

Percutaneous Coronary Intervention

ORG: M-52 (ISC)

[Link to Codes](#)

MCG Health

Inpatient & Surgical Care
30th Edition

- Care Planning - Inpatient Admission and Alternatives
 - Clinical Indications for Procedure
 - Alternatives to Procedure
 - Operative Status Criteria
- Hospitalization
 - Optimal Recovery Course
 - Goal Length of Stay - **Ambulatory**
 - Extended Stay
- Discharge
 - Discharge Planning
 - Discharge Destination
- Evidence Summary
 - Background
 - Criteria
 - Alternatives
 - Hospitalization
 - Length of Stay
 - Rationale
 - Related CMS Coverage Guidance
- References
- Footnotes
- Definitions
- Codes

Care Planning - Inpatient Admission and Alternatives

Clinical Indications for Procedure

- Procedure is indicated for **1 or more** of the following^{[A](1)(2)}[N](#)
 - ☐ Left main coronary artery stenosis, as indicated by **ALL** of the following:
 - Significant left main coronary artery stenosis, as indicated by **1 or more** of the following(1)(2):
 - 50% or more luminal diameter narrowing
 - Lumen diameter of less than 2.8 mm

- Lumen area of less than 6 mm²
- Fractional flow reserve (FFR) less than 0.80[B]
- Instantaneous wave-free ratio (iFR) less than 0.89[B]
- Percutaneous coronary intervention appropriate (eg, judged that PCI will provide equivalent revascularization compared with CABG, or patient is a poor surgical candidate)
- Coronary artery (other than left main) stenosis (ie, vessel(s) with greater than or equal to 70% stenosis, FFR less than 0.80, or iFR less than 0.89)[B] with symptoms due to cardiac ischemia (eg, chest pain, dyspnea) that persist despite maximally tolerated doses of antianginal medications (2 or more medications, including beta-blocker if tolerated)[C](1)(2)(11)
- Clinically significant (eg, causing angina, myocardial ischemia) in-stent restenosis (eg, 50% or greater restenosis)(1)
- History of ventricular fibrillation, polymorphic ventricular tachycardia, or cardiac arrest presumed to be ischemia-mediated due to coronary artery disease amenable to PCI[D](1)
- Recent (eg, within 45 days) STEMI or NSTEMI with culprit artery-only PCI performed at time of the infarct with one or more non-culprit coronary arteries (not left main) with significant stenosis (70% or more stenosis, FFR less than 0.80, or iFR less than 0.89)[E](1)(13)
- Planned transcatheter aortic valve replacement and significant stenosis of left main (eg, 50% or more stenosis) or proximal coronary artery (70% or more stenosis, FFR less than 0.80, or iFR less than 0.89)(1)
- Coronary artery pseudoaneurysm(4)(5)
- ☐ Coronary artery dissection and **1 or more** of the following[F](1)(14):
 - Ongoing ischemia
 - Hemodynamic instability

Alternatives to Procedure

- Alternatives include(1)(2)(11)(15):[NN](#)
 - Optimal medical therapy with antianginal medications and risk-reduction therapy, including lipid-lowering, antiplatelet, and antihypertensive medications, diabetic control, exercise, nutrition, smoking cessation, and weight loss counseling(2)(11)(15)
 - Enhanced external counterpulsation[G](2)(23)(24)
 - Hybrid coronary revascularization (combining coronary angiography and PCI with minimally invasive left internal mammary artery surgical bypass grafting)[H](25)
 - Totally endoscopic coronary artery bypass surgery[I]
 - Minimally invasive coronary bypass surgery. See Coronary Artery Bypass Graft, Minimally Invasive Direct (MIDCAB) [ISC guideline](#).
 - Coronary artery bypass grafting. See Coronary Artery Bypass Graft (CABG) [ISC guideline](#).

Operative Status Criteria

Goal Length of Stay: Ambulatory

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

- Ambulatory

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

Hospitalization

Optimal Recovery Course

Day	Level of Care	Clinical Status	Activity	Routes	Interventions	Medications
1	• Catheterization lab • Social Determinants of Health Assessment • Recovery room, intermediate care, or floor to discharge • Discharge planning	• Hemodynamic stability • Arterial puncture site without evidence of infection, aneurysm, or growing hematoma[J] • No evidence of ongoing myocardial ischemia • No evidence of vascular compromise distal to puncture site • Discharge plans and education understood	• Ambulatory or acceptable for next level of care[K]	• Oral hydration[L] • Oral medications or regimen acceptable for next level of care • Oral diet or acceptable for next level of care	• Vascular sheath removed • Probable stent • ECG, Troponin • Cardiac monitoring	• Aspirin • Antiplatelet agent (eg, clopidogrel, ticagrelor, IV cangrelor) • Anticoagulant therapy • Lipid-lowering agent • Beta-blocker • Possible antihypertensive medication

(1)(29)(30)(31)NN

Recovery Milestones are indicated in **bold**.

Goal Length of Stay: Ambulatory

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

Extended Stay

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

- Inpatient stay (eg, need for hospital-based care beyond postoperative day 1) may be needed for(1)(32):
 - Failure to meet discharge criteria (recovery milestones in Optimal Recovery Course)
 - Expect brief stay extension.
 - Percutaneous coronary intervention after acute MI(12)(33)
 - See Myocardial Infarction [ISC guideline](#).
 - Persistent postprocedural instability (eg, Hypotension, chest pain, dyspnea)
 - Expect brief to moderate stay extension.

