# Diabetes - High Blood Sugar

**After Hours Telehealth Triage Guidelines | Adult | 2023**

Schmitt-Thompson Clinical Content

## DEFINITION

- Patient with known diabetes mellitus
- Has a high blood sugar (hyperglycemia), defined as a blood glucose > 200 mg/dL (11.1 mmol/L)
- Has symptoms of high blood sugar
- Has questions regarding high blood sugar

**SYMPTOMS** of High Blood Sugar (Hyperglycemia) include:

- *Mild hyperglycemia*: Most often patient will have no symptoms.
- *Moderate hyperglycemia*: polyuria, polydipsia, fatigue, blurred vision.
- *Severe hyperglycemia*: confusion and coma.
- *Diabetic ketoacidosis* (DKA): fruity odor on breath, vomiting, rapid breathing, weakness, confusion, and coma.

## INITIAL ASSESSMENT QUESTIONS

1. BLOOD GLUCOSE: "What is your blood glucose level?"
2. ONSET: "When did you check the blood glucose?"
3. USUAL RANGE: "What is your glucose level usually?" (e.g., usual fasting morning value, usual evening value)
4. KETONES: "Do you check for ketones (urine or blood test strips)?" If Yes, ask: "What does the test show now?"
5. TYPE 1 or 2: "Do you know what type of diabetes you have?" (e.g., Type 1, Type 2, Gestational; doesn't know)
6. INSULIN: "Do you take insulin?" "What type of insulin(s) do you use? What is the mode of delivery? (syringe, pen; injection or pump)?"
7. DIABETES PILLS: "Do you take any pills for your diabetes?" If Yes, ask: "Have you missed taking any pills recently?"
8. OTHER SYMPTOMS: "Do you have any symptoms?" (e.g., fever, frequent urination, difficulty breathing, dizziness, weakness, vomiting)
9. PREGNANCY: "Is there any chance you are pregnant?" "When was your last menstrual period?"

## TRIAGE ASSESSMENT QUESTIONS

**Call EMS 911 Now**

Unconscious or difficult to awaken

*R/O: diabetic ketoacidosis (DKA), severe hyperglycemia, profound hypoglycemia*
*CA: 40, 1012, 1014, 1*

Acting confused (e.g., disoriented, slurred speech)

*R/O: DKA, severe hyperglycemia, hypoglycemia*
*CA: 40, 1011, 1012, 1013, 1*

Very weak (e.g., can't stand)

*R/O: DKA, severe hyperglycemia, hypoglycemia*
*CA: 40, 1011, 1012, 1013, 1*

Sounds like a life-threatening emergency to the triager

*CA: 40, 1011, 1012, 1013, 1*

**Go to ED Now**

[1] Vomiting AND [2] signs of dehydration (e.g., very dry mouth, lightheaded, dark urine)

*Reason: May need IV hydration, possible DKA.*
*CA: 41, 92, 81, 1*

[1] Blood glucose > 240 mg/dL (13.3 mmol/L) AND [2] rapid breathing

*R/O: DKA*
*CA: 41, 92, 81, 1*

**Go to ED Now (or PCP triage)**

Blood glucose > 500 mg/dL (27.8 mmol/L)

*CA: 42, 444, 80, 87, 1*

[1] Blood glucose > 240 mg/dL (13.3 mmol/L) AND [2] urine ketones moderate-large (or more than 1+)

*R/O: DKA. Note: Most people with diabetes who use insulin do the urine ketone test.*
*CA: 42, 444, 80, 87, 1*

[1] Blood glucose > 240 mg/dL (13.3 mmol/L) AND [2] blood ketones > 1.4 mmol/L

*R/O: DKA. Note: Some patients check their blood for ketones using a hand-held device.*
*CA: 42, 444, 80, 87, 1*

[1] Blood glucose > 240 mg/dL (13.3 mmol/L) AND [2] vomiting AND [3] unable to check for ketones (in blood or urine)

*R/O: DKA. Note: Most people with diabetes who use insulin do the urine ketone test. Others check their blood for ketones using a hand-held device.*
*CA: 42, 444, 80, 87, 1*

[1] New-onset diabetes suspected (e.g., frequent urination, weak, weight loss) AND [2] vomiting or rapid breathing

*CA: 42, 80, 87, 1*

Vomiting lasts > 4 hours

*R/O: DKA, dehydration*
*CA: 42, 444, 80, 87, 1*

Patient sounds very sick or weak to the triager

*Reason: Severe acute illness or serious complication suspected.*
*CA: 42, 444, 80, 87, 1*

**See HCP (or PCP Triage) Within 4 Hours**

Fever > 100.4 F (38.0 C)

*Reason: Diabetes suppresses the immune system, consider possibility of bacterial infection.*
*CA: 43, 444, 1002, 1005, 27, 1*

**Call PCP Now**

Blood glucose > 400 mg/dL (22.2 mmol/L)

*Reason: Significant hyperglycemia.*
*CA: 49, 444, 24, 27, 1*

[1] Blood glucose > 300 mg/dL (16.7 mmol/L) AND [2] two or more times in a row

*Reason: Obtain PCP input regarding medication adjustment and diet.*
*CA: 49, 444, 446, 27, 1*

Urine ketones moderate - large (or blood ketones > 1.4 mmol/L)

*Reason: Obtain PCP input regarding medication adjustment and diet.*
*CA: 49, 444, 25, 27, 1*

[1] Symptoms of high blood sugar (e.g., abnormally thirsty, frequent urination, weight loss) AND [2] not able to test blood glucose AND [3] pregnant

*Reason: During pregnancy, tighter blood glucose control is needed because of possible neonatal complications associated with hyperglycemia. Note: People can buy diabetes testing equipment at a drugstore without a prescription.*
*CA: 49, 1620, 444, 27, 1*

