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# Managing Diabetes With Continuous Glucose Monitors and Insulin Pumps: How to Support Your Patients

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A webinar with Diabetes Lifestyle Expert Toby Smithson, MS, RDN, CDCES, FAND

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# Toby Smithson, MS, RDN, LD, CDCES, FAND

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Toby is a certified diabetes care and education specialist (CDCES) and registered dietitian nutritionist (RDN) who has successfully managed her own type 1 diabetes for more than five decades.

She has dynamically combined her professional knowledge with her life experiences managing diabetes by producing scores of videos under the banner DiabetesEveryDay, guiding people with diabetes to better understand and practice diabetes self-management at her website DiabetesEveryDay.com, on YouTube at Diabetes EveryDay and on other social media platforms.

Toby was recently awarded the 2021 Benedictine University Alumni Achievement Award and the 2020 Diabetes Educator of the Year honor by the Diabetes Dietetic Practice Group of the Academy of Nutrition and Dietetics. She is a former media spokesperson for the Academy of Nutrition and Dietetics, and media spokesperson for the Association of Diabetes Care and Education Specialists. Toby is a frequent resource for nutrition writers and bloggers and writes regularly for *U.S. News* and *type2diabetes.com*. She is the principal author of *Diabetes Meal Planning and Nutrition for Dummies*.

She earned her Bachelor of Science in Dietetics, Nutrition and Food Science from Northern Illinois University's Coordinated Undergraduate Program and her Master of Science in Nutrition and Wellness from Benedictine University. Toby is a Fellow of the Academy of Nutrition and Dietetics (FAND).



# Disclosure to Participants

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## Notice of Requirements For Successful Completion

Please refer to learning goals and objectives

Learners must attend the full activity and complete the evaluation in order to claim continuing education credit/hours

## Conflict of Interest (COI) and Financial Relationship Disclosures

No conflicts to disclose



# Learning Objectives

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At the conclusion of this webinar, the learner will be able to:

1. State four advantages of managing diabetes with a continuous glucose monitor (CGM)
2. State the difference between a traditional insulin pump and a patch pump
3. Describe at least one pro and one con of using a CGM
4. State at least two considerations when using an insulin pump
5. Define a Sensor-Augmented Pump (SAP)
6. Describe and state an advantage of both open- and closed-loop systems



# Part 1:

## What Are Continuous Glucose Monitors (CGMs)?

# Self-Monitoring Blood Glucose (SMBG)

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- Checking BG with a traditional blood glucose meter and test strips
- Provides a snapshot
- Average 3-7 daily checks
  - Fasting
  - Before a meal
  - 2 hours after a meal
  - lows/highs
  - Bedtime



# CGMs: How Do They Work?

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- Real-time BG measurement using interstitial fluid every 5 minutes 24 hours/day
- Sensor beneath the skin
- Worn on the skin for 10-14 days or 90 if implanted
  - Typically arm or abdomen
- Can personalize alert preferences



# CGMs: Different Types

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- Abbott
- Dexcom
- Medtronic
- Senseonics



# CGMs: Who Do They Benefit?

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- Those with hypoglycemia unawareness
- Those with nocturnal hypoglycemia
- Those who often forget to take insulin
- Those requiring multiple daily insulin injections
- Pregnant women aiming for target A1C of <6%
- Elderly individuals with vision or dexterity challenges
- Those with T1DM with A1C >7%



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# CGMs: Advantages

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- Detects BG trends
- Decreases fingersticks
- Provides data to help direct treatment and tell you:
  - how food and exercise affect BG levels
  - the direction BG is trending
  - if you need to adjust insulin to carb ratios
- Safety with alarm feature



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# Poll Question

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Which of the following is a potential con associated with using a CGM?

- a) Increased risk for hypoglycemic episodes
- b) Decreased accuracy
- c) Increased risk for diabetic acidosis
- d) No way to easily share data with others

# CGMs: Pros

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- Prevents hypoglycemic episodes
- Prevents diabetic acidosis
- Parents, healthcare providers, caregivers can access data remotely
- Smartphone integration



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# CGMs: Cons

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- Accuracy
  - Interstitial fluid vs bloodstream
- Attached to the body
- Finger sticks 2x daily may be necessary to calibrate CGM
- Delays
  - May take 5-25 min longer to show glucose increase compared to venous BG reading
- Cost



