Cardiology GRG

GRG: MG-C (ISC GRG)

MCG Health
General Recovery Care
30th Edition
Medical Admission Case Management GRG GRG

Note: An appropriate Optimal Recovery Guideline (ORG) should be identified and used whenever possible. This General Recovery Guideline (GRG) is intended to aid only in situations in which no ORG appears applicable.

Care Planning - Inpatient Admission and Alternatives

Clinical Indications for Admission to Inpatient Care

- Hospital admission is needed for appropriate care of the patient because of **1 or more** of the following(1)(2)(3):
  - Hemodynamic instability (4)(5)(6)(7)
  - Bradycardia that is symptomatic (eg, dizziness, Hypotension) and persists despite observation care(8)
  - Symptomatic (eg, dizziness, presyncope, syncope, confusional state due to hypoperfusion, or heart failure symptoms) first-degree,[A] second-degree, or third-degree atrioventricular block, and **ALL** of the following(8)(9)(10):
    - Block not readily reversible (eg, in observation care)[B]

- Block requires hospital care beyond placement of permanent pacemaker (ie, absent other issues or complications, successful placement of a permanent pacemaker does not routinely require inpatient care)

− Asymptomatic type II second-degree atrioventricular heart block (Mobitz type II)[C] or third-degree atrioventricular heart block and **ALL** of the following[B](8)(9)(10):

- Block not readily reversible (eg, in observation care)[B]
- Block requires hospital care beyond placement of permanent pacemaker (ie, absent other issues or complications, successful placement of a permanent pacemaker does not routinely require inpatient care)

- Permanent pacemaker malfunction requiring adjustment, repair, or replacement not feasible in observation care (eg, infection requiring lead removal with need for prolonged telemetry monitoring, or temporary pacemaker placement)(12)
- Cardiac injury (eg, contusion) requiring monitoring or treatment beyond observation care (eg, longer-term monitoring for arrhythmia needed)[D](13)(14)

− Pericardial effusion and **1 or more** of the following(15):

- Evidence of actual or impending cardiac tamponade (eg, Hemodynamic instability, worsening dyspnea or Tachypnea, increased jugular venous pressure, pulsus paradox, electrical alternans, or echocardiogram findings)(16)
- Hemopericardium[E]
- Pericardial effusion that is enlarging

- Pneumopericardium[F](15)(18)(20)(21)

− Aortic stenosis and **1 or more** of the following(7)(22):

- Hemodynamic instability
- Pulmonary edema resulting in Hypoxemia
- Tachypnea or dyspnea that persists despite observation care
- Decompensated aortic stenosis requiring invasive hemodynamic monitoring (eg, right heart catheterization for initiation of vasodilator therapy)(23)

− Aortic regurgitation and **1 or more** of the following(7)(22)(23):

- Hemodynamic instability
- Pulmonary edema resulting in Hypoxemia
- Tachypnea or dyspnea that persists despite observation care

− Mitral stenosis and **1 or more** of the following(7)(22):

- Hemodynamic instability
- Pulmonary edema resulting in Hypoxemia
- Tachypnea or dyspnea that persists despite observation care
- Significant hemoptysis (eg, greater than 100 mL in 24 hours, or any amount associated with airway obstruction, Respiratory distress, or Hypoxemia)(22)(24)(25)(26)(27)

− Mitral regurgitation and **1 or more** of the following(7)(28):

- Hemodynamic instability
- Pulmonary edema resulting in Hypoxemia
- Tachypnea or dyspnea that persists despite observation care

- Prosthetic valve thrombosis(23)
- Prosthetic valve with significant paravalvular leak (eg, symptomatic, worsening)(29)

− Initial inpatient care needed for anticoagulation therapy (eg, due to valvular disease), as indicated by **ALL** of the following:

- Temporary subtherapeutic anticoagulation unacceptable
- Inpatient anticoagulation needed

- Severe surgical or device complication (eg, valve replacement complication, left ventricular assist device or ICD dysfunction or failure, hemothorax, device thrombosis, infection) requiring inpatient care(30)(31)(32)(33)(34)(35)

- Stress-related cardiomyopathy (Takotsubo syndrome) requiring inpatient treatment (eg, Hypotension, pulmonary edema with Hypoxemia, ventricular arrhythmia)(36)

- Nonbacterial thrombotic endocarditis (also known as Libman-Sacks, verrucous, or marantic endocarditis) and **1 or more** of the following[G](37)(38):
  - Hemodynamic instability
  - New heart failure attributable to valvular dysfunction
  - Pulmonary edema resulting in Hypoxemia
  - Acute embolic event