[1] Caller has URGENT medication or insulin pump question AND [2] triager unable to answer question

*CA: 49, 444, 9, 1*

**See PCP Within 24 Hours**

[1] Blood glucose > 240 mg/dL (13.3 mmol/L) AND [2] pregnant

*Reason: During pregnancy, tighter blood glucose control is needed because of possible neonatal complications associated with hyperglycemia.*
*CA: 44, 1621, 6, 27, 1*

[1] Symptoms of high blood sugar (e.g., abnormally thirsty, frequent urination, weight loss) AND [2] not able to test blood glucose

*Note: People can buy diabetes testing equipment at a drugstore without a prescription.*
*CA: 44, 6, 27, 1*

New-onset diabetes suspected (e.g., abnormally thirsty, frequent urination, weight loss)

*CA: 44, 6, 27, 1*

**Call PCP Within 24 Hours**

[1] Caller has NON-URGENT medication or insulin pump question AND [2] triager unable to answer question

*CA: 50, 445, 9, 1*

**Home Care**

[1] Blood glucose > 300 mg/dL (16.7 mmol/L) AND [2] uses insulin (e.g., insulin-dependent, all people with type 1 diabetes)

*Reason: Hyperglycemia. Note: Triager will provide call back instructions for blood glucose over 300 mg/dL (16.7 mmol/L) that happens 2 or more times in a row.*
*CA: 48, 447, 5, 6, 4, 11, 1163, 1164, 34, 35, 1171, 8, 1*

[1] Blood glucose 240 - 300 mg/dL (13.3 - 16.7 mmol/L) AND [2] uses insulin (e.g., insulin-dependent, all people with type 1 diabetes)

*Reason: Hyperglycemia.*
*CA: 48, 5, 6, 4, 11, 1163, 1164, 34, 35, 1171, 8, 1*

[1] Blood glucose > 300 mg/dL (16.7 mmol/L) AND [2] does not use insulin (e.g., not insulin-dependent; most people with type 2 diabetes)

*Reason: Hyperglycemia. Note: triager will provide call back instructions for blood glucose over 300 mg/dL (16.7 mmol/L) that happens 2 or more times in a row.*
*CA: 48, 447, 5, 6, 11, 1163, 1164, 34, 35, 1171, 8, 1*

[1] Blood glucose 240 - 300 mg/dL (13.3 - 16.7 mmol/L) AND [2] does not use insulin (e.g., not insulin-dependent; most people with type 2 diabetes)

*Reason: Hyperglycemia.*
*CA: 48, 5, 6, 11, 1163, 1164, 34, 35, 1171, 33, 8, 1*

Blood glucose 70-240 mg/dL (3.9 -13.3 mmol/L)

*CA: 48, 5, 22, 1164, 34, 35, 1163, 1171, 1170, 33, 7, 1*

Sick day rules for people with diabetes who use insulin, questions about

*CA: 48, 1165, 28, 29, 30, 1167, 1168, 1178, 1172, 8, 1*

Sick day rules for people with diabetes who do not use insulin, questions about

*CA: 48, 1166, 1167, 1169, 1178, 1172, 8, 1*

## CARE ADVICE (CA) -

1. **Care Advice** given per Diabetes - High Blood Sugar (Adult) guideline.

4. **Continue Insulin:**
   - Follow the *insulin dosing plan* recommended by your doctor (or NP/PA).
   - IF your doctor has given you instructions to take extra rapid-acting (e.g., lispro, aspart) or short acting (regular) insulin when your blood sugar is high, give yourself the insulin dose your doctor has recommended.

5. **High Blood Sugar (Hyperglycemia):**
   - *Definition:* Fasting blood glucose of 126 mg/dL (7.0 mmol/L) or above, or random blood glucose over 200 mg/dL (11.1 mmol/L).
   - *Symptoms of mildly high blood sugar:* Frequent urination (peeing), increased thirst, fatigue, blurred vision.
   - *Symptoms of severely high blood sugar:* Confusion and coma.
   - *Contributing factors:* Not taking medicines as prescribed, eating a high calorie or high sugar diet, taking steroid medicines, and infection.

6. **Treatment - Liquids:**
   - Drink at least one glass (8 oz; 240 ml) of water per hour for the next 4 hours. *Reason:* Adequate hydration will help lower blood sugar.
   - Try to drink 6 to 8 glasses of water each day.

7. **Call Back If:**
   - Urine ketones are moderate or large (or more than 1+); if you check blood ketones, when blood ketone test is over 1.4 mmol/L
   - Blood glucose over 300 mg/dL (16.7 mmol/L) two or more times in a row
   - You become worse

8. **Call Back If:**
   - Blood glucose over 300 mg/dL (16.7 mmol/L), two or more times in a row.
   - Urine ketones become moderate or large (or more than 1+); if you check blood ketones, blood ketone test is over 1.4 mmol/L
   - Vomiting lasting over 4 hours or unable to drink any fluids
   - Rapid breathing occurs
   - You have more questions
   - You become worse

9. **Call Back If:**
   - You have more questions.
   - You become worse

11. **Continue Diabetes Pills:**
   - Continue taking your diabetes pills.

22. **General Diabetes Advice:**
   - *Medical check-ups:* See your doctor (or NP/PA) regularly.
   - *Testing:* Test your blood glucose. Follow your doctor's advice regarding how often.
   - *Record-keeping:* Keep a daily log of how you are feeling and the results of your tests.
   - *Medicines:* Take your diabetes medicines as prescribed.
   - *Eat healthy:* Work with your doctor or a dietician to develop healthy meal plan.
   - *Exercise:* Staying physically active is important. 30 minutes of daily activity is best.
   - *Eye exam:* Get an eye exam once a year by an eye doctor (ophthalmologist).
   - *Feet:* Keep your feet clean and dry. Check your feet daily for sores.

