Hyperglycemia and Diabetes Control: Common Complications and Conditions

MCG Health
Inpatient & Surgical Care
30th Edition

CCC: CCC-015 (ISC)
Link to Codes

Prevention

- Prevention issues and possible preventive measures include(1):
  - Monitor glucose levels.[A]
  - For critically ill patients with serum glucose over 180 mg/dL (10.0 mmol/L), initiate insulin protocol (continuous IV insulin is preferred) to maintain serum glucose in range of 140 to 180 mg/dL (7.8 to 10.0 mmol/L).[B](1)(2)
  - For non-critically ill patients with serum glucose over 180 mg/dL (10.0 mmol/L)[C] or for patients undergoing surgical procedures, initiate insulin protocol (eg, basal subcutaneous insulin with prandial and as-needed correction boluses) to maintain serum glucose in range of 100 to 180 mg/dL (5.6 to 10.0 mmol/L).[D](1)
  - Implement inpatient diabetes management programs and protocols.[E](8)
  - Avoid use of correctional bolus-only (formerly "sliding scale") insulin treatment.
  - In patients with previous episodes of hypoglycemia (eg, plasma glucose less than 70 mg/dL (3.9 mmol/L)), monitor glucose more closely and be especially cautious with insulin administration.
  - For preoperative patients taking oral hypoglycemic agents, discontinue SGLT2 inhibitors 3 to 4 days before surgery; withhold metformin or other oral hypoglycemic agents on the day of the procedure.(1)
  - For preoperative patients taking insulin, reduce the dose on the day of surgery by 20% to 50% (depending on the agent), and monitor glucose every 2 to 4 hours while NPO.(1)
  - For patients taking corticosteroids, add or adjust insulin as needed based on glycemic response.(1)

Clinical Indications for Ongoing Inpatient Care

- Ongoing inpatient care is indicated for **1 or more** of the following(1)(9)(10):

- Diabetic ketoacidosis that requires inpatient management, as indicated by **ALL** of the following(1)(9)(10)(11):
  - Plasma glucose level is consistent with ketoacidosis, or euglycemic diabetic ketoacidosis is suspected, as indicated by **1 or more** of the following:
    - Hyperglycemia (plasma glucose 200 mg/dL (11.1 mmol/L)) or greater(1)(9)(10)
    - Any glucose level and prior history of diabetes[F](1)(10)(12)
    - Plasma glucose is less than 200 mg/dL (11.1 mmol/L) and one or more risk factors for euglycemic diabetic ketoacidosis are present, as indicated by **1 or more** of the following[G](1)(10)(14)(15):
      - Pregnancy
      - Prolonged starvation
      - Heavy alcohol intake
      - Chronic liver or renal disease
      - Sepsis or severe infection
      - Patient recently received insulin
      - Ketogenic (low-carbohydrate) diet
      - SGLT2 inhibitor
      - Pancreatitis
      - Glycogen storage disease
      - Other risk factor for euglycemic diabetic ketoacidosis or hypoglycemia
  - Ketonuria or ketonemia (eg, serum beta-hydroxybutyrate 3.0 mmol/L or higher, or moderate to large ketonuria (2+ or higher on urine ketone stick))[H](1)
  - Acidosis as indicated by arterial or venous pH less than 7.30,[I] serum bicarbonate 18 mEq/L (mmol/L) or less, or anion gap greater than 12 (or above the upper limit of normal for local laboratory)[J](1)(10)
- Hyperglycemic hyperosmolar state, as indicated by **ALL** of the following[K](1)(10)(13)(22)(23):
  - Plasma glucose greater than 600 mg/dL (33.3 mmol/L)
  - Total serum osmolality greater than 320 mOsm/kg (mmol/kg)[L] or effective serum osmolality greater than 300 mOsm/kg (mmol/kg)[M]
- Hyperglycemia requiring inpatient care, as indicated by **1 or more** of the following(13)(22):
  - Hypotension
  - Altered mental status
  - Significant electrolyte abnormality (eg, hypokalemia, hyperkalemia, hypernatremia, hypophosphatemia)
  - Inability to maintain oral hydration (eg, IV fluid support required)
  - Glucose level persistently too high for next level of care (eg, concern for redevelopment of dehydration, electrolyte abnormality) or not sufficiently stable
  - Inpatient treatment of underlying etiology of hyperglycemia needed (eg, infection requiring inpatient care)

