Pneumonia

ORG: M-282 (ISC)
Link to Codes

MCG Health
Inpatient & Surgical Care
30th Edition

Care Planning - Inpatient Admission and Alternatives

Clinical Indications for Admission to Inpatient Care

Note: Some patients may be appropriate for Observation care. For consideration of observation care, see Pneumonia: Observation Care ISC.

Note: For patients with clinically active secondary conditions, see Pneumonia Multiple Condition Management Guidelines.

- Admission is indicated for **1 or more** of the following[A][B](2)(3)(6): NN
  - Hypoxemia (3)

- Hemodynamic instability (2)(3)
- Altered mental status that is severe or persistent (3)
- Dehydration that is severe or persistent (9)
- Ventilatory assistance[C] needed (eg, mechanical ventilation, noninvasive ventilation)(2)(3)
- Bacteremia
- Moderate-risk-category or high-risk-category patient (Pneumonia Severity Index class IV or V, CURB-65 score of 3 or greater, or Quick Sequential Organ Failure Assessment (qSOFA) score of 2 or 3) PSI Calculator CURB-65 Calculator(2)(3)(6)(10)
- Respiratory finding (eg, Tachypnea) that persists despite observation care(11)
- Complicated pleural effusions (eg, empyema, loculated)(12)
- Inability to maintain oral hydration (IV fluid support necessary) despite observation care
- Isolation indicated that cannot be performed outside hospital setting

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(13):
  - 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)(3)(14)(15):
  - Outpatient care in emergency department, rapid treatment site, urgent care center, or medical office
    - History, physical examination, and assessment of risk factors
    - Chest x-ray and laboratory testing
    - Antibiotics and re-evaluation of hemodynamics, oxygenation status, and other parameters
    - Discharge on oral or parenteral antibiotics.
  - Observation. See Pneumonia: Observation Care ISC guideline as appropriate.
  - Home care(16)
    - Nursing visits for assessment and laboratory work
    - Parenteral antibiotics, respiratory therapy, and oxygen, as indicated
  - Recovery facility
    - Parenteral fluid and medication
    - Respiratory treatment and oxygen
    - Frequent assessment and treatment
    - Management of comorbidities

Hospitalization

Optimal Recovery Course

Day	Level of Care	Clinical Status	Activity	Routes	Interventions	Medications
1	• ICU[D] or floor • Social Determinants of Health Assessment • Adult Readmission Risk Assessment • Extended Stay Risk Assessment • Discharge planning	• **Clinical Indications met[E]** • Possible Fever, dyspnea, purulent sputum, pleuritic pain, Altered mental status	• Activity as tolerated	• Possible IV fluids • Parenteral or oral medications • Liquid or usual diet	• WBC • Possible ABG or oximetry • Blood culture • Possible sputum Gram stain and culture • Possible respiratory therapy • Probable oxygen • Possible thoracentesis • Incentive spirometry • Head of bed at 30 degrees	• IV antibiotics • Possible corticosteroids
2	• Floor • Social Determinants of Health Assessment • Adult Readmission Risk Assessment • Extended Stay Risk Assessment	• **No CO_2 retention or acidosis** • **No requirement for mechanical ventilation** • **Hypotension absent** • **Afebrile or fever improved** • **No hypoxia on room air or oxygenation improved** • **Mental status improved or at baseline**	• **Increased activity**	• Oral hydration • Oral medications • Usual diet	• Incentive spirometry • Pulse oximetry • Head of bed at 30 degrees • Possible oxygen	• IV or oral antibiotics • Possible corticosteroids
3	• Social Determinants of Health Assessment • Adult Readmission Risk Assessment • Extended Stay Risk Assessment • Floor to discharge[F]	• **Hemodynamic stability** • **Afebrile or temperature acceptable for next level of care** • **Tachypnea absent** • **Hypoxemia absent** • **Mental status at baseline** • **Antibiotic regimen acceptable for next level of care**	• **Ambulatory or acceptable for next level of care**	• **Oral hydration[G]** • **Oral medications or regimen acceptable for next level of care** • **Oral diet or acceptable for next level of care**	• **Oxygen absent or at baseline need** • **Isolation not indicated or is performable at next level of care** • WBC • Incentive spirometry	• Oral antibiotics • Possible oral corticosteroids

• Complete discharge planning	• **Discharge plans and education understood**					

(1)(3)(8)(14)(19)(20)N

Recovery Milestones are indicated in **bold**.