24. **Recheck:**
   - If you have not done so already, recheck your blood sugar to make certain that it is really that high.

25. **Drink Extra Fluids:**
   - Drink at least one glass (8 oz; 240 ml) of water per hour for the next 4 hours.
   - Good hydration will help lower the blood sugar.

27. **Call Back If:**
   - Vomiting occurs
   - Rapid breathing occurs
   - You become worse

28. **Insulin - Do Not Stop Taking It:**

- If you are supposed to be using insulin, do not stop using it.
- During an illness you may need even more insulin than usual.

29. **Note to Triager - Supplemental Insulin for Hyperglycemia:**

- **Note To Triager:** Supplemental rapid-acting (e.g., lispro, aspart) or short-acting (regular) insulin is sometimes needed in addition to usual insulin doses for treating hyperglycemia. Most patients should already have been given 'sick day rules' education by their doctor and instructions on when to use supplemental insulin.
- **Total Daily Dose** (TDD): The TDD is calculated by adding up ALL insulin administered during a Usual day.
- **Typical Sick Day Insulin Supplementation - Urine Ketones Negative Or Trace:** If glucose is 80-240 mg/dL (4.4-13.3 mmol/L), give usual dose. If glucose is 250-400 mg/dL (13.9-22.2 mmol/L), supplemental insulin dosage is 10% of TDD. If glucose is over 400 mg/dL (22 mmol/l), supplemental insulin dosage is 20% of TDD.
- **Typical Sick Day Insulin Supplementation - Urine Ketones Moderate:** If glucose is 80-240 mg/dL (4.4-13.3 mmol/L), give usual dose. If glucose is 250-400 mg/dL (13.9-22.2 mmol/L), supplemental insulin dosage is 20% of TDD. If glucose is over 400 mg/dL (22.2 mmol/l), supplemental insulin dosage is 20% of TDD.
- **The triage nurse must discuss all insulin dosing with the doctor before giving insulin dosing recommendations to the patient**. In most cases it is best if the doctor talks directly with the patient.

30. **Note to Triager - Decreased Insulin for Hypoglycemia:**

- Decreased insulin dosing is sometimes needed in people with a blood glucose under 80 mg/dL (4.4 mmol/L), especially if there is decreased oral intake.
- **Typical Sick Day Insulin Reduction:** For blood glucose under 80 mg/dL (4.4 mmol/L) and there is decreased oral intake: Do not give rapid-acting (e.g., lispro, aspart) or short-acting (regular) insulin. Reduce intermediate-acting insulin (e.g., NPH, Lente, 70/30) and long-acting insulin (e.g., glargine, degludec, detemir) by 20%.
- **The triage nurse must discuss all insulin dosing with the doctor (or NP/PA) before giving insulin dosing recommendations to the patient**. In most cases it is best if the doctor talks directly with the patient.

33. **Expected Course:**

- *You should call back in 3 to 5 days if any of the following happen.*
- Your blood sugar continues to get above 240 mg/dL (13.3 mmol/L).
- Your blood sugar continues to be higher than your daily glucose goals set by you and your doctor (or NP/PA).
- It has been longer than 6 months since you had a Hemoglobin A1C test.

34. **Daily Blood Glucose Goals - Gestational Diabetes in Pregnancy (Diabetes that Started in Pregnancy):**

- You and your doctor (or NP/PA) should set your blood glucose goals. Typical goals for most pregnant women who perform daily finger-stick blood testing at home are as shown below.
- *Pre-prandial (before meal)*: less than 95 mg/dL (5.3 mmol/L)
- *Post-prandial:* less than 140 mg/dL (7.8 mmol/L) one-hour after eating OR less than 120 mg/dL (6.7 mmol/L) two-hours after eating.

35. **Daily Blood Glucose Goals - Type 1 or 2 Diabetes in Pregnancy (Diabetes that Started before Pregnancy):**

- You and your doctor (or NP/PA) should set your blood glucose goals. Typical goals for most pregnant women who perform daily finger-stick blood testing at home are as shown below.
- *Fasting:* <90 mg/dL (5.0 mmol/L)
- *One-Hour post-prandial (after a meal):* less than 130-140 mg/dL (7.2-7.8 mmol/L)
- *Two-Hour post-prandial (after a meal):* less than 120 mg/dL (6.7 mmol/L)

40. **Call EMS 911 Now:**

- Immediate medical attention is needed. You need to hang up and call 911 (or an ambulance).
- *Triager Discretion:* I'll call you back in a few minutes to be sure you were able to reach them.

41. **Go to ED Now:**

- You need to be seen in the Emergency Department.
- Go to the ED at _____ Hospital.
- Leave now. Drive carefully.

42. **Go to ED Now (or PCP Triage):**

- **If No PCP (Primary Care Provider) Second-Level Triage:** You need to be seen within the next hour. Go to the ED/UCC at _____ Hospital. Leave as soon as you can.
- **If PCP Second-Level Triage Required:** You may need to be seen. Your doctor (or NP/PA) will want to talk with you to decide what's best. I'll page the provider on-call now. If you haven't heard from the provider (or me) within 30 minutes, go directly to the ED/UCC at _____ Hospital.

43. **See HCP (or PCP Triage) Within 4 Hours:**

• **If Office Will Be Open:** You need to be seen within the next 3 or 4 hours. Call your doctor (or NP/PA) now or as soon as the office opens.

• **If Office Will Be Closed and No PCP (Primary Care Provider) Second-Level Triage:** You need to be seen within the next 3 or 4 hours. A nearby Urgent Care Center (UCC) is often a good source of care. Another choice is to go to the ED. Go sooner if you become worse.