- Intravascular procedural complications such as acute vessel closure, stent thrombosis, stent malposition or embolization, pseudoaneurysm, device entrapment, air embolism, side branch closure, vessel dissection or perforation(4)(5)(34)(35)(36)
 - Anticipate ultrasound or other imaging, topical compression, urgent repeat endovascular intervention, mechanical circulatory support, or surgery.
 - Coronary perforation may require pericardiocentesis and endovascular or surgical intervention.(36)
 - Expect minimal to brief stay extension for repeat intervention.
 - Expect brief to moderate stay extension for surgical intervention.
- Extravascular procedural complications such as retroperitoneal hematoma, forearm hematoma and compartment syndrome, pericardial effusion, or cardiac tamponade(35)(36)
 - Anticipate imaging, echocardiography, pericardiocentesis, or surgery.
 - Expect brief stay extension.
- Entry site complications causing bleeding, hematoma, or distal ischemia and requiring ongoing monitoring, surgical repair, or surgical thrombectomy(35)(36)
 - Expect minimal to brief stay extension.
- Urgent or emergent CABG surgery needed(37)
 - Expect brief to moderate stay extension.
 - See Coronary Artery Bypass Graft (CABG) [ISC guideline](#).
- Cerebrovascular accident(38)
 - Patients with underlying carotid artery disease, atrial fibrillation, and older age are at higher risk.
 - Anticipate brain imaging studies and neurologic monitoring.
 - Expect brief stay extension.
- Periprocedural MI(34)(39)
 - Anticipate cardiac monitoring and repeat biomarker (eg, Troponin) testing.
 - Expect brief stay extension.
- Acute kidney injury(40)
 - Anticipate fluid and electrolyte monitoring and possible renal replacement therapy.
 - Expect brief stay extension.
- Patient requiring mechanical circulatory support during procedure(41)
 - Expect brief to moderate stay extension.

See Common Complications and Conditions [ISC](#) for further information.

Discharge

Discharge Planning

- Discharge planning includes[M]:
 - 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.(45)(46)
 - Evaluate and address patient or caregiver preferences as indicated.

- Identify skilled services needed at next level of care, with specific attention to:
 - Cardiovascular status assessment(47)(48)
 - Medication management, adherence instruction, and side effects assessment(49)(50)
 - Wound or dressing management
- Early identification of anticipated discharge destination; options include(44)(51):
 - Home; considerations include:
 - Home safety assessment. See Home Safety Assessment [SR](#) for further information.
 - ☐ Patient safe to go home; examples include(52)(53)(54):
 - 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)(51)(55):
 - Patient and caregiver education complete.
 - See Teach-Back Tool [SR](#) for further information.
 - See Percutaneous Coronary Intervention: Patient Education for Clinicians [SR](#) for further information.
 - ☐ Medication reconciliation completion includes(50)(56):
 - 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)(57)
 - 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(58):

- 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(59)
 - Cardiologist(12)
 - Interventional cardiologist(49)
 - Rehabilitation therapy services(12)(29)(60)
 - Specialists for management of comorbidities as needed(3)
 - Other
- Outpatient testing and procedure plans made, which may include:
 - Echocardiogram(47)
 - Exercise stress test(12)
 - Laboratory testing(12)
 - Other
- Referrals made for assistance or support, which may include:
 - Educational program (eg, chronic condition management, self-management)(59)(61)
 - Financial, for follow-up care, medication, and transportation
 - Tobacco use treatment(48)(62)(63)
 - Other
- Medical equipment and supplies coordinated (ie, delivered or delivery confirmed), which may include:
 - Wound care equipment and supplies(64)
 - Other

Discharge Destination

- Post-hospital levels of admission may include:
 - Home.
 - Home healthcare. See Home Care Indications for Admission Section [HC](#) in Percutaneous Coronary Intervention guideline in Home Care.

Evidence Summary

Background

Coronary artery angioplasty with or without stent placement is known as percutaneous coronary intervention.(3) **(EG 2)**

The Angina [ISC](#) guideline is to be used when the diagnosis of unstable angina is made (ie, the etiology of signs and symptoms is myocardial ischemia in a pattern or presentation consistent with a diagnosis of unstable angina (not stable angina)). The Chest Pain [ISC](#) guideline is to be used for patients with symptoms (eg, chest pain) of unknown etiology (eg, rule out MI). The Percutaneous Coronary Intervention guideline, which is intended for planned elective PCI, is to be used for patients with chronic stable angina undergoing elective PCI.

Criteria

The evidence for the clinical indications found in this guideline includes 9 published peer reviewed articles, 3 specialty society or other evidence-based guidelines, and 2 book sections.

A specialty society guideline states that PCI is appropriate for patients with left main coronary artery stenosis if it will provide equivalent revascularization compared with CABG.(1) **(EG 2)** For significant coronary artery (other than left main) stenosis, appropriate-use criteria supported by multiple specialty societies recommend PCI for those with symptoms due to ischemia that persist despite maximally tolerated doses of 2 or more antianginal medications.(1) **(EG 2)** For ventricular fibrillation, polymorphic ventricular tachycardia, or cardiac arrest presumed to be ischemia-mediated, a specialty society guideline recommends PCI for patients with significant coronary artery stenosis.(1) **(EG 2)** For recent NSTEMI or STEMI with culprit artery-only PCI performed, a specialty society guideline recommends additional PCI for those with significant non-culprit artery stenosis to reduce risk of further cardiovascular events.(1) **(EG 2)** For coronary artery pseudoaneurysm, a cardiology textbook and a narrative review support PCI with stenting to diminish blood flow into the aneurysm.(4)(5) **(EG 2)** For spontaneous coronary artery dissection, a specialty society guideline notes that PCI may be appropriate in the setting of ongoing ischemia or hemodynamic instability.(1) **(EG 2)**

Alternatives

Revascularization has been found to reduce angina and improve quality of life in patients with angina that persists despite optimal medical therapy.(16)(17)(18) **(EG 1)** Two evidence-based American College of Cardiology (ACC) guidelines concur that elective revascularization is appropriate for treatment-resistant angina.(1)(2) **(EG 2)**

Randomized trials examining the benefit of PCI in patients with stable multivessel coronary artery disease and reduced ejection fraction failed to demonstrate a benefit in terms of mortality, arrhythmia, or hospitalization for heart failure compared with optimal medical therapy.(19)(20)(21) **(EG 1)** A systematic review of randomized controlled trials concludes that compared with optimal medical therapy, revascularization with PCI has not been shown to reduce the incidence of MI or death in patients with stable coronary artery disease.(22) **(EG 1)**

Hospitalization

A specialty society guideline, based upon a systematic review of the randomized controlled trial literature, concludes that radial artery access is preferred for PCI, including in patients with acute coronary syndromes, due to reduced rates of major bleeding, vascular complications, and mortality (in acute coronary syndrome patients).(1) **(EG 2)**

