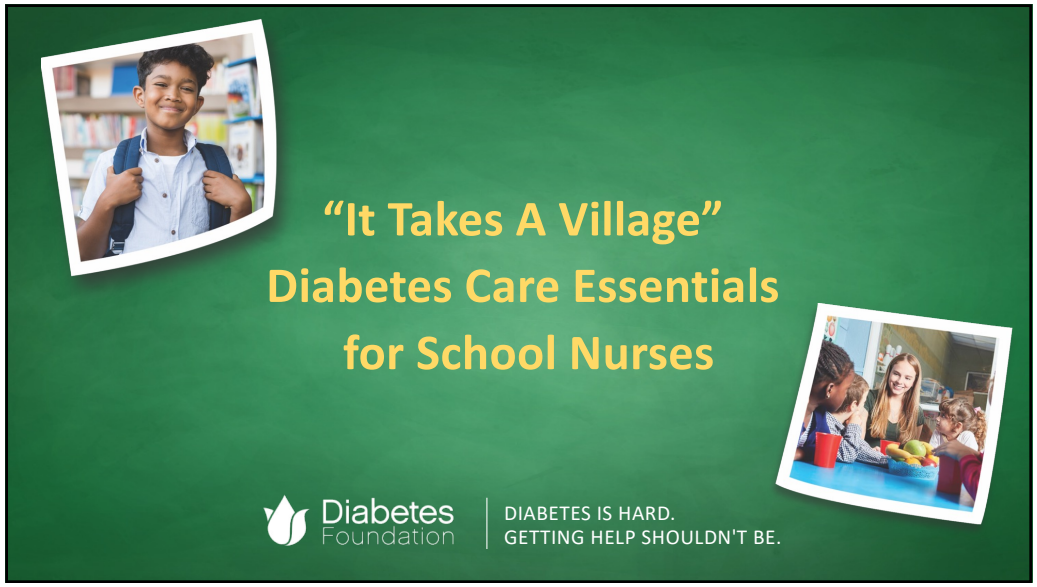


1

Disclosure Statement

Notice of Requirements for Successful Completion:
Learners must participate in the full activity and complete the evaluation in order to claim continuing education credit/hours.

Financial Relationship Disclosures – within the past 24 months:
Speakers: no disclosures
Planners: no disclosures

Diabetes Foundation

2

WELCOME

Danielle Kennedy, RD, CDCES
Lead Educator
Diabetes Foundation, Inc.

Rita Saltiel-Berzin, RN, MPH, CDCES
Diabetes Foundation, Inc.

3

Agenda

Status of Diabetes in Schools
- Focus on T1D
- Awareness and Early Intervention

Diabetes Tools for Management of T1D
- Nutrition
- Physical Activity
- Insulin (Medication)
- Monitoring
- Problem Solving

Care Coordination and Implementation

4

Status In Schools: Objectives

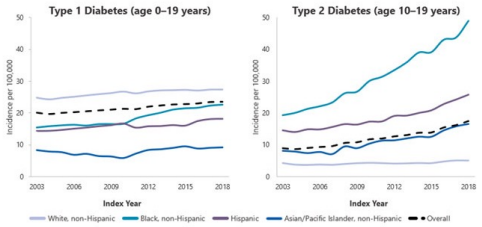
- Build awareness around diabetes trends in youth
- Identify the demographic groups most impacted by T1D and T2D
- Review the risk factors & symptoms of T1D
- State the purpose of the screening tool for early identification of T1D among family members

Diabetes Foundation

5

Incidence Rate of T1D and T2D in Youth

Figure 5. Trends in incidence of type 1 and type 2 diabetes in children and adolescents, overall and by race and ethnicity, 2002–2018



Note: Adapted from Wagenknecht LE et al.[1] Data are model-adjusted incidence estimates (see Appendix B: Detailed Methods and Data Sources).
Data source: SEARCH for Diabetes in Youth study.

As you can see on the left: Non-Hispanic white children and adolescents had the highest incidence of T1D.

- There's been an increase in the non-Hispanic black youth as well.

On the right, you can see the significant increase in incidence of T2D in children and adolescents by race:

- Non-Hispanic Black
- Hispanic
- Asian/pacific islanders

Diabetes Foundation

6

Risk Factors

Type 1 Diabetes

Family history of T1D (especially siblings, parents)
Personal or family history of autoimmune diseases (e.g., thyroiditis, celiac disease)
Environmental triggers (possible viral infections)

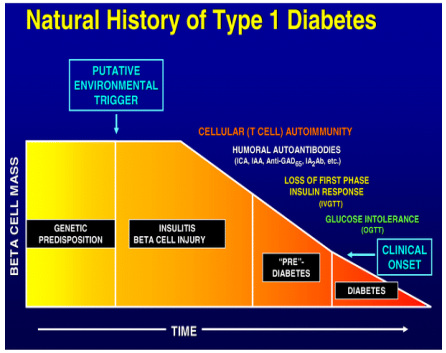
CDC. "National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP)." *National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP)*, 16 May 2024, www.cdc.gov/nccdphp/index.html.

Diabetes Foundation

7

T1D Progression

- Begins with a genetic disposition and a triggering event, that injures the beta cells.
- Then a period of insulin loss followed by an abrupt loss of insulin function resulting in the clinical signs and symptoms.
- After this initial event, the beta cells sometime "come back" temporarily for a "honeymoon period" that can last up to 1 year (Stage1).
- Insulin in small doses continue to be given despite normal glucose levels:
  - Reinforces the chronic status of the condition.
  - Allows beta cells to recover from the glucose toxicity.



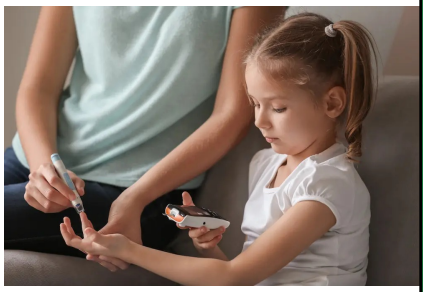
Available from: https://pro.campus.sanofi/t1d/articles/how-should-individuals-with-positive-autoimmune-t1d-autoantibodies-be-monitored-over-time

Diabetes Foundation

8

Detection for T1D: Screening

- **Antibody screening blood tests** may detect the presence of **autoantibodies.**
- Who should be screened?
  - Individuals with a family history of T1D are at a 10-15 times higher risk.
  - Individuals with pre-existing autoimmune condition.



Positive Autoantibody Screening PLUS Tzield may delay T1D onset (stage 3)

American Diabetes Association. "Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2025." *Diabetes Care*, vol. 48, no. Supplement_1, 9 Dec. 2024, pp. S27–S49, diabetesjournals.org/care/article/48/Supplement_1/S27/157566/2-Diagnosis-and-Classification-of-Diabetes, https://doi.org/10.2337/dc25-S002.