Goal Length of Stay: 2 days

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

Note: See Pneumonia Multiple Condition Management Benchmarking Table for more detailed information.

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

- Extended stay beyond goal length of stay may be needed for(3)(8):
  - Failure to meet discharge criteria (recovery milestones within final day in Optimal Recovery Course)
    - Expect brief stay extension.
  - Unclear diagnosis
    - Patient with negative cultures who is not recovering (eg, persistent signs and symptoms) on empiric antibiotics may require bronchoscopy, open lung biopsy, pleural biopsy, or changed antibiotic regimen.
    - Expect brief stay extension.
  - Pleural disease
    - Large pleural effusions or empyema may require repetitive drainage after diagnostic thoracentesis, chest tube drainage, or video-assisted thoracoscopy.
    - Expect brief stay extension.
  - Severe pneumonia or treatment failure(17)(21)
    - Nonresponsiveness to initial therapy has been associated with higher initial severity of infection (eg, high Pneumonia Severity Index or CURB-65 scores), hypoxemia, respiratory rate greater than 30 breaths per minute, and thrombocytopenia.(21)
    - Patient with necrotizing pneumonia or lung abscess may require longer hospital stay for recovery.(22)
    - Patient with extension of x-ray infiltrates, multilobar disease, or ongoing hypoxemia may require longer hospital stay for recovery.
    - Patient with bacterial and viral co-infection may have higher morbidity and require longer hospital stay.(23)
    - Expect brief stay extension.
  - Infection with antibiotic-resistant organism (eg, *Pseudomonas* species, *Acinetobacter* species, methicillin-resistant *Staphylococcus aureus*)[B][H][I](4)(5)(27)
    - Patient infected with antibiotic-resistant organism may require multiple antibiotics, broader coverage, and more prolonged IV antibiotic course.
    - Expect brief stay extension.
  - Respiratory insufficiency or failure
    - Anticipate ventilatory support.[C](19)(20)(28)
    - Expect moderate stay extension.

- New-onset hyponatremia (serum sodium concentration of 135 mEq/L (mmol/L) or less)
  - Anticipate close monitoring for signs and symptoms and of serum electrolytes.
  - Expect brief stay extension.
- Clinically significant comorbid illness (eg, heart failure, atrial fibrillation with rapid heart rate, alcohol withdrawal, renal insufficiency, diabetes)
  - Anticipate evaluation and treatment of specific comorbidity.
  - Expect brief stay extension.
- Comorbid acute exacerbation of obstructive lung disease (eg, COPD, asthma)(29)
  - COPD is associated with higher mortality, higher rates of ventilator-dependent respiratory failure, and *Pseudomonas* infection.
  - Expect brief stay extension.
- Concomitant diagnosis of malignancy (eg, postobstruction pneumonia)
  - Malignancy may be associated with malnutrition, immunologic impairment, or bronchial obstruction.
  - Expect brief to moderate stay extension.
- Altered mental status
  - Altered mental status disease may delay mobilization and recovery.
  - Expect brief stay extension.
- Malnutrition(30)
  - Malnutrition is associated with higher mortality, higher rates of ventilator-dependent respiratory failure, and higher risk of sepsis and septic shock.
  - Expect brief stay extension.

See Common Complications and Conditions ISC for further information.

Discharge

Discharge Planning

- Discharge planning includes[J]:
  - Assessment of needs and planning for care, including(32)(33)(34):
    - 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.
    - Evaluate and address patient or caregiver preferences as indicated.
    - Identify skilled services needed at next level of care, with specific attention to:
      - Medication management, adherence instruction, and side effects assessment(35)
      - Ongoing education required(36)
      - Respiratory status assessment
  - Early identification of anticipated discharge destination; options include(34)(37)(38):
    - Home; considerations include:
      - Home safety assessment. See Home Safety Assessment SR for further information.
      - Patient safe to go home; examples include(39)(40)(41):
        - 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(34)(37)(38)(42):
  - Patient and caregiver education complete.
    - See Teach-Back Tool SR for further information.
    - See Pneumonia: Patient Education for Clinicians SR for further information.
  - Medication reconciliation completion includes(35)(43):
    - 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)(44)
    - 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(45):
    - 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(46)
    - Follow-up evaluation call. See Post-Acute Care Follow-Up Call Tool SR for further information.(33)
    - Infectious disease specialist(33)
    - Pulmonologist
    - Respiratory therapy(33)

