Pancreatitis, with Common Duct Stone

ORG: M-251 (ISC)
Link to Codes

MCG Health
Inpatient & Surgical Care
30th Edition

Care Planning - Inpatient Admission and Alternatives

Clinical Indications for Admission to Inpatient Care

- Admission is indicated for **1 or more** of the following(1)(2)(3)(4)(5)(6):
  - Acute pancreatitis suspected to be secondary to biliary obstruction (eg, common duct stone, common bile duct dilation or obstruction)(2)(4)(6)

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(8):
  - 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

- Not usually used

Hospitalization

Optimal Recovery Course

Day	Level of Care	Clinical Status	Activity	Routes	Interventions	Medications
1	• ICU[A] or floor • Social Determinants of Health Assessment • Adult Readmission Risk Assessment • Pancreatitis, with Common Duct Stone: Readmission Risk Assessment • Discharge planning	• **Clinical Indications met[B]** • Pain, fever, or vomiting • Common duct stone	• Bed rest	• NPO, enteral, or oral feeds as tolerated[C] • IV fluids • IV medications	• Abdominal imaging • CXR, ECG • Possible NG tube[D] • Possible endoscopic procedure for stone evaluation and treatment • Possible surgical evaluation • Laboratory tests • Possible oxygen and pulse oximetry	• Parenteral analgesics • Possible antibiotics
2	• ICU[E] or floor • Social Determinants of Health Assessment • Adult Readmission Risk Assessment • Pancreatitis, with Common Duct Stone: Readmission Risk Assessment	• **Hemodynamic stability** • **Pain absent or managed**	• Activity as tolerated	• Oral diet as tolerated • Possible oral hydration • Possible oral medications	• **NG tube absent** • Laboratory tests	• Possible antibiotics • Parenteral analgesics
3	• Floor • Social Determinants of Health Assessment • Adult Readmission Risk Assessment • Pancreatitis, with Common Duct Stone: Readmission Risk Assessment • Possible discharge[F]	• **WBC stable or declining** • **Liver function blood tests normal or improved** • **Amylase level normal or improved** • **Tolerates clear liquid diet** • **Tolerates increasing activity**	• **Progressive activity**	• **Oral hydration** • **Oral medications** • **Advance diet**	• Laboratory tests	• Possible antibiotics

4	• Social Determinants of Health Assessment • Adult Readmission Risk Assessment • Pancreatitis, with Common Duct Stone: Readmission Risk Assessment • Floor to discharge • Complete discharge planning	• **Hemodynamic stability** • **No evidence of infection requiring inpatient care** • **Pain absent or managed** • **Liver function blood tests normal or improved** • **Amylase level normal or improved** • **Renal function at baseline or acceptable for next level of care** • **Electrolyte abnormalities absent or acceptable for next level of care** • **Diet tolerated** • **Discharge plans and education understood**	• **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**		• Possible antibiotics[H]

(3)(5)(6)(7)(14)(15)(16)(17)NNNN

Recovery Milestones are indicated in **bold**.

Goal Length of Stay: 3 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

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(2)(7):
  - Failure to meet discharge criteria (recovery milestones within final day in Optimal Recovery Course)
    - Expect brief stay extension.
  - Moderately severe or severe acute pancreatitis[I](31)(32)
    - Respiratory, renal, or metabolic complications, or Hemodynamic instability may develop.
    - Necrotizing pancreatitis, walled-off necrosis, or pancreatic infection may develop.(33)
    - Anticipate imaging with contrast CT scan, MRI, MRCP, or endoscopic ultrasound.
    - Anticipate endoscopic or percutaneous drainage of symptomatic, infected, or rapidly enlarging pancreatic fluid collections with placement of transmural, percutaneous, or transpapillary stent and possible nasocystic tube.(3)(21)(23)(34)
    - Anticipate direct endoscopic necrosectomy for patient with necrotizing acute pancreatitis who fails, or is not a candidate for, percutaneous or endoscopic drainage.(33)(34)
    - Anticipate surgical intervention for minority of patients with infected pancreatic necrosis who fail percutaneous drainage, endoscopic drainage, or endoscopic necrosectomy; patients with continued symptoms; or patients with progressive organ failure despite medical therapy.(3)(33)(35)
    - Endoscopic, percutaneous, or surgical interventions may be delayed until encapsulation of fluid collection or demarcation of necrosis occurs.(9)(21)(33)(35)(36)
    - Expect moderate to prolonged stay extension.
  - Persistent symptoms, ascites, or pleural effusion
    - Anticipate CT scan with IV contrast or nonenhanced MRI, antibiotics, and possible percutaneous aspiration of fluid collections.