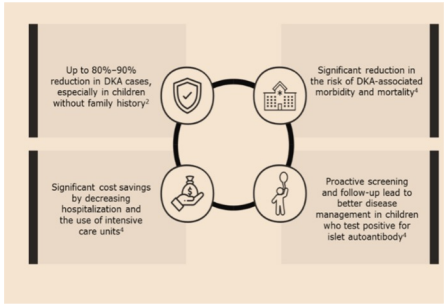
Diabetes Foundation

9

Early Intervention for T1D: Advantages

Decreased risk of DKA

Hospitalizations
Neurological Complications
Hemoglobin A1C levels



https://pro.campus.sanofi/t1d/articles/early-detection-of- autoimmune-type-1-diabetes-could-reduce-the-risk-of-diabetic-ketoacidosis

"Reduce DKA Risk with Early Autoimmune T1D Screening & Detection." *Sanofi Campus*, 2016, pro.campus.sanofi/t1d/articles/early-detection-of-autoimmune-type-1-diabetes-could-reduce-the-risk-of-diabetic-ketoacidosis. Accessed 17 May 2025.

Diabetes Foundation

10

Diabetes Tools for Management: Objectives

- Review Treatment Goals for T1D
- Review T1D Management Plan
- Utilize Nutrition Tools for diabetes
- List safe Physical Activity guidelines
- Discuss Medications & the newest technology related to Insulin delivery
- Review Monitoring methods
- Utilize problem solving for all areas of self-management & treatment for out-of-range glucose levels

11

Treatment Goals for Students

- **Maintain glucose target range of 80-180 mg/dL**
  - Avoiding hypo and hyperglycemia
- **Every child with T1D are treated with an intensive insulin regimen**
- **CGM is the preferred monitoring method for students with T1d**
  - If CGM is not available, blood glucose checks at 6-8 times per day
- **Lifestyle modifications including healthy meal planning and increasing physical activity**

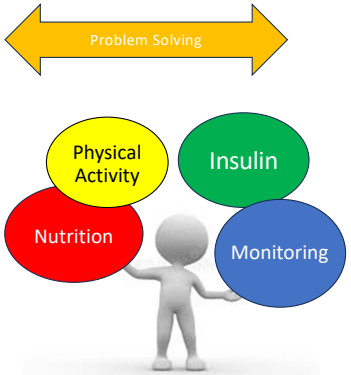
ElSayed, Nuha A, et al. "14. Children and Adolescents: Standards of Care in Diabetes—2025." *Diabetes Care*, vol. 48, no. Supplement_1, 9 Dec. 2024, pp. S283–S305, diabetesjournals.org/care/article/48/Supplement_1/S283/157559/14-Children-and-Adolescents-Standards-of-Care-in?searchresult=1, https://doi.org/10.2337/dc25-s014.

Diabetes Foundation

12

T1D Management Plans

- **T1D Daily Management**
  - Nutrition
  - Physical Activity
  - Insulin Management
  - Monitoring
  - Problem Solving



T1D Management plans are individualized

ElSayed, Nuha A, et al. "14. Children and Adolescents: Standards of Care in Diabetes—2025." *Diabetes Care*, vol. 48, no. Supplement_1, 9 Dec. 2024, pp. S283–S305, diabetesjournals.org/care/article/48/Supplement_1/S283/157559/14-Children-and-Adolescents-Standards-of-Care-in?searchresult=1, https://doi.org/10.2337/dc25-s014.

Diabetes Foundation

13

Learning Objectives: Nutrition

- **State the Macronutrients and how they impact Glucose Levels**
- **List the components needed to create a balanced meal**
- **List the components to create a healthy snack**

Diabetes Foundation

14

Carbohydrates: Impact on Glucose Levels

- Carbohydrate foods have the **greatest** immediate **impact** on blood glucose levels.
- Monitoring carbohydrate intake should be paired with monitoring blood glucose levels for optimal post meal numbers.
  - 1 serving = approximately **15 g** of carbohydrate
  - Portions of food vary based on carbohydrate for example:
    - 15 g = ½ large banana = 4 ounces of orange juice
    - 15 g = 1/3 cup of cooked rice = 1 cup of cooked spinach
    - 15 g = 1 cup of milk = 1 ½ cups of plain greek yogurt
    - 15 g = 1 and ½ Oreos = 1 medium apple
- Educating students that eating a carbohydrate alone may cause a quick rise in blood sugar level can be helpful.

Diabetes Foundation

15

Protein: Impact on Glucose Levels

- Protein does not cause blood glucose levels to rise immediately after eating but protein may cause delayed and sustained rise in glycemia.
  - For t1d students who are eating a lot of protein at meals, this may require additional premeal insulin.
- Teach students to identify foods with protein so they can learn to create balanced meals & snacks to support healthy post prandial glucose levels and potentially prevent post exercise hypoglycemia excursions.

Paterson, M. A., et al. "Influence of Dietary Protein on Postprandial Blood Glucose Levels in Individuals with Type 1 Diabetes Mellitus Using Intensive Insulin Therapy." *Diabetic Medicine*, vol. 33, no. 5, 6 Dec. 2015, pp. 592–598, https://doi.org/10.1111/dme.13011.
Dao, Giang M., et al. "The Glycemic Impact of Protein Ingestion in People with Type 1 Diabetes." *Diabetes Care*, 14 Feb. 2025, proxy.lirn.net/MuseProxyID=mp01/MuseSessionID=0011h0w/MuseProtocol=https/MuseHost=pubmed.ncbi.nlm.nih.gov/MusePath/39951019/, https://doi.org/10.2337/dci24-00.

Diabetes Foundation

16

Fat: Impact on Glucose Levels

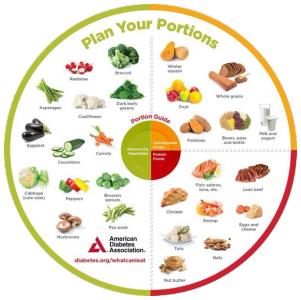
- Large quantities may impact postprandial glucose levels later, often > 3 hours after eating.
  - May delay glycemic response initially which causes a hypoglycemia risk
  - Late postprandial response may be result in hyperglycemia for prolonged period.
  - In combination with protein there may be a longer postprandial high for a prolonged period.
- Teach students the various fats and high-light unsaturated fats to include more often in limited quantities.