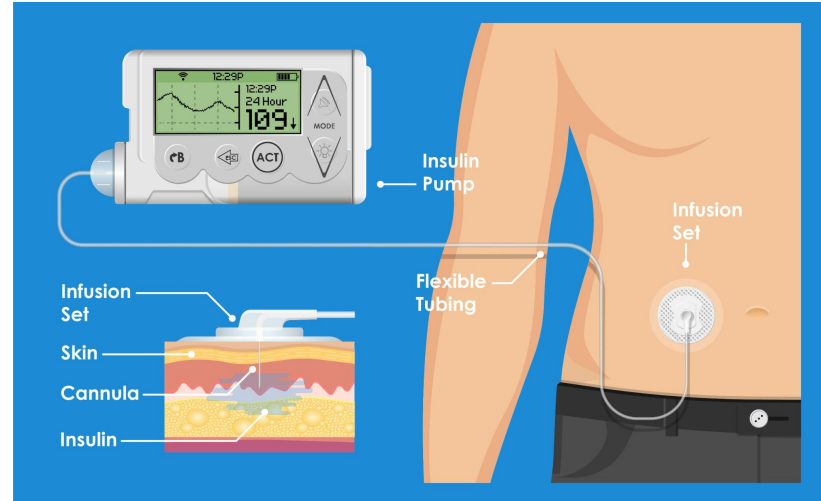


# Part 2:

## Insulin Pumps

# Insulin Pumps: How Do They Work?

- Computerized device that delivers insulin through a tube under the skin
  - Infusion set includes thin plastic tubing + a needle or cannula
  - Infusion site: belly, buttock, thigh
- Basal + bolus short-acting and rapid-acting insulin
- Programmable
- Usually battery powered



# Traditional Insulin Pump

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- Reservoir of insulin + pumping mechanism that attaches to the body with an infusion set
- Controlled with buttons or touch screen
- Worn on a belt or attached to clothing
- Usually pre-set to deliver specific number of units but can be manually adjusted to calculate bolus dosage



# Infusion Sets

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- Made of steel or teflon
- Attaches to skin with an adhesive patch for insulin injection
- Angled set: inserted to skin surface at a 30°-45° angle
- Straight set: inserted to skin surface at a 90° angle
- Needle should be changed every 2-3 days



# Poll Question

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Which of the following is TRUE of insulin pump use?

- a) May reduce hypoglycemic episodes
- b) May increase the risk of 'dawn phenomenon'
- c) May promote weight loss
- d) May complicate BG management when exercising

# Patch Pump

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- Has a small case with a reservoir of insulin + pumping mechanism without tubes or wires
- Controlled wirelessly
- Attaches directly to the skin with an adhesive
- Tubes/cannula are automatically inserted into the skin using a remote device
- Need to be replaced every 3 days
- User can calculate and program bolus dosage



# IPs: Advantages

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- Greater accuracy
- Fewer needle sticks
- Fewer lows
- Easier dosing for meals and snacks
- Better management of 'dawn phenomenon'
- No need for insulin injections with a syringe
- Increased lifestyle flexibility
- Easier BG management when exercising



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# IPs: Disadvantages

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- May feel bulky
- Increased risk of high BGs
  - When disconnected from the pump
  - With infrequent BG checks
- Possible weight gain
  - With higher initial basal insulin levels
- Risk of infection
- Cost



# Insulin Pumps: Who Do They Benefit?

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- Those who are physically active
- Those with frequent lows
- Those with gastroparesis
- Women planning pregnancy
- Those interested in using the pump's bolus calculator to determine insulin doses
- Those with type 2 or type 2 DM
- Those that can use the device safely by themselves or with a caregiver



# Insulin Pumps: Special Considerations

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- Carb Counting
- Exercise
- DKA



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# Insulin Pumps: Learning Curve

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- More frequent blood sugar checks in the beginning
- Work with diabetes educator and healthcare provider
- Set basal rates
- Insulin sensitivity factor (ISF)
- Insulin to carb ratio



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# Insulin Pumps: Tips & Tricks

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- Cut out holes in pockets for tubing
- Tuck in tubing
- Medical tape
- Remove when swimming/bathing
- Keep extra batteries or charger on hand
- Rotate infusion sites



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# Part 3:

## A Combined Approach: CGMs with IPs

# Poll Question

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Which type of combined insulin pump/CGM system eliminates the need for finger pricks throughout the day?

- a) 'Open-loop' system
- b) 'Closed-loop' system

# Sensor-Augmented Pumps (SAPs)

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- 'Open-loop' system
- Combined insulin pump with a continuous glucose sensor
- Provides regular BG level updates
- Eliminates the need for finger pricks throughout the day
- Requires manual adjustments and input from the user
- Pump can suspend basal rate injected by the pump when BG is dropping to prevent hypoglycemia



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# Hybrid Closed-Loop Systems

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- Require input from the user
  - Input carbs consumed
  - Approve meal-time boluses
  - Factor in exercise and illness
- Automatically adjust basal rate if outside of target range



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# Closed-Loop Insulin Delivery Systems

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- CGM technology + insulin pump
- Uses complex algorithms to predict BG
- Glucose readings used to calibrate insulin levels and delivery of a specific amount of basal insulin immediately and automatically every 5 minutes
- Mimics pancreatic function



# Questions?

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# More On This Topic

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Thank you for attending!

- Learn more from Toby at [DiabetesEveryDay.com](https://DiabetesEveryDay.com), [Diabetes EveryDay](https://www.youtube.com/channel/UC...) YouTube channel, and follow on Instagram: [@tobysmithson](https://www.instagram.com/tobysmithson)  
Facebook: [DiabetesEveryDay](https://www.facebook.com/DiabetesEveryDay)
- Learn more with *Diabetes in Practice: Case Studies with Commentary (18 CPEUs)*, at [SkellySkills.com](https://SkellySkills.com). Get 25% off with code DCS25 through 3/26/22
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