Length of Stay

Analysis of procedure data for a commercially insured population shows 89% of patients undergoing elective PCI were discharged the day of or the day after surgery.(31) **(EG 3)** Analysis of procedure data for a Medicare-insured population shows 85% of patients undergoing elective PCI were discharged the day of or the day after surgery.(31) **(EG 3)**

Rationale

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

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

Related CMS Coverage Guidance

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

Code of Federal Regulations (CFR): 42 CFR 412.3(65); 42 CFR 419.22(66); 42 CFR 422.101(67)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(68); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(69); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(70); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(71)

Medicare Coverage Determinations: Medicare Coverage Database(72)

References

1. Lawton JS, et al. 2021 ACC/AHA/SCAI guideline for coronary artery revascularization: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation* 2022;145(3):e18-e114. DOI: 10.1161/CIR.0000000000001038. (Reaffirmed 2025 Jun) [Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21] View abstract...
2. Writing Committee Members, et al. 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA guideline for the management of patients with chronic coronary disease: a report of the American Heart Association/American College of Cardiology joint committee on clinical practice guidelines. *Journal of the American College of Cardiology* 2023;82(9):833-955. DOI: 10.1016/j.jacc.2023.04.003. [Context Link 1, 2, 3, 4, 5, 6, 7] View abstract...
3. Kumbhani DJ, Bhatt DL. Percutaneous coronary intervention. In: Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD, editors. *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine*. 12th ed. Elsevier; 2022:786-805. [Context Link 1, 2]
4. Kar S, Webel RR. Diagnosis and treatment of spontaneous coronary artery pseudoaneurysm: Rare anomaly with potentially significant clinical implications. *Catheterization and Cardiovascular Interventions* 2017;90(4):589-597. DOI: 10.1002/ccd.26997. [Context Link 1, 2, 3] View abstract...
5. Goel K, Al-Hijji M, Rijhal CS. Pseudoaneurysm diagnosis and management. In: Rihal CS, Raphael CE, editors. *Handbook of Structural Heart Interventions*. Philadelphia, PA 19103-2899: Elsevier; 2021:343-360 e1. [Context Link 1, 2, 3]
6. De Bruyne B, et al. Fractional flow reserve-guided PCI for stable coronary artery disease. *New England Journal of Medicine* 2014;371(13):1208-1217. DOI: 10.1056/NEJMoa1408758. [Context Link 1, 2, 3] View abstract...
7. Gotberg M, et al. Instantaneous wave-free ratio versus fractional flow reserve to guide PCI. *New England Journal of Medicine* 2017;376(19):1813-1823. DOI: 10.1056/NEJMoa1616540. [Context Link 1, 2, 3, 4] View abstract...
8. Davies JE, et al. Use of the instantaneous wave-free ratio or fractional flow reserve in PCI. *New England Journal of Medicine* 2017;376(19):1824-1834. DOI: 10.1056/NEJMoa1700445. [Context Link 1, 2, 3, 4] View abstract...
9. Truesdell AG, et al. Intravascular imaging during percutaneous coronary intervention: JACC state-of-the-art review. *Journal of the American College of Cardiology* 2023;81(6):590-605. DOI: 10.1016/j.jacc.2022.11.045. [Context Link 1] View abstract...
10. Amabile N, et al. OCT vs angiography for guidance of percutaneous coronary intervention of calcified lesions: the CALIPSO randomized clinical trial. *Journal of the American Medical Association Cardiology* 2025;10(7):666-675. DOI: 10.1001/jamacardio.2025.0741. [Context Link 1] View abstract...
11. Joshi PH, de Lemos JA. Diagnosis and management of stable angina: a review. *Journal of the American Medical Association* 2021;325(17):1765-1778. DOI: 10.1001/jama.2021.1527. [Context Link 1, 2, 3] View abstract...
12. Rao SV, et al. 2025 ACC/AHA/ACEP/NAEMSP/SCAI Guideline for the Management of Patients With Acute Coronary Syndromes: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation* 2025;DOI: 10.1161/CIR.0000000000001309. (Reaffirmed 2025 Mar 04) [

Context Link 1, 2, 3, 4, 5, 6] View abstract...