Alternatives to Inpatient Care

- Alternatives to inpatient stay extension include(1)(9)(10)(24)(25)(26):
  - Outpatient care
    - Blood glucose monitoring
    - Oral hypoglycemics, self-administered insulin via injection or infusion device
    - Diabetes education
    - Follow-up with primary care physician
  - Recovery facility

- Parenteral fluid and medication (insulin)
- Testing and education
- Frequent assessment and treatment
- Management of comorbidities

Discharge

- Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present(1)(10)(22)(27)(28):
  - Hemodynamic stability
  - Mental status at baseline
  - No precipitating cause identified, or cause manageable in outpatient setting
  - Acidosis absent
  - Blood glucose under acceptable control
  - Dehydration absent
  - Electrolyte abnormalities absent or acceptable for next level of care
  - Renal function at baseline or acceptable for next level of care
  - Oral hydration[N]
  - Oral medications or regimen acceptable for next level of care
  - Oral diet or acceptable for next level of care
  - Outpatient diabetic medication regimen established

References

1. American Diabetes Association. Standards of care in diabetes - 2025. Diabetes Care 2025;48(S1):S1-S352. (Reaffirmed 2025 Mar) [Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]
2. Blonde L, et al. American Association of Clinical Endocrinology clinical practice guideline: developing a diabetes mellitus comprehensive care plan-2022 update. Endocrine Practice 2022;28(10):923-1049. DOI: 10.1016/j.eprac.2022.08.002. (Reaffirmed 2025 Jun) [Context Link 1, 2, 3, 4] View abstract...
3. McCall AL, et al. Management of individuals with diabetes at high risk for hypoglycemia: an Endocrine Society Clinical practice guideline. Journal of Clinical Endocrinology and Metabolism 2023;108(3):529-562. DOI: 10.1210/clinem/dgac596. (Reaffirmed 2025 Jul) [Context Link 1] View abstract...
4. Visser MM, Vangoitsenhoven R, Gillard P, Mathieu C. Review article - diabetes technology in the hospital: an update. Current Diabetes Reports 2024;24(8):173-182. DOI: 10.1007/s11892-024-01545-3. [Context Link 1, 2] View abstract...
5. Bellon F, et al. Perioperative glycaemic control for people with diabetes undergoing surgery. Cochrane Database of Systematic Reviews 2023, Issue 8. Art. No.: CD007315. DOI: 10.1002/14651858.CD007315.pub3. [Context Link 1] View abstract...
6. Phelan H, et al. ISPAD clinical practice consensus guidelines 2022: Sick day management in children and adolescents with diabetes. Pediatric Diabetes 2022;23(7):912-925. DOI: 10.1111/pedi.13415. (Reaffirmed 2025 Jul) [Context Link 1] View abstract...
7. Granados A, Carrillo Iregui A. Type 1 diabetes management in the hospital setting. Pediatrics in Review 2024;45(4):201-209. DOI: 10.1542/pir.2022-005645. [Context Link 1] View abstract...
8. Gray J, Roseleur J, Edney L, Karnon J, Southern Adelaide Local Health Network's (SALHN) Hypoglycaemia Clinical Working Group. Pragmatic review of interventions to prevent inpatient hypoglycaemia. Diabetic Medicine 2022;39(2):Online. DOI: 10.1111/dme.14737. [Context Link 1] View abstract...
9. Glaser N, et al. ISPAD clinical practice consensus guidelines 2022: Diabetic ketoacidosis and hyperglycemic hyperosmolar state. Pediatric Diabetes 2022;23(7):835-856. DOI: 10.1111/pedi.13406. (Reaffirmed 2025 Jul) [Context Link 1, 2, 3, 4] View abstract...