Garonzi, Chiara, et al. "Impact of Fat Intake on Blood Glucose Control and Cardiovascular Risk Factors in Children and Adolescents with Type 1 Diabetes." *Nutrients*, vol. 13, no. 8, 29 July 2021, p. 2625, https://doi.org/10.3390/nu13082625

Diabetes Foundation

17

Creating a Balanced Meal



Protein (P)

Fish/shellfish
Poultry (chicken/turkey)
Lean ground beef (93%)
Eggs
Beans & legumes
Tofu/soy beans/tempeh
Nuts & Seeds
LF milk/yogurt/cheese

Carbohydrate (C)

All fruit (including fruit juice and dried fruit)
Corn
Squash
Potatoes/yams
Peas/beans
Rice
Quinoa
Oats
Popcorn
Bread (all)
Tortillas
Crackers
Milk/yogurt

Fat (F)

Nuts & Seeds (all/any)

Fatty fish rich in omega-3's (salmon/sardines/cod/light can tuna/anchovies)

Oils (EVOO, corn, canola, sunflower, safflower, & soybeans)

Avocados

Vegetable (V)

Greens (salad/kale/chard/spinach)
Cabbage
Asparagus
Broccoli
Cauliflower
Carrots
Peppers
Mushrooms
Onions
Brussel sprouts
Celery
Cucumber
Tomatoes
Artichokes

Diabetes Foundation

18

Creating a Healthy Snack

Carb + Protein + Healthy Fat Pairings:

1 Hard-boiled egg + 10 baked chips
2 Tbsp of nut butter + banana
½ cup of canned tuna + 1 slice of bread
¼ cup of hummus + 10 Tortilla chips
½ cup of plain yogurt + ½ cup of berries
Chia Pudding: 2 tbsp chia seeds + 2/3 cup of soy milk + 1 TBSP of maple syrup
Cup cottage cheese + ½ cup of berries
Rice cake + PB
Plain Popcorn (popped with Olive oil) & ¼ cup nuts
Trail Mix (single serving)

Low Carb Choices:

Beef Jerky
Chocolate covered almonds
Cheese Whisps
Cheese stick + carrots
Hummus + carrots
Celery + PB + mini chocolate chips

Diabetes Foundation

19

Diabetes Management: Physical Activity

- **State Safety Guidelines when Planning a Physical Activity**
- **State the relationship between Physical Activity and Hypoglycemia**
- **State the actions that can be taken to prevent Hypoglycemia during exercise**

Diabetes Foundation

20

Physical Activity: Safety Guidelines

- Extra Carbohydrate intake prior to physical activity may be necessary
- Monitor glucose levels before, after and during prolonged activity
- Hydration is important
- Insulin adjustments may be necessary prior to any strenuous physical activity or long duration of activity.
- A carbohydrate source should always be available during physical activity.
- A Medical ID bracelet is always helpful in case of emergency.

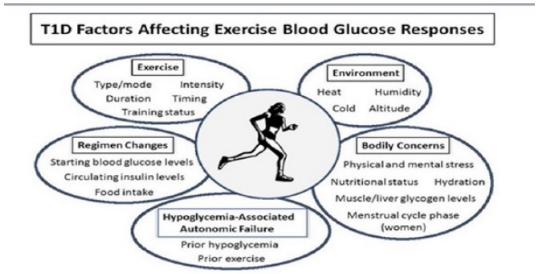


Figure 2: Showing TID factors affecting exercise blood glucose responses.

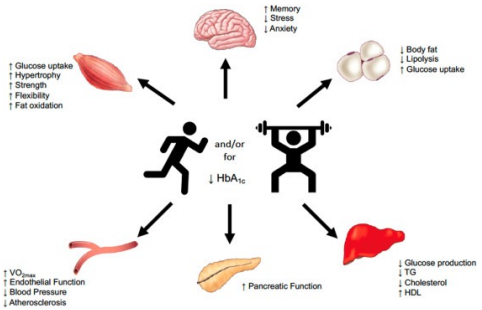
https://www.omicsonline.org/open-access/effect-of-physical-excercises-on-glucemic-variability-in-type-1-diabetes-mellitus-121846.html

Diabetes Foundation

21

Physical Activity and Hypoglycemia

- During exercise, there is increased uptake of glucose by the muscles.
- Post-exercise there is a deficit of glucose in the blood, often leading to post exercise hypoglycemia.



The essential role of exercise in the management of type 2 diabetes.
Cleveland Clinic Journal of Medicine. 2017;84(7 Suppl 1):S15–S21.
DOI: 10.3949/ccjm.84.s1.03

Diabetes Foundation

22

Physical Activity: Tips for preventing Hypoglycemia

- Reduce basal & prandial insulin before exercise; may need to reduce post exercise bolus dose as well.
- Frequent glucose monitoring before, during, and after exercise via SMBG or CGM.
- Blood glucose goals prior to physical activity and exercise should be **126–180 mg/dL** but should be **individualized based on the type, intensity, and duration of activity.**
- Consider additional carbohydrate intake during and/or after exercise, depending on the duration and intensity of physical activity.

ElSayed, Nuha A, et al. "14. Children and Adolescents: Standards of Care in Diabetes—2025." *Diabetes Care*, vol. 48, no. Supplement_1, 9 Dec. 2024, pp. S283–S305, diabetesjournals.org/care/article/48/Supplement_1/S283/157559/14-Children-and-Adolescents-Standards-of-Care-in?searchresult=1, https://doi.org/10.2337/dc25-s014.

Diabetes Foundation

23

Learning Objectives: Insulin Management

- **State the Goals of Insulin Therapy**
- **Identify the various types of insulin and their activity**
- **List the various insulin delivery methods**

Diabetes Foundation

24

Goals of Insulin Therapy

- Achieve A1C Goal(s) of 7-8%
- Bring daily glucose goals as close to normal as possible *without significant hypoglycemia.*
- Reduce daily glucose fluctuations (hyper- and hypoglycemia)
- Insulin regimen should mimic glucose metabolism in a non-diabetic state

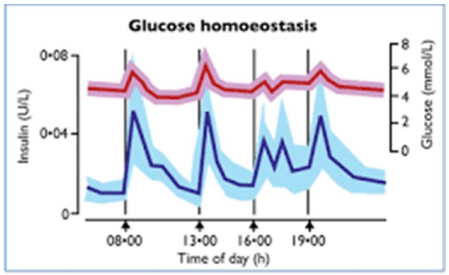


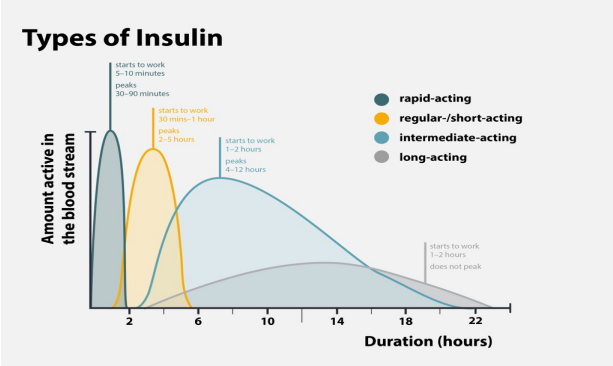
Figure 1. Twenty-four-hour plasma glucose and insulin profiles in healthy subjects. Mean values with 95% confidence interval. Red line: plasma glucose; blue line: insulin. Source: Reference 1. Reprinted with permission from Owens, with permission from Elsevier.