• **If Office Will Be Closed and PCP Second-Level Triage Required:** You may need to be seen. Your doctor (or NP/PA) will want to talk with you to decide what's best. I'll page the on-call provider now. If you haven't heard from the provider (or me) within 30 minutes, call again. **Note:** If on-call provider can't be reached, send to UCC or ED.

**Note to Triager:**

• Use nurse judgment to select the most appropriate source of care.

• Consider both the urgency of the patient's symptoms AND what resources may be needed to evaluate and manage the patient.

**Sources of Care:**

• **ED:** Patients who may need surgery or hospital admission need to be sent to an ED. So do most patients with serious symptoms or complex medical problems.

• **UCC:** Some UCCs can manage patients who are stable and have less serious symptoms (e.g., minor illnesses and injuries). The triager must know the UCC capabilities before sending a patient there. If unsure, call ahead.

• **OFFICE:** If patient sounds stable and not seriously ill, consult PCP (or follow your office policy) to see if patient can be seen NOW in office.

44. **See PCP Within 24 Hours:**

• **If Office Will Be Open:** You need to be examined within the next 24 hours. Call your doctor (or NP/PA) when the office opens and make an appointment.

• **If Office Will Be Closed:** You need to be seen within the next 24 hours. A clinic or an urgent care center is often a good source of care if your doctor's office is closed or you can't get an appointment.

• **If Patient Has No PCP:** Refer patient to a clinic or urgent care center. Also try to help caller find a PCP for future care.

**Note to Triager:**

• Use nurse judgment to select the most appropriate source of care.

• Consider both the urgency of the patient's symptoms AND what resources may be needed to evaluate and manage the patient.

45. **See PCP Within 3 Days:**

• You need to be seen within 2 or 3 days.

• **PCP Visit:** Call your doctor (or NP/PA) during regular office hours and make an appointment. A clinic or urgent care center are good places to go for care if your doctor's office is closed or you can't get an appointment. **Note:** If office will be open tomorrow, tell caller to call then, not in 3 days.

• **If Patient Has No PCP:** A clinic or urgent care center are good places to go for care if you do not have a primary care provider. **Note:** Try to help caller find a PCP for future care (e.g., use a physician referral line). Having a PCP or "medical home" means better long-term care.

46. **See PCP Within 2 Weeks:**
- You need to be seen for this ongoing problem within the next 2 weeks.
- **PCP Visit:** Call your doctor (or NP/PA) during regular office hours and make an appointment.
- **If Patient Has No PCP:** A primary care clinic is where you need to be seen for chronic health problems. **Note:** Try to help caller find a PCP (e.g., use a physician referral line). Having a PCP or "medical home" means better long-term care.

47. **Home Care - Information or Advice Only Call.**

48. **Home Care:**
- You should be able to treat this at home.

49. **Call PCP Now:**
- You need to discuss this with your doctor (or NP/PA).
- I'll page the on-call provider now. If you haven't heard from the provider (or me) within 30 minutes, call again.

50. **Call PCP Within 24 Hours:**
- You need to discuss this with your doctor (or NP/PA) within the next 24 hours.
- **If Office Will Be Open:** Call the office when it opens tomorrow morning.
- **If Office Will Be Closed:** I'll page the on-call provider now. **Exception:** from 9 pm to 9 am. Since this isn't urgent, we'll hold the page until morning.

51. **Call PCP When Office Is Open:**
- You need to discuss this with your doctor (or NP/PA) within the next few days.
- Call the office when it is open.

52. **Go to L&D Now:**
- You need to be seen.
- Go to the Labor and Delivery Unit or the Emergency Department at _____ Hospital.
- Leave now. Drive carefully.

80. **Another Adult Should Drive:**
- It is better and safer if another adult drives instead of you.

81. **Bring Medicines:**
- Bring a list of your current medicines when you go to the Emergency Department (ER).
- Bring the pill bottles too. This will help the doctor (or NP/PA) to make certain you are taking the right medicines and the right dose.

87. **Bring Medicines:**
- Bring a list of your current medicines when you go to see the doctor (or NP/PA).
- Bring the pill bottles too. This will help the doctor to make certain you are taking the right medicines and the right dose.

92. **Note to Triager - Driving:**

- Another adult should drive.
- Patient should not delay going to the emergency department.
- If immediate transportation is not available via car, rideshare (e.g., Lyft, Uber), or taxi, then the patient should be instructed to call EMS-911.

444. **Alternate Disposition - Call Your Diabetes Specialist Now:**

- If you have a diabetes specialist (doctor, NP, PA), call the specialist now.

445. **Alternate Disposition - Call Your Diabetes Specialist:**

- If you have a diabetes specialist (doctor, NP, PA), call the specialist in the next 24 hours.

446. **Patients with Insulin Pumps - Make Sure Your Pump Is Working:**

- Check your glucose sensor and meter to make sure they are working well.
- Have you changed your pump site and infusion set?
- Consider also calling your pump company for questions about your pump.

447. **Alternate Disposition - Call Your Diabetes Specialist:**

- If you have a diabetes specialist (doctor, NP, PA), call the specialist within the next 2 to 3 days.
- Call the office when it is open.