- Expect brief to moderate stay extension.
- Abdominal compartment syndrome(3)
  - Anticipate NG tube decompression, paracentesis, deep sedation and paralysis if receiving mechanical ventilation, or surgical decompression.
  - Expect moderate stay extension.
- Cholangitis or ongoing biliary obstruction(6)(9)
  - Anticipate IV antibiotics and ERCP with possible sphincterotomy and biliary duct stenting.
  - Anticipate surgical intervention with possible ERCP, interoperative cholangiogram, or laparoscopic common bile duct exploration.(6)
  - Expect brief to moderate stay extension.
- Late complications(3)(9)
  - Late complications include fluid collections, pancreatic pseudocyst, infected pancreatic necrosis, pancreatic necrosis, gastric outlet dysfunction, and biliary, vascular, or infectious complications.(37)
  - Anticipate antibiotics, and either radiographically guided aspiration and percutaneous drainage, endoscopic drainage, or surgical intervention.
  - Expect moderate to prolonged stay extension.
- Acute kidney injury (stage 2) or Acute renal failure (stage 3 acute kidney injury) (38)
  - Acute kidney injury is more likely in patients with prior renal disease, abdominal compartment syndrome, or hypoxemia.
  - Anticipate renal replacement therapy.
  - Expect brief to moderate stay extension.
- Acute hypoxic respiratory failure(13)
  - Acute respiratory distress syndrome, pulmonary edema, atelectasis, pneumonia, or pleural effusions may complicate severe pancreatitis.
  - Anticipate oxygen therapy, possible invasive or noninvasive ventilation,[J] and ICU transfer.
  - Stay extension varies.
- Child or adolescent with comorbid malnutrition(39)
  - Undernutrition is independently associated with a higher risk of severe acute pancreatitis.
  - Expect moderate to prolonged stay extension.
- Frail patient (eg, Hospital Frailty Risk Score of 5 or greater)(20)(40)(41)
  - Patients who are frail are more likely to experience complications of pancreatitis, including necrosis, pseudocysts, sepsis, organ failure, and inpatient mortality.
  - Patients who are frail have higher rates of discharge to skilled nursing facilities and home healthcare.
  - Expect brief to moderate stay extension.

See Common Complications and Conditions ISC for further information.

Discharge

Discharge Planning

- Discharge planning includes[K]:
  - Assessment of needs and planning for care, including(43)(44):
    - 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(45):
      - Gastrointestinal status assessment
      - Nutrition and hydration management(46)
      - Pain management(6)
  - Early identification of anticipated discharge destination; options include(44)(47):
    - Home; considerations include:
      - Home safety assessment. See Home Safety Assessment SR for further information.
      - Patient safe to go home; examples include(48)(49)(50):
        - 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(44)(47)(51):
    - Patient and caregiver education complete.
      - See Teach-Back Tool SR for further information.
      - See Pancreatitis, with Common Duct Stone: Patient Education for Clinicians SR for further information.
    - Medication reconciliation completion includes(52)(53):
      - 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)(54)
      - 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(55):
      - Inpatient care and service providers
      - Primary care provider
      - All post-discharge care and service providers
    - Appointments planned or scheduled, which may include(45):
      - Primary care provider(56)
      - Dietitian
      - Gastroenterologist
      - General surgeon
      - Specialists for management of comorbidities as needed
      - Other
    - Outpatient testing and procedure plans made, which may include(6):
      - Laboratory testing
      - Radiology
      - Other
    - Referrals made for assistance or support, which may include(57):
      - Alcohol and other drug abuse or dependence treatment
      - Financial, for follow-up care, medication, and transportation(58)
      - Self-help or support groups
      - Tobacco use treatment(46)(59)
      - Other
    - Medical equipment and supplies coordinated (ie, delivered or delivery confirmed), which may include:
      - Nutritional supplements
      - Other

Discharge Destination

- Post-hospital levels of admission may include:
  - Home.
  - Home healthcare. See Home Care Indications for Admission Section HC in Pancreatitis, with Common Duct Stone guideline in Home Care.

Evidence Summary

Criteria

The evidence for the clinical indications found in this guideline includes 3 published peer reviewed articles, 2 specialty society or other evidence-based guidelines, and 1 book section.