- Other
- Outpatient testing and procedure plans made, which may include(47):
  - Laboratory testing
  - Radiology(33)
  - Other
- Referrals made for assistance or support, which may include:
  - Alcohol and other drug abuse or dependence treatment(48)(49)
  - Community services
  - Financial, for follow-up care, medication, and transportation
  - Tobacco use treatment(48)(50)
  - Other
- Medical equipment and supplies coordinated (ie, delivered or delivery confirmed), which may include:
  - Incentive spirometer(36)
  - Nebulizer
  - Oxygen and supplies
  - Other

Discharge Destination

- Post-hospital levels of admission may include:
  - Home.
  - Home healthcare. See Home Care Indications for Admission Section HC in Pneumonia guideline in Home Care.
  - Recovery facility care. See Recovery Facility Care Indications for Admission Section RFC in Pneumonia guideline in Recovery Facility Care.

Evidence Summary

Background

For patients with pneumonia suspected or known to be of viral etiology other than COVID-19 (eg, positive test for influenza), the Viral Illness, Acute ISC guideline is appropriate. For viral infection due to COVID-19, the COVID-19 ISC guideline should be used. If the etiology is bacterial or unknown (eg, treating with antibiotics empirically), the Pneumonia guideline is appropriate.

This guideline pertains to the vast majority of patients with pneumonia, including patients deemed to have healthcare-associated pneumonia (HCAP). HCAP is defined as pneumonia developing in a patient with one or more of the following healthcare contacts: residence in a nursing home or long-term care facility, wound care, IV chemotherapy or hemodialysis within the previous 30 days, or acute care hospitalization for 2 or more days within the previous 90 days.(2) **(EG 2)** Concerns have been raised as to whether a patient identified as having HCAP is truly more likely to be infected with a multidrug-resistant organism.(3)(4)(5) **(EG 2)**

Criteria

The evidence for the clinical indications found in this guideline includes 4 published peer reviewed articles, 2 specialty society or other evidence-based guidelines, and 4 book sections.

Analysis of national hospital discharge data for a commercially insured population shows 19.5% of patients seen in an emergency department with a principal diagnosis of pneumonia were admitted to inpatient care.(7) **(EG 3)** Analysis of national hospital discharge data for a Medicare-insured population shows 60.7% of patients seen in an emergency department with a principal diagnosis of pneumonia were admitted to inpatient care.(7) **(EG 3)** Analysis of an all-payer database shows a mean length of stay of 4.8 days for patients admitted to inpatient care.(8) **(EG 3)**

An emergency medicine textbook recommends that patients evaluated by the Pneumonia Severity Index (PSI) as high risk (class IV or V) should be admitted to inpatient care, that moderate-risk patients (class III) can be initially treated in observation care, and that, absent other indications for admission, low-risk patients (class I or II) can be treated as outpatients.(2) **(EG 2)** Clinical variables that are included in the PSI, and thus contribute to a higher risk score, are tachycardia, hypotension, altered mental status, tachypnea, and hypoxemia.(2) **(EG 2)** A specialty society guideline recommends use of the PSI in addition to clinical judgment in the evaluation of pneumonia patients and specifies that low-risk patients can be treated as outpatients.(3) **(EG 2)** This same guideline identifies major and minor criteria that would denote a patient as having severe pneumonia (inpatient treatment appropriate, likely ICU). Examples include respiratory failure (ventilatory assistance needed), hypotension, hypoxemia, and altered mental status.(3) **(EG 2)** Another specialty society guideline also recommends the use of the PSI to help identify patients who require inpatient care, specifically outpatient care for low-risk patients (class I or II), observation care for moderate-risk patients (class III), and inpatient care for high-risk patients (class IV or V).(6) **(EG 2)** An emergency medicine textbook identifies a CURB-65 score of 2 (1 point each for confusion, BUN greater than 19 mg/dL (6.8 mmol/L), respiratory rate 30 breaths per minute or higher, SBP less than 90 mm Hg or DBP 60 mm Hg or less, and age 65 years or older) as indicative of intermediate severity (eg, observation care appropriate) and a CURB-65 score of 3 or greater as warranting inpatient care.(2) **(EG 2)**

