



COMMONWEALTH of VIRGINIA

DEPARTMENT OF BEHAVIORAL HEALTH AND DEVELOPMENTAL SERVICES

Post Office Box 1797
Richmond, Virginia 23218-1797

Nelson Smith
Commissioner

Telephone (804) 786-3921
Fax (804) 371-6638
www.dbhds.virginia.gov

Office of Integrated Health Health & Safety Alert/Information

Part 1: Diabetes Overview Health & Safety Alert

Diabetes Introduction

Diabetes is a chronic (long-term) medical disorder in which the pancreas either does not produce the hormone insulin, or the insulin it produces, cannot be used by the body efficiently, resulting in an increased amount of glucose (sugar) in the blood stream. When food is digested, it is broken down into sugars called glucose in the stomach. Insulin, (the hormone produced by the pancreas), acts like a key to unlock the cell in order for glucose to enter cells and produce energy (Figure 1).

Maintaining blood sugar levels within the normal range is a balancing act a healthy well-functioning body accomplishes on a daily basis. However, individuals who have diabetes are unable to maintain their blood sugar levels within the normal limits independently and therefore must rely on medications, insulin and diet modifications to do so. The normal range for glucose in the blood (before meals) should be between 80 to 130 milligrams per deciliter [mg/dL] (10).

When glucose levels increase in the blood (above normal levels), the result is called hyperglycemia (Figure 2). When the cells are not able to utilize the insulin available, glucose stays in the blood stream and blood sugar levels will continue to increase. Eventually, cells become resistant to the effects of insulin, resulting in blood sugar levels remaining high for extended periods of time. Prolonged hyperglycemia causes damage to cells in the blood vessels, heart, kidneys, eyes and nerves.

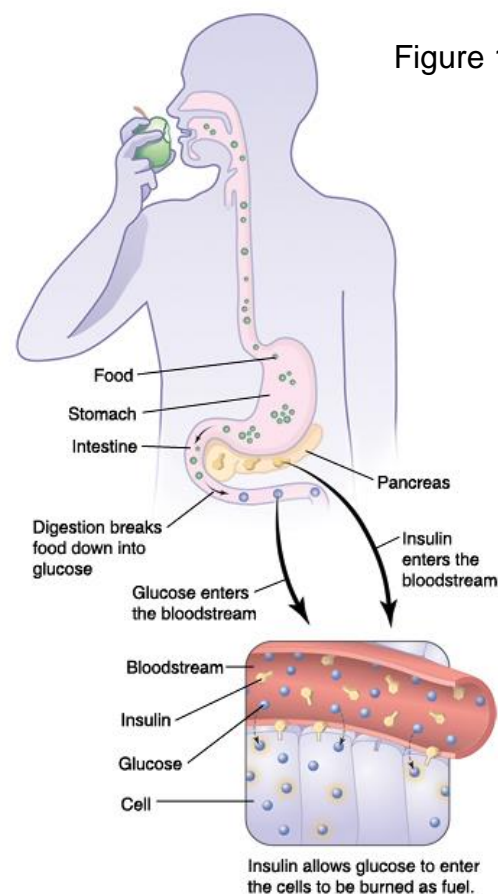


Figure 1

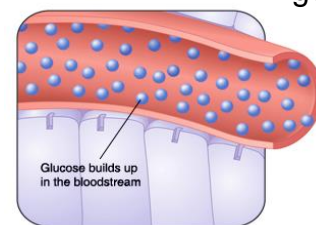


Figure 2

Balancing and monitoring glucose levels is an ongoing requirement for individuals diagnosed with diabetes. One of the most common ways of monitoring blood sugar levels is with a finger stick. The table below (Figure 3) shows various glucose levels and suggested actions for each. Low blood sugar (hypoglycemia) occurs when glucose levels are 70 mg/dL or less, and high blood sugar (hyperglycemia) occurs when glucose levels above 180 mg/dL or greater.

Level	mg/dL	mmol/L	Risk	Suggested action
Dangerously high	315+	17.4	Very high	Seek immediate medical attention
High	280	15.6	High	Seek medical attention
High	250	13.7	High	Seek medical attention
High	215	11	High	Seek medical attention
Borderline	180	10	Medium	Consult your doctor
Borderline	150	8.2	Medium	Consult your doctor
Borderline	120	7	Medium	Consult your doctor
Normal	108	6	No risk	No action needed
Normal	72	4	No risk	No action needed
Low	70	3.9	Medium	Consult your doctor
Dangerously low	50	2.8	High	Seek medical attention

Figure 3

Diabetes is a complicated disease and even well managed diabetes takes a toll on the body. Poorly managed diabetes can have debilitating consequences on the body, and can be fatal. Secondary medical conditions such as hypertension, elevated cholesterol, and elevated triglycerides (in conjunction with diabetes) dramatically increases an individual's risk for heart disease, peripheral vascular disease, stroke, kidney failure, increased infections and blindness (59) (30) (4).

Prevalence

Diabetes is the seventh leading cause of death in the United States. Globally, about 1 in 11 adults have diabetes. According to the National Diabetes Statistics Report, 34.2 million Americans have been diagnosed with diabetes (4) (9) and the numbers continue to rise. Type 2 diabetes accounts for more than 90% of all diabetes diagnoses (59). The younger the age of an individual at diagnosis, the greater the financial impact on their lifetime (59). The Commonwealth of Virginia's statistics indicate 9.6% of the state's population has a diagnosis of diabetes (15).

Types of Diabetes

Pre-Diabetes

Pre-diabetes is the precursor to diabetes and occurs when blood sugar levels are above normal, but not increased enough for a diagnosis of diabetes. An estimated 1 in 3 people

in the U.S. are living with prediabetes and do not know it. The CDC estimates 88 million people in the U.S. have pre-diabetes, and more than 84% of them are unaware. People with pre-diabetes are at higher risks for developing Type 2 diabetes, heart disease, and stroke. Early detection, through regular medical exams including blood sugar testing, improved eating habits, increased physical activity, and reduced stress levels are all ways of lowering the risk of developing Type 2 diabetes (4) (6) (7) (9).