- Cyanotic heart disease and **1 or more** of the following(3)(39)(40):
  - Acute onset of Hypoxemia
  - Exacerbation (eg, worsening oxygenation) that persists despite observation care
  - Exacerbation (eg, worsening oxygenation) that is not appropriate for observation care (ie, too severe)

- Complications of transplanted heart, as indicated by **1 or more** of the following(41)(42):
  - Acute graft rejection requiring inpatient management (eg, IV immunosuppression, vasoactive agent)(43)(44)(45)
  - Acute graft heart failure, as indicated by **1 or more** of the following(44)(46):
    - Hemodynamic instability
    - Cardiac arrhythmias of immediate concern (47)
    - Pulmonary edema that is very severe (eg, invasive or noninvasive assisted ventilation needed, imminent, or likely, or need for 100% oxygen to keep oxygen saturation above 90%)
    - Pulmonary edema and **ALL** of the following:
      - New need for oxygen therapy to keep oxygen saturation above 90% (or increased FiO_2 need from baseline)
      - Has not improved sufficiently in observation care with IV diuretics or other heart failure treatments
    - Altered mental status that is severe or persistent
    - Increased creatinine (new on laboratory test) with reduction of more than 50% in estimated glomerular filtration rate from baseline eGFR - Adult Calculator or eGFR - Pediatric Calculator
    - Progressively (ongoing) rising creatinine (known from past laboratory test) with reduction of more than 25% in estimated glomerular filtration rate from baseline eGFR - Adult Calculator or eGFR - Pediatric Calculator
    - Acute renal failure (stage 3 acute kidney injury)
    - Acute peripheral ischemia (eg, examination shows pulseless, cool, mottled, or cyanotic extremity)
    - Pulmonary artery catheter monitoring needed
  - Infection requiring inpatient management (eg, Hemodynamic instability, Altered mental status, new organ dysfunction, need for IV antimicrobial treatment)(48)
  - Cardiac allograft vasculopathy requiring inpatient management (eg, evidence of cardiac ischemia)[H](42)(49)(50)
  - Other complication of transplanted heart (eg, stroke, severe valvular dysfunction) requiring inpatient management(41)(51)

- Inpatient palliative care needed.[I](52)(53)(54) See Inpatient Palliative Care Criteria GRG.
- **Cardiology** condition, symptom, or finding for which observation care has failed or is not considered appropriate. See General Criteria: Observation Care ISC, General Admission Criteria GRG, or Pediatric General Admission Criteria GRG guideline as appropriate.

Supplemental Medicare Criteria

Note: These criteria are to be considered for Medicare patients if none of the standard Clinical Indications for Admission to Inpatient Care apply.

- Patient with Medicare coverage requires inpatient admission, as indicated by **1 or more** of the following(55):
  - Admitting clinician expects patient to require hospital care for less than 2 midnights but, based on complex medical factors documented in medical record, judges that inpatient care is necessary (case-by-case exception). The medical record must contain sufficient documentation to make clear the rationale for the exception.
  - Patient has need for intubation and mechanical ventilation that is new (ie, did not present to hospital already on mechanical ventilation).
  - Treatment plan for hospital admission includes procedure designated by CMS as inpatient only (ie, on Inpatient Only List).
  - Patient has already received medically necessary hospital care that meets 2-midnight benchmark (excluding activities such as triage/intake, delays in provision of care, or time added due to patient or family convenience). The medical record must contain sufficient documentation to make clear the medical necessity for hospital care across 2 or more midnights.