Analysis of an all-payer database shows a mean length of stay of 4.7 days for patients admitted to inpatient care.(7) **(EG 3)** An emergency medicine textbook and a specialty society guideline state that patients with biliary pancreatitis should be admitted for inpatient care for IV fluids, analgesia, nutritional support, and surgical consultation.(1)(5) **(EG 2)**

Hospitalization

For patients with acute gallstone pancreatitis, specialty society guidelines recommend cholecystectomy during the initial admission as opposed to interval operation and recommend against the use of routine urgent ERCP unless cholangitis is present or there is a high suspicion for a persistent common bile duct stone.(2)(3)(5)(18) **(EG 2)** A risk-adjusted analysis of 129,251 patients (mean age 55 years) with mild acute gallstone pancreatitis (ie, no organ failure or cholangitis) from the Nationwide Readmissions Database undergoing early (within 2 days) or late (2 days to 2 weeks) cholecystectomy found that late cholecystectomy was associated with higher risks of major adverse events (adjusted odds ratio (aOR) 1.40, 95% confidence interval (CI) 1.24 to 1.51), cardiovascular complications (aOR 1.70, 95% CI 1.16 to 2.48), infectious complications (aOR 1.44), and non-home discharge (aOR 1.41, 95% CI 1.29 to 1.53).(19) **(EG 2)** Analysis of 7941 propensity-matched frail geriatric patients (modified frailty index of 0.4 or greater, mean age 74 years) with acute biliary cirrhosis from the Nationwide Readmissions Database who were treated with either cholecystectomy or nonoperative management (eg, therapeutic ERCP) during their index admission found that nonoperative care patients had a 12% failure rate as well as higher rates of 6-month hospital readmission (22.7% vs 9.3%), pancreas-related complications (eg, abscess, recurrent biliary pancreatitis, pseudocyst; 12.0% vs 4.7%), more unplanned pancreas-related procedures (6.5% vs 1.8%), and 20% (1 day) longer median hospital stays.(20) **(EG 2)**

A study of 104 patients with infected necrotizing pancreatitis (63% with gallstone pancreatitis) randomized to immediate drainage (within 24 hours of diagnosis, mean age 60 years) or postponed drainage (after walled-off necrosis occurs, mean age 59 years) found no significant differences in mortality or adverse events at 6-month follow-up; however, 39% of patients assigned to postponed drainage never required drainage.(21) **(EG 1)** A long-term (up to 51 months) follow-up of this study (88 patients) again found no significant difference in the primary outcome of death or major complications (48% immediate vs 46% postponed; relative risk (RR) 1.06, 95% CI 0.69 to 1.60); because 35% of the assigned postponed drainage group did not require drainage over long-term follow-up, the study concluded that a strategy of postponed drainage could potentially avoid intervention without increasing the risk of adverse outcomes.(22) **(EG 1)** A narrative review recommends limiting early drainage to infected necrotic collections refractory to antibiotic therapy or necrotic collections associated with elevated intra-abdominal pressure.(23) **(EG 2)** A study of 121 adult patients (55.4% with gallstones, mean age 43 years) with acute pancreatitis (predominantly mild disease) randomized to fluid resuscitation with either Ringer's lactate solution or normal saline found that patients treated with Ringer's lactate had fewer ICU admissions and 24% (1.1 day) shorter median hospital stays.(24) **(EG 1)** A retrospective cohort study of 692 patients (45% with biliary pancreatitis, mean age 50 years) admitted with acute pancreatitis and treated with either Ringer's lactate solution or normal saline over the first 24 hours found, after multivariate adjustment, that the use of Ringer's lactate was associated with a 48% decrease in the risk of developing moderately severe or severe pancreatitis during their hospital stay (odds ratio 0.52, 95% CI 0.31 to 0.88).(25) **(EG 2)** A specialty society guideline recommends fluid resuscitation with Ringer's lactate solution over normal saline for patients admitted with acute pancreatitis because of studies showing less pancreatic inflammation, a lower incidence of severe disease, less likelihood of ICU transfer, and shorter hospital stays.(2) **(EG 2)** A multicenter study of 249 patients (mean age 57 years) with mild to moderate acute pancreatitis (61% with gallstone pancreatitis) randomized to aggressive fluid resuscitation with Ringer's lactate solution (20 mL/kg bolus, then 3 mL/kg/hr) vs more moderate fluid resuscitation (1.5 mL/kg/hr with PRN 10 mL/kg bolus) was halted at interim analysis due to higher rates of volume overload in the aggressive resuscitation group (20.5% vs 6.3%).(26) **(EG 1)** Differences in progression to moderately severe or severe acute pancreatitis (22.1% vs 17.3% for aggressive vs moderate fluid resuscitation, respectively), development of organ failure (7.4% vs 3.9%), and ICU admission (6.6% vs 1.6%) were not statistically significant between groups, signifying that aggressive resuscitation proffered no benefit for these disease outcomes; however, the median hospital stay was 17% (1 day) shorter in the moderate resuscitation group.(26) **(EG 1)**