Type 1 Diabetes (Juvenile/Insulin-Dependent)

Type 1 diabetes (Figure 4) is a chronic lifelong health condition, which occurs when an individual's pancreas does not produce insulin or produces insufficient amounts of insulin. As a result, the body's immune system attacks the beta cells in the pancreas, which produce insulin.

Type 1 diabetes does not develop due to lifestyle choices (30). Some believe the cause may be due to a genetic component passed on from parents, while other researchers believe the disorder may be related to exposure to certain viruses in the environment (30). Individuals are typically diagnosed as children or teens, but some individuals are not diagnosed until adulthood. Type 1 diabetes requires daily administration of insulin for survival, along with regular monitoring of blood sugar levels (8). Individual's diagnosed with Type 1 diabetes may also have other autoimmune disorders such as Graves' disease, Hashimoto's, Addison's disease, vitiligo, celiac disease, and pernicious anemia (24).

Symptoms of Type 1 diabetes may present in children as sudden bed wetting at night, weight loss, extreme thirst and excessive drinking, tiredness, frequent illness, frequent urination, and/or urinating accidents during the day (41). An episode of ketoacidosis may be the first sign of Type 1 diabetes. Diabetic ketoacidosis develops as a result of the body's inability to metabolize glucose and other electrolytes, which causes the body to start burning stored fat as fuel. As a result, blood acids called ketones build up in an individual's bloodstream (8).

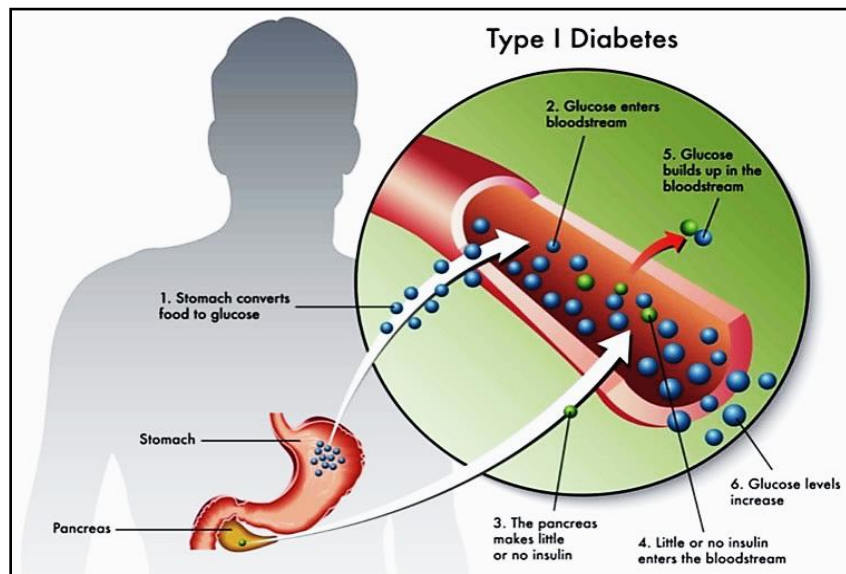


Figure 4

Type 2 Diabetes (Adult On-Set/Non-Insulin Dependent)

Type 2 diabetes (Figure 5) develops later in life, typically after the age of 45, and is a chronic health condition. Type 2 diabetes occurs when an individual's pancreas makes enough insulin, but the body is unable to effectively use the insulin it makes. Thus, insulin produced by the beta cells of the pancreas are not used efficiently by the body and/or the body becomes resistant to insulin.

Type 2 diabetes is directly related to lifestyle choices (30). Two of the primary causes of Type 2 diabetes are related to obesity (excess body weight) and lack of physical activity. Excess body weight is known to cause insulin resistance (59) (4) (5) (6). A simplified explanation is this: the body cannot make enough insulin relative to the individual's body mass. In other words, the more body mass an individual has the more insulin the individual will need to maintain glucose levels within the normal range.

The Type 2 diabetes disease process develops over many years. Symptoms can be unrecognizable until other serious health issues become apparent such as hypertension or kidney function decline. Uncontrolled Type 2 diabetes can cause heart failure, kidney failure, amputations, blindness, and death (30). It may be treated with oral medication, but in some instances, insulin is also required (4) (5) (6). Eating a well-balanced diet, and adding physical activities are both essential components to reducing the secondary health complications resulting from Type 2 diabetes (30).

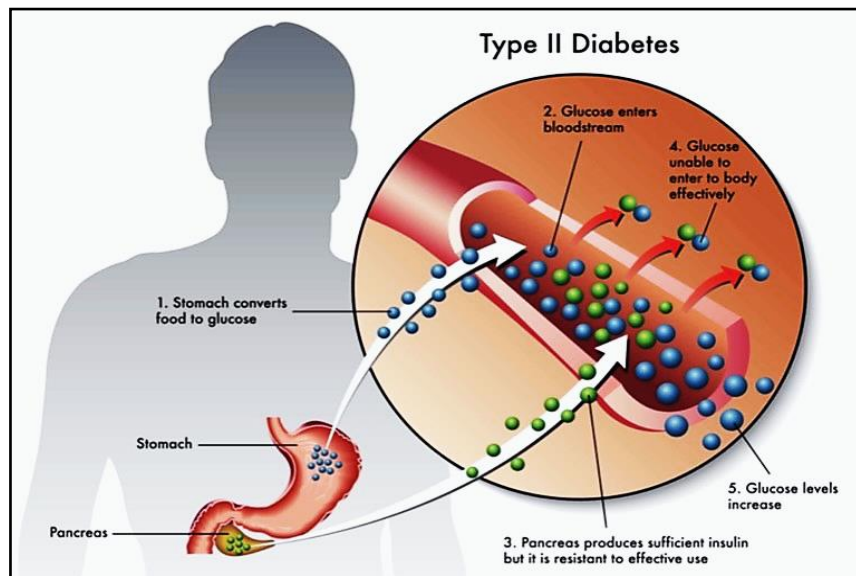


Figure 5

Gestational Diabetes

Gestational diabetes occurs during pregnancy (gestation) and may be due to changes in hormone levels, which result in insulin resistance (28). Although the cause is unknown, between 6-9% of women in the United States develop gestational diabetes while pregnant (16) (35). Gestational diabetes can result in: an increased risk for hypertension,