Alternatives to Admission

- Alternatives include(2)(23)(31)(37):
  - Outpatient care in emergency department, observation care (see General Criteria: Observation Care ISC guideline as appropriate), rapid treatment site, urgent care center, or medical office(14)(52)(56)
    - Care may include(7)(52)(57)(58):
      - History, physical examination, and laboratory tests
      - Oximetry, ABG, and chest x-ray
      - ECG or cardiac monitoring
      - IV diuretics or antihypertensives with observation of response
      - Oral medications (eg, antianginal agents, lipid-lowering agents, renin-angiotensin inhibitors, beta-blockers)
      - Discontinuation or adjustment of medications that could cause cardiac conduction abnormality or hypotension(9)(10)(59)
      - Nuclear perfusion testing
      - Angiogram or other imaging
      - Cardiac stress testing(9)
      - Echocardiogram
      - Antimicrobial treatment(60)
      - Cardioversion(56)
      - Pacemaker adjustment
      - Pulmonary artery catheterization(58)
    - Disposition may include:
      - Discharge when studies confirm low-risk condition or diagnosis that is appropriate for outpatient treatment (eg, nonemergent noncardiovascular chest pain)(61)
      - Drug therapy when condition is appropriate for outpatient treatment; examples include:
        - Antianginal agents for ischemia(57)(62)
        - Low-molecular-weight heparin on outpatient basis with anticoagulation monitoring regimen
      - Ambulatory ECG monitoring(9)(11)
      - Outpatient treatment with return for subsequent procedure such as anticoagulation with subsequent cardioversion, or permanent pacemaker placement(9)(11)(56)
      - Use of multidisciplinary outpatient care team to address patient's needs(52)
  - Home care(52)
    - Nursing visit with frequent assessment as needed
    - Laboratory testing

- Oral, parenteral, or rectal medications(57)
- Home blood pressure monitoring
- Patient education
- Coordination of further diagnostic evaluation
- Palliative care,[J] including continuous care(52)(53)(54)

- Recovery facility(52)
  - Frequent nursing care, observation, and laboratory monitoring
  - IV medications
  - Oxygen and respiratory treatments
  - Weight and fluid balance
  - Physical therapy and rehabilitation
  - Palliative care, including respite care(52)(53)(54)

Hospitalization

General Recovery Course

Stage	Level of Care	Clinical Status	Interventions
1	• ICU or intermediate care[K] • Social Determinants of Health Assessment • Discharge planning. See Discharge Planning Tool SR.	• **Clinical Indications met[L]**	• Inpatient interventions as needed
2	• Floor • Social Determinants of Health Assessment	• **No ICU or intermediate care needs** • Pulmonary and peripheral edema absent or improved • Arrhythmias absent or improved	• Inpatient interventions continue • Transition to oral routes • Taper off IV medications
3	• **Activity level acceptable** • Social Determinants of Health Assessment • Floor to discharge • Complete discharge planning	• **Hemodynamic stability** • **Cardiovascular status acceptable** • **Cardiac inflammation absent or controlled** • **General Discharge Criteria met**	• **Intake acceptable** • **No inpatient interventions needed**

(7)(15)(31)(52)(56)

Recovery Milestones are indicated in **bold**.

Benchmark Length of Stay (BLOS): Access diagnosis and procedure code-specific BLOS via Search functions.

Discharge Criteria

- Continued inpatient stay is needed until **1 or more** of the following are present:
  - Acceptable patient status for next level of care is achieved.
  - **ALL** of the following are present:
    - 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(63)(64):
        - Tachycardia absent
        - Hypotension absent
        - No evidence of inadequate perfusion (eg, no myocardial ischemia)
        - No other hemodynamic abnormalities (eg, no Orthostatic hypotension)
    - Cardiovascular status acceptable, as indicated by **ALL** of the following:
      - Cardiac rhythm acceptable, as indicated by **1 or more** of the following(65):
        - Normal sinus or paced rhythm
        - Sinus arrhythmia or supraventricular arrhythmia (eg, atrial fibrillation) with ventricular rate controlled, and no need for cardioversion(66)
      - No severe cardiac arrhythmias noted (eg, sustained ventricular tachycardia, ventricular fibrillation)(65)
      - No severe cardiac or peripheral ischemia(57)(67)
      - Heart failure or other cardiovascular disease is **1 or more** of the following(52):
        - Not present
        - At baseline
        - Manageable at next level of care
      - Cardiac inflammation absent or controlled
    - Activity level acceptable, as indicated by **1 or more** of the following:
      - Patient ambulatory and can perform ADL as appropriate for age and development
      - Activity at baseline
      - Activity level acceptable for next level of care
    - Intake acceptable, as indicated by **1 or more** of the following(68):
      - Oral hydration, medications, and diet
      - Enteral hydration, medications, and diet
      - Administration routes performable at next level of care
    - No inpatient interventions needed; examples include:
      - Vital signs, neurologic signs, or vascular checks more often than feasible at next level of care
      - Cardiac monitoring
      - IV anticoagulation, antiarrhythmics, or platelet inhibitors
      - Acute thrombolytics
      - Urgent or emergent surgery
      - Temporary pacemaker
      - Urgent or emergent cardioversion
      - Urgent or emergent electrophysiologic study and procedure
      - Urgent or emergent pacemaker or implantable cardioverter-defibrillator implantation
      - Urgent or emergent cardiac catheterization or angioplasty
      - Urgent or emergent cardiac stress test or other evaluation

General Discharge Criteria GRG met or Pediatric General Discharge Criteria GRG met (if either is relevant or necessary for patient's condition)

Case Management

See Medical Admission Case Management GRG GRG for further information.