1002. **Fever Medicines:**

- For fevers above 101° F (38.3° C) take either acetaminophen or ibuprofen.
- They are over-the-counter (OTC) drugs that help treat both fever and pain. You can buy them at the drugstore.
- The goal of fever therapy is to bring the fever down to a comfortable level. Remember that fever medicine usually lowers fever 2 degrees F (1 - 1 1/2 degrees C).
- **Acetaminophen - Regular Strength Tylenol:** Take 650 mg (two 325 mg pills) by mouth every 4 to 6 hours as needed. Each Regular Strength Tylenol pill has 325 mg of acetaminophen. The most you should take is 10 pills a day (3,250 mg total). *Note:* In Canada, the maximum is 12 pills a day (3,900 mg total).
- **Acetaminophen - Extra Strength Tylenol:** Take 1,000 mg (two 500 mg pills) every 6 to 8 hours as needed. Each Extra Strength Tylenol pill has 500 mg of acetaminophen. The most you should take is 6 pills a day (3,000 mg total). *Note:* In Canada, the maximum is 8 pills a day (4,000 mg total).
- **Ibuprofen (e.g., Motrin, Advil):** Take 400 mg (two 200 mg pills) by mouth every 6 hours. The most you should take is 6 pills a day (1,200 mg total).

1005. **Fever Medicines - Extra Notes and Warnings:**

- Follow these dosing instructions unless your doctor (or NP/PA) has told you to take a different dose.
- Acetaminophen is thought to be safer than ibuprofen or naproxen in people over 65 years old. Acetaminophen is in many OTC and prescription medicines. It might be in more than one medicine that you are taking. You need to be careful and not take an overdose. An acetaminophen overdose can hurt the liver.
- McNeil, the company that makes Tylenol, has different maximum dosage instructions for Tylenol in Canada than in the United States. Bayer, the company that makes Aleve, has different dosage maximum instructions for Aleve in Canada and the United States.
- **Caution:** Do not take acetaminophen if you have liver disease.
- **Caution:** Do not take ibuprofen or naproxen if you have stomach problems, kidney disease, are pregnant, or have been told by your doctor to avoid this type of anti-inflammatory drug. Do not take ibuprofen or naproxen for more than 7 days without consulting your doctor. If you take blood thinners, ibuprofen and naproxen can increase the risk of bleeding.
- *Before taking any medicine, read all the instructions on the package.*

1011. **First Aid Advice If Glucose Level Is Low or Unknown - Glucose by Mouth:**

- Give sugar (15 to 20 grams glucose) by mouth **if the patient is conscious**, able to follow commands, and able to swallow.
- **Sources of Glucose:** Each of the following has the right amount of sugar: **glucose tablets** (3-4 tablets; 15-20 grams); glucose gel (15-20 grams); fruit juice or non-diet soda (1/2 cup; 120 ml); milk (1 cup; 240 ml); pre-packaged juice box (1 box); Skittles candy (15); table sugar or honey (3 teaspoons; 15 ml).
- **Expected Course:** Symptoms should begin to improve within 5 to 10 minutes. It may take 15 to 20 minutes for symptoms to go away completely.
- **Repeat** the glucose if not better within 15 to 20 minutes.

1012. **First Aid Advice If Glucose Level is Low or Unknown - Glucagon:**

- If the patient has glucagon for hypoglycemic emergencies, tell the caller to give the glucagon now.
- **Instructions:** Tell the caller to follow the instructions in the glucagon kit. Inject it IM into the upper outer thigh. The adult dosage is 1 mg.
- **Expected Course:** Symptoms should begin to improve within 5 to 10 minutes. It may take 15 to 20 minutes for symptoms to go away completely.
- **Call EMS 911:** Call 911 right after giving glucagon or have another person call while you are giving glucagon.

1013. **Note to Triager - First Aid Advice - Glucose or Glucagon:**

- If the blood glucose level is low or unknown, direct the caller to give **Glucose** or **Glucagon**.
- Hypoglycemia is a serious emergency. *Reason:* Severe hypoglycemia can cause brain damage.
- Hyperglycemia is not as serious a condition.

1014. **Note to Triager - First Aid Advice - Glucagon for Hypoglycemia:**

- If the blood glucose level is low or unknown, direct the caller to give **Glucagon**.
- Hypoglycemia is a serious emergency. *Reason:* severe hypoglycemia can cause brain damage.
- Hyperglycemia is not as serious a condition.

1163. **Measure and Record Your Blood Glucose:**

- Measure your blood glucose before breakfast and before going to bed.
- Keep a log and show it to your doctor (or NP/PA) at your next office visit.

1164. **Daily Blood Glucose Goals:**

- You and your doctor (or NP/PA) should decide upon your blood glucose goals. Typical goals for most non-pregnant adults who perform daily finger-stick blood glucose testing at home are as follows.
- *Pre-prandial (before meal)*: 80-130 mg/dL (4.4-7.2 mmol/L)
- *Post-prandial (1-2 hours after a meal)*: Less than 180 mg/dL (10 mmol/L)
- *A1C Level:* Less than 7%

1165. **Sick Day Rules - For Patients Who Take Insulin:**

- *Do not stop taking your insulin*. During illness the blood sugar often rises.
- *Check your blood glucose every 3 to 4 hours*. Write down the results.
- *Check for ketones (urine or blood) every 3 to 4 hours*. Ketones can be a sign of dehydration or poorly controlled diabetes.
- *Drink liquids*. It is important to prevent dehydration. Drink small amounts frequently.
- *Avoid hypoglycemia*. If your appetite is bad, you are not eating solid food, and your blood glucose is less than 200 mg /dL (11.1 mmol/L), then you should be drinking sugar-containing liquids. Examples are soda, clear juices, and sports drinks.

1166. **Sick Day Rules - For People with Diabetes Who Do Not Use Insulin:**

- Do not stop taking your diabetes pills. *Reason:* During illness the blood sugar often rises.
- Check your blood glucose every 3 to 4 hours. Write down the results.