preeclampsia, C-section, a future diagnosis of Type 2 diabetes, pre-term birth, abnormally high birth weight (over 9 lbs.), respiratory distress syndrome, hypoglycemia (after delivery), and delivery complications for both the mother and the infant sometimes resulting in death (35).

What Factors Increase Risk for Diabetes?

Prediabetes Risk Factors

- Over the recommended Body Mass Index (BMI) (6).
- Over age 45 or older (6).
- Family members with diabetes (6).
- Reduced physical activity, (less than 3 times a week) (4) (6).
- A diagnosis of gestational diabetes during pregnancy (28) (6).
- A diagnosis of polycystic ovary syndrome (6).

Type 1 Diabetes Risk Factors

- Genetic factors such as having a parent or other close relative with Type 1 diabetes (5) (8).
- Young age (5) (8).
- In the United States Caucasians are more likely to be diagnosed with Type 1 diabetes (5).

Type 2 Diabetes Risk Factors

- Having signs and symptoms of prediabetes (28).
- Age 45 years or older (6).
- Being African American, Hispanic/Latino American, American Indian, or Pacific islanders and Asian Americans (6).
- Family history of Type 2 diabetes (28) (6).
- Obesity - People with a BMI of, (or greater than), 25 km/m² 89% are at greater risk for developing diabetes. See Figure 6 - Body Mass Index table (59).
- Sedentary lifestyle, which affects circulation of the blood in the lower limbs, resulting in peripheral neuropathy, peripheral vascular disease and foot infections leading to amputations (20).

**DEPARTMENT OF
BEHAVIORAL HEALTH AND DEVELOPMENTAL
SERVICES**

Post Office Box 1797
Richmond, Virginia 23218-1797

WEIGHT	lbs	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290
	kgs	41	45	50	54	59	64	68	73	77	82	86	91	95	100	104	109	113	118	122	127	132
HEIGHT	ft/in	cm	Underweight				Healthy				Overweight				Obese				Extremely Obese			
4'8"	142.2	20	22	25	27	29	31	34	36	38	40	43	45	47	49	52	54	56	58	61	63	65
4'9"	144.7	19	22	24	26	28	30	32	35	37	39	41	43	45	48	50	52	54	56	58	61	63
4'10"	147.3	19	21	23	25	27	29	31	33	36	38	40	42	44	46	48	50	52	54	56	59	61
4'11"	149.8	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	51	53	55	57	59
4'12"	152.4	18	20	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57
5'1"	154.9	17	19	21	23	25	26	28	30	32	34	36	38	40	42	43	45	47	49	51	53	55
5'2"	157.4	16	18	20	22	24	26	27	29	31	33	35	37	38	40	42	44	46	48	49	51	53
5'3"	160.0	16	18	19	21	23	25	27	28	30	32	34	35	37	39	41	43	44	46	48	50	51
5'4"	162.5	15	17	19	21	22	24	26	27	29	31	33	34	36	38	39	41	43	45	46	48	50
5'5"	165.1	15	17	18	20	22	23	25	27	28	30	32	33	35	37	38	40	42	43	45	47	48
5'6"	167.6	15	16	18	19	21	23	24	26	27	29	31	32	34	36	37	39	40	42	44	45	47
5'7"	170.1	14	16	17	19	20	22	24	25	27	28	30	31	33	34	36	38	39	41	42	44	45
5'8"	172.7	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	37	38	40	41	43	44
5'9"	175.2	13	15	16	18	19	21	22	24	25	27	28	30	31	33	34	35	37	38	40	41	43
5'10"	177.8	13	14	16	17	19	20	22	23	24	26	27	29	30	32	33	34	36	37	39	40	42
5'11"	180.3	13	14	15	17	18	20	21	22	24	25	27	28	29	31	32	33	35	36	38	39	40
6'0"	182.8	12	14	15	16	18	19	20	22	23	24	26	27	28	30	31	33	34	35	37	38	39
6'1"	185.4	12	13	15	16	17	18	20	21	22	24	25	26	28	29	30	32	33	34	36	37	38
6'2"	187.9	12	13	14	15	17	18	19	21	22	23	24	26	27	28	30	31	32	33	35	36	37
6'3"	190.5	11	13	14	15	16	18	19	20	21	23	24	25	26	28	29	30	31	33	34	35	36
6'4"	193.0	11	12	13	15	16	17	18	19	21	22	23	24	26	27	28	29	30	32	33	34	35
6'5"	195.5	11	12	13	14	15	17	18	19	20	21	23	24	25	26	27	28	30	31	32	33	34
6'6"	198.1	10	12	13	14	15	16	17	18	20	21	22	23	24	25	27	28	29	30	31	32	34
6'7"	200.6	10	11	12	14	15	16	17	18	19	20	21	23	24	25	26	27	28	29	30	32	33
6'8"	203.2	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	29	30	31	32
6'9"	205.7	10	11	12	13	14	15	16	17	18	19	20	21	23	24	25	26	27	28	29	30	31
6'10"	208.2	9	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6'11"	210.8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	26	27	28	29	30

Figure 6

- An unhealthy diet composed of carbohydrates and sugars (4) (5) (6).
- Metabolic syndrome - which includes increased waist size, and increased blood pressure, triglycerides, and cholesterol (59).
- Cigarette smoking - which increases the risk of developing diabetes by 30-40% (5). The CDC reports individuals with intellectual and developmental disabilities smoke at a rate of 27.8% in contrast to adults without disabilities at 13.4% (7).
- A diagnosis of gestational diabetes during pregnancy (30) (6).
- Depression and increased stress levels (59) (30) (5) (6).

