (eg, electricity, water, gas, or oil) are currently shut off or unavailable.
    - In the past year, electric, water, gas, or oil company threatened to shut off services.

- Personal safety risk, as indicated by **2 or more** of the following(5):
  - Individual is sometimes or frequently physically hurt by another person (including family member).
  - Individual is sometimes or frequently insulted or talked down to by another person (including family member).
  - Individual is sometimes or frequently threatened with physical harm by another person (including family member).
  - Individual is sometimes or frequently screamed or cursed at by another person (including family member).
- Insufficient dependent care, as indicated by **1 or more** of the following:
  - In the past year, individual or caregiver was unable to work due to lack of dependent care.
  - In the past year, individual or caregiver was unable to work more (additional) hours due to lack of dependent care.
  - In the past year, individual or caregiver missed medical appointments or could not get medications due to lack of dependent care.
  - In the past year, individual or caregiver missed nonmedical activities (eg, school, church, social activity) due to lack of dependent care.
- Depression risk, as indicated by **ALL** of the following(8):
  - In the past 2 weeks, individual had little interest or pleasure in normal activities on at least several days.
  - In the past 2 weeks, individual felt down, depressed, or hopeless on at least several days.

References

1. Scanlon A, Reinisch C. Social determinants of health. In: Harding MM, Kwong J, Hagler D, Reinisch C, editors. Lewis's Medical-Surgical Nursing: Assessment and Management of Clinical Problems. 12th ed. St. Louis, MO: Mosby; 2023:18-20.
2. Billioux A, Verlander K, Anthony S, Alley D. Standardized Screening for Health-Related Social Needs in Clinical Settings: the Accountable Health Communities Screening Tool. [Internet] National Academy of Sciences. 2017 May Accessed at: https://nam.edu/. [accessed 2025 Sep 12]
3. Addressing social determinants of health. In: Perez R, editor. CMSA's Integrated Case Management. 2nd ed. Springer Publishing Company LLC; 2023:62-75.
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5. Children's HealthWatch Survey. Screening Instrument [Internet] Children's HealthWatch. 2024 Feb 13 Accessed at: https://childrenshealthwatch.org/. [accessed 2025 Mar 31]
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8. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Medical Care 2003;41(11):1284-92. DOI: 10.1097/01.MLR.0000093487.78664.3C.

Tachycardia

- Tachycardia,[A][B] as indicated by **1 or more** of the following:
  - Heart rate greater than 100 beats per minute in adult[A][B](1)
  - Heart rate greater than 85 beats per minute in child 13 to 17 years of age[A][C](2)
  - Heart rate greater than 95 beats per minute in child 6 to 12 years of age[A][C](2)
  - Heart rate greater than 110 beats per minute in child 1 to 5 years of age[A][C](2)
  - Heart rate greater than 120 beats per minute in infant 3 to 11 months of age[A][C](2)
  - Heart rate greater than 150 beats per minute in infant 1 or 2 months of age[A][C](2)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.
B. Interpretation of heart rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline heart rate, medications, and clinical impact. For example, an elderly patient on a beta-blocker medication with a baseline resting heart rate of 60 beats per minute may be clinically tachycardic at a heart rate of 94 beats per minute. Likewise, a patient who is upset, in pain, or nervous in the emergency department with a heart rate of 106 beats per minute may meet the technical definition of tachycardia, but this tachycardia (absent associated findings such as chest pain or hypotension) may not be clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachycardia. Whether a heart rate above or below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.
C. Interpretation of heart rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline heart rate, medications, and clinical impact. A patient who is upset, in pain, or nervous in the emergency department with an elevated heart rate may meet the technical definition of tachycardia, but this tachycardia (absent associated findings such as hypotension) may not be clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachycardia. Whether a heart rate above or below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

Tachycardia absent

- Tachycardia[A][B] absent, as indicated by **1 or more** of the following:
  - Heart rate less than or equal to 100 beats per minute in adult[A][B](1)
  - Heart rate less than or equal to 85 beats per minute in child 13 to 17 years of age[A][B](2)
  - Heart rate less than or equal to 95 beats per minute in child 6 to 12 years of age[A][B](2)
  - Heart rate less than or equal to 110 beats per minute in child 1 to 5 years of age[A][B](2)
  - Heart rate less than or equal to 120 beats per minute in infant 3 to 11 months of age[A][B](2)
  - Heart rate less than or equal to 150 beats per minute in infant 1 or 2 months of age[A][B](2)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no

or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. Interpretation of heart rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline heart rate, medications, and clinical impact. For example, an elderly patient on a beta-blocker medication with a baseline resting heart rate of 60 beats per minute may be clinically tachycardic at a heart rate of 94 beats per minute. Likewise, a patient who is upset, in pain, or nervous in the emergency department with a heart rate of 106 beats per minute may meet the technical definition of tachycardia, but this tachycardia (absent associated findings such as chest pain or hypotension) may not be clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachycardia. Whether a heart rate above or below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

Tachypnea

- Tachypnea,[A][B] as indicated by **1 or more** of the following:
  - Respiratory rate greater than 20 breaths per minute in adult[A][B](1)
  - Respiratory rate greater than 18 breaths per minute in child 13 to 17 years of age[A][B](2)
  - Respiratory rate greater than 22 breaths per minute in child 6 to 12 years of age[A][B](2)
  - Respiratory rate greater than 25 breaths per minute in child 3 to 5 years of age[A][B](2)
  - Respiratory rate greater than 30 breaths per minute in child 1 or 2 years of age[A][B](2)
  - Respiratory rate greater than 40 breaths per minute in infant 6 to 11 months of age[A][B](2)
  - Respiratory rate greater than 45 breaths per minute in infant 3 to 5 months of age[A][B](2)
  - Respiratory rate greater than 55 breaths per minute in infant 1 or 2 months of age[A][B](2)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. Interpretation of respiratory rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline respiratory rate and whether the respiratory rate is indicative of significant underlying respiratory or other pathology. A mildly increased respiratory rate (eg, 20 to 22 breaths per minute in an adult), absent other indications of serious illness (eg, hypoxemia, metabolic acidosis, decreased tidal volume, pain), may be transitory and not clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachypnea. Whether a respiratory rate above the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment. In addition, the measurement of the respiratory rate is subject to error. A medical textbook states that because there can be significant breath-to-breath variation in respiratory rate, the rate should be assessed for at least 30 seconds, preferably for a full minute.(1) This same textbook also states that new technologies designed to measure the respiratory rate have not proved to be clinically useful.(1)

Codes

ICD-10 Diagnosis: I45.6, I45.9, I47.10, I47.19, I47.9, I48.0, I48.11, I48.19, I48.20, I48.21, I48.3, I48.4, I48.91, I48.92, I49.2, I49.3, I49.40, I49.49, I49.5, I49.8, I49.9 [Hide]

ICD-10 Procedure: 02583ZF, 02583ZZ, 02584ZZ, 025S3ZZ, 025T3ZZ

CPT®: 0747T, 93650, 93653, 93654, 93655, 93656, 93657

Last Update: 1/25/2026 6:06:03 AM
Build Number: 30.0.2026012500524.025256