Discharge Destination

- Post-hospital levels of admission may include:
  - Home.
  - Home healthcare. See Medical Admission Home Care GRG HC or Geriatric Admission Home Care GRG HC for further information.
  - Recovery facility care. See Medical Admission Recovery Facility Care GRG RFC or Geriatric Admission Recovery Facility Care GRG RFC for further information.
  - Inpatient rehabilitation facility. See Inpatient Rehabilitation Facility (IRF) Admission Recovery Facility Care GRG RFC for further information.

Evidence Summary

Criteria

The evidence for the clinical indications found in this guideline includes 35 published peer reviewed articles, 6 specialty society or other evidence-based guidelines, and 13 book sections.

Rationale

Use of this MCG care guideline helps the clinician identify patient-specific complex clinical factors that make it reasonable to expect a necessity for hospital care across 2 or more midnights. The evidence-based clinical criteria assist the clinician in the decision to appropriately admit a patient to inpatient care. For Medicare enrollees, MCG care guidelines also support the clinician in the decision to appropriately admit a patient to inpatient care when there is not an expectation of 2 or more midnights of hospital care (eg, CMS' Two-Midnight Rule exceptions).

Use of these evidence-based clinical criteria to support decision making around the need for inpatient treatment is of clinical benefit to the patient and is crucial for quality patient care. Use of evidence-based clinical criteria ensures patients receive the most appropriate care for their specific condition, reduces unnecessary risks, promotes recovery, and provides a standard that can reduce disparities in care. Evidence-based clinical criteria not only help align treatment decisions with best practice, but they can also help reduce unwarranted variation in care by fostering consistency and equality in healthcare provision across regions and facilities. Appropriate use of the evidence-based clinical criteria in conjunction with the Supplemental Medicare Criteria ensures Medicare patients receive full access to Medicare benefits (eg, inpatient care), without risk of delay or decreased access, based on variables such as clinical severity of illness, length of provision of medically necessary hospital-level care, or satisfaction of specified Medicare criteria as directed by CMS. Use of these criteria will help ensure that the patient receives necessary care in the appropriate setting.

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(55); 42 CFR 419.22(69); 42 CFR 422.101(70)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(71); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(72); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(73); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(74)

Medicare Coverage Determinations: Medicare Coverage Database(75)

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Footnotes

[A] Patients with first-degree atrioventricular block are usually asymptomatic; however, in severe cases (eg, PR interval greater than 300 msec), dyssynchrony between atrial and ventricular contraction may occur, resulting in symptoms from decreased cardiac output and increased pulmonary congestion.(9) [A in Context Link 1, 2]

[B] Examples of reversible etiologies include increased vagal tone, metabolic abnormalities, and medications.(9)(10) [B in Context Link 1, 2, 3]

[C] Mobitz type I (Wenckebach) second-degree heart block is common, is usually caused by disease within the atrioventricular node, and has a generally benign prognosis. Mobitz type II and high-grade second-degree atrioventricular block are caused by disease distal to the atrioventricular node (infranodal). Patients with distal infranodal second-degree blocks are at risk of developing infranodal third-degree blocks, which are characterized by slow ventricular escape rhythms that may cause hemodynamic instability. Mobitz type II second-degree heart block has been associated with progression to third-degree heart block, syncope, and sudden death, and should be monitored until a pacemaker is placed.(8)(11) [C in Context Link 1, 2]

[D] Most life-threatening arrhythmias caused by cardiac contusions occur within the first 48 hours of injury.(13) [D in Context Link 1]

[E] Causes of hemopericardium include trauma, myocardial infarction with ventricular wall rupture, malignancy, retrograde bleed from aortic dissection, or iatrogenic injury (eg, from a catheter-based cardiac procedure, pacemaker or implantable defibrillator insertion, epicardial intervention, or laparoscopic gastroesophageal surgery).(14)(15)(17) [E in Context Link 1]