ElSayed, Nuha A, et al. "14. Children and Adolescents: Standards of Care in Diabetes—2025." *Diabetes Care*, vol. 48, no. Supplement_1, 9 Dec. 2024, pp. S283–S305, diabetesjournals.org/care/article/48/Supplement_1/S283/157559/14-Children-and-Adolescents-Standards-of-Care-in?searchresult=1, https://doi.org/10.2337/dc25-s014.

Diabetes Foundation

25

Insulin Types & Duration



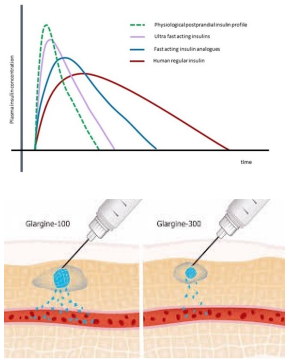
"Diabetes Educational Tool." *Ucsd.edu*, 2025, ddi.ucsd.edu/insulearn/index.html.

Diabetes Foundation

26

Newer Analog Insulins

- Bolus Insulins: Ultra rapid insulins (Fiasp, Lyumjev)
- Basal Insulins: Long-acting insulins: (Insulin Delgudec, U-300 Lantus Insulin)
- Result in
  - Less hypoglycemia
  - Improved postprandial glucose excursions
  - Administration flexibility
  - Less weight gain
  - Flat Stable and Prolonged action for basal insulins



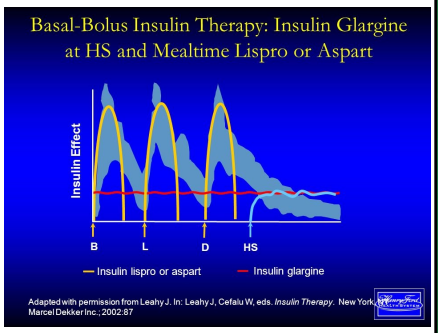
Hirsch, Irl B. "Insulin Analogues." *New England Journal of Medicine*, vol. 352, no. 2, 13 Jan. 2005, pp. 174–183, https://doi.org/10.1056/nejmra040832. Accessed 6 June 2025

Diabetes Foundation

27

Replication of Physiological Insulin Delivery with Multiple Daily Injections (MDI)

- Multiple Daily Injections (MDI):
  - Basal insulin replicates the slow release of glucose during the day and night.
  - Bolus insulin is released prior to each meal and snack.
  - MDI can approximate physiological insulin release.
    - Requires 3-4 injections/day.
    - Approximately the same amount of carbs must be eaten at each meal if a fixed amount of insulin is given.
    - If more precise control is desired, user will need to calculate bolus doses based on insulin: carb ratios and insulin sensitivity factors.



BODE, B. "Use of Rapid-Acting Insulin Analogues in the Treatment of Patients with Type 1 and Type 2 Diabetes Mellitus: Insulin Pump Therapy versus Multiple Daily Injections." *Clinical Therapeutics*, vol. 29, 2007, pp. S135–S144, https://doi.org/10.1016/j.clinthera.2007.12.013. Accessed 17 Sept. 2025.

Diabetes Foundation

28

Types of Insulin Delivery

- Multiple daily injections
  - Syringe and Vial
  - Insulin Pens
  - Smart Pens
- Pump (programmed basal, patient-initiated boluses for nutrition +correction)
- Automated Insulin Delivery: AID Systems
  - Pump + CGM (suspend before low)
  - Pump + CGM (basal titration based on CGM glucoses)
  - Pump + CGM (+correctional doses if high)

Diabetes Foundation

29

Insulin Delivery: Insulin Pens

- Have grown in popularity
- Volume delivered varies from ½ unit to 80units in some pens
- More convenient to carry and deliver insulin outside of the home.
- Simple to use: Doses are “dialed in”, lower risk if wrong dose delivered.
- Requires a needle attached to the pen before each use.
  - Needles as short as 4mm available
- Pens cannot be shared!
- Most people will require two pens
  - Bolus Insulin
  - Basal Insulin

Diabetes Foundation

30

Insulin Delivery: Smart Insulin Pens/Pen Caps

- Track insulin doses given and active insulin on board
- May have an insulin bolus calculator to calculate mealtime insulin doses based on the amount of carbohydrates they are about to consume and their glucose level prior to the meal.
- *InPen:* Communicates with CGM applications (eg, Guardian Connect, Dexcom G6,Dexcom G7) to keep track of both blood glucose levels and insulin dose. Alerts the user to a missed basal or bolus insulin dose.
- *Bigfoot/Tempo Smart Button:* smart cap attaches to commercially available short- or long-acting disposable insulin pens. Integrated with CGM. The cap captures the glucose data and suggests a correction dose . The cap records the timing of insulin dose and will not recommend an additional correction dose within 3 hours of a previous dose.

Vieira, Ginger. "Connected Insulin Pens: Here Are Today's "Smart Pen" Options." *T1D Exchange*, 6 Dec. 2023, t1dexchange.org/connected-insulin-pen-options/.

Diabetes Foundation

31

Insulin Delivery: Insulin Pumps

Automated Insulin Devices (AID Pumps)

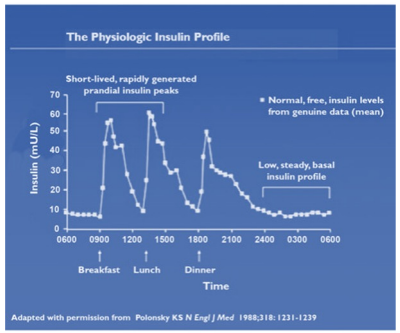
Conventional Insulin Pumps

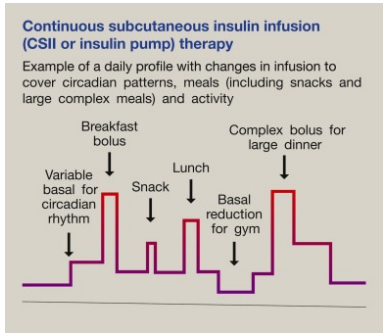
Insulet Omnipod | Cequr Simplicity | Mannkind V-Go

Diabetes Foundation

32

Replication of Physiologic Insulin Profile with an Insulin Pump





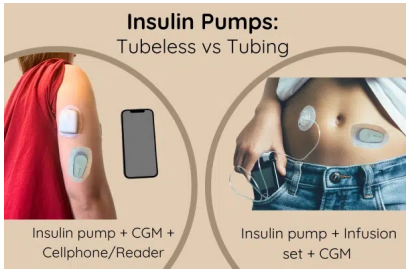
Neupane, Sankalpa, and Mark L. Evans. "Modern Strategies for Management of Glycaemia in Type 1 Diabetes." *Medicine*, vol. 47, no. 1, Jan. 2019, pp. 28–31, https://doi.org/10.1016/j.mpmed.2018.10.003.