Length of Stay

Analysis of national hospital discharge data shows 28% of hospitalized adult patients with a principal diagnosis of pneumonia were discharged in 2 days or less.(8) **(EG 3)**

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(13); 42 CFR 419.22(51); 42 CFR 422.101(52)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(53); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(54); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(55); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(56)

Medicare Coverage Determinations: Medicare Coverage Database(57)

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Footnotes

[A] For patients with pneumonia suspected or known to be of viral etiology other than COVID-19 (eg, positive test for influenza), the Viral Illness, Acute ISC guideline is appropriate. For viral infection due to COVID-19, the COVID-19 ISC guideline should be used. If the etiology is bacterial or unknown (eg, treating with antibiotics empirically), the Pneumonia guideline is appropriate. [A in Context Link 1]

[B] This guideline pertains to the vast majority of patients with pneumonia, including patients deemed to have healthcare-associated pneumonia (HCAP). Pneumonia is diagnosed by the presence of radiographic findings (eg, patchy or lobar consolidation, air space opacities) with 2 or more signs (temperature greater than 100.4 degrees F (38 degrees C) or 96.8 degrees F (36 degrees C) or less, Hypoxemia, leukocyte count greater than 10,000/mm^3 (10 x10^9/L) or less than 4000/mm^3 (4 x10^9/L), respiratory rate greater than 20 breaths per minute) or symptoms (new or increased cough, dyspnea, or sputum production).(1) HCAP is defined as pneumonia developing in a patient with one or more of the following healthcare contacts: residence in a nursing home or long-term care facility, wound care, IV chemotherapy or hemodialysis within the previous 30 days, or acute care hospitalization for 2 or more days within the previous 90 days.(2) Concerns have been raised as to whether a patient identified as having HCAP is truly more likely to be infected with a multidrug-resistant organism.(3)(4)(5) [B in Context Link 1, 2]

[C] Ventilatory assistance includes noninvasive methods (eg, high-flow nasal cannula (HFNC), CPAP, BPAP) and invasive methods (intubation with mechanical ventilation). [C in Context Link 1, 2]

[D] Specialty society guidelines recommend ICU admission for a patient with need for invasive or noninvasive assisted ventilation, Hemodynamic instability, or any 3 of the following severity factors: sodium less than 130 mEq/L (mmol/L), PaO_2 to FiO_2 ratio of 250 mm Hg or less, multilobed infiltrates, Altered mental status, BUN 20 mg/dL (7.1 mmol/L) or greater, WBC count less than 4000/mm^3 (4 x10^9/L), platelet count less than 100,000/mm^3 (100 x10^9/L), or temperature less than 96.8 degrees F (36 degrees C). See Intensive, Intermediate, and Telemetry Care Guidelines ISC for further information.(3)(6)(17)(18) [D in Context Link 1]

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

[F] The patient may be discharged on oral antibiotics.(3) [F in Context Link 1]

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

[H] The most useful and powerful risk factors for infection with antibiotic-resistant organisms are those that are locally developed and validated, as prevalence can vary significantly.(3) Concerning methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas* species, an evidence-based specialty society guideline concludes that the most consistently strong individual risk factors, other than those developed locally, are a patient having had either organism previously isolated, especially from the respiratory tract, or recent (within past 90 days) hospitalization with exposure to parenteral antibiotics.(3) This same guideline recommends that, when empiric coverage for *Pseudomonas* species or MRSA is used, therapy should be de-escalated (reversion to routine antibiotic coverage) if microbiological results (eg, blood culture, sputum culture) do not confirm infection with a resistant organism within 48 hours.(3) [H in Context Link 1]

[I] In pneumonia patients, the absence of nasal methicillin-resistant *Staphylococcus aureus* (MRSA) colonization upon admission indicates a very low likelihood of MRSA infection. A systematic review and meta-analysis (22 studies, 5163 patients) examining nasal colonization screening found a pooled sensitivity for MRSA pneumonia of 71% and a pooled specificity of 90%.(3)(24) Assuming a 10% prevalence of MRSA pneumonia, this would translate to a positive predictive value (PPV) of 45% and a negative predictive value (NPV) of 97%, indicating that a negative screen can essentially rule out MRSA pneumonia.(3)(24) In settings with a lower prevalence of MRSA pneumonia, the NPV would be even higher. The PPV, on the other hand, does not allow this screening to rule in MRSA pneumonia,