1167. **Sick Day Rules - Diet:**

- *Appetite OK, minimal nausea:* Continue your normal meal plan. Avoid spicy or greasy foods.
- *Appetite fair, moderate nausea:* Eat a bland diet. Try small amounts of food 6 to 8 times a day. Take 1/2 to 1 cup (120 - 240 ml) of food or liquids every 1 to 2 hours.
- *Appetite poor, severe nausea:* Take a liquid diet. Sip 1 tablespoon (15 ml) of liquid every 10 minutes. Examples include broth, juice, sport drinks, and soft drinks.
- *Gradually start foods again when you start to feel better.*

1168. **Sick Day Rules - Liquids:**

- Drink more fluids, at least 8 to 10 glasses daily (8 oz or 240 ml each glass).
- You need even more fluids if you have fever, vomiting or diarrhea.

1169. **Sick Day Rules - Liquids:**
- Drink more fluids, at least 8 to 10 glasses daily (8 oz or 240 ml each glass).
- You need even more fluids if you have fever, vomiting or diarrhea.
- *If glucose over 200 mg/dL (11.1 mmol/L):* Drink sugar-free liquids (e.g., water).
- *If glucose under 120 mg/dL (6.5 mmol/L):* Drink sugar-containing liquids (e.g., sports drinks, juice, soft drinks).
- *If glucose is between 120 and 200 mg/dL (6.7-11.1 mmol/l):* Alternate the 2 types of fluids.

1170. **Resources:**
- Reliable educational information is available from the following organizations.
- *American Diabetes Association:* 1-800-DIABETES. *Website:* https://www.diabetes.org.
- *Canadian Diabetes Association:* 1-800-226-8464. *Website:* https://www.diabetes.ca.
- *U.S. National Diabetes Education Program:* 1-800-438-5383. *Website:* https://ndep.nih.gov/.

1171. **Ketone Testing:**
- If you use insulin, you should have ketone test strips at home.
- You should check for ketones when you are sick or your blood glucose is over 240 mg/dL (13.3 mmol/L).
- There are two ways a person can test for ketones:
- **... Urine Ketone Test:** Most people with diabetes use this test. Kits are available at your local drugstore.
- **... Blood Ketone Test:** Some people have special meters that allow them to test for blood ketones.

1172. **Check for Ketones:**
- You should check your ketones when you are sick or your blood glucose is over 240 mg/dL (13.3 mmol/L).
- There are two ways a person can test for ketones.
- **Urine Ketone Test:** Most people with diabetes use this test. Urine test kits are available at your local drugstore.
- **Blood Ketone Test:** Some people have special meters to test for blood ketones.

1178. **Check Blood Glucose:**
- When you are ill, you should measure your blood glucose every 3 to 4 hours.
- Write down the results. Keep a log.

1620. **Alternate Disposition - Call Your Obstetrician Now:**
- If you have a OB doctor (or NP/ PA), call them now.

1621. **Alternate Disposition - Call Your Obstetrician Within 24 Hours:**
- If you have a OB doctor (or NP/ PA), talk with them within the next 24 hours.

## FIRST AID

**FIRST AID Advice for Hypoglycemia -- Glucose**

*... IF BLOOD GLUCOSE is 70 mg/dL (3.9 mmol/L) or below or UNKNOWN, for a person who is conscious, able to follow commands, and able to swallow:*

- Give sugar (15-20 grams glucose) by mouth.
- Each of the following has the right amount of sugar: **glucose tablets** (3-4 tablets; 15-20 grams); glucose gel (15-20 grams); fruit juice or non-diet soda (1/2 cup; 120 ml); milk (1 cup; 240 ml); pre-packaged juice box (1 box); Skittles candy (15); table sugar or honey (3 teaspoons; 15 ml).
- Symptoms should begin to improve within 5-10 minutes. It may take 15-20 minutes for symptoms to go away completely.
- **Repeat** if not better within 15-20 minutes.

**FIRST AID Advice for Hypoglycemia -- Glucagon**

*... IF BLOOD GLUCOSE is 70 mg/dL (3.9 mmol/L) or below or UNKNOWN (pending EMS arrival). Glucagon is preferred if patient is unconscious or unable to swallow:*

- If family or caregiver has glucagon for hypoglycemic emergencies AND the caller knows how to use it, instruct the caller to give the glucagon now.
- Inject it IM into the upper outer thigh.
- Adult dosage is 1 mg.
- Glucagon can be used in unconscious patients.
- Symptoms should begin to improve within 5-10 minutes. Full recovery may take 10-15 minutes.

## BACKGROUND INFORMATION

**Causes of Hyperglycemia (High Blood Sugar)**

There are a number of other factors that can cause or increase the likelihood of hyperglycemia.

- Infection
- Malfunctioning insulin pump
- Noncompliance with diabetes diet
- Noncompliance with taking insulin or other diabetes medicines. Forgetting to take insulin is the most common cause.
- Steroid medications (e.g., Prednisone, Medrol dose pack)
- *... or a combination of these factors.*

**Diabetes Mellitus**

Diabetes mellitus is an endocrine condition in which patients have elevated blood glucose levels (hyperglycemia). Insulin is a hormone produced by the pancreas.

The classic symptoms of untreated or undertreated diabetes are:

- Frequent urination (polyuria),
- Polydipsia (excessive thirst), and
- Involuntary weight loss.

There are four different classes of diabetes mellitus:

- Type 1 diabetes
- Type 2 diabetes

- Gestational diabetes
- Specific types of diabetes due to other causes

What is the role of insulin?

- Insulin helps the body process and store the glucose it gets from food.
- Eating food makes the blood glucose rise and insulin makes the blood glucose fall.