Diabetes Foundation

33

AID Pumps: CGM Integration

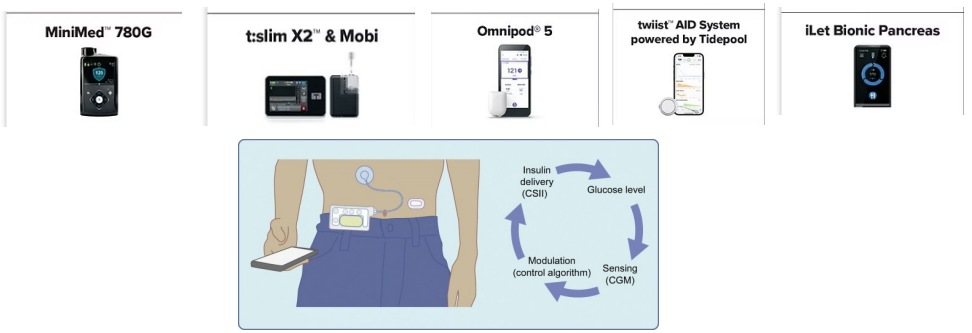
- The AID pump automatically receives readings from a CGM via Bluetooth.
  - It delivers basal insulin using a proprietary algorithm based on a blood glucose target.
  - Bolus insulin is delivered based on a target, and the carbs user enters into the device.
    - The Ilet pump delivers insulin based on the size of the meal. It "learns" over time the amount of carbs in a meal by size and does not require carb counting.
  - In some pumps, insulin delivery is reduced or stopped when patients are predicted to develop hypoglycemia.
  - It takes about 3 days for the pump to apply the algorithm correctly.
  - It works best if users are not giving correction doses



Diabetes Foundation

34

Newest AID Systems



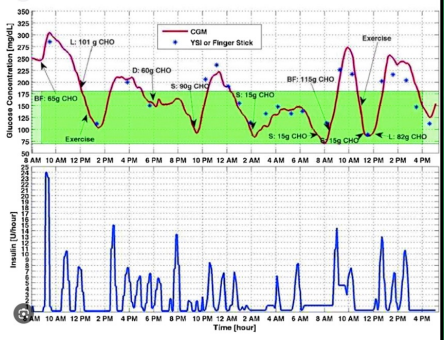
"Device Comparison Chart." *PANTHER Program*, www.pantherprogram.org/device-comparison-chart.

Diabetes Foundation

35

AID Systems

- Doctor prescribes settings:
  - Target Range
  - Beginning Basal Rate
  - Insulin Sensitivity Factor
  - Beginning Carb: Insulin Ratio
- When glucose drops because of activity, insulin is suspended.
- As glucose rises, insulin is automatically released in small micro-doses in some pumps, in other pumps, basal rate is temporarily increased.
- Requires 3 days for system to "learn" user's needs.
- Works best if user lets pump do the work.



Diabetes Foundation

36

AID Systems: Advantages & Disadvantages

Advantages

- Reduces Burden of Disease
- Requires fewer individual decisions/calculations because the system makes most of the decisions.
- Fewer highs and lows, especially overnight.
- Finger sticks and injections not required.
- Has been shown to improve time-in-range, especially during sleep
- Allows for more "forgiveness" if carb counting skills are not precise, the pump compensates by increasing the insulin (basal and/or bolus) based on the glucose.
- Matches basal needs more physiologically instead of presuming someone's basal requirements are the same day after day

Disadvantages

- Requires wearing two devices at all times
- Risk of skin irritation/infections
- More alerts and alarms can cause "alarm fatigue"
- Daily T1D management (carb counting, adjusting for exercise, etc.) still required
- Setting it up and getting used to it can take some time. Works best if manual adjustments are not made.
- It needs to be worn all the time
- Basal and bolus settings must be assessed prior to initiating delivery of insulin.
- User must still pre-bolus for food and adjust for exercise, stress, or illness.

Diabetes Foundation

37

AID Systems: Special Considerations

- Treatment of hypoglycemia requires less than 15 grams of carb
  - 6-8 g of carbohydrate is recommended
- Exercise
  - Should be pre-planned
  - May require glucose target to be raised.
  - May require reduction in bolus dose.
- Requires a back-up plan in the event of a pump failure
- Need to rotate "sites" of infusion and CGM.
- Users sometimes go on "Pump Holidays".

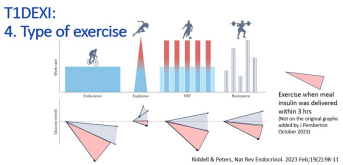
Sherr, Jennifer L., et al. "Automated Insulin Delivery: Benefits, Challenges, and Recommendations. A Consensus Report of the Joint Diabetes Technology Working Group of the European Association for the Study of Diabetes and the American Diabetes Association." *Diabetologia*, vol. 66, no. 1, 6 Oct. 2022, pp. 3–22, https://doi.org/10.1007/s00125-022-05744-z.

Diabetes Foundation

38

Use of Variable Basal Rates in Pump Therapy

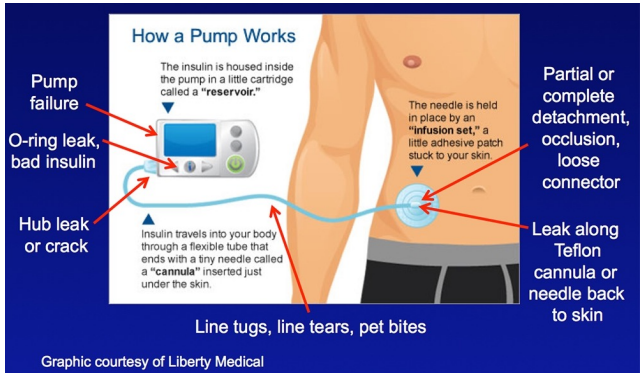
- *Variable Basal Rates:* Different rates can be programmed at different times of day or night.
  - Effectively treat Dawn phenomenon by lowering rate at 3:00 AM
  - Lowering rate based on timing and type of exercise
  - Adjusting rate during a high fat meal (e.g. pizza)



Diabetes Foundation

39

Weak Spots in Insulin Pump Delivery



Diabetes Foundation

40

Student Case Study:

This is an 8-year-old female T1D 3rd grade student who is on Omnipod 5 AID pump.