although it may yield a likelihood that rises above the treatment (eg, IV vancomycin) threshold. Two studies, encompassing 901 patients admitted for community-acquired pneumonia, reported that a Drug Resistance in Pneumonia (DRIP) score of less than 4 had a 99% NPV for having a drug-resistant pathogen.(25)(26) Low PPV for a DRIP score of 4 or greater (4.7% to 8.4%) in these studies indicates the need to continue using antibiotic stewardship and de-escalation practices in conjunction with this score after broad-spectrum antibiotics are started.(25)(26) A calculator is available at www.mdcalc.com/drug-resistance-pneumonia-drip-score. [I in Context Link 1]

[J] Discharge instructions should be given in the patient's and caregiver's native language using trained language interpreters whenever possible.(31) [J in Context Link 1]

Definitions

Acute kidney injury (stage 2)

- Acute kidney injury (stage 2) with significant clinical findings, as indicated by **ALL** of the following(1)(2)(3):
  - Acute[A] kidney injury (stage 2), as indicated by **1 or more** of the following[B]:
    - Acute[A] rise in serum creatinine between 2 and 2.9 times its baseline value[C] (increase of 3 times baseline would qualify as stage 3 acute kidney injury)
    - Decreased urine output,[D] as indicated by **ALL** of the following:
      - Assessment of urine output appropriate (eg, adequate volume status, no urinary obstruction)
      - Urine output less than 0.5 mL/kg/hr for 12 hours
  - Significant clinical findings, as indicated by **1 or more** of the following[B]:
    - Hemodynamic instability
    - Worsening clinical status despite observation care (eg, rising creatinine or urine output remains less than 0.5 mL/kg/hr)
    - Altered mental status
    - Cardiac arrhythmias of immediate concern
    - Severe hypertension (SBP greater than 180 mm Hg or DBP greater than 120 mm Hg in adults or greater than the 95th percentile for age, gender, and height plus 30 mm Hg in pediatric patients)(4)(5)
    - Significant respiratory findings (eg, pulmonary edema) that are severe (eg, Hypoxemia) or persist despite observation care
    - Clinically significant electrolyte abnormality that is severe (eg, hyperkalemia with severe ECG findings)[E] or persists despite observation care
    - Clinically significant metabolic abnormality (eg, metabolic acidosis) that is severe or persists despite observation care

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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. 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)
C. 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
D. 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)
E. ECG findings include peaked T-waves, PR interval greater than 0.20 seconds, QRS interval greater than 0.12 seconds, and arrhythmia.(6)(7)

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)

Adult Readmission Risk Assessment

- Risk of readmission is increased by presence (upon admission or during hospital stay) of **1 or more** of the following(1):
  - Clinically significant comorbid illness that necessitates (during current hospital stay) new or intensified treatment, prolongs length of stay, or impacts discharge level of care (eg, heart failure, COPD, active malignancy, cirrhosis, dementia, psychosis)(1)(2)(3)
  - End-stage renal disease or new need for dialysis(1)
  - Malnutrition[A](1)
  - Need for parenteral nutrition or supplemental enteral tube feeding (eg, via gastrostomy tube or jejunostomy tube)(1)
  - Need for transfusion of platelets or red blood cells(1)
  - Need for supplemental oxygen after discharge (new or pre-existing)(1)
  - Potential barriers to postdischarge clinical care (eg, homelessness, lack of transportation, impaired access to care or medication, active substance abuse)(1)
  - Frailty (ie, as indicated by a frailty measurement tool)[B][C](1)(5)(6)(7)
  - Two or more emergency department visits and/or inpatient admissions within previous 6 months(1)(8)