10. Umpierrez GE, et al. Hyperglycemic crises in adults with diabetes: a consensus report. Diabetes Care 2024;47(8):1257-1275. DOI: 10.2337/dci24-0032. [Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16] View abstract...
11. Koves IH, Glaser N. Diabetic ketoacidosis. In: Zimmerman JJ, et al., editors. Fuhrman and Zimmerman's Pediatric Critical Care. 6th ed. Elsevier; 2022:1016-1022.e4. [Context Link 1]
12. Guideline for the Management of Children and Young People under the age of 18 years with Diabetic Ketoacidosis. [Internet] British Society for Paediatric Endocrinology and Diabetes. 2024 Nov Accessed at: https://www.bsped.org.uk/clinical-resources/bsped-dka-guidelines/. [created 2021; accessed 2025 Aug 25] [Context Link 1, 2]
13. 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. [Context Link 1, 2, 3, 4, 5, 6, 7]
14. Long B, Lentz S, Koyfman A, Gottlieb M. Euglycemic diabetic ketoacidosis: Etiologies, evaluation, and management. American Journal of Emergency Medicine 2021;44:157-160. DOI: 10.1016/j.ajem.2021.02.015. [Context Link 1, 2] View abstract...
15. Barski L, Eshkoli T, Brandstaetter E, Jotkowitz A. Euglycemic diabetic ketoacidosis. European Journal of Internal Medicine 2019;63:9-14. DOI: 10.1016/j.ejim.2019.03.014. [Context Link 1, 2] View abstract...
16. Handelsman Y, et al. American Association of Clinical Endocrinologists and American College of Endocrinology position statement on the association of SGLT-2 ihibitors and diabetiic ketoacidosis. Endocrine Practice 2016;22(6):753-62. DOI: 10.4158/EP161292.PS. [Context Link 1] View abstract...
17. 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. [Context Link 1] View abstract...
18. Nyenwe EA, Wan JY, Kitabchi AE. Venous serum bicarbonate concentration predicts arterial pH in adults with diabetic ketoacidosis. Endocrine Practice 2014;20(3):201-206. DOI: 10.4158/EP13250.OR. [Context Link 1] View abstract...
19. Emmett M. Review of clinical disorders causing metabolic acidosis. Advances in Chronic Kidney Disease 2022;29(4):355-363. DOI: 10.1053/j.ackd.2022.07.004. [Context Link 1] View abstract...
20. Hamm LL, DuBose TD. Disorders of acid-base balance. In: Yu AS, Chertow GM, Luyckx VA, Marsden PA, Skorecki K, Taal MW, editors. Brenner and Rector's The Kidney. 11th ed. Philadelphia, PA: Elsevier; 2020:496-536.e3. [Context Link 1]
21. Lee K, et al. Characterization of variable presentations of diabetic ketoacidosis based on blood ketone levels and major society diagnostic criteria: a new view point on the assessment of diabetic ketoacidosis. Diabetes, Metabolic Syndrome and Obesity : Targets and Therapy 2019;12:1161-1171. DOI: 10.2147/DMSO.S209938. [Context Link 1, 2] View abstract...
22. Lovegrove SS, Dubbs SB. Hyperosmolar hyperglycemic state. Emergency Medicine Clinics of North America 2023;41(4):687-696. DOI: 10.1016/j.emc.2023.07.001. [Context Link 1, 2, 3, 4] View abstract...
23. Mustafa OG, Haq M, Dashora U, Castro E, Dhatariya KK, Joint British Diabetes Societies (JBDS) for Inpatient Care Group. Management of Hyperosmolar Hyperglycaemic State (HHS) in Adults: An updated guideline from the Joint British Diabetes Societies (JBDS) for Inpatient Care Group. Diabetic Medicine 2023;40(3):Online. DOI: 10.1111/dme.15005. [Context Link 1, 2] View abstract...
24. Kliegman RM, et al. Diabetes mellitus. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:3515-3549. [Context Link 1]
25. Karter AJ, Parker MM, Moffet HH, Gilliam LK, Dlott R. Association of real-time continuous glucose monitoring with glycemic control and acute metabolic events among patients with insulin-treated diabetes. Journal of the American Medical Association 2021;325(22):2273-2284. DOI: 10.1001/jama.2021.6530. [Context Link 1] View abstract...
26. Pandya N, Trenery A, Sieradzan R, Gabai C, Ermakova A, Xiong Y. Hypoglycemia upon hospital admission from long-term care: health care resource use. American Journal of Managed Care 2021;27(10):e349-e354. DOI: 10.37765/ajmc.2021.88765. [Context Link 1] View abstract...
27. Copeland KC, et al. Management of newly diagnosed type 2 diabetes mellitus (T2DM) in children and adolescents. Pediatrics 2013;131(2):364-382. DOI: 10.1542/peds.2012-3494. (Reaffirmed 2025 Jul) [Context Link 1] View abstract...
28. Rosenbloom AL. Hyperglycemic hyperosmolar state: an emerging pediatric problem. Journal of Pediatrics 2010;156(2):180-184. DOI: 10.1016/j.jpeds.2009.11.057. [Context Link 1] View abstract...