SCHEDULE					
	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:38 AM				GYM	
9:20 AM			GYM		
11:30 AM	LUNCH: Prebolus Lunch 30-45 g				
11:50 AM	Recess	Recess	Recess	Recess	Recess
2:00 PM	SNACK: Prebolus 15-30 g				
Special Foods	Pizza Day	Prebolus 20 g		After an hour, correct with "use sensor" or input 10-20 g based on glucose	
Special Foods	Ice cream Day: Chocolate Bar, 23 g	Give insulin for 13 g when prebolusing for lunch		In 1 hour, give bolus for 10 g carb	

Diabetes Foundation

41

Student Case Study:

Date:	9/3/2025		WEDNESDAY				
Time:	9:22 AM	10:00 AM	11:21 AM	11:30 AM	11:50 AM	1:02 PM	2:20 PM
BG	364	264	69	65	121	180	199
Trend	Steady	arrow down	diagonal down	diagonal down	arrow up	steady	diagonal down
CHO			1 glucose tab	1 glucose tab & started eating cantaloupe (45 g)			15 g
Activity	GYM			LUNCH	RECESS		SNACK/PLAYGROUND x 5 min

Date:	9/4/2025		THURSDAY				
Time:	8:49 AM	10:00 AM	11:13 AM	11:28 AM	11:50 AM	2:00 PM	2:21 PM
BG	159	97	113	108	115	68	180
Trend	diagonal down	steady	steady	steady	steady	diagonal down	diagonal down
CHO				30 g		27 g	
Activity	GYM			LUNCH	RECESS	SNACK	

Date:	9/5/2025		FRIDAY				
Time:	8:49 AM	9:05 AM	10:26 AM	11:20 AM	12:00 PM	1:00 PM	2:00 PM
BG	112	126	99	98	143	221	170
Trend	steady	steady	steady	steady	steady	steady	steady
CHO				40 g			15 g
Activity				LUNCH	RECESS		SNACK

Diabetes Foundation

42

Learning Objectives: Monitoring

- **State the ADA Recommendations for T1D Monitoring in Youth**
- **Interpret the results of the AGP Report**
- **State how CGM is best implemented in the school setting**

Diabetes Foundation

43

ADA Recommendations: T1D Youth Glucose Monitoring

- Real-time Continuous Glucose Monitoring (CGM) should be offered for diabetes management at diagnosis or as soon as possible in youth treated with multiple daily injections or insulin pump therapy.
- Recent data have demonstrated that the use of real-time CGM lowered A1C and increased TIR in adolescents and young adults and, in children aged <8 years old, was associated with a lower risk of hypoglycemia.
- In the U.S., real-time CGM is approved for use in children aged 2 years and older and intermittently scanned CGM is approved for use in children aged 4 years and older.

ElSayed, Nuha A, et al. "14. Children and Adolescents: Standards of Care in Diabetes—2025." *Diabetes Care*, vol. 48, no. Supplement_1, 9 Dec. 2024, pp. S283–S305, diabetesjournals.org/care/article/48/Supplement_1/S283/157559/14-Children-and-Adolescents-Standards-of-Care-in?searchresult=1, https://doi.org/10.2337/dc25-s014.

Diabetes Foundation

44

Monitoring Methods

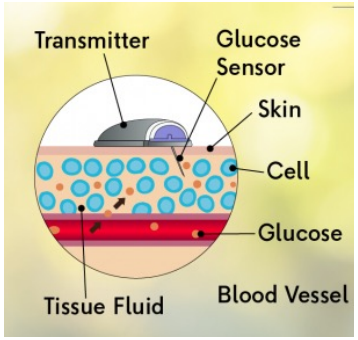
- Blood Glucose Monitoring or Continuous Glucose Monitoring are essential to T1D and T2D management.
- Both monitoring tools allow people, on an individual basis, to evaluate their responses to therapy and assess whether glycemic goals are being safely achieved.

Diabetes Foundation

45

How does a CGM work?

- Measures interstitial glucose continuously
  - This may lag 5-15 minutes behind the blood glucose leading to some differences between CGM and fingerstick readings, especially if the glucose is changing rapidly.
    - If glucose is changing rapidly, may need to double check with a BGM fingerstick
  - Current CGMs on the market have a high degree of accuracy.
- A tiny sensor is inserted under the skin, and a reusable transmitter sends the information via radio waves from sensor to a wireless device; phone, receiver insulin pump and/or the cloud.
- Includes directional arrows and a graph indicating if the glucose is trending up or down.



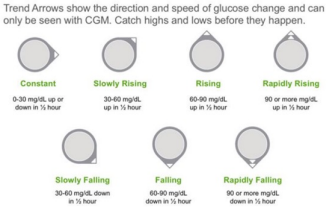
Russell, Steven. "Continuous Glucose Monitoring." *National Institute of Diabetes and Digestive and Kidney Diseases*, 2023, www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/continuous-glucose-monitoring

Diabetes Foundation

46

Advantages of CGM

- Provides real time glucose information every 5minutes
  - Up to 288 readings in a 24-hour period
- Shows current glucose
- Shows where glucose was
  - Trend graph
- Predicts where glucose is going with rate of change arrows
- Remote monitoring
  - Multiple alarm settings
  - *Eliminates finger-sticks*



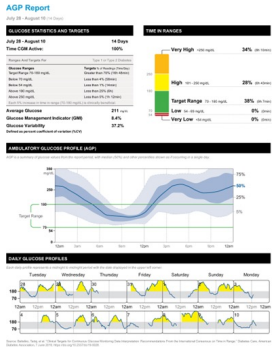
Russell, Steven. "Continuous Glucose Monitoring." *National Institute of Diabetes and Digestive and Kidney Diseases*, 2023, www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/continuous-glucose-monitoring.