Blood Sugar Fluctuations

Hyperglycemia (High Blood Sugar)

Hyperglycemia occurs when higher than normal (greater than >140 milligrams per deciliter [mg/dL]) amounts of glucose are in the blood (10). If blood sugar levels remain high for extended periods, the symptoms can become more serious. Hyperglycemia can occur when an individual with diabetes needs a medication adjustment; after eating foods high in carbohydrates and sugars; during an illness; or due to consumption of a medication that interferes with diabetes medications (e.g. steroids) (32).

Early Signs and Symptoms of Hyperglycemia

- Frequent urination.
- Bubbly and or foamy urine.
- Increased thirst.
- Blurred vision.
- Fatigue and lethargy.
- Headache (32).

Late Signs and Symptoms of Hyperglycemia

- Fruity-smelling breath.
- Nausea and vomiting.
- Shortness of breath.
- Dry mouth.
- Weakness.
- Confusion.
- Coma.
- Abdominal pain (32).

Serious Complications of Hyperglycemia

- Diabetic ketoacidosis occurs when the body breaks down fat for energy because it does not have enough glucose. This process produces toxic acids called ketones, which collect in the blood stream and are later urinated out by the kidneys. Ketoacidosis is a medical emergency, and requires an examination by a physician immediately, as it can lead to coma and/or death (32).
- Hyperosmolar hyperglycemic state (HHS) happens when blood glucose levels reach greater than >1,000 mg/dL, which leads to severe dehydration (extreme thirst) and confusion. It is a life-threatening condition, which can lead to coma and/or death. It is a medical emergency and the individual must be examined immediately by a physician (32).

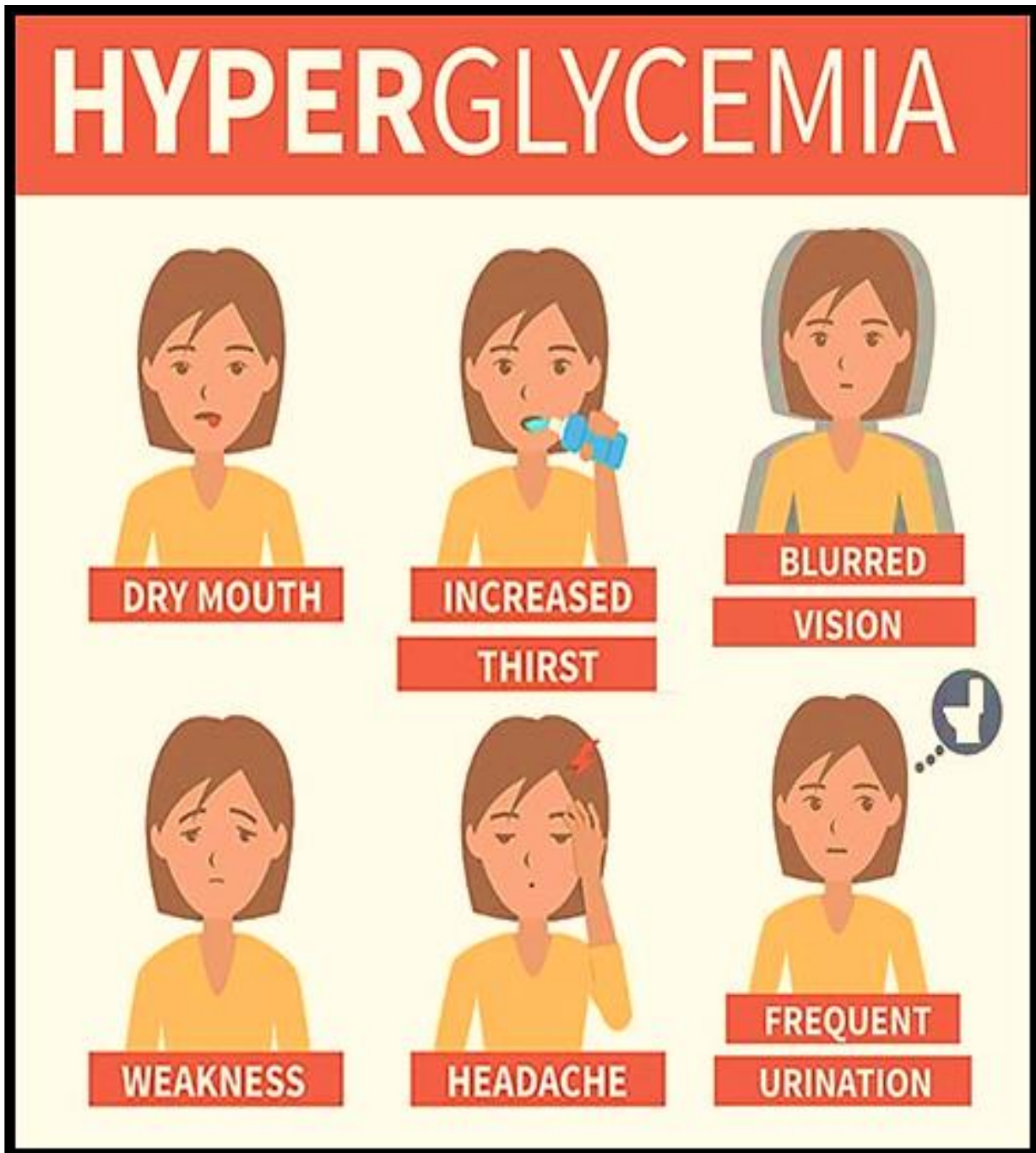


Image - <https://www.woundcareinc.com/resources/hyperglycemia-vs-hypoglycemia-what-you-need-to-know>

Hypoglycemia (Low Blood Sugar)

Hypoglycemia occurs when the glucose level in the blood falls below normal (less than <70 milligrams per deciliter [mg/dL]). Treatment of hypoglycemia requires immediate administration of sugar to increase glucose levels. Individuals who experience regular hypoglycemic episodes sometimes carry glucose tablets for emergencies. Two other good options for raising glucose levels quickly are whole milk and/or orange juice. Both contain high amounts of sugars, are easy to consume, and are digested quickly by the body. Within the first 30 minutes following a hypoglycemic episode, the individual should also consume a healthy snack, in order to keep blood sugars within normal limits (31).