[F] Pneumopericardium may be caused by trauma, asthma and other lung diseases associated with high alveolar pressures, fistula, infection with gas-producing organism, vigorous Valsalva maneuvers (eg, during recreational drug inhalation or weightlifting), or be the result of an iatrogenic complication (eg, pericardiocentesis, other cardio-invasive procedure, or high lung inflation pressure).(18) It has also been reported to occur in patients with COVID-19 infection.(19) [F in Context Link 1]

[G] Nonbacterial thrombotic endocarditis is usually asymptomatic unless valvular dysfunction occurs, there is an embolic event, or the valvular vegetations become secondarily infected.(37)(38) [G in Context Link 1]

[H] Due to denervation of a transplanted heart, cardiac allograft vasculopathy resulting in myocardial ischemia may not cause chest pain and therefore may not be noticed until significant heart damage and infarction have occurred, causing symptoms such as heart failure, syncope, cardiac arrhythmias, or cardiac arrest.(42)(49) [H in Context Link 1]

[I] Palliative or formal hospice patient care may be needed on an inpatient basis for symptoms or conditions that cannot be controlled by continuous care at any other level.(52)(53)(54) [I in Context Link 1]

[J] Palliative care or formal hospice enrollment may be indicated for terminal disease or symptom control.(52)(53)(54) [J in Context Link 1]

[K] See Intensive Care Guidelines GRG and Intermediate Care Guidelines GRG. [K in Context Link 1]

[L] See Clinical Indications for Admission to Inpatient Care in this guideline. [L in Context Link 1]

Definitions

Activity level acceptable

- Activity level acceptable, as indicated by **1 or more** of the following:
  - Patient ambulatory and can perform ADL as appropriate for age and development
  - Activity at baseline
  - Activity level acceptable for next level of care

Acute renal failure (stage 3 acute kidney injury)

- Acute[A] kidney injury (stage 3),[B] as indicated by **1 or more** of the following[C](1)(2)(3):
  - Acute[A] rise in serum creatinine to 3 times its baseline value[D] or higher
  - Acute[A] rise in serum creatinine to at least 1.5 times its baseline value[D] (increase of 50%) and serum creatinine is greater than 4 mg/dL (354 micromoles/L)
  - In child younger than 18 years, estimated GFR less than 35 mL/min/1.73m^2 (0.58 mL/sec/1.73m^2) eGFR - Pediatric Calculator and **1 or more** of the following:
    - Acute[A] rise in serum creatinine to at least 1.5 times its baseline value[D] (increase of 50%)
    - Within past 48 hours, rise in serum creatinine greater than 0.3 mg/dL (26.5 micromoles/L)
  - Decreased urine output,[E] as indicated by **ALL** of the following:
    - Assessment of urine output appropriate (eg, adequate volume status, no urinary obstruction)
    - Oligoanuria, as indicated by **1 or more** of the following:
      - Urine output less than 0.3 mL/kg/hr for 24 hours
      - Anuria (urine output less than 0.1 mL/kg/hr) for 12 hours
  - Initiation of renal replacement therapy required(4)

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Footnotes

A. A specialty society practice guideline defines acute kidney injury as a change in renal function that is known or presumed to have occurred over the previous 7 days.(1)

B. For purposes of these criteria, the term acute renal failure can be viewed as stage 3 acute kidney injury in the KDIGO classification system.(1) Of note, in the ICD-10 diagnostic coding system (main coding scheme used in labeling diagnoses), the relevant codes covering the clinical entity of significant acute kidney injury use the term acute kidney failure (eg, code N17.9).
C. In determining the stage of acute kidney injury (eg, stage 2 vs stage 3), patients should be staged according to the criteria that give them the highest stage.(1)
D. If the baseline serum creatinine is not known, absent known or suspected chronic kidney disease, a baseline serum creatinine can be approximated by assuming an estimated GFR of 75 mL/min/1.73m^2 (1.25 mL/sec/1.73m^2).(1) eGFR - Adult Calculator eGFR - Pediatric Calculator
E. The use of urine output as an indicator of acute kidney injury is important, as change in urine output can occur before a noticeable rise in creatinine.(1)(3) It is also suggested that urine output can identify patients with acute kidney injury that may otherwise be missed.(1)(3) However, urine output as a metric is only valid under the appropriate conditions. For example, the patient must not be hypovolemic, there must not be urinary obstruction, and the collection and measurement of urinary output must be complete and accurate.(1)(3) Use of urinary output to define acute kidney injury can be inaccurate in obese patients due to the nonlinear relationship between body weight and urine output. For example, in a 100-kg (220-lb) patient, urine output of 45 mL/hr over 12 hours (adequate output) would qualify as stage 2 acute kidney injury.(1)(3)