**Type 1 Diabetes**

- *Other names:* insulin dependent diabetes mellitus (IDDM), juvenile onset diabetes.
- *Physiology:* There is no production of insulin by the body.
- *Ketosis-prone:* Patients with this type of diabetes are ketosis-prone. This means that if they do not receive daily insulin shots, their bodies break down fats and produce ketones. The ketones spill into the urine and can be measured. Patients with type I diabetes are at risk for developing Diabetic KetoAcidosis (DKA), a life-threatening condition.
- *Onset:* It most commonly first appears in childhood or adolescence. Approximately 10% of people with diabetes are type 1.
- *Treatment:* Subcutaneous insulin is required and needs to be given a least once daily. Patients striving for tighter control of their blood glucose will take insulin more often than once a day. Recommended therapy for type 1 diabetes includes: *1*) use of multiple-dose insulin injections (3–4 injections per day) and *2*) matching of mealtime (prandial) insulin to carbohydrate intake, before meal blood glucose reading, and anticipated exercise.

**Type 2 Diabetes**

- *Other names:* Non-Insulin Dependent Diabetes Mellitus (NIDDM), Adult-Onset Diabetes
- *Physiology:* There is decreased insulin production and decreased sensitivity to insulin.
- *Not ketosis-prone:* These patients are not prone to ketosis. DKA rarely occurs.
- *Onset:* It more commonly develops in elderly and overweight adults.
- *Treatment:* The initial and most important treatments are exercise and weight loss. When these measures fail, oral medicines (e.g., metformin) can be prescribed. These medicines help the body make more insulin or use the insulin more effectively. Occasionally patients require insulin therapy.
- *Diagnosis:* Probably the best way to diagnose diabetes is an A1C test. A value of 6.5% or above indicates diabetes. There are two other tests that have long been used for diagnosing diabetes: a fasting plasma glucose (FPG) of 126 mg/dL (7.0 mmol/L) or above and a 2-hour oral glucose tolerance test (OGTT) with a glucose of 200 mg/dL (11.1 mmol/L) or above.

**Gestational Diabetes**

Gestational diabetes is diabetes that is found for the first time when a woman is pregnant.

- *Other names:* Pregnancy-induced diabetes
- *Physiology:* In gestational diabetes, the body is not making sufficient insulin to keep pace with the weight gain and other hormonal changes of pregnancy.
- *Not ketosis-prone:* These patients are not prone to ketosis. DKA rarely occurs.
- *Onset:* It occurs during pregnancy.
- *Treatment:* A meal plan and regular physical activity are important. If these measures fail, diabetes medicine (usually insulin) may be prescribed.

During pregnancy, tighter blood glucose control is needed because of possible neonatal complications associated with hyperglycemia.

**Diabetic Ketoacidosis (DKA)**

- *Definition:* Blood glucose > 240 mg/dL (13.3 mmol/L) with acidosis and ketosis (urine ketones moderate to large; or blood ketones > 1.4 mmol/L)
- *Symptoms of DKA:* In addition to symptoms of hyperglycemia, fruity odor on breath, vomiting, rapid/deep breathing, confusion, and coma.
- *Causes:* Poor compliance or inadequate use of insulin in type 1 diabetes, infections.

**Ketone Testing**

People with diabetes who take insulin should test for ketones when their blood sugar is more than 240 mg/dL (13.3 mmol/L). They should also check for ketones when they are sick or have symptoms of ketoacidosis (vomiting, fruity breath, or rapid breathing). Detecting ketosis early is important in order to help prevent life-threatening diabetic ketoacidosis.

There are now two ways patients can test for ketones at home.

- **Urine Ketone Tests:** Many patients test for urine ketones (urine acetoacetate) by doing a urine ketone test. Testing kits are available at local drugstores. The results indicate the amount of urine ketones as small, moderate, or large. Moderate to large amount ketones indicate ketosis.
- **Blood Ketone Tests:** Some blood glucose test meters now allow the patient to also test for blood ketones (blood β-hydroxybutyrate) at the same time. The blood ketone test does require a different strip made just for ketone tests. Blood ketone tests may detect ketones a bit sooner than urine ketone test. The blood ketone tests give the patient a number reading. A number below 0.6 mmol/L is considered normal. Numbers between 0.6 to 1.4 mmol/L means ketosis is developing and the patient should call their doctor for further instructions. Numbers more than 1.4 mmol/L means ketosis is concerning and patients should call their doctor (or NP/PA) or seek medical care now.

**Types of Insulin**

There are different types of insulin. They vary in how quickly they start to work, when they peak, and how long they last.

- *Rapid-acting* (Humalog/lispro, NovoLog/aspart, Apidra/gluisine): onset 5-15 minutes; peaks 30-90 minutes; lasts 4-6 hours.
- *Short-acting (*Regular, Humulin R, Novolin R): onset 30-60 minutes; peaks 2-3 hours; lasts 5-8 hours.
- *Intermediate-acting* (NPH, Lente, Humulin N, Humulin L, Novolin N, Novolin L): onset 2-4 hours; peaks 4-12 hours; lasts 10-18 hours.
- *Long-acting* (Lantus/glargine, Levemir/detemir): onset 2-4 hours; no true peak; lasts 18-24 hours.
- *Newer long-acting insulins* (Tresiba/degludec, Basaglar/glargine, Toujeo/glargine): last more than 24 hours.
- *Pre-mixed* (Humulin 70/30, Humulin 50/50, Humalog mix, NovoLog mix): 2 peaks; lasts 10-16 hours; depends on mixture.
- *Inhaled* (Afrezza): onset 12-15 minutes; peaks 35-55 minutes; lasts 3 hours.

**Insulin Routines**

Insulin is required for all people with type 1 diabetes. It is sometimes needed for people with type 2 diabetes.

- *Insulin Injections:* Once daily long-acting insulin works by providing the basal (baseline) level of insulin the body needs all day long. It does not cover the extra insulin needed when a person eats meals. It may be used alone in patients with type 2 diabetes. Patients with type 1 diabetes often need a combination of insulin types (shorter and longer-acting) and may need 3 to 4 injections per day.