Footnotes

[A] Continuous glucose monitoring has been advocated by several specialty society guidelines as a useful modality for detecting severe hypoglycemic and hyperglycemic events.(1)(2)(3) Continuous glucose monitoring is not recommended for use in ICU settings due to concerns about inaccuracies in patients who are hypovolemic, hypoperfused, hypoxic, edematous, or receiving vasopressor agents.(4) Certain drugs, including acetaminophen, may also affect the accuracy of these devices.(4) [A in Context Link 1]

[B] More stringent targets (eg, 110 to 140 mg/dL (6.1 to 7.8 mmol/L)) may be reasonable for selected critically ill patients if they can be attained without causing hypoglycemia.(1)(2) [B in Context Link 1]

[C] Higher serum glucose targets up to 250 mg/dL (13.9 mmol/L) may be appropriate for patients with a short life expectancy, renal failure, high risk for hypoglycemia, or labile glycemia.(1)(2) [C in Context Link 1]

[D] A meta-analysis of 20 randomized trials (2670 patients) found that more intensive perioperative glycemic control provided no benefit in mortality, infectious complications, or length of stay compared with conventional glycemic control; however, the risk of hypoglycemic events was higher.(5) [D in Context Link 1]

[E] A specialty society guideline recommends that insulin be administered using standardized protocols that allow for predefined adjustments in insulin dosage based on glycemic fluctuations.(1) A specialty society guideline recommends that diabetic devices (eg, automated insulin delivery systems or continuous glucose monitoring sensors) be continued in the inpatient setting, if resources and training are available, with confirmatory point-of-care glucose measurements performed for decisions on insulin dosing or hypoglycemia management.(1) The same guideline recommends that inpatients be given the opportunity for diabetic self-management if they are competent to do so and if self-management is appropriate.(1) A pediatric guideline and a narrative review note that contraindications for self-management with insulin pumps include clinical instability (eg, critically ill, diabetic ketoacidosis, hyperglycemic hyperosmolar state), altered mental status or cognitive impairment, inability to use hands or arms (eg, trauma), suicidal ideation, inability of caregiver to supervise or manage the pump, and unfamiliarity of hospital staff with the device.(6)(7) [E in Context Link 1]

[F] A specialty society guideline states that diabetic ketoacidosis (DKA) may be diagnosed in adult patients with a prior history of diabetes, irrespective of their glucose levels at presentation, if ketosis and acidosis criteria are present.(10) A pediatric clinical guideline also notes that children and young people with known diabetes may develop DKA with glucose levels that are normal.(12) [F in Context Link 1]

[G] Although most patients with diabetic ketoacidosis (DKA) will present with hyperglycemia, some patients with risk factors (eg, hypoglycemic agents, impaired gluconeogenesis, starvation) may have what is termed "euglycemic DKA," with normal or only mild elevations of serum glucose.(10)(13)(14)(15)(16) [G in Context Link 1]

[H] Measurement of ketones can be performed via the nitroprusside reaction in urine or serum, but this provides only a semi-quantitative estimation (eg, mild, moderate); does not measure beta-hydroxybutyrate, the principal ketone produced in diabetic ketoacidosis (DKA); and thus can underestimate the ketone burden. A more complete measurement of ketonemia can be obtained via a measurement of serum beta-hydroxybutyrate.(10) Ketones can also be elevated in non-DKA states such as starvation ketosis or alcoholic ketoacidosis.(13) [H in Context Link 1]

[I] Analyses have concluded that venous and arterial pH measurements are highly correlated, with small differences between them that are usually not clinically significant, including in patients with diabetic ketoacidosis.(13)(17)(18) [I in Context Link 1]

[J] A specialty society guideline states that anion gap is not recommended as a first-line diagnostic criterion, but identifies an anion gap of greater than 12 as corroborating evidence for diabetic ketoacidosis, which may be useful when ketone measurements are not available.(10) The upper limit of normal for anion gap of the local laboratory may be a more appropriate indicator when available and may vary between laboratories depending on the analyzers used; the normal range

generally runs between 8 and 12.(19) It should be noted that a falsely normal or falsely low anion gap (anion gap acidosis is present but not detected by standard calculation) may occur if serum albumin is low (eg, severe malnutrition, nephrotic syndrome) or if cations are elevated that are not used in the anion gap calculation (eg, lithium, calcium, magnesium, immunoglobulins); these substances can be measured and the anion gap adjusted when there is clinical suspicion for ketoacidosis despite an apparently normal anion gap.(20) There may be concomitant causes of acidosis (eg, lactate, salicylates) and metabolic alkalosis (eg, from severe vomiting or metabolic compensation for chronic hypercapnia) that can complicate interpretation of measured pH.(10)(13)(21) Metabolic acidosis with concomitant metabolic alkalosis may present with a normal (or near-normal) serum bicarbonate and pH; in such cases, the anion gap may be the only indicator that significant metabolic acidosis is present.(21) An anion gap calculator, which can correct the anion gap for low serum albumin and also identify acidosis in the setting of concurrent metabolic alkalosis, is available at www.mdcalc.com/calc/1669/anion-gap. [J in Context Link 1]