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Footnotes

A. There are many tools used to assess for malnutrition in adults. Near universal elements include recent weight loss and low muscle mass. Most tools include criteria based on BMI. Some include criteria around etiology such as low food intake vs disease burden or inflammation.(4) The Malnutrition Universal Screening Tool (MUST) is available at www.mdcalc.com/calc/10190/malnutrition-universal-screening-tool-must. The Nutrition Risk Screening 2002 (NRS-2002) tool is available at www.mdcalc.com/calc/4012/nutrition-risk-screening-2002-nrs-2002. A document that outlines the elements and scoring of several tools can be downloaded from https://aspenjournals.onlinelibrary.wiley.com/action/downloadSupplement?doi=10.1002%2Fjpen.1440&file=jpen1440-sup-0001-Appendix.docx.
B. There are numerous measurement tools used to assess for frailty. Some of the more commonly used scales (with score indicating frailty in parentheses) include the following: Frailty Phenotype (3 or higher), 40-item Frailty Index (0.25 or higher), Study of Osteoporotic Fracture Index (2 or higher), Edmonton Frail Scale (8 or higher), FRAIL Scale (3 or higher), Clinical Frailty Scale (5 or higher), and Tilburg Frailty Indicator (5 or higher).(5)
C. Frailty may be described as a phenotype or as an accumulation of health deficits. The Fried phenotype delineates a clinical syndrome resulting from altered metabolism coupled with abnormal stress responses.(6) This model includes 5 characteristic features: exhaustion (energy level), weakness (hand grip strength), slowness (gait speed), physical inactivity (falls), and weight loss.(6)(7) The presence of 3 or more of these deficits indicates the presence of frailty.(6)(7) Frailty as deficit accumulation considers findings in multiple domains (eg, cognitive, physical, nutritional, laboratory) and high-risk comorbidities.(6)(7) In this model, the degree of frailty is quantified by the number of indicative items present.(6)

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)

References

1. Maher PJ. Confusion. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:126-131.e1.
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3. Abraham G, Maher PJ. Delirium and dementia. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:1269-1280.e2.
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Bacteremia

- Bacteremia refers to blood culture isolation of a bacterial species that is likely to be pathologic and not a contaminant.(1)(2)

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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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Clinically active atrial fibrillation

- Clinically active atrial fibrillation refers to atrial fibrillation necessitating electrical cardioversion or treatment with parenteral (IV) medication, while hospitalized, to control heart rate (eg, digoxin, diltiazem, metoprolol) or to cardiovert (eg, amiodarone, procainamide).

Clinically active chronic obstructive pulmonary disease

- Clinically active chronic obstructive pulmonary disease (COPD) refers to COPD necessitating assisted ventilation (eg, BPAP, CPAP) or treatment with oral or parenteral (IV) corticosteroids while hospitalized.

Clinically active diabetes

- Clinically active diabetes refers to diabetes necessitating treatment with insulin while hospitalized.

Clinically active heart failure

- Clinically active heart failure refers to heart failure necessitating treatment with parenteral (IV) diuretics (eg, furosemide) during the first 1 to 2 days of hospital care.

Clinically significant dementia

- Clinically significant dementia refers to dementia necessitating treatment with antipsychotic medication (eg, haloperidol, risperidone) or dementia-specific medication (eg, donepezil, memantine) while hospitalized.

Clinically significant malnutrition

- Clinically significant malnutrition refers to patients presenting with findings indicative of poor nutritional status; examples include unintentional weight loss, BMI less than 18.5, inadequate nutritional intake, loss of subcutaneous fat (eg, orbital, triceps, over ribs), or loss of muscle mass (eg, temples, clavicles, hands).

 BMI Calculator

Dehydration that is severe or persistent

- Dehydration and **1 or more** of the following(1)(2)(3)(4):
  - Clinical findings of severe dehydration, as indicated by **1 or more** of the following:
    - Hemodynamic instability
    - Acute renal failure (stage 3 acute kidney injury)
    - Acute kidney injury (stage 2)
    - Serum sodium greater than 150 mEq/L (mmol/L)
  - Dehydration that is persistent, as indicated by **ALL** of the following:
    - Oral rehydration therapy not tolerated or insufficient to adequately correct dehydration
    - Dehydration persists despite appropriate treatment (eg, IV fluids, observation care)

References

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4. Greenbaum LA. Maintenance and replacement therapy. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:525-529.

Extended Stay Risk Assessment

- Risk of extended length of stay is increased by presence of **1 or more** of the following(1):
  - Acute heart failure (eg, pulmonary edema)
  - Acute renal failure (stage 3 acute kidney injury)
  - Comorbid acute exacerbation of COPD

References

1. Premier PINC AI™ Healthcare Database (PHD), 01/01/2023-12/31/2024. Premier, Inc.

Fever

- Fever is defined as a core[A] temperature greater than or equal to 100.4 degrees F (38 degrees C).[B](2)(3)

References

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Footnotes

A. While a rectal temperature can be considered a core reading, it is not always practical. Tympanic membrane temperature is not usually considered a core reading; however, the devices that measure this temperature often are (or can be) programmed so that they automatically adjust readings to reflect a core temperature equivalent.(1)
B. There is not a universally accepted definition of fever, as various temperatures are proposed as the cutoff that constitutes a fever.