• *Continuous subcutaneous insulin infusion*

People can take insulin in different ways:

• Injection or shot (needle and syringe)
• Insulin pen
• Insulin pump

An inhaled form of insulin (Arezza) has recently been developed.

**Types of Oral Medicines**

There are many different types of oral medicines (pills) for treating diabetes.

• *Alpha-glucosidase inhibitors:* Examples include acarbose (Precose, Glucobay) and miglitol (Glyset).
• *Biguanides:* Examples include metformin (Glucophage, Glumetza, Fortamet, generics). Metformin is the preferred first drug to use in people with type 2 diabetes.
• *DPP-4 Inhibitors:* Examples include Sitagliptin (Januvia), saxagliptin (Onglyza), linagliptin (Tradjenta), and alogliptin (Nesina).
• *GLP-1 Agents:* An example is semaglutide (Rybelsus).
• *Meglitinides:* Examples include repaglinide (Prandin; Gluconorm available in Canada) and nateglinide (Starlix).
• *SGLT2 Inhibitors:* Examples are canagliflozin (Invokana), dapagliflozin (Farxiga), empagliflozin (Jardiance). SGLT2 inhibitors increase the risk of DKA. SGLT2 inhibitors are associated with Euglycemic DKA (i.e., DKA with normal or near normal glucose levels).
• *Sulfonylureas:* Examples include glyburide (Micronase, DiaBeta, generics), glipizide (Glucotrol, Glucotrol XL, generics), gliclazide (Diamicron, generics), and glimepiride (Amaryl).
• *Thiazolidinediones:* Examples include rosiglitazone (Avandia) and pioglitazone (Actos).

**Types of Non-insulin Injected Medicines**

This is a relatively new type of medicine used to treat diabetes.

• *GLP1 Agonists:* Examples include liraglutide (Victoza), dulaglutide (Trulicity), semaglutide (Ozempic), exenatide (Bydureon, Byetta).

**Goals for Diabetes Management**

Goals should be individualized based upon: age/life expectancy, duration of diabetes, comorbid conditions, hypoglycemic unawareness, history of severe hypoglycemic reactions, pregnancy, and other individual considerations. *Internet Resource:* ADA Standards of Medical Care in Diabetes 2016; available at: https://care.diabetesjournals.org/content/39/Supplement_1

Depending on the patient, the **blood glucose** should be measured 1 to 3 times per day. The ADA recommends the following blood glucose goals:

• *Pre-prandial (before meal):* 80-130 mg/dL (4.4-7.2 mmol/L)
• *Post-prandial (1-2 hours after a meal):* Less than 180 mg/dL (10 mmol/L)

Gestational diabetes has different glucose targets than diabetes in non-pregnant people.

• *Fasting glucose goal:* Less than 95 mg/dL (5.3 mmol/L).
• *Post-prandial (2 hours after a meal):* Less than 120 mg/dL (6.7 mmol/L)

The **glycosylated hemoglobin (HbA1c or A1C)** provides a good estimate of how well a patient has managed their diabetes during the past 2-3 months. The HbA1C is the primary goal for diabetes management. Depending on the patient, it should be measured 2-4 times a year. With good diabetes management, the HbA1c goes down. With poor management it goes up. In general, the higher the HbA1c, the greater the risk of the long-term diabetes complications.

What is the target level for HbA1c?

- The American Association of Clinical Endocrinologists (AACE) and the American College of Endocrinology (ACE) recommend a level of less than 6.5%.
- The American Diabetes Association (ADA) recommends a goal of less than 7.0% for non-pregnant adults.
- The Canadian Diabetes Association also recommends a goal of less than 7.0%.
- The United Kingdom NICE guidelines recommend a level of less than 6.5%.

Less stringent HbA1c goals (less than 8%) may be appropriate for:

- Patients at risk of severe hypoglycemia, or
- Who have limited life expectancy, or
- Who already have serious complications from diabetes

**Long-Term Complications of Diabetes Mellitus**

- Eye disease (e.g., retinopathy): Diabetes is the leading cause of blindness.
- Heart disease (e.g., coronary heart disease, myocardial infarction)
- Kidney disease (e.g., renal failure, proteinuria)
- Nerve disease (e.g., peripheral and autonomic neuropathy)
- Stroke

**Converting Glucose Levels: MG/DL and MMOL/L**

- In the United State glucose is typically measured using the units **mg/dL**. Nearly every country in the world (including Canada) measures glucose levels using the units **mmol/L**.
- To convert mmol/L of glucose to mg/dL, multiply by 18.
- To convert mg/dL of glucose to mmol/L, divide by 18 or multiply by 0.055.

**Screening for Diabetes**

- **Hemoglobin A1c:** < 5.7 (Normal); 5.7 - 6.4 (Impaired Fasting Glucose); > 6.4 (Type 2 Diabetes)
- **Fasting Glucose mg/dL:** < 100 (Normal); 100 - 125 (Impaired Fasting Glucose); > 125 (Type 2 Diabetes)
- **Fasting Glucose mmol/L:** < 5.6 (Normal); 5.6 - 6.9 (Impaired Fasting Glucose); > 6.9 (Type 2 Diabetes)

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## SEARCH WORDS

BLOOD GLUCOSE
BLOOD KETONES
BLOOD SUGAR
COMA
DIABETES
DIABETES MELLITUS
DIABETIC
DKA
DM
EXUBERA
GLUCOSE
HIGH BLOOD SUGAR
HYPERGLYCEMIA
IDDM
INSULIN
KETONE
KETONES
LIGHTHEADED
LIGHTHEADEDNESS
NIDDM
SICK DAY
SICK RULE
SICK RULES
SUGAR

SUGARS
URINE KETONE
URINE KETONES
WEAK
WEAKNESS

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