[K] Patients with hyperosmolar state can present with mild elevations in ketonemia (eg, due to lactic acidosis, starvation ketosis) or with a mixed hyperosmolar state with concomitant diabetic ketoacidosis.(13)(22)(23) [K in Context Link 1]

[L] Total serum osmolality can be directly measured in the serum or estimated using the equation (2 x sodium ion (in mEq/L)) + glucose (in mg/dL)/18 + BUN (in mg/dL)/2.8.(10) [L in Context Link 1]

[M] Effective serum osmolality is calculated using the equation (2 x sodium ion (in mEq/L)) + glucose (in mg/dL)/18.(10) [M in Context Link 1]

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

Definitions

Altered mental status

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

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 stability

- Hemodynamic stability, as indicated by **1 or more** of the following:
  - Hemodynamic abnormalities at baseline or acceptable for next level of care
  - Patient hemodynamically stable, as indicated by **ALL** of the following(1)(2):
    - Tachycardia absent

- Hypotension absent
- No evidence of inadequate perfusion (eg, no myocardial ischemia)
- No other hemodynamic abnormalities (eg, no Orthostatic hypotension)

References

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

Hypotension

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

References

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

Footnotes

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

B. Interpretation of blood pressure requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline blood pressure, medications, and clinical impact. For example, an elderly patient with heart failure may be prescribed medication with the intentional goal of a reduced pressure. If the patient's baseline SBP is 92 mm Hg to 96 mm Hg, absent signs or symptoms of hypotension, an emergency department SBP of 86 mm Hg should not

automatically be categorized as hypotensive. This would hold for mean arterial pressure (MAP) as well. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term hypotension. Whether a blood pressure below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

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

D. Interpretation of blood pressure requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline blood pressure, medications, and clinical impact. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term hypotension. Whether a blood pressure below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

Hypotension absent

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

References

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

Footnotes

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

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

Orthostatic hypotension

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

References

1. Shibao C, Lipsitz LA, Biaggioni I, American Society of Hypertension Writing Group. Evaluation and treatment of orthostatic hypotension. Journal of the American Society of Hypertension 2013 Jul-Aug;7(4):317-324. DOI: 10.1016/j.jash.2013.04.006.
2. 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.

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.