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)

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.
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7. Wardi G, Brice J, Correia M, Liu D, Self M, Tainter C. Demystifying lactate in the emergency department. Annals of Emergency Medicine 2020;75(2):287-298. DOI: 10.1016/j.annemergmed.2019.06.027.
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9. Olivieri L, Chasm R. Diabetic ketoacidosis in the pediatric emergency department. Emergency Medicine Clinics of North America 2013;31(3):755-773. DOI: 10.1016/j.emc.2013.05.004.
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14. Alexander PMA, et al. Cardiovascular dysfunction criteria in critically ill children: the PODIUM consensus conference. Pediatrics 2022;149(1 Suppl 1):S39-S47. DOI: 10.1542/peds.2021-052888F.
15. Ramgopal S. The shock index among children presenting to the emergency department: analysis of nationally representative sample. Journal of Emergency Medicine 2024;67(2):e146-e156. DOI: 10.1016/j.jemermed.2024.03.022.

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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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

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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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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.

Hypoxemia absent

- Hypoxemia absent, as indicated by **1 or more** of the following(1):
  - Arterial oxygen saturation (SpO_2) of 90% or greater or arterial partial pressure of oxygen (PaO_2) of 60 mm Hg (8.0 kPa) or greater on room air[A][B]
  - Oxygen requirements are stable and arranged for at next level of care.

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. 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. Specific target values (ie, 90% or 60 mm Hg (8.0 kPa)) may require adjustment when care is delivered at high altitude.(2)

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.

Observation care

- When a Clinical Indication says "…despite (or beyond) observation care," the intent is to signify that, despite an attempt to address a sign, symptom, finding, or treatment need in observation care, a continued need for hospital-based care persists beyond the observation care time frame (ie, Observation Care Discharge Criteria are not met). The time frame of observation care is determined by regulation (eg, CMS's Two-Midnight Rule) or payer-provider contractual agreement. MCG's understanding of observation care is that it must be finite and of short duration. The Two-Midnight Rule for Medicare patients (inpatient is defined as medical necessity for hospital-based care across 2 or more midnights) provides a good example of what is meant by a short duration (ie, observation care should not continue beyond the second midnight).

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

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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.

Pneumonia Multiple Condition Management Guidelines

- For patients who also have:
  - Clinically active atrial fibrillation, see Pneumonia with Clinically Active Atrial Fibrillation MCM
  - Clinically active chronic obstructive pulmonary disease and Clinically active diabetes, see Pneumonia with Clinically Active Chronic Obstructive Pulmonary Disease and Clinically Active Diabetes MCM
  - Clinically active chronic obstructive pulmonary disease, see Pneumonia with Clinically Active Chronic Obstructive Pulmonary Disease MCM
  - Clinically active diabetes, see Pneumonia with Clinically Active Diabetes MCM
  - Clinically active heart failure, see Pneumonia with Clinically Active Heart Failure MCM
  - Clinically significant dementia, see Pneumonia with Clinically Significant Dementia MCM
  - Clinically significant malnutrition, see Pneumonia with Clinically Significant Malnutrition MCM
  - Severe renal failure, see Pneumonia with Severe Renal Failure MCM

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.
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Severe renal failure

- Severe renal failure refers to renal failure or insufficiency necessitating inpatient dialysis or treatment with phosphate-binding agent medication (eg, sevelamer) or medication to treat secondary hyperparathyroidism (eg, cinacalcet).

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)

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.
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Footnotes

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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.
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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)

Tachypnea absent

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

References

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Codes

ICD-10 Diagnosis: A21.2, A22.1, A37.01, A37.11, A37.81, A37.91, A48.1, A70, A78, B37.1, B44.0, J13, J14, J15.0, J15.1, J15.20, J15.211, J15.212, J15.29, J15.3, J15.4, J15.5, J15.61, J15.69, J15.7, J15.8, J15.9, J16.0, J16.8, J17, J18.0, J18.1, J18.8, J18.9 [Hide]

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