13. Reddy RK, et al. Percutaneous coronary revascularization strategies after myocardial infarction: a systematic review and network meta-analysis. *Journal of the American College of Cardiology* 2024;84(3):276-294. DOI: 10.1016/j.jacc.2024.04.051. [Context Link 1] View abstract...
14. Hayes SN, et al. Spontaneous coronary artery dissection: current state of the science: a scientific statement From the American Heart Association. *Circulation* 2018;137(19):e523- e557. DOI: 10.1161/CIR.0000000000000564. (Reaffirmed 2025 Jun) [Context Link 1, 2] View abstract...
15. Morrow DA, de Lemos J. Stable ischemic heart disease. In: Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD, editors. *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine*. 12th ed. Elsevier; 2022:739-785. [Context Link 1, 2]
16. Bangalore S, Maron DJ, Stone GW, Hochman JS. Routine revascularization versus initial medical therapy for stable ischemic heart disease: a systematic review and Meta-Analysis of Randomized Trials. *Circulation* 2020;142(9):841-857. DOI: 10.1161/CIRCULATIONAHA.120.048194. [Context Link 1] View abstract...
17. Brown DL, Boden WE. Impact of revascularisation on outcomes in chronic coronary syndromes: a new meta-analysis with the same old biases? *European Heart Journal* 2021;42(45):4652-4655. DOI: 10.1093/eurheartj/ehab330. [Context Link 1] View abstract...
18. Soares A, et al. Death and myocardial infarction following initial revascularization versus optimal medical therapy in chronic coronary syndromes with myocardial ischemia: a systematic review and meta-analysis of contemporary randomized controlled trials. *Journal of the American Heart Association* 2021;10(2):Online. DOI: 10.1161/JAHA.120.019114. [Context Link 1] View abstract...
19. Perera D, et al. Arrhythmia and death following percutaneous revascularization in ischemic left ventricular dysfunction: prespecified analyses from the REVIVED-BCIS2 trial. *Circulation* 2023;148(11):862-871. DOI: 10.1161/CIRCULATIONAHA.123.065300. [Context Link 1] View abstract...
20. Perera D, et al. Percutaneous revascularization for ischemic left ventricular dysfunction. *New England Journal of Medicine* 2022;387(15):1351-1360. DOI: 10.1056/NEJMoa2206606. [Context Link 1] View abstract...
21. Ezad SM, et al. Impact of anatomical and viability-guided completeness of revascularization on clinical outcomes in ischemic cardiomyopathy. *Journal of the American College of Cardiology* 2024;84(4):340-350. DOI: 10.1016/j.jacc.2024.04.043. [Context Link 1] View abstract...
22. Al-Lamee RK, Foley M, Rajkumar CA, Francis DP. Revascularization in stable coronary artery disease. *British Medical Journal* 2022;377:Online. DOI: 10.1136/bmj-2021-067085. [Context Link 1] View abstract...
23. Amin F, Al Hajeri A, Civelek B, Fedorowicz Z, Manzer BM. Enhanced external counterpulsation for chronic angina pectoris. *Cochrane Database of Systematic Reviews* 2010, Issue 2. Art. No.: CD007219. DOI: 10.1002/14651858.CD007219.pub2. [Context Link 1, 2] View abstract...
24. Caceres J, Atal P, Arora R, Yee D. Enhanced external counterpulsation: A unique treatment for the "No-Option" refractory angina patient. *Journal of Clinical Pharmacy and Therapeutics* 2021;46(2):295-303. DOI: 10.1111/jcpt.13330. [Context Link 1, 2] View abstract...
25. Thielmann M, et al. Hybrid coronary revascularization: position paper of the European Society of Cardiology Working Group on Cardiovascular Surgery and European Association of Percutaneous Cardiovascular Interventions. *European Journal of Cardio-Thoracic Surgery* 2024;66(2):DOI: 10.1093/ejcts/ezae271. [Context Link 1, 2] View abstract...
26. Hemli JM, Patel NC. Robotic cardiac surgery. *Surgical Clinics of North America* 2020;100(2):219-236. DOI: 10.1016/j.suc.2019.12.005. [Context Link 1] View abstract...
27. Kolkailah AA, Alreshq RS, Muhammed AM, Zahran ME, Anas El-Wegoud M, Nabhan AF. Transradial versus transfemoral approach for diagnostic coronary angiography and percutaneous coronary intervention in people with coronary artery disease. *Cochrane Database of Systematic Reviews* 2018, Issue 4. Art. No.: CD012318. DOI: 10.1002/14651858.CD012318.pub2. [Context Link 1] View abstract...
28. Boztosun B, et al. Early ambulation after diagnostic heart catheterization. *Angiology* 2007;58(6):743-746. DOI: 10.1177/0003319707308890. [Context Link 1] View abstract...
29. Writing Committee, et al. 2021 ACC expert consensus decision pathway on same-day discharge after percutaneous coronary intervention: a report of the American College of Cardiology solution set oversight committee. *Journal of the American College of Cardiology* 2021;77(6):811-825. DOI: 10.1016/j.jacc.2020.11.013. (Reaffirmed 2025 Mar) [Context Link 1, 2] View abstract...
30. Box LC, et al. SCAI position statement on the performance of percutaneous coronary intervention in ambulatory surgical centers. *Catheterization and Cardiovascular Interventions* 2020;96(4):862-870. DOI: 10.1002/ccd.28991. (Reaffirmed 2025 Jun) [Context Link 1] View abstract...
31. Proprietary health insurance data sources (2023-2024); and Medicare 5% Standard Analytical File (2022-2023). [Context Link 1, 2, 3]