Early Signs and Symptoms of Hypoglycemia

- An irregular or fast heartbeat.
- Fatigue.
- Pale skin.
- Shakiness.
- Anxiety.
- Sweating.
- Hunger.
- Irritability.
- Tingling or numbness of the lips, tongue or cheek (31).

Late signs and symptoms of Hypoglycemia

- Confusion, abnormal behavior or both, such as the inability to complete routine tasks.
- Visual disturbances, such as blurred vision.
- Seizures.
- Loss of consciousness (31).

Serious Complications of Hypoglycemia

- Untreated hypoglycemia can quickly lead to seizure, loss of consciousness and death.
- Hypoglycemia can also be a factor in dizziness or weakness, falls, unexplained injuries, motor vehicle accidents and increase dementia.
- Hypoglycemia unawareness happens when the body and brain do not produce signs and symptoms, which warn of low blood sugar. This is a severe and life-threatening condition which requires the individual to be assessed by a physician immediately (31).

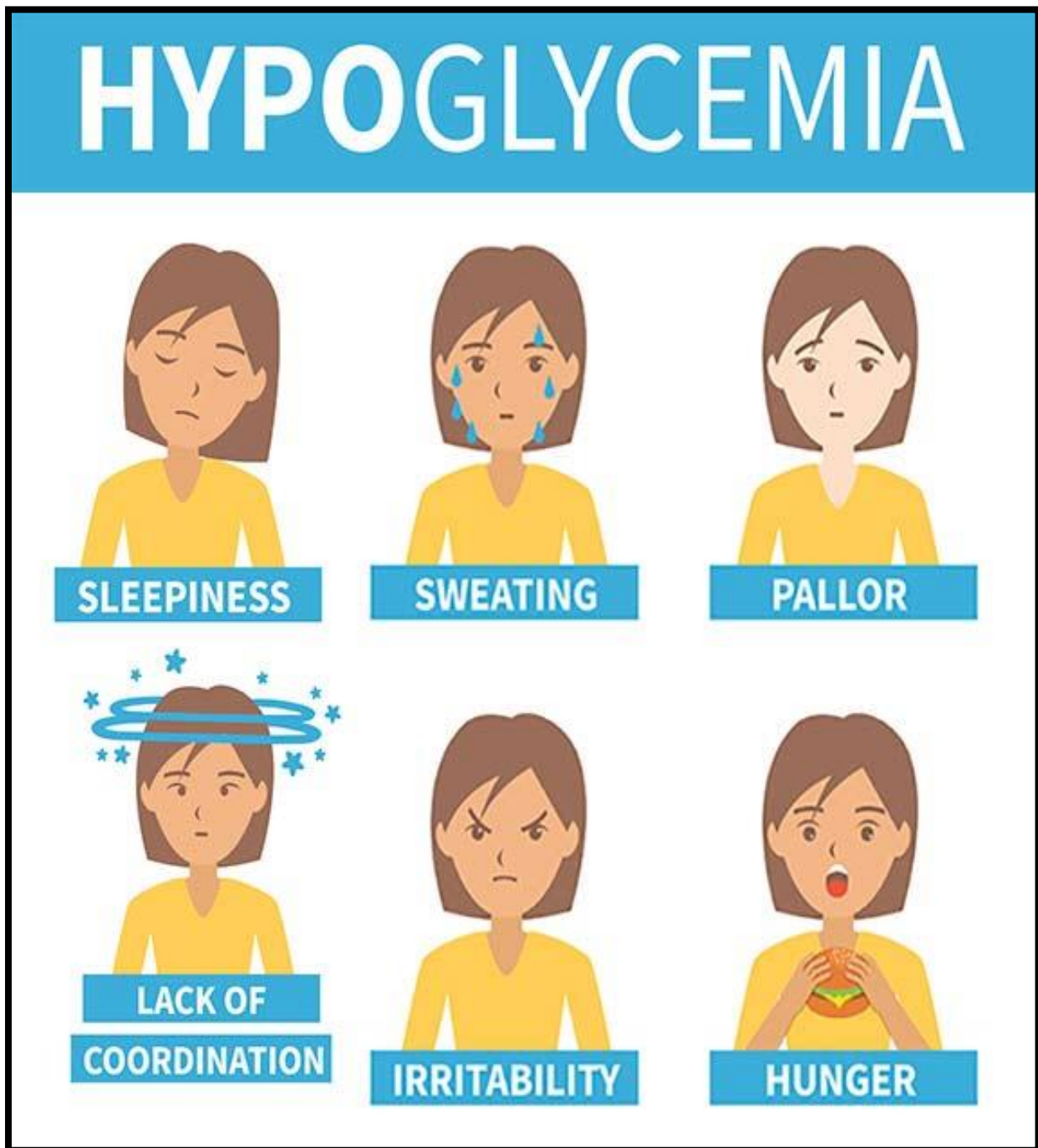


Image - <https://www.woundcareinc.com/resources/hyperglycemia-vs-hypoglycemia-what-you-need-to-know>

Medical Conditions Associated with Diabetes Complications

Living with diabetes may lead to other serious medical conditions over time. When diabetes goes untreated, the risk for life-long medical complications increases (40). Other health conditions commonly associated with diabetes are:

- **Heart Disease**- diabetics are at an increased risk for stroke, atherosclerosis, heart attack, and coronary artery disease (59) (39).
- **Neuropathy**- damage to blood vessels to nerves cause tingling, numbness, and burning pain. Left untreated can lead to permanent loss of sensation (59) (39).
- **Kidney Disease**- damage to blood vessels associated with the kidney filtration system can lead to kidney failure, end stage kidney disease. Dialysis or transplant may be the result (59) (39).
- **Eye Damage**- damage to blood vessels of the retina can lead to blindness; also, there is a greater risk for cataracts and glaucoma (59).
- **Foot Complications**- neuropathy and decreased blood flow to the lower extremities increases the risk for infection and poor wound healing. May lead to amputation (59).
- **Skin Complications**- diabetics are at higher risk of developing skin infections (fungal) (40).
- **Alzheimer's Disease**- diabetics are at increased risk for dementia (40).
- **Depression**- common among Type 1 and Type 2 diabetics (59).

Diabetes and Intellectual Disability

Individuals with Intellectual and developmentally disabilities are diagnosed with diabetes at an estimated 2 to 3 times higher rate than the general population. Due to cognitive limitations, many individuals with IDD are not included in general diabetes research studies, so the true prevalence of diabetes within the IDD population may be skewed (30).

Specific groups of children with intellectual and developmental disabilities, such as individuals with Down syndrome, autism, and spina bifida, are 2 to 3 times more likely to be obese (22), which increases their risk of developing Type 2 diabetes. IDD individuals with Type 2 diabetes are at an increased risk for ongoing weight problems, due to diets high in fats and inactivity, which is partially associated with the administration of anti-psychotic medications. For children with disabilities ages 10-17, the prevalence for obesity is 20%, compared to 15% among children without disabilities of the same age group (14). The evidence reveals individuals with IDD receive inadequate education on weight management, self-care management, and or healthcare support for the diagnosis (3) (30).

Type 1 diabetes in childhood, adolescence and adulthood is well known to be associated with certain genetic conditions such as Down syndrome (DS), Turner syndrome (TS), Prader-Willi syndrome (PWS), Friedreich ataxia (FA), Klinefelter syndrome (KS), Bardet-Biedl syndrome (BBS), Alström syndrome (AS), and Berardinelli-Seip syndrome (BSS), (also known as congenital generalized lipodystrophy), among others (55).

A systematic review by McVilly et al. (42) reported the prevalence of diabetes among individuals with Down syndrome (DS) as being four to ten times higher than in the general population (42) (55). Individuals with DS are also at a higher risk of autoimmune diseases (57) (44), as well as premature birth (before 38 weeks of gestation), which are both known to increase risk for Type 1 diabetes (55) (44).

There are several other health conditions (commonly associated with DS), which also increase the risk for diabetes complications: heart defects, dementia, leukemia, sleep apnea, autoimmune conditions, hypothyroidism, infections at a young age and obesity. (55) (44) among others.

The Health Impact of Diabetes on Individuals with IDD

- The development of secondary health complications.
- Increased hospitalizations.
- Increased length of hospital stays.
- Reduced quality of life.
- Increased health expenditures.
- Complications related to the detection of pain (42).

The Emotional Impact of Diabetes on Individuals with IDD

- Feelings of loss relating to not being able to eat and drink what they liked, when they liked.
- Feelings of being different due to the comparison between what they were eating, and what others were eating, especially in group settings.
- Feelings of being punished or negatively impacted or controlled.
- Concern and worry about the future. These feelings were especially apparent among those in community housing situations.
- A lack of full understanding of the dietary changes and care need to manage their diabetes (42) (30).

The Impact on Caregivers

- Caregivers felt they did not receive sufficient information from the individual's healthcare professionals to support their clients at the time of diagnosis.
- Caregivers did not understand where to get the support required for diabetes care.
- Caregivers expressed a lack of communication skills, which would enable them to care-related issues to the individual's PCP and/or medical specialists (42) (30).

The Caregiver's Role in the Management of Diabetes

A caregiver's attitude can play a major role in assisting an individual with diabetes management and life style changes. It is vital for direct care providers to be educated about diabetes and the importance of lifestyle management, in order to better assist individuals with their daily choices (30).

Caregivers should also receive training on how to support individuals to make informed decisions; how those decisions affect future outcomes; and how to provide continued education to individuals with cognitive limitations (52) (30). Individuals have a right to choose what they want to eat, even if their choice does not comply with dietary parameters. The key to success involves training for the caregiver (as well as the individual), to support and enable both to make educated decisions. Education needs to be tailored to the individual's capacity for learning (52) (30). However, there is a fine line in complying with physician orders and infringing on an individual's rights related to decision making. If you are unsure if a plan of care is infringing on an individual's rights, please contact the [Office of Human Right's in your Region](#) for help and guidance.

The Individual's Role in Self-Management of Diabetes

Self-management of diabetes among individuals with IDD is often a struggle, due to a lack of training which is both supportive and encourages independence. McVilly et al. (42) reported that individual's felt better supported at healthcare visits if caregivers or family members attended with them, so the information could be explained again later at home. In addition, there is a lack of educational resources written specifically for individuals with intellectual disability. For individuals to be successful with self-management, repeated education, caregiver involvement, and consistency to promote lifestyle changes to ensure improved outcomes is a vital part of success (42) (30).