Readmission risk and reduction: Review of a national database of pregnant women with acute biliary pancreatitis (7787 pregnant women, 102,412 nonpregnant women) found, after multivariate analysis, that pregnancy was independently associated with an increased risk of 30-day readmission.(27) **(EG 2)** Univariate and cluster analysis of 188,757 adult patients (38.7% with biliary pancreatitis) admitted for acute pancreatitis found that stage IV or V chronic kidney disease, malnutrition, cirrhosis, pancreatic malignancy, HIV infection, and need for necrosectomy or percutaneous pancreatic drainage were all associated with an increased risk of readmission within 30 days.(28) **(EG 2)** Analysis of 62,768 patients with mild acute biliary pancreatitis undergoing either cholecystectomy (70%, mean age 50 years) or nonoperative management (30%, mean age 58 years) found, after adjustment for confounders, that nonoperative management was independently associated with a higher risk of recurrent acute pancreatitis at both 30 and 180 days and an increased risk of unplanned 30-day readmission (13.4% vs 5.6%).(29) **(EG 2)** A multivariate analysis of the National Readmissions Database including 1122 pediatric patients (mean age 13.5 years) admitted with acute biliary pancreatitis (34%) or choledocholithiasis (66%) found that performance of ERCP during the index admission was independently associated with a 3.6-fold decrease in the risk of 30-day readmission (adjusted odds ratio (aOR) 0.28, 95% confidence interval (CI) 0.17 to 0.45), while

cholecystectomy performed during the index admission was independently associated with a 6-fold decrease in 30-day readmission risk (aOR 0.16, 95% CI 0.11 to 0.24).(30) **(EG 2)**

Length of Stay

A study of 97 patients (median age 40 years) with gallstone pancreatitis randomized to early cholecystectomy with cholangiogram (within 24 hours) or to delayed procedure (until clinical resolution of pancreatitis) reported median lengths of stay of 3.2 days for the delayed group and 2.1 days for the early surgery group.(16) **(EG 1)** Analysis of the National Surgical Quality Improvement Program database including 1927 patients (mean age 52 years) hospitalized with gallstone pancreatitis who underwent cholecystectomy in less than 3 days from admission found a median length of stay of 3 days.(17) **(EG 2)** Analysis of national hospital discharge data shows 49% of hospitalized patients with a principal diagnosis of pancreatitis and common duct stone (biliary pancreatitis) were discharged in 3 days or less.(7) **(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(8); 42 CFR 419.22(60); 42 CFR 422.101(61)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(62); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(63); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(64); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(65)

Medicare Coverage Determinations: Medicare Coverage Database(66)

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Footnotes

[A] ICU admission is appropriate for pleural effusion, life-threatening electrolyte abnormality, systolic blood pressure less than 90 mm Hg, persistent tachycardia greater than 120 beats per minute, need for vasopressor agent, renal failure (eg, creatinine greater than 1.9 mg/dL (168 micromoles/L) after rehydration or urine output less than 50 mL/hour), admission hematocrit greater than 47% (0.47), need for mechanical ventilation, arterial PaO_2 60 mm Hg (8.0 kPa) or less despite supplemental oxygen, PaO_2 to FiO_2 ratio less than 300 mm Hg, age 55 years or older, BMI greater than 30, greater than 30% pancreatic necrosis on CT scan, expanding pseudocyst, infected pancreas, calculated Apache II score greater than 8, encephalopathy, organ failure requiring ICU level of care, or severe comorbidities. (2)(3) See Intensive, Intermediate, and Telemetry Care Guidelines ISC for further information. [A in Context Link 1]

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

[C] Patients may be NPO for planned cholecystectomy or other procedure. Patients with mild pancreatitis (ie, no organ failure or local or systemic complications) should be offered a low-fat or usual diet upon admission. For those who initially cannot tolerate a diet, food should be made available to allow the patient to self-advance their diet.(5) [C in Context Link 1]

[D] NG tube suctioning may be appropriate if the patient experiences protracted nausea and vomiting.(9) NG or nasojejunal tube feeding is appropriate for patients unable to tolerate oral feeding.(5)(10)(11)(12) [D in Context Link 1]