32. Premier PINC AI™ Healthcare Database (PHD), 01/01/2023-12/31/2024. Premier, Inc. [Context Link 1]
33. Patel MR, et al. ACC/AATS/AHA/ASE/ASNC/SCAI/SCCT/STS 2016 appropriate use criteria for coronary revascularization in patients with acute coronary syndromes: a report of the American College of Cardiology appropriate use criteria task force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and the Society of Thoracic Surgeons. *Journal of the American College of Cardiology* 2017;69(5):570-591. DOI: 10.1016/j.jacc.2016.10.034. (Reaffirmed 2025 Jun) [Context Link 1] View abstract...
34. Tehrani DM, Seto AH. Management of coronary complications. *Interventional Cardiology Clinics* 2022;11(4):445-453. DOI: 10.1016/j.iccl.2022.06.002. [Context Link 1, 2] View abstract...
35. Sandoval Y, Bell MR, Gulati R. Transradial artery access complications. *Circulation. Cardiovascular Interventions* 2019;12(11):e007386. DOI: 10.1161/CIRCINTERVENTIONS.119.007386. [Context Link 1, 2, 3] View abstract...
36. Masoomi R, Kearney KE, Davies RE. Unlocking success: strategies for preventing and managing complications in chronic total occlusion percutaneous coronary intervention procedures. *American Journal of Cardiology* 2024;232:41-48. DOI: 10.1016/j.amjcard.2024.09.012. [Context Link 1, 2, 3, 4] View abstract...
37. Pi Y, et al. Utilization, characteristics, and in-hospital outcomes of coronary artery bypass grafting in patients with ST-segment-elevation myocardial infarction: results from the national cardiovascular data registry acute coronary treatment and intervention outcomes network registry-get with the guidelines. *Circulation. Cardiovascular Quality and Outcomes* 2017;10(8):e003490. DOI: 10.1161/CIRCOUTCOMES.116.003490. [Context Link 1] View abstract...
38. Alkhouli M, Alqahtani F, Tarabishy A, Sandhu G, Rihal CS. Incidence, predictors, and outcomes of acute ischemic stroke following percutaneous coronary intervention. *JACC. Cardiovascular Interventions* 2019;12(15):1497-1506. DOI: 10.1016/j.jcin.2019.04.015. [Context Link 1] View abstract...
39. Thygesen K, et al. Fourth Universal Definition of Myocardial Infarction (2018). *Circulation* 2018;138(20):e618-e651. DOI: 10.1161/CIR.0000000000000617. [Context Link 1] View abstract...
40. Griffiths RI, et al. Cost to Medicare of acute kidney injury in percutaneous coronary intervention. *American Heart Journal* 2023;262:20-28. DOI: 10.1016/j.ahj.2023.03.013. [Context Link 1] View abstract...
41. Kim SH, Baumann S, Behnes M, Borggrete M, Akin I. Patient selection for protected percutaneous coronary intervention: who benefits the most? *Interventional Cardiology Clinics* 2022;11(4):455-464. DOI: 10.1016/j.iccl.2022.07.001. [Context Link 1] View abstract...
42. Hudson T. The role of social determinates of health in discharge practices. *Nursing Clinics of North America* 2021;56(3):369-378. DOI: 10.1016/j.cnur.2021.04.004. [Context Link 1] View abstract...
43. Chovanec KA, Arsene C, Beck A, Zachrich K, Liedel B, Wolff-Elliott J. Association of discharge disposition with outcomes. *Population Health Management* 2021;24(1):116-121. DOI: 10.1089/pop.2019.0176. [Context Link 1] View abstract...
44. Centers for Medicare and Medicaid Services. "Condition of participation: Discharge planning." 42 CFR Pt. 482.43 Washington, DC 2025 Jan 01 [accessed 2025 Jul 22] Accessed at: <https://www.ecfr.gov/>. [Context Link 1, 2, 3]
45. Agarwala A, et al. Implementation of prevention science to eliminate health care inequities in achieving cardiovascular health: a scientific statement from the American Heart Association. *Circulation* 2023;148(15):1183-1193. DOI: 10.1161/CIR.0000000000001171. [Context Link 1] View abstract...
46. Jia J, Carnethon MR, Wong M, Lewis CE, Schreiner PJ, Kandula NR. Food insecurity and incident cardiovascular disease among Black and White US individuals, 2000-2020. *Journal of the American Medical Association Cardiology* 2025;DOI: 10.1001/jamacardio.2025.0109. [Context Link 1] View abstract...
47. Hagler D, Hagler DR. Assessment: cardiovascular system. In: Harding MM, Kwong J, Hagler D, Reinisch C, editors. *Lewis's Medical-Surgical Nursing: Assessment and Management of Clinical Problems*. 12th ed. St. Louis, MO: Mosby; 2023:767-796. [Context Link 1, 2]
48. The client with alterations in cardiovascular function. In: Haugen N, Galura SJ, editors. *Ulrich & Canale's Nursing Care Planning Guides, 8th Edition Revised Reprint with 2021-2023 NANDA-I Updates*. 8th ed. Elsevier; 2022:217-339.e10. [Context Link 1, 2]
49. Management of patients with coronary vascular disorders. In: Hinkle JL, Cheever KH, Overbaugh KJ, editors. *Brunner & Suddarth's Textbook of Medical-Surgical Nursing*. 15th ed. Wolters Kluwer; 2022:725-764. [Context Link 1, 2]
50. Adverse drug reactions and medication errors. In: Burchum JR, Rosenthal LD, editors. *Lehne's Pharmacology for Nursing Care*. 12th ed. Elsevier; 2025:64-75. [Context Link 1, 2]

51. Targeted care planning and care transitions. In: Perez R, editor. CMSA's Integrated Case Management. 2nd ed. Springer Publishing Company LLC; 2023:178-189. [Context Link 1, 2]
52. Elements of Excellence in Transitions of Care (TOC). TOC Checklist [Internet] National Transitions of Care Coalition. 2006 Accessed at: <https://www.ntocc.org>. [accessed 2025 Sep 16] [Context Link 1]
53. Medical-surgical nursing. In: Hinkle JL, Cheever KH, Overbaugh KJ, editors. Brunner & Suddarth's Textbook of Medical-Surgical Nursing. 15th ed. Wolters Kluwer; 2022:33-55. [Context Link 1]
54. Transition of care. In: Gillingham DC, editor. Foundations of Case Management. Blue Bayou Press; 2021:137-144. [Context Link 1]
55. Becker C, et al. Interventions to improve communication at hospital discharge and rates of readmission: a systematic review and meta-analysis. JAMA Network Open 2021;4(8):e2119346. DOI: 10.1001/jamanetworkopen.2021.19346. [Context Link 1] View abstract...
56. The nursing process in drug therapy and patient safety. In: Tucker RG, editor. Karch's Focus on Nursing Pharmacology. 9th ed. Wolters Kluwer; 2023:47-57. [Context Link 1]
57. Safe medication preparation. In: Perry AG, Potter PA, Ostendorf WR, Laplante N, editors. Clinical Nursing Skills and Techniques. 11th ed. Elsevier; 2025:586-607. [Context Link 1]
58. The case manager's roles, functions, and activities. In: Gillingham DC, editor. Foundations of Case Management. Blue Bayou Press; 2021:9-14. [Context Link 1]
59. Anderson TS, Ayanian JZ, Herzig SJ, Souza J, Landon BE. Gaps in primary care follow-up after hospital discharge among Medicare beneficiaries. Journal of the American Geriatrics Society 2025;DOI: 10.1111/jgs.19496. [Context Link 1, 2] View abstract...
60. Cardiac Rehabilitation. [Internet] National Heart Lung and Blood Institute. Accessed at: <https://www.nhlbi.nih.gov/health-topics/cardiac-rehabilitation>. Updated 2022 Mar [accessed 2025 Jan 07] [Context Link 1]
61. Nursing diagnoses in alphabetical order. In: Doenges ME, Moorhouse MF, Murr AC, editors. Nursing Diagnosis Manual: Planning, Individualizing, and Documenting Client Care. 7th ed. F.A. Davis Company; 2022:40-1095. [Context Link 1]
62. Harding MM. Substance use disorders in acute care. In: Harding MM, Kwong J, Hagler D, Reinisch C, editors. Lewis's Medical-Surgical Nursing: Assessment and Management of Clinical Problems. 12th ed. St. Louis, MO: Mosby; 2023:162-178. [Context Link 1]
63. Mir H, Pipe A. Smoking cessation. In: Levine GN, editor. Cardiology Secrets. 6th ed. Elsevier; 2023:377-381. [Context Link 1]
64. Management of patients with dermatologic disorders. In: Hinkle JL, Cheever KH, Overbaugh KJ, editors. Brunner & Suddarth's Textbook of Medical-Surgical Nursing. 15th ed. Wolters Kluwer; 2022:1815-1864. [Context Link 1]
65. Centers for Medicare and Medicaid Services. "Admissions." 42 CFR 412.3 Washington, DC 2025 Jul [accessed 2025 Jul 22] Accessed at: <https://www.ecfr.gov/current/title-42/chapter-IV/subchapter-B/part-412>. [Context Link 1]
66. Centers for Medicare and Medicaid Services. "Hospital services excluded from payment under the hospital outpatient prospective payment system." 42 CFR 419.22 Washington, DC 2023 Jul [accessed 2025 Jul 22] Accessed at: <https://www.ecfr.gov/>. [Context Link 1]
67. Centers for Medicare and Medicaid Services. "Requirements relating to basic benefits." 42 CFR 422.101 Washington, DC 2025 Jun 03 [accessed 2025 Jul 23] Accessed at: <https://www.ecfr.gov/>. [Context Link 1]
68. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 1 - Inpatient Hospital Services Covered Under Part A Rev. 10892 [Internet] Centers for Medicare and Medicaid Services. 2021 Aug Accessed at: <https://www.cms.gov/manuals/>. [accessed 2025 Sep 09] [Context Link 1]
69. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 6 - Hospital Services Covered Under Part B Rev. 12425 [Internet] Centers for Medicare and Medicaid Services. 2023 Dec Accessed at: <http://www.cms.gov/manuals/>. [accessed 2025 Sep 09] [Context Link 1]
70. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 15 - Covered Medical and Other Health Services Rev. 13108 [Internet] Centers for Medicare and Medicaid Services. 2025 Apr 11 Accessed at: <https://www.cms.gov/manuals/>. [accessed 2025 Sep 09] [Context Link 1]
71. Centers for Medicare and Medicaid Services. Medicare Program Integrity Manual. Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment Rev. 10365 [Internet] Centers for Medicare and Medicaid Services. 2020 Oct 02 Accessed at: <https://www.cms.gov/medicare/regulations-guidance/manuals/internet-only-manuals-ioms>. [accessed 2025 Sep 09] [Context Link 1]