Diabetes Resources

The National Diabetes Education Program, The Centers for Disease Control and Prevention - <https://www.cdc.gov/diabetes/prevention/index.html>

Gvoke auto injection glucagon - <https://www.gvokeglucagon.com/hcp>

U.S. Department of Health and Human Services and U.S. Department of Agriculture. *2020-2015 Dietary Guidelines for Americans*. 9th Edition. December 2020. Available at https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf

The American Diabetes Association - <https://www.diabetes.org/>

The Centers for Disease Control and Prevention – Diabetes
<https://www.cdc.gov/diabetes/library/factsheets.html>

My Plate.gov - <https://www.choosemyplate.gov/>

References

1. [Brown, M., Taggart, L., Karatzias, T., Truesdale-Kennedy, M., Walley, R., Northway, R., Macrae, S., Carey, M., & Davies, M. \(2017\). Improving diabetes care for people with intellectual disabilities: A qualitative study exploring the perceptions and experiences of professionals in diabetes and intellectual disability services. *Journal of Intellectual Disability Research, 61*\(5\), 435-449.](#)
2. [Brunner J. E. \(2015\). Does your patient need diabetic therapeutic footwear? \(Where benefit, evidence, and bureaucracy collide\). *Clinical diabetes: a publication of the American Diabetes Association, 33*\(2\), 51–53.](#)
3. [Bryant, L., Russell, A., Walwyn, R., Farrin, A., Wright-Hughes, A., Graham, E., Nagi, D., Stansfield, A., Birtwistle, A., Meer, S., Aijan, R., & House, A. \(2017\). Characterizing adults with type 2 diabetes mellitus and intellectual disability: Outcomes of a case-finding study. *Diabetic Medicine*. Doi: 10.1111/dme.13510](#)
4. [Centers for Disease Control and Prevention \(CDC\). \(2020a\). What is Diabetes?](#)
5. [Centers for Disease Control and Prevention \(CDC\). \(2020b\). Diabetes risk factors.](#)
6. [Centers for Disease Control and Prevention \(CDC\). \(2020c\). Prediabetes: Your chance to prevent type 2 diabetes.](#)
7. [Centers for Disease Control and Prevention \(CDC\). \(2020d\). How is smoking related to diabetes.](#)
8. [Centers for Disease Control and Prevention \(CDC\). \(2020e\). Type 1 diabetes.](#)
9. [Centers for Disease Control and Prevention \(CDC\). \(2020f\). National Diabetes Statistics Report, 2020.](#)
10. [CDC \(2020g\). Manage blood sugar.](#)
11. [Centers for Disease Control and Prevention \(CDC\). \(2019a\). Cigarette smoking among adults with disabilities.](#)
12. [Centers for Disease Control and Prevention \(CDC\). \(2019b\). Data and statistics on Down syndrome.](#)
13. [Centers for Disease Control and Prevention \(CDC\). \(2019c\). Diabetes and your feet.](#)
14. [Centers for Disease Control and Prevention \(CDC\). \(2019d\). Disability and obesity.](#)
15. [Centers for Disease Control and Prevention \(CDC\). \(2017\). Diabetes Report Card 2017.](#)
16. [Centers for Disease Control and Prevention \(CDC\). \(2018a\). Reproductive health: Diabetes during pregnancy.](#)
17. [Centers for Disease Control and Prevention \(CDC\). \(2018b\). Watch out for diabetic retinopathy.](#)
18. [Diabetes Dietetic Practice Group \(DDPG\) \(2020\). Patient education handouts.](#)

**DEPARTMENT OF
BEHAVIORAL HEALTH AND DEVELOPMENTAL
SERVICES**

Post Office Box 1797
Richmond, Virginia 23218-1797

19. [Diabetic foot \[Image\]. \(2020\). All Care Foot and Ankle.](#)
20. [Diniz, I. V., Oliveria, P. S., Santos, I. C. R. V., Matos, S. D. O., Costa, I. K. F., Costa, M. M. L., and Soares, M. J. G. O. \(2019\). Factors associated with non-traumatic amputation in people with Diabetes Mellitus: a cross-sectional study. *Revista Electronica de Enfermagem.*, 21\(52484\), 1-9.](#)
21. [Ellis, S., Patel, M., Kashchak, E., & Lantis, J. Jr. \(2020\). Location of lower-extremity diabetic foot ulcers with concomitant arterial or venous disease. *Wounds International.* 11\(3\), 20-23.](#)
22. [Grumstrup, B., and Demchak, M. \(2017\). Obesity, nutrition, and physical activity for people with significant disabilities. *Physical Disabilities: Education and Related Services*, 36\(1\), 13-28.](#)
23. [Insulin \[Image\]. \(2016\). Cornerstones4care.](#)
24. [Inzucchi, S., Bergenstal, r., Fonseca, V., Gregg, E., Mayer-Davis, B., Spollett, G., & Wender, R. \(2010\). Diagnosis and Classification of Diabetes Mellitus. *American Diabetes Association.* 33\(1\). 562-569. Doi: 10:2337/dc10-5062](#)
25. [Joslin Diabetes Center. \(2020\). Continuous glucose monitoring helps young people with type 1 diabetes achieve better glycemic control.](#)
26. [Kirwan, J. P. \(2017\). The essential role of exercise in the management of type 2 diabetes. *Cleve Clin J Med.* 84\(7\). 15-21. Doi: 10.3949/ccjm.84.s1.03.](#)
27. [Kloss, K., A., Funnell, M. M., Piatt, G. A., & Nwankwo, R. \(2020\). One size does not fit all: Nutrition strategies for people with diabetes. *Nursing 2020*, 50\(8\), 33-38. Doi: 10.1097/01.NURSE.0000684176.14404.ff](#)
28. [Kordi, M., and Heravan, M. B. \(2020\). Prediction of self-efficacy and self-care behaviors among diabetic women based on their attitude towards gestational diabetes. *Journal of Midwifery & Reproductive Health*, 8\(4\), 2486-2493. Doi: 10.22038/jmrh.2020.45863.1558](#)
29. [MacRae, S., Brown, M., Karatzias, T., Taggart, L., Truesdale-Kennedy, M., Walley, R., Sierka, A., Northway, R., Carey, M., & Davies, M. \(2015\). Diabetes in people with intellectual disabilities: A systemic review of the literature.](#)
30. [Maine, A., Brown, M. and Truesdale, M. \(2020\). Diabetes and people with learning disabilities: Issues for policy, practice, and education. *Tizard Learning Disability Review*, 25\(1\), 26-34. Doi: 10.1108/TLDR-05-2019-0020.](#)
31. [Mayo Clinic \(2020a\). Hypoglycemia.](#)
32. [Mayo Clinic \(2020b\). Hyperglycemia in diabetes.](#)
33. [Mayo Clinic. \(2020c\). Diabetes: Diagnosis and tests.](#)
34. [Mayo Clinic. \(2020d\). Fasting plasma glucose.](#)
35. [Mayo Clinic. \(2020e\). Gestational diabetes: Overview.](#)
36. [Mayo Clinic. \(2020f\). Oral glucose tolerance test.](#)
37. [Mayo Clinic. \(2019a\). Diabetes diet: Create your healthy-eating plan.](#)
38. [Mayo Clinic. \(2019b\). Type 2 diabetes: Diagnosis and treatment.](#)
39. [Mayo Clinic. \(2018a\). A1C tests.](#)
40. [Mayo Clinic. \(2018b\). Diabetes: Symptoms and causes.](#)
41. [Mayo Clinic. \(2017\). Type 1 diabetes: Diagnosis and treatment.](#)
42. [McVilly, K., McGillivray, J., Curtis, A., Lehmann, J., Morrish, L., & Speight, J. \(2014\). Diabetes in people with an intellectual disability: A systematic review of prevalence, incidence and impact. *Diabetic Medicine*, 897-904. Doi:10.1111/dme.12494](#)
43. [McVilly, K., McGillivray, J., Curtis, A., Lehmann, J., Morrish, L., & Speight, J. \(2014\). Diabetes in people with an intellectual disability: a systematic review of prevalence, incidence and impact. *Diabetic medicine*, 31\(8\), 897-904.](#)