Codes

ICD-10 Diagnosis: E08.00, E08.01, E08.10, E08.11, E08.21, E08.22, E08.29, E08.311, E08.319, E08.3211, E08.3212, E08.3213, E08.3219, E08.3291, E08.3292, E08.3293, E08.3299, E08.3311, E08.3312, E08.3313, E08.3319, E08.3391, E08.3392, E08.3393, E08.3399, E08.3411, E08.3412, E08.3413, E08.3419, E08.3491, E08.3492, E08.3493, E08.3499, E08.3511, E08.3512, E08.3513, E08.3519, E08.3521, E08.3522, E08.3523, E08.3529, E08.3531, E08.3532, E08.3533, E08.3539, E08.3541, E08.3542, E08.3543, E08.3549, E08.3551, E08.3552, E08.3553, E08.3559, E08.3591, E08.3592, E08.3593, E08.3599, E08.36, E08.37X1, E08.37X2, E08.37X3, E08.37X9, E08.39, E08.40, E08.41, E08.42, E08.43, E08.44, E08.49, E08.51, E08.52, E08.59, E08.610, E08.618, E08.620, E08.621, E08.622, E08.628, E08.630, E08.638, E08.65, E08.69, E08.8, E08.9, E09.00, E09.01, E09.10, E09.11, E09.21, E09.22, E09.29, E09.311, E09.319, E09.3211, E09.3212, E09.3213, E09.3219, E09.3291, E09.3292, E09.3293, E09.3299, E09.3311, E09.3312, E09.3313, E09.3319, E09.3391, E09.3392, E09.3393, E09.3399, E09.3411, E09.3412, E09.3413, E09.3419, E09.3491, E09.3492, E09.3493, E09.3499, E09.3511, E09.3512, E09.3513, E09.3519, E09.3521, E09.3522, E09.3523, E09.3529, E09.3531, E09.3532, E09.3533, E09.3539, E09.3541, E09.3542, E09.3543, E09.3549, E09.3551, E09.3552, E09.3553, E09.3559, E09.3591, E09.3592, E09.3593, E09.3599, E09.36, E09.37X1, E09.37X2, E09.37X3, E09.37X9, E09.39, E09.40, E09.41, E09.42, E09.43, E09.44, E09.49, E09.51, E09.52, E09.59, E09.610, E09.618, E09.620, E09.621, E09.622, E09.628, E09.630, E09.638, E09.65, E09.69, E09.8, E09.9, E10.10, E10.11, E10.21, E10.22, E10.29, E10.311, E10.319, E10.3211, E10.3212, E10.3213, E10.3219, E10.3291, E10.3292, E10.3293, E10.3299, E10.3311, E10.3312, E10.3313, E10.3319, E10.3391, E10.3392, E10.3393, E10.3399, E10.3411, E10.3412, E10.3413, E10.3419, E10.3491, E10.3492, E10.3493, E10.3499, E10.3511, E10.3512, E10.3513, E10.3519, E10.3521, E10.3522, E10.3523, E10.3529, E10.3531, E10.3532, E10.3533, E10.3539, E10.3541, E10.3542, E10.3543, E10.3549, E10.3551, E10.3552, E10.3553, E10.3559, E10.3591, E10.3592, E10.3593, E10.3599, E10.36, E10.37X1, E10.37X2, E10.37X3, E10.37X9, E10.39, E10.40, E10.41, E10.42, E10.43, E10.44, E10.49, E10.51, E10.52, E10.59, E10.610, E10.618, E10.620, E10.621, E10.622, E10.628, E10.630, E10.638, E10.65, E10.69, E10.8, E10.9, E10.A0, E10.A1, E10.A2, E11.00, E11.01, E11.10, E11.11, E11.21, E11.22, E11.29, E11.311, E11.319, E11.3211, E11.3212, E11.3213, E11.3219, E11.3291, E11.3292, E11.3293, E11.3299, E11.3311, E11.3312, E11.3313, E11.3319, E11.3391, E11.3392, E11.3393, E11.3399, E11.3411, E11.3412, E11.3413, E11.3419, E11.3491, E11.3492, E11.3493, E11.3499, E11.3511, E11.3512, E11.3513, E11.3519, E11.3521, E11.3522, E11.3523, E11.3529, E11.3531, E11.3532, E11.3533, E11.3539, E11.3541, E11.3542, E11.3543, E11.3549, E11.3551, E11.3552, E11.3553, E11.3559, E11.3591, E11.3592, E11.3593, E11.3599, E11.36, E11.37X1, E11.37X2, E11.37X3, E11.37X9, E11.39, E11.40, E11.41, E11.42, E11.43, E11.44, E11.49, E11.51, E11.52, E11.59, E11.610, E11.618, E11.620, E11.621, E11.622, E11.628, E11.630, E11.638, E11.65, E11.69, E11.8, E11.9, E11.A, E13.00, E13.01, E13.10, E13.11, E13.21, E13.22, E13.29, E13.311, E13.319, E13.3211, E13.3212, E13.3213, E13.3219, E13.3291, E13.3292, E13.3293, E13.3299, E13.3311, E13.3312, E13.3313, E13.3319, E13.3391, E13.3392, E13.3393, E13.3399, E13.3411, E13.3412, E13.3413, E13.3419, E13.3491, E13.3492, E13.3493, E13.3499, E13.3511, E13.3512, E13.3513, E13.3519, E13.3521, E13.3522, E13.3523, E13.3529, E13.3531, E13.3532, E13.3533, E13.3539, E13.3541, E13.3542, E13.3543, E13.3549, E13.3551, E13.3552, E13.3553, E13.3559, E13.3591, E13.3592, E13.3593, E13.3599, E13.36, E13.37X1, E13.37X2, E13.37X3, E13.37X9, E13.39, E13.40, E13.41, E13.42, E13.43, E13.44, E13.49, E13.51, E13.52, E13.59, E13.610, E13.618, E13.620, E13.621, E13.622, E13.628, E13.630, E13.638, E13.65, E13.69, E13.8, E13.9, O24.03, O24.13, O24.33, O24.83, O24.93 [Hide]

Last Update: 1/25/2026 6:33:08 AM
Build Number: 30.0.2026012500524.025256