72. Medicare Coverage Database. [Internet] Centers for Medicare and Medicaid Services. Accessed at: <https://www.cms.gov/medicare-coverage-database/search.aspx>? Updated 2025 [accessed 2025 Oct 23] [Context Link 1]

Footnotes

[A] The Angina [↗](#) ISC guideline is to be used when the diagnosis of unstable angina is made (ie, the etiology of signs and symptoms is myocardial ischemia in a pattern or presentation consistent with a diagnosis of unstable angina (not stable angina)). The Chest Pain [↗](#) ISC guideline is to be used for patients with symptoms (eg, chest pain) of unknown etiology (eg, rule out MI). The Percutaneous Coronary Intervention guideline, which is intended for planned elective PCI, is to be used for patients with chronic stable angina undergoing elective PCI. [A in Context Link 1]

[B] PCI may be guided by conventional angiography based on luminal narrowing of the coronary arteries, by using physiologic measures of coronary flow, or by intravascular imaging (ultrasound or optical coherence tomography).(6)(7)(8)(9)(10) Two means by which to identify stenoses as physiologically important are via fractional flow reserve (FFR) or instantaneous wave-free ratio (iFR).(6)(7)(8) FFR is the ratio of pressure distal to a stenosis relative to the pressure proximal to the stenosis. The lower the ratio, the more hemodynamically significant the stenosis.(6) iFR is similar in concept to FFR but does not require the administration of adenosine during angiography as is required for the measurement of FFR.(7)(8) Adenosine is not universally available, is expensive, can cause bradycardia, and commonly induces chest pain or dyspnea in patients.(7)(8) A specialty society guideline recommends that PCI not be performed above a threshold FFR of 0.80 or iFR of 0.89.(1) [B in Context Link 1, 2, 3]

[C] Some patients may have documented contraindications, intolerable side effects, or allergy to one or more classes of antianginal medications, thus reducing (or even eliminating) available options.(1) [C in Context Link 1]

[D] The PCI guideline applies to patients undergoing elective PCI due to a **history** of cardiac arrhythmia (not currently present or the reason for acute presentation) that is felt to be caused (at least in part) by myocardial ischemia due to a lesion or lesions amenable to PCI. Patients presenting **acutely** (eg, to the emergency department) for an arrhythmia would be appropriate for the guideline concerning that arrhythmia (eg, Ventricular Arrhythmia [↗](#) ISC guideline). Patients presenting with acute myocardial ischemia are appropriate for the Angina [↗](#) ISC or Myocardial Infarction [↗](#) ISC guideline. [D in Context Link 1]

[E] A specialty society guideline for coronary artery revascularization recommends that hemodynamically stable patients with STEMI or NSTEMI treated initially with PCI of the identified culprit artery may undergo PCI of non-culprit arteries either as part of the initial procedure, as a second procedure before discharge, or as a planned interval procedure following discharge.(12) [E in Context Link 1]

[F] Most patients with acute spontaneous coronary artery dissection may be treated without intervention. PCI or CABG should be considered in patients with ongoing ischemia or hemodynamic instability.(1)(14) [F in Context Link 1]

[G] Enhanced external counterpulsation is a technique that uses inflatable cuffs wrapped around the lower extremities to increase venous return and augment diastolic blood pressure.(23)(24) [G in Context Link 1]

[H] A specialty society guideline suggests the use of hybrid revascularization for patients with left anterior descending (LAD) coronary artery disease and either 2-vessel disease with an LAD lesion not amenable to PCI or multivessel disease with either contraindication to full sternotomy, no available arterial or venous conduits for bypass, poor surgical targets for circumflex or right coronary artery bypass (eg, poor runoff, extensive coronary calcification, or extensive aortic atheroma with need for aortic manipulation to bypass) that are amenable to PCI, or as a staged procedure after emergent minimally invasive direct coronary artery bypass (MIDCAB).(25) [H in Context Link 1]

[I] Totally endoscopic coronary artery bypass (TECAB) is performed endoscopically through small port incisions on the left thorax using robotic assistance technology and remote-access cardiopulmonary bypass. In contrast to robotic minimally invasive direct coronary artery bypass (MIDCAB), TECAB can be used to bypass multiple arteries and is not limited to bypassing the left anterior descending artery.(26) [I in Context Link 1]

[J] Radial access leads to fewer bleeding and vascular complications than femoral access.(27) [J in Context Link 1]

[K] Patients with uncomplicated femoral catheterization procedures and femoral artery closure via a closure device may safely ambulate after 2 hours.(28) [K in Context Link 1]

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

[M] Discharge instructions should be given in the patient's and caregiver's native language using trained language interpreters whenever possible.(42) [M in Context Link 1]

Definitions

Altered mental status

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

References

1. Maher PJ. Confusion. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:126-131.e1.
2. Lei C, Smith C. Depressed consciousness and coma. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:117-125.e1.
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.
4. Holler-Managan YF. Neurologic evaluation. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:3550-3560.