**DEPARTMENT OF
BEHAVIORAL HEALTH AND DEVELOPMENTAL
SERVICES**

Post Office Box 1797
Richmond, Virginia 23218-1797

44. [Mortimer, G., & Gillespie, K. \(2020\). Early onset of autoimmune diabetes in children with Down syndrome-Two separate etiologies or an immune system pre-programmed for autoimmunity. *Current Diabetes Reports*, 20\(47\).](#)
45. [National Institute of Aging. \(2020\). Four types of exercise can improve your health and physical ability. *U.S. Department of Health and Human Services*.](#)
46. [National Institute of Diabetes and Digestive and Kidney Diseases \(NIDDK\). \(2016\). Diabetes diet, eating, & physical activity. *U.S. National Institutes of Health*.](#)
47. [Nagelkerka, J., Thompsonb, M. E., Bouthillierc, M., Tompkinsd, A., Baere, L. J., Trytkof, J., Boothg, A., Stevensh, A. & Groeneveld, K. \(2018\). Improving outcomes in adults with diabetes through an inter-professional collaborative practice program. *Journal of Inter-professional Care*. 32\(1\), 4–13.](#)
48. [Phillips, A. \(2011\). Diabetes evidence-based management: Working in partnership to treat skin complications of diabetes. *Practice Nursing*. 22\(7\). 362-369.](#)
49. [Precision Nutrition Inc. \[Image\]. \(2020\). Figure 3 & 4: Diabetes Type 1 & Type 2.](#)
50. [Saint Luke's Health System \[Image\]. \(2020\). Figure 1 & 2: Type 1 Diabetes.](#)
51. [Thomas, M. T., and Owens, C. R. \(2020\). Diabetic retinopathy. *Diabetes & Primary Care*, 22, 79-81.](#)
52. [Trip, H., Conder, J., Hale, L., & Whitehead, L. \(2015\). The role of key workers in supporting people with intellectual disability in the self-management of their diabetes: A qualitative New Zealand study. *Health & Social Care*. Doi: 10.1111/hsc12262](#)
53. [U.S. Department of Health and Human Services and U.S. Department of Agriculture. \(2015\). *2015-2020 Dietary Guidelines for Americans*. 8th Edition.](#)
54. [U.S. Food and Drug Administration. \(2018\). What is an artificial pancreas device system.](#)
55. [Wallen, E. F., Ljungren, G., Calsson, A. C., Pettersson, D., & Wandell, P. \(207\). High prevalence of diabetes mellitus, hypertension and obesity among persons with a recorded diagnosis of intellectual disability or autism spectrum disorder. *Journal of Intellectual Disability Research*, 62\(4\), 269-280. Doi: 10.1111/jir.12462](#)
56. [Weterings, S., Oppewal, A., & Hilgenkamp, T. I. M. \(2019\). The feasibility of vigorous resistance exercise training in adults with intellectual disabilities with cardiovascular disease risk factors. *Journal of Applied Research in Intellectual Disabilities*, 33. 488-495. Doi: 10.1111/jar.12690.](#)
57. [Whooten, R., Schmitt, J., & Schwartz, A. \(2018\). Endocrine manifestations of Down syndrome. *Curr Opin Endocrinol Diabetes Obes*, 25\(1\), 61-66. Doi: 10.1097/MED](#)
58. [Xeris Pharmaceuticals. \(2020\). What is Gvoke glucagon injection.](#)
59. [Zheng, Y., Ley, S. H., & Hu., F.B. \(2018\). Global etiology and epidemiology of type 2 diabetes mellitus and its complications. *Macmillan Publishers Limited, part of Springer Nature*. 2\(14\). 88-98. Doi:10.1038/nrendo.2017.151](#)

To the best of the OIHSN Nursing Team's knowledge the information contained within this alert is current and accurate. If the reader discovers any broken or inactive hyperlinks, typographical errors, or out-of-date content please send email to communitynursing@dbhds.virginia.gov to include the title of the Health & Safety alert with specifics details of concern.