Diabetes Foundation

47

CGM: AGP Report

- The AGP report is a standardized viewing format for retrospective CGM data.
- Combines thousands of data points obtained over multiple days
- Assists in understanding patterns and changes in therapy or behavior (meal planning, insulin adjustment)



Czupryniak, Leszek, et al. "Ambulatory Glucose Profile (AGP) Report in Daily Care of Patients with Diabetes: Practical Tips and Recommendations." *Diabetes Therapy*, vol. 13, no. 4, 12 Mar. 2022, pp. 811–821, https://doi.org/10.1007/s13300-022-01229-9.
Martens, Thomas W. "Roadmap to the Effective Use of Continuous Glucose Monitoring in Primary Care." *Diabetes Spectrum*, vol. 36, no. 4, 1 Nov. 2023, pp. 306–314, diabetesjournals.org/spectrum/article-abstract/36/4/306/153814/Roadmap-to-the-Effective-Use-of-Continuous-Glucose?redirectedFrom=fulltext, https://doi.org/10.2337/dsi23-0001.

Diabetes Foundation

48

CGM: Technology & Innovation

Libre 3

Dexcom G8

Eversense CGM 18+

Diabetes Foundation

49

CGM Recommendations in the School Setting

- The student may need to have cell phone with them or use school Wi-Fi to transmit data to remote receivers during the school day.
- Constant monitoring is not expected; priority should be given to low and high alerts.
- High alerts may occur after eating and will not always need to be treated. There must be two hours between insulin doses.
- Blood glucose should be checked with finger stick if symptoms don't match the sensor glucose reading.

ElSayed, Nuha A, et al. "14. Children and Adolescents: Standards of Care in Diabetes—2025." *Diabetes Care*, vol. 48, no. Supplement_1, 9 Dec. 2024, pp. S283–S305, diabetesjournals.org/care/article/48/Supplement_1/S283/157559/14-Children-and-Adolescents-Standards-of-Care-in?searchresult=1, https://doi.org/10.2337/dc25-s014.

Diabetes Foundation

50

Learning Objectives: Problem Solving

- Review signs and symptoms of Hypoglycemia: Mild and Severe
- State the Rule of 15
- State the treatment for Severe Hypoglycemia
- Identify when Glucagon should be administered
- Review signs and symptoms of Hyperglycemia
- State the actions to take when Hyperglycemia is identified

Diabetes Foundation

51

Mild/Moderate Hypoglycemia

Glucose level: below 70 mg/dL

Symptoms: Shakiness or trembling of hands, Weakness such as inability to participate in gym class, Confusion or difficulty focusing during class, Rapid Heart Rate that feels like anxiety, Dizziness, Headache, Sweating that is noticeably abnormal, Hunger

Causes: Physical Activity, Timing, composition of meals & insulin dosing

Treatment: Student must be able to follow directions and self-treat using the 15/15 rule

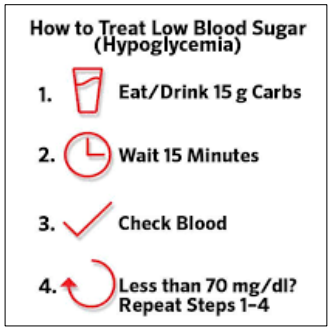
Diabetes Foundation

52

Hypoglycemia: 15-15 Rule

When to Initiate:
- Symptoms of hypoglycemia are present and/or glucose reading indicates low glucose level (<70 mg/dL)
- If hypoglycemia is suspected & unable to confirm with glucose measurement, assume low & treat glucose.
- If student is able to take food or drink by mouth.

Examples of 15 gm Fast acting Carb:
- 4 ounces of juice/soda
- 3 glucose tabs
- 3-4 starbursts
- Fun size pack of skittles
- 2 pkg smarties
- 1 tube glucose gel
- 3 sugar packets
- 1 Tbsp honey



Diabetes Foundation

CDC. "Treatment of Low Blood Sugar (Hypoglycemia)." *Diabetes*, 31 May 2024, www.cdc.gov/diabetes/treatment/treatment-low-blood-sugar-hypoglycemia.html.

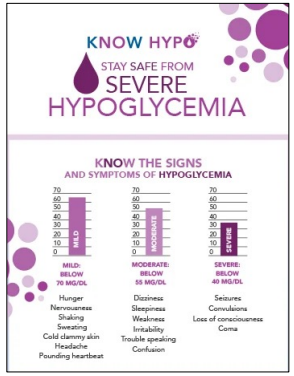
53

Severe Hypoglycemia

Glucose level: Drops to ≤54 mg/dL
- Medical Emergency
- If student is unresponsive treat with glucagon

Symptoms:
- Double vision or blurry vision
- Slurred speech
- Difficulty with coordination during an activity
- Not oriented to time and place
- Seizures
- Loss of consciousness

Causes: A condition in which autonomic symptoms and neurological symptoms typically present in hypoglycemia, become hardly noticeable.
- This may be due to altered brain glucose sensing
- Impaired hormonal counter regulation
- Impaired autonomic & neuroglycopenic symptoms



Diabetes Foundation

Ha, Won Chul, et al. "Severe Hypoglycemia Is a Serious Complication and Becoming an Economic Burden in Diabetes." *Diabetes & Metabolism Journal*, vol. 36, no. 4, 2012, p. 280, https://doi.org/10.4093/dmj.2012.36.4.280.

54

Severe Hypoglycemia: Administering Glucagon

When? Symptoms such as unconsciousness, seizures, or extreme lethargy.

What to do?

- Place on side & administer glucagon according to instructions
- Immediately after treating student, call 911 & parents
- A response should be clear within 15 minutes of administration; if not, a second dose should be considered.
- Once consciousness is regained, 15g of carbohydrate should be consumed.
- Glucose should be monitored for up to 2 hours after administration of glucagon.

- Reactions can occur

Zegalogue

Baqsimi

Gvoke

Ha, Won Chul, et al. "Severe Hypoglycemia Is a Serious Complication and Becoming an Economic Burden in Diabetes." *Diabetes & Metabolism Journal*, vol. 36, no. 4, 2012, p. 280, https://doi.org/10.4093/dmj.2012.36.4.280.

Diabetes Foundation

55

Hyperglycemia

What? Glucose rises to >180 mg/dL (10 mmol/L)

Why? Result of decreased insulin production or no insulin being produced by the cells of the pancreas. May be because of shifts in routine. Can cause ketoacidosis.

Symptoms:

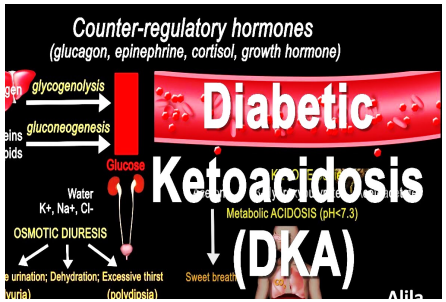
- ***Early****:* Increased thirst, Frequent urination, Dry mouth, Blurred vision, Fatigue or drowsiness, Headache, Increased hunger
- ***Severe:*** Fruity-smelling breath (a sign of ketones),Nausea or vomiting, Shortness of breath, Confusion, disorientation, flushed, hot, dry skin, rapid heartbeat, Abdominal pain

Diabetes Foundation

56

Hyperglycemia: Treatment

- Follow the physician's order via the DMMP
  - Notify parents if a pattern of hyperglycemia has been identified or if levels are elevated for a period of time.
  - Verify with blood glucose check
  - Check ketones
  - Correction dose if physician order present
- Push water and SF fluid intake
- Untreated can cause DKA
- Educate student to prevent recurrence of hyperglycemia
  - Help the student problem solve around what may be contributing to high glucose levels.
  - Model monitoring in the office and discuss options for lowering glucose levels.