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.
2. Koch E, Lovett S, Nghiem T, Riggs RA, Rech MA. Shock index in the emergency department: utility and limitations. Open Access Emergency Medicine 2019;11:179-199. DOI: 10.2147/OAEM.S178358.
3. Angus DC. Approach to the patient with shock. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:658-665.
4. Balhara KS, Hsieh YH, Hamade B, Circh R, Kelen GD, Bayram JD. Clinical metrics in emergency medicine: the shock index and the probability of hospital admission and inpatient mortality. Emergency Medicine Journal 2017;34(2):89-94. DOI: 10.1136/emmermed-2015-205532.
5. Weiss SL, Tissieres P, Peters MJ. Shock. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:600-611.
6. Singer M, et al. The Third International Consensus definitions for sepsis and septic shock (Sepsis-3). Journal of the American Medical Association 2016;315(8):801-810. DOI: 10.1001/jama.2016.0287.
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.
8. Kraut JA, Madias NE. Lactic acidosis. New England Journal of Medicine 2014;371(24):2309-2319. DOI: 10.1056/NEJMr1309483.
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.
10. Maloney GE, Glauser JM. Diabetes mellitus and disorders of glucose homeostasis. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:1543-1558.e2.

11. Arnold TD, Miller M, van Wessem KP, Evans JA, Balogh ZJ. Base deficit from the first peripheral venous sample: a surrogate for arterial base deficit in the trauma bay. *Journal of Trauma* 2011;71(4):793-7; discussion 797. DOI: 10.1097/TA.0b013e31822ad694.
12. Malinoski DJ, Todd SR, Slone S, Mullins RJ, Schreiber MA. Correlation of central venous and arterial blood gas measurements in mechanically ventilated trauma patients. *Archives of Surgery* 2005;140(11):1122-5. DOI: 10.1001/archsurg.140.11.1122.
13. Zakrison T, McFarlan A, Wu YY, Keshet I, Nathens A. Venous and arterial base deficits: do these agree in occult shock and in the elderly? A Bland-Altman analysis. *Journal of Trauma and Acute Care Surgery* 2013;74(3):936-9. DOI: 10.1097/TA.0b013e318282747a.
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)

References

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

Hypotension

- Hypotension, as indicated by **1 or more** of the following:
 - Hypotension in adult patient, as indicated by **1 or more** of the following:
 - Systolic blood pressure less than 90 mm Hg[A][B](1)
 - Mean arterial pressure[C] less than 70 mm Hg[A][B]  MAP Calculator(1)(2)
 - Decrease in baseline systolic blood pressure of 30 mm Hg or more, with significant signs or symptoms due to lower blood pressure (eg, near syncope, syncope, chest pain)[A][B](1)
 - Hypotension in pediatric patient, as indicated by **1 or more** of the following:
 - Systolic blood pressure less than 110 mm Hg in child 13 to 17 years of age[A][D](3)
 - Systolic blood pressure less than 100 mm Hg in child 6 to 12 years of age[A][D](3)
 - Systolic blood pressure less than 95 mm Hg in child 3 to 5 years of age[A][D](3)
 - Systolic blood pressure less than 90 mm Hg in child 1 or 2 years of age[A][D](3)
 - Systolic blood pressure less than 80 mm Hg in infant 6 to 11 months of age[A][D](3)
 - Systolic blood pressure less than 70 mm Hg in infant 3 to 5 months of age[A][D](3)
 - Systolic blood pressure less than 65 mm Hg in infant 1 or 2 months of age[A][D](3)

References

- 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.
- Puskarich MA, Jones AE. Shock. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:34-41.e1.
- 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

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

- 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.
- Puskarich MA, Jones AE. Shock. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:34-41.e1.
- 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

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

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

- Shibao C, Lipsitz LA, Biaggioni I, American Society of Hypertension Writing Group. Evaluation and treatment of orthostatic hypotension. Journal of the American Society of Hypertension 2013 Jul-Aug;7(4):317-324. DOI: 10.1016/j.jash.2013.04.006.
- Dalal AS, Van Hare GF. Syncope. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:592-599.

3. Fang JC, O'Gara PT. History and physical examination: an evidence-based approach. In: Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD, editors. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 12th ed. Elsevier; 2022:123-140.

Footnotes

- A. Concomitant measurements of the heart rate are important to measure to help diagnose subtypes of orthostatic hypotension (eg, the lack of a compensatory increase in heart rate is typical of autonomic failure and an exaggerated tachycardia may be reflective of volume depletion). However, the heart rate is not a component of the definition of orthostatic hypotension, which relies upon blood pressure alone.(1)(2)(3)
- B. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