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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Altered mental status that is severe or persistent

- Altered mental status (ie, different from baseline) that is severe or persistent, as indicated by **1 or more** of the following(1)(2)(3)(4):
  - Confusional state (eg, disorientation, difficulty following commands, deficit in attention) that persists despite appropriate treatment (eg, of underlying cause, despite observation care)
  - Lethargy (eg, awake or arousable, but with drowsiness; reduced awareness of self and environment) that persists despite appropriate treatment (eg, of underlying cause, despite observation care)
  - 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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Bradycardia

- Bradycardia[A], as indicated by **1 or more** of the following(1)(2)(3):
  - Heart rate less than 50 beats per minute in adult (age 18 years or older)[B]
  - Heart rate less than 55 beats per minute in adolescent 13 to 17 years of age
  - Heart rate less than 60 beats per minute in child or adolescent 6 to 12 years of age
  - Heart rate less than 65 beats per minute in child 3 to 5 years of age
  - Heart rate less than 70 beats per minute in child 1 to 2 years of age
  - Heart rate less than 80 beats per minute in infant 6 to 11 months of age
  - Heart rate less than 90 beats per minute in infant 3 to 5 months of age

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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. An evidence-based specialty society guideline has defined bradycardia in adults as less than 50 beats per minute.(1)

Cardiac arrhythmias of immediate concern

- Cardiac arrhythmias or findings of immediate concern, as indicated by **1 or more** of the following(1)(2)(3):
  - Heart rhythms that are inherently dangerous or unstable, as indicated by **1 or more** of the following(4)(5)(6):
    - 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 and **1 or more** of the following:

- Suspected cardiac ischemia as cause or consequence of ventricular tachycardia
- Acute myocarditis

- Unstable cardiac conduction defects, as indicated by **1 or more** of the following(7)(8):
  - Type II second-degree atrioventricular block
  - Third-degree atrioventricular block
  - New-onset left bundle branch block with suspected myocardial ischemia(9)
- Any heart rhythm and **1 or more** of the following(5)(8)(10)(11)(12)(13):
  - Continuous long-term ECG monitoring needed (eg, initiation of drug requiring monitoring beyond observation care)
  - Patient has automatic implantable cardioverter-defibrillator that is repeatedly firing, malfunctioning, or in need of immediate adjustment of settings beyond scope of observation care.
- Heart rhythms of concern due to **1 or more** of the following(8):
  - Hypotension
  - Respiratory distress
  - Association with other significant symptoms (eg, syncope)(10)(11)

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Cardiovascular status acceptable

- Cardiovascular status acceptable, as indicated by **ALL** of the following:
  - Cardiac rhythm acceptable, as indicated by **1 or more** of the following(1):
    - Normal sinus or paced rhythm
    - Sinus arrhythmia or supraventricular arrhythmia (eg, atrial fibrillation) with ventricular rate controlled, and no need for cardioversion(2)
  - No severe cardiac arrhythmias noted (eg, sustained ventricular tachycardia, ventricular fibrillation)(1)
  - No severe cardiac or peripheral ischemia(3)(4)
  - Heart failure or other cardiovascular disease is **1 or more** of the following(5):
    - Not present
    - At baseline
    - Manageable at next level of care

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General Discharge Criteria met

- General Discharge Criteria met or Pediatric General Discharge Criteria met (if either is relevant or necessary for patient's condition)

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)

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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)

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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

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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.

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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.