Diabetes Foundation

57

Learning Objectives: School Nurse Role and Delegation of Responsibilities

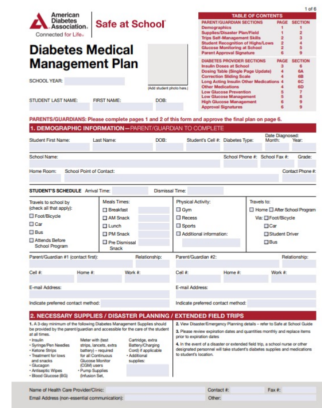
- **Identify the Role of School Nurse in Communication to other health care team members and parents.**
- **State when it is appropriate to delegate responsibilities to other school personnel and students for self-management and supervision.**

Diabetes Foundation

58

Role of the School Nurse in Team Management

- Coordination of Care:
  - School nurses act as the primary point of contact for diabetes care at school, collaborating with parents, healthcare providers, and other school staff.
- The school nurse develops the individualized healthcare plan(IHP)/Diabetes Medical Management Plan(DMMP) and an emergency healthcare plan (EHP), ***in conjunction with medical provider***
- Communicates regularly with the student, parents/guardians, and the healthcare team, and documents care while at school or school sponsored events.


American Diabetes Association. Connected for Life.
Safe at School
Diabetes Medical Management Plan

"Care of Students with Diabetes in Schools: Frequently Asked Questions." www.nj.gov/education/safety/health/profs/diabetes/faq.shtml.

Diabetes Foundation

59

Educating School Personnel about Diabetes

- The school nurse is encouraged to provide an overview of diabetes to all employees.
  - More specific training to those most likely to have responsibility or supervision of a student with diabetes.
- Topics should include hypoglycemia and hyperglycemia and when to call for assistance.
  - Staff working with school-sponsored programs outside the regular school day such as coaches, athletic trainers, club advisors, afterschool care providers, and others responsible for the supervision of students, should be included in the training.

Diabetes Foundation

60

Diabetes Emergencies: Delegation of Responsibility and Education of Ancillary Personnel

- Exercise is an important part of diabetes care.
  - The child should be permitted to check his/her glucose before, during, and after exercise.
  - Students may need to eat before intensive exercise and extra snacks may be needed to prevent low blood sugar
  - Coaches and physical education teachers must be keenly aware of the child's medical condition, the signs and symptoms of hypoglycemia, and appropriate treatments.
- The school nurse may designate, additional employees of the school district who volunteer to administer glucagon to a student experiencing severe hypoglycemia(low blood sugar) when the nurse is not physically present.
  - Training includes recognition of the signs and symptoms of hypoglycemia; how to mix, withdraw, and inject the medication into a student's arm, thigh, or buttock. It is recommended that trained delegates also be CPR-AED certified.

NJ Department of Education: https://www.nj.gov/education/safety/health/profs/diabetes/faq.shtml

Diabetes Foundation

61

Delegation of Diabetes Management to Student

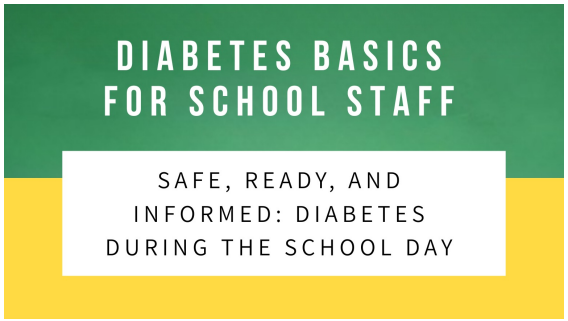
- A student may practice self-diabetes management when his/her parents/guardians and healthcare providers provide written authorization from his/her physician or advanced practice nurse.
  - A student is permitted to self- manage his/her diabetes and care as needed in the classroom, in any area of the school or grounds, or at any school-related activity. This includes glucose monitoring, administering insulin, and treating hypoglycemia or hyperglycemia.
  - Possession and use of syringes consistent with the purposes of diabetes management shall not be considered a violation of applicable statutes and regulations.
- Timing of meals, the quantity of food, and nutrient quality of food are major parts of the management of diabetes.
  - The student's IHP/IEHP should outline the diabetes meal plan and any need for additional snacks related to exercise.
  - He/she may need access to snacks and water in the classroom.
  - Parents/guardians should provide a ready supply of snacks that can be safely stored or carried during the school day.

"Care of Students with Diabetes in Schools: Frequently Asked Questions." *Www.nj.gov*, www.nj.gov/education/safety/health/profs/diabetes/faq.shtml.

Diabetes Foundation

62

Educating Personnel



Focuses on staff personnel education.

Topics include:

- *Overview of diabetes*
- *Signs and symptoms*
- *Issues and general emergency actions*
- *IHP/IEHP Procedures*
- *Glucose and insulin administration information*

Diabetes Foundation

63

Additional Professional Resources

- Pink Panther Books
  - https://www.childrensdiabetesfoundation.org/t1d-resources/pink-panther-books
- Panther Program: Educational Materials re: Diabetes Technology
  - https://www.pantherprogram.org/
- Breakthrough Type 1: Managing Type 1 Diabetes in Schools
  - https://www.breakthrought1d.org/t1d-resources/school/
- ADA Safe at School: Includes Webinars, Training Materials
  - https://diabetes.org/advocacy/safe-at-school-state-laws
- National Institutes of Health: Helping the Student with Diabetes Succeed
  - https://www.niddk.nih.gov/health-information/professionals/clinical-tools-patient-management/diabetes/helping-student-diabetes-succeed-guide-school-personnel

Diabetes Foundation

64

The Diabetes Foundation Difference

Creating Access to Improve Health for Nearly Four Decades

Our high-quality accessible services provide awareness, prevention, diabetes management, and health professional tools across the state of New Jersey and beyond

Services free insulin, diabetes supplies, A1C screenings, self-management education, social support groups, and navigation to services such as health insurance and providers.

We are funded entirely through philanthropic gifts. Please become a donor today at any level if you can. Every contribution counts.



Diabetes Foundation

65