Social Determinants of Health Assessment

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

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

References

1. Scanlon A, Reinisch C. Social determinants of health. In: Harding MM, Kwong J, Hagler D, Reinisch C, editors. Lewis's Medical-Surgical Nursing: Assessment and Management of Clinical Problems. 12th ed. St. Louis, MO: Mosby; 2023:18-20.
2. Billioux A, Verlander K, Anthony S, Alley D. Standardized Screening for Health-Related Social Needs in Clinical Settings: the Accountable Health Communities Screening Tool. [Internet] National Academy of Sciences. 2017 May Accessed at: <https://nam.edu/>. [accessed 2025 Sep 12]
3. Addressing social determinants of health. In: Perez R, editor. CMSA's Integrated Case Management. 2nd ed. Springer Publishing Company LLC; 2023:62-75.
4. Sandel M, et al. Unstable housing and caregiver and child health in renter families. Pediatrics 2018;14(2):e20172199. DOI: 10.1542/peds.2017-2199.
5. Children's HealthWatch Survey. Screening Instrument [Internet] Children's HealthWatch. 2024 Feb 13 Accessed at: <https://childrenshealthwatch.org/>. [accessed 2025 Mar 31]
6. PRAPARE®: Protocol for Responding to and Assessing Patient Assets, Risks, and Experiences Screening Tool. 2.0 [Internet] Association of Asian Pacific Community Health Organizations (AAPCHO) and National Association of Community Health Centers (NACHC). 2025 Accessed at: <https://prapare.org/the-prapare-screening-tool/>. [accessed 2025 Sep 08]
7. Cook JT, et al. A brief indicator of household energy security: associations with food security, child health, and child development in US infants and toddlers. Pediatrics 2008;122(4):e867-75. DOI: 10.1542/peds.2008-0286.
8. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Medical Care 2003;41(11):1284-92. DOI: 10.1097/01.MLR.0000093487.78664.3C.

Tachycardia

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

References

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

Footnotes

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

Tachycardia absent

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

References

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

Footnotes

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

beats per minute may meet the technical definition of tachycardia, but this tachycardia (absent associated findings such as chest pain or hypotension) may not be clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachycardia. Whether a heart rate above or below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

Troponin

- Troponin elevation alone does not indicate acute myocardial infarction; factors to consider include(1)(2):
 - Patients can have elevated levels of cardiac troponin due to other causes of myocardial injury, either acutely or chronically (eg, heart failure, myocarditis, pulmonary embolism, cardiomyopathy, defibrillator shock).
 - Patients with an elevated troponin should, on subsequent measurement, have a fall or rise in the troponin level of more than 20% to confirm acuity of myocardial injury. Absent this variation, the acuity of the myocardial injury should be questioned.
 - Attributing acute troponin release to myocardial ischemia depends on the presence of associated symptoms (eg, chest pain, dyspnea), ECG changes (eg, acute ST-segment deviation), and imaging findings (eg, new wall motion abnormalities on echocardiogram).
 - A report from a facility (eg, hospital) laboratory of an elevated troponin level, in general, indicates a level above the 99th percentile for the specific troponin assay used. The precise value that represents the 99th percentile depends on the specific troponin assay used.
 - The recommended time interval between serial troponin level assessments (eg, to detect fall or rise in troponin level) is 1 to 3 hours for high-sensitivity troponin, and 3 to 6 hours for conventional (contemporary) troponin assays.
 - Evidence-based specialty society guidelines recommend use of high-sensitivity troponin assays, rather than older less-sensitive assays (collectively labeled contemporary assays).(1)(3) This is due to more rapid detection or exclusion of myocardial injury and increased diagnostic accuracy with high-sensitivity assays.(1)(3)

References

1. Gulati M, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation* 2021;144(22):e368-e454. DOI: 10.1161/CIR.0000000000001029. (Reaffirmed 2025 Jun)
2. Thygesen K, et al. Fourth Universal Definition of Myocardial Infarction (2018). *Circulation* 2018;138(20):e618-e651. DOI: 10.1161/CIR.0000000000000617.
3. Kontos MC, et al. 2022 ACC expert consensus decision pathway on the evaluation and disposition of acute chest pain in the emergency department: a report of the American College of Cardiology Solution Set Oversight Committee. *Journal of the American College of Cardiology* 2022;80(20):1925-1960. DOI: 10.1016/j.jacc.2022.08.750. (Reaffirmed 2025 Mar)

Codes

ICD-10 Diagnosis: I23.7, I24.0, I24.89, I24.9, I25.811, I25.83, I25.84, T82.855A

ICD-10 Procedure: 0270346, 027034Z, 0270356, 027035Z, 0270366, 027036Z, 0270376, 027037Z, 02703D6, 02703DZ, 02703E6, 02703EZ, 02703F6, 02703FZ, 02703G6, 02703GZ, 02703T6, 02703TZ, 02703Z6, 02703ZZ, 02704DZ, 0271346, 027134Z, 0271356, 027135Z, 0271366, 027136Z, 0271376, 027137Z, 02713D6, 02713DZ, 02713E6, 02713EZ, 02713F6, 02713FZ, 02713G6, 02713GZ, 02713T6, 02713TZ, 02713Z6, 02713ZZ, 0272346, 027234Z, 0272356, 027235Z, 0272366, 027236Z, 0272376, 027237Z, 02723D6, 02723DZ, 02723E6, 02723EZ, 02723F6, 02723FZ, 02723G6, 02723GZ, 02723T6, 02723TZ, 02723Z6, 02723ZZ, 0273346, 027334Z, 0273356, 027335Z, 0273366, 027336Z, 0273376, 027337Z, 02733D6, 02733DZ, 02733E6, 02733EZ, 02733F6, 02733FZ, 02733G6, 02733GZ, 02733T6, 02733TZ, 02733Z6, 02733ZZ, 02C03Z6, 02C03Z7, 02C03ZZ, 02C13Z6, 02C13Z7, 02C13ZZ, 02C23Z6, 02C23Z7, 02C23ZZ, 02C33Z6, 02C33Z7, 02C33ZZ, 02F03ZZ, 02F13ZZ, 02F23ZZ, 02F33ZZ, XW0J3HA, XW0J3JA, XW0J3KA, XW0J3LA, XW0K3HA, XW0K3JA, XW0K3KA, XW0K3LA, XW0L3HA, XW0L3JA, XW0L3KA, XW0L3LA, XW0M3HA, XW0M3JA, XW0M3KA, XW0M3LA [Hide]

CPT®: 0913T, 0914T, 92920, 92924, 92928, 92930, 92933, 92937, 92941, 92943, 92945

CPT copyright 2025 American Medical Association. All rights reserved.

MCG Health
Inpatient & Surgical Care 30th Edition
Copyright © 2026 MCG Health, LLC
All Rights Reserved

Last Update: 1/25/2026 6:05:44 AM
Build Number: 30.0.2026012500524.025256