Inpatient anticoagulation needed

- Contraindication to outpatient use of medication with rapid anticoagulation effect (eg, IV unfractionated heparin and warfarin indicated),[A] as indicated by **ALL** of the following(1)(2)(4)(5):
  - Contraindication to use of low-molecular-weight heparin, as indicated by **1 or more** of the following:
    - Current or history of heparin-induced thrombocytopenia
    - Severe thrombocytopenia (eg, platelet count less than 50,000/mm^3 (50 $x10^9$/L))
    - Allergy to heparin, low-molecular-weight heparin, or product components
    - Need for neuraxial anesthesia or spinal puncture anticipated
    - Inability to manage self-injection (eg, by patient, caregiver, or visiting nurse)
  - Contraindication to use of fondaparinux, as indicated by **1 or more** of the following:
    - Severe thrombocytopenia (eg, platelet count less than 50,000/mm^3 (50 $x10^9$/L))
    - Allergy to fondaparinux, related drugs, or product components
    - Renal failure (creatinine clearance less than 30 mL/min/1.73m^2 (0.50 mL/sec/1.73m^2) or on dialysis) eGFR - Adult Calculator eGFR - Pediatric Calculator
    - Pregnancy(4)
    - Severe liver disease (eg, Child-Pugh class C or coagulopathy (eg, elevated INR) due to liver disease)
    - Mechanical heart valve
    - Need for neuraxial anesthesia or spinal puncture anticipated
    - Inability to manage self-injection (eg, by patient, caregiver, or visiting nurse)
    - BMI greater than or equal to 50[B]
  - Contraindication to use of oral direct thrombin inhibitor (eg, dabigatran) or oral factor Xa inhibitor (eg, apixaban, edoxaban, rivaroxaban), as indicated by **1 or more** of the following[C][D](11):
    - Severe thrombocytopenia (eg, platelet count less than 50,000/mm^3 (50 $x10^9$/L))

- Allergy to medication or product components
- Pregnancy or breast-feeding[D](4)(11)
- Severe liver disease (eg, Child-Pugh class C or coagulopathy (eg, elevated INR) due to liver disease)(12)
- Renal failure (creatinine clearance less than 15 mL/min/1.73m^2 (0.25 mL/sec/1.73m^2) or on dialysis)[D](11) eGFR - Adult Calculator eGFR - Pediatric Calculator
- Mechanical heart valve[D](11)(13)
- Atrial fibrillation with rheumatic mitral stenosis[D](11)
- Thrombotic antiphospholipid syndrome[D](11)
- Left ventricular thrombus[D](11)
- Catheter-associated deep venous thrombosis[D](11)
- Cerebral venous sinus thrombosis[D](11)
- Need for neuraxial anesthesia or spinal puncture anticipated
- BMI greater than or equal to 50[B]

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Footnotes

A. Patients using low-molecular-weight heparin, fondaparinux, an oral direct thrombin inhibitor, or an oral factor Xa inhibitor achieve full anticoagulation rapidly (eg, a few hours after first dose).(1)(2)(3)

B. The clinical utility of factor Xa inhibitors or direct thrombin inhibitors in patients with a BMI greater than or equal to 50 is unclear, due to a relative paucity of data in these patients.(6)(7)(8) While some do advocate the use of factor Xa inhibitors or direct thrombin inhibitors in this patient group, others suggest that absent clear evidence of efficacy, it is preferable to use heparin (low-molecular-weight or unfractionated) transitioning to warfarin because of the long established ability to carefully adjust dosage based on measurement of anticoagulant effect (eg, via measurement of anti-factor Xa level, prothrombin/INR).(6)(7)(8)

C. With caution and dose adjustment, apixaban can be administered to patients with stage 5 renal failure (creatinine clearance less than 15 mL/min/1.73m^2 (0.25 mL/sec/1.73m^2)) or who are receiving hemodialysis.(5)(9)(10) Rivaroxaban and edoxaban are not recommended for patients with stage 5 or hemodialysis-dependent renal failure.

D. A systematic review of relevant randomized controlled trials concludes that direct oral anticoagulants (ie, oral factor Xa and oral thrombin inhibitors) should not be standard treatment for patients with mechanical heart valves, atrial fibrillation with rheumatic mitral stenosis, or thrombotic antiphospholipid syndrome.(11) For these indications, use of a vitamin K antagonist (eg, warfarin) is preferred.(11) The review further concludes that the efficacy and safety of direct oral anticoagulants is uncertain in patients with left ventricular thrombus, catheter-associated deep venous thrombosis, or cerebral venous sinus thrombosis.(11) Concerning patients with end-stage renal disease, the review states that the choice of an anticoagulant should be individualized due to the lack of definitive data, balancing the pros and cons of a direct oral anticoagulant and vitamin K antagonist-based anticoagulation.(11) Patients who are pregnant or breast-feeding should avoid direct oral anticoagulants pending further study concerning safety.(11)

Intake acceptable

- Intake acceptable, as indicated by **1 or more** of the following(1):
  - Oral hydration, medications, and diet
  - Enteral hydration, medications, and diet
  - Administration routes performable at next level of care

References

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No inpatient interventions needed

- No inpatient interventions needed; examples include:
  - Vital signs, neurologic signs, or vascular checks more often than feasible at next level of care
  - Cardiac monitoring
  - IV anticoagulation, antiarrhythmics, or platelet inhibitors
  - Acute thrombolytics
  - Urgent or emergent surgery
  - Temporary pacemaker

- Urgent or emergent cardioversion
- Urgent or emergent electrophysiologic study and procedure
- Urgent or emergent pacemaker or implantable cardioverter-defibrillator implantation
- Urgent or emergent cardiac catheterization or angioplasty
- Urgent or emergent cardiac stress test or other evaluation

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

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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)

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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.