[E] ICU transfer from floor may be indicated for worsening renal failure (eg, rising BUN or creatinine, urine output less than 0.5 mL/kg/hour for more than 6 hours), persistent systemic inflammatory response syndrome (SIRS) criteria (temperature below 96.8 degrees F (36 degrees C) or above 100.4 degrees F (38 degrees C), pulse greater than 90 beats per minute, respiratory rate greater than 20 breaths per minute, and white blood cell count lower than 4000/mm^3 (4 x10^9/L) or greater than 12,000/mm^3 (12 x10^9/L)) despite adequate fluid resuscitation, C-reactive protein greater than 15 mg/dL (150 mg/L), imaging findings of pancreatic or peripancreatic necrosis consistent with evolving severe pancreatitis, worsening hypoxia, or pulmonary complications requiring invasive or noninvasive ventilation.(3)(9)(13) [E in Context Link 1]

[F] Patient may be discharged if duct obstruction treatment (eg, endoscopic procedure) is not necessary.(7) [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] Patient may be discharged on antibiotics. [H in Context Link 1]

[I] Moderately severe acute pancreatitis is defined by the presence of local complications (eg, necrosis, peripancreatic fluid collection, pseudocyst) or transient organ failure (less than 48 hours). Severe acute pancreatitis involves persistent (longer than 48 hours) organ failure. For adults, organ failure is defined as a systolic blood pressure less than 90 mm Hg, hypoxia (PaO_2 less than 60 mm Hg (8.0 kPa)), renal failure (serum creatinine of 2 mg/dL (177 micromoles/L) or greater), gastrointestinal bleeding of more than 500 mL of blood over 24 hours, or by a modified Marshall score of 2 or greater.(2)(4)(14) The modified Marshall score grades severity of hypoxia, renal function, and blood pressure; an online calculator is available at https://qxmd.com/calculate/calculator_376/modified-marshall-score.(2)(14) For children, organ failure is defined as hypotension (mean arterial blood pressure less than 5th percentile for age or systolic blood pressure less than 2 standard deviations below normal for age), need for vasoactive drug to maintain normal blood pressure, renal failure (serum creatinine 2 or more times greater than either baseline or upper limit of normal for age), hypoxia (PaO_2 to FiO_2 ratio less than 300 mm Hg, $PaCO_2$ greater than 65 mm Hg (8.7 kPa), or need for FiO_2 of 50% or more to maintain a 92% oxygen saturation), or by 2 or more of the following criteria: unexplained metabolic acidosis, arterial lactate more than twice the upper limit of normal, oliguria less than 0.5 mL/kg/hour, capillary refill greater than 5 seconds, or core to peripheral temperature gap greater than 3 degrees C (37.4 degrees F).(31) [I in Context Link 1]

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

[K] Discharge instructions should be given in the patient's and caregiver's native language using trained language interpreters whenever possible.(42) [K 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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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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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)

References

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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. 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

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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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Footnotes

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

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

Orthostatic hypotension

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

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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.

Pancreatitis, with Common Duct Stone: Readmission Risk Assessment

- Risk of readmission is increased by presence of **1 or more** of the following(1)(2)(3):
  - Pancreatic necrosis with need for necrosectomy or percutaneous drainage(1)
  - Severe or end-stage renal disease (on dialysis or GFR less than 30 mL/min/1.73m^2 (0.5 mL/sec/1.73m^2))(1)

    eGFR - Adult Calculator eGFR - Pediatric Calculator
  - Pancreatic malignancy(1)
  - HIV infection(1)
  - Cirrhosis(1)
  - Pregnant patient(2)

- Nonoperative management (cholecystectomy not performed)(3)(4)

References

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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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Social Determinants of Health Assessment

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

- Utilities (eg, electricity, water, gas, or oil) are currently shut off or unavailable.
- In the past year, electric, water, gas, or oil company threatened to shut off services.

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

References

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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.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

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

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

Tachypnea

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

References

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

Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.
B. Interpretation of respiratory rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline respiratory rate and whether the respiratory rate is indicative of significant underlying respiratory or other pathology. A mildly increased respiratory rate (eg, 20 to 22 breaths per minute in an adult), absent other indications of serious illness (eg, hypoxemia, metabolic acidosis, decreased tidal volume, pain), may be transitory and not clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachypnea. Whether a respiratory rate above the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment. In addition, the measurement of the respiratory rate is subject to error. A medical textbook states that because there can be significant breath-to-breath variation in respiratory rate, the rate should be assessed for at least 30 seconds, preferably for a full minute.(1) This same textbook also states that new technologies designed to measure the respiratory rate have not proved to be clinically useful.(1)

Codes

ICD-10 Diagnosis: K85.10, K85.11, K85.12, K86.2, K86.3

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