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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)

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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)

Temporary subtherapeutic anticoagulation unacceptable

- Temporary subtherapeutic anticoagulation unacceptable because of high short-term risk of venous or arterial thromboembolism due to **1 or more** of the following[A][B](1)(3)(4):
  - Venous thromboembolism or left ventricular thrombus within past 3 months(4)
  - Underlying malignancy[C](4)
  - Patient with mechanical cardiac valve[D](1)(3)
  - Underlying hypercoagulable state (eg, protein C or protein S deficiency, antithrombin deficiency, antiphospholipid antibodies, severe thrombophilia)(4)
  - Patient at temporary high risk of thromboembolism (eg, status post orthopedic surgery)(4)
  - Atrial fibrillation and **1 or more** of the following[A]:
    - Recent stroke or transient ischemic attack (eg, within past 3 months) or prior perioperative stroke(1)(4)

- Rheumatic valvular heart disease(3)(4)
- CHA2DS2-VASc score of 7 or greater or CHADS2 score of 5 or greater[E](3)(4)

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Footnotes

A. Very few patients with atrial fibrillation or atrial flutter (same criteria for anticoagulation apply) require inpatient care or need to have their inpatient stay extended due to a need to achieve immediate therapeutic anticoagulation (ie, stay in the hospital to receive IV unfractionated heparin until warfarin-induced anticoagulation is sufficient). Most patients, including those with clear indications for long-term anticoagulation, do not need immediate anticoagulation, as the risk of an embolic event within the few days until their warfarin becomes therapeutic is very low (a small fraction of 1% per day).(1) Only patients deemed to be at particular risk for embolization (eg, mechanical valve, recent stroke or transient ischemic attack) are candidates for bridge therapy.(1) In addition, the vast majority of patients are eligible to be anticoagulated through use of an oral direct thrombin inhibitor (eg, dabigatran), an oral coagulation factor Xa inhibitor (eg, rivaroxaban, apixaban, edoxaban), or low-molecular-weight heparin, all of which achieve full anticoagulation rapidly (eg, a few hours after the first dose).(1)

B. A systematic review of relevant randomized controlled trials concludes that direct oral anticoagulants (ie, oral factor Xa inhibitors and oral thrombin inhibitors) should not be standard treatment for patients with mechanical heart valves, atrial fibrillation with rheumatic mitral stenosis, or thrombotic antiphospholipid syndrome.(2) For these indications, the use of a vitamin K antagonist (eg, warfarin) is preferred.(2) The review further concludes that the efficacy and safety of direct oral anticoagulants are uncertain in patients with left ventricular thrombus, catheter-associated deep venous thrombosis, or cerebral venous sinus thrombosis.(2) Concerning patients with end-stage renal disease, the review states that the choice of an anticoagulant should be individualized due to the lack of definitive data, balancing the pros and cons of direct oral anticoagulant-based and vitamin K antagonist-based anticoagulation.(2) Patients who are pregnant or breast-feeding should avoid direct oral anticoagulants pending further study concerning safety.(2)

C. A specialty society guideline identifies pancreatic cancer, myeloproliferative disorders, primary brain cancer, gastric cancer, and esophageal cancer as being especially high risk and states that patients with other malignancies may not be at high short-term risk of thromboembolism.(3)

D. A specialty society guideline concludes that patients with atrial fibrillation and a mechanical cardiac valve are at high short-term risk of arterial thromboembolism.(1) Another specialty society guideline identifies the following features in patients with mechanical heart valves that confer high thrombotic risk: patients with a mitral valve and major risk factors for stroke, patients with mitral or aortic caged ball or tilting-disc valves, and patients with mechanical valves and recent stroke or transient ischemic attack.(3)

E. Online calculators for the CHA2DS2-VASc score and the CHADS2 score are available at www.mdcalc.com/calc/801/cha2ds2-vasc-score-atrial-fibrillation-stroke-risk and www.mdcalc.com/calc/40/chads2-score-atrial-fibrillation-stroke-risk, respectively.

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