Introduction to Continuous Glucose Monitoring and the Dexcom and Freestyle Devices

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• The planners and presenters of this CE event have disclosed no conflict of interest, including no relevant financial relationships with any commercial interests pertaining to these CE activities, except:
  • Cara Liday receives speaker's bureau honoraria from Dexcom

Objectives
• Compare and contrast currently available continuous glucose monitoring (CGM) devices for use in patients with diabetes
• Interpret an ambulatory glucose profile
• Discuss the benefits and limitations of CGM
• Describe the role of the health care provider in identifying patients for CGM
• Determine an appropriate device and provide education for an individual patient
• Identify components, demonstrate set-up and review downloaded data of Dexcom and Freestyle CGM devices

Case: 28 year old male
• Type 1 diabetes (T1DM)
• MDI: detemir 20 units BID, aspart 1:13 CHO & 1:30 correction
• A1c 15%
• Non-compliant with insulin and SMBG
• Hospitalized 4 times in the past 6 mo for DKA
• In clinic complains of hypoglycemia signs & symptoms periodically

Fingerstick glucose monitors
• Standard for guiding treatment decisions
• Blood glucose reading “right now”
• No information regarding past or future glucose direction
• T1DM must check frequently for insulin dosing and corrections
• T2DM: data doesn’t show benefit unless multiple daily insulin (MDI) doses or use FPG to adjust basal insulin doses

Monitoring
• Recommended monitoring for T1DM
  • 6-9 times/day
  • Before meals and snacks
  • 2-3 hours post-prandial
  • Bedtime
  • Before exercise or activity
  • Hypoglycemia signs & symptoms
  • After treating low or high
  • Before critical tasks such as driving
CGM Basics

- Tiny wire sensor placed into subcutaneous fat
- Attached to a transmitter that sends glucose data to a reader/receiver, phone, or other device
- CGM measures interstitial fluid not serum glucose
- Measures glucose @ every 5 mins; 288/day
- Gives glucose with direction and rate of change
- Disposable sensors
- Reusable transmitter (except Libre)
- Professional versions available

Freestyle Libre®

- Intermittently scanned CGM: isCGM
  - Only receive SG readings when you scan
  - NO alarms or alerts
  - Dispensed from pharmacy or medical supply
  - Reader or smart phone
  - Replace sensor every 14 days
  - ≥ 18 years of age
  - Data sharing with LinkUp app
  - Provider/patient can download

Freestyle Libre®

- Ascobic acid and salicylic acid can interfere with sensor readings
- Warm up of 1 hour without readings; should use fingerstick glucose for first 12 hours
- Scan minimum of every 8 hours
- No calibration
- Need fingerstick for decisions

Dexcom G6®

- Real time CGM: rtCGM
  - Real time alerts and alarms
  - Continuous data stream to device or phone
  - Urgent low soon alert
  - Replace sensor every 10 days; 2 hour warm-up
  - Dispensed from pharmacy
  - ≥ 2 years of age
  - Receiver or smartphone app; data sharing
  - No calibration required; replaces fingersticks
  - Links to Tandem insulin pumps
Guardian Connect®
- Real time CGM: rtCGM
- Real time alerts and alarms
- Predictive alerts for high and low
- No reader; smartphone app only; links to Sugar.IQ
- Replace sensor every 7 days
- ≥ 14 years of age; if 670G pump system then 7 years
- Share data with 5 people
- Acetaminophen falsely elevates glucose readings
- 2 hour warm-up
- Calibration required: 2 hrs, 6 hrs, then every 12 hrs

Sensor placement
- Freestyle Libre: back of arms
- Dexcom G6: abdomen and upper buttocks
- Medtronic: back of arm and abdomen
- Flat and “pinchable” area
- Rotate insertion sites
- Avoid:
  - Areas of pressure: clothing, sleeping, bony
  - Tattoos or scar tissue
  - Hair
  - Irritation

Eversense®
- rtCGM
- On body vibration and device alerts
- Insert sensor in arm q90 days (180 days Europe)
- In office procedure
- ≥ 18 years of age
- Daily removable and rechargeable transmitter
- Smartphone app; data sharing with 5 people
- Warm up 24 hours
- 2 calibrations per day
Ambulatory Glucose Profile

- Consensus on what is included in summary page
- Profile summaries for CGM and SMBG
  1. Statistics and targets
  2. Time in ranges
  3. Ambulatory glucose profile
  4. Daily glucose profiles

CGM Targets

Battelino T et al. Diabetes Care 2019;42(8):1593-1603
Benefits of CGM

- Patient engagement
- More accurate insulin dosing
- Less glucose variability
  - Fewer hypo and hyperglycemic excursions
- Improvements in A1c
- Move from A1c to AGP
- Use of CGM is more beneficial to glucose control than insulin delivery

CGM selection

- rCGM (Dexcom G6®, Guardian®, Eversense®)
  - Intensive insulin therapy
  - Increased hypoglycemic risk/ unawareness
  - Nocturnal hypoglycemia
  - Significant glycemic variability
  - Continuous data, alerts and alarms
  - Children ≥ 2 years (G6®)
  - Pump integration (G6®, Guardian®)
  - Allergy to tape adhesives (Eversense®)

- isCGM (Freestyle)
  - Non-insulin or only LA insulin regimen
  - **Medicare requires ≥ 3 insulin injections/day
  - Doesn’t need alerts & will scan device
  - Low risk of hypoglycemia
  - Non-compliant with fingerstick
  - Less expensive and very easy set-up

ADA 2020 recommendations

- T1DM and/or MDI
- Struggle with glucose variability
- Hypoglycemia unawareness or frequent lows
- Non-compliant with glucose meter
- rCGM considered in all children with T1DM
- rCGM may be used in pregnancy
- isCGM considered as SMBG substitute when frequent monitoring is required
- Recommend the AGP for all CGM devices

When prescribing continuous glucose monitoring (CGM) devices, robust diabetes education, training, and support are required for optimal CGM device implementation and ongoing use.

ADA Standards of Medical Care 2020
Pharmacist role

- At a minimum..... providing education
- Recommend CGM to appropriate patients
- Prescribe CGM
- All providers struggle to keep up with new advances! Be the one who does.

Pharmacists role

Patient selection

- Frequent glucagon fills
- Excessive or little to no refills on test strips
- Reducing doses of insulin to avoid lows resulting in high A1c
- Frequent hospitalizations: severe hypoglycemic events or DKA
- Motivated to achieve better control
- Caregiver concern

Idaho Medicaid

- Freestyle or Dexcom G5/G6
- T1 or T2 diabetes
- Submit SMBG documenting 4+ checks/day
- Insulin treatment with 3+ injections/day or pump
- Insulin requires frequent adjustment
- Within 6 months prior in-person visit with provider
- Every 6 months in-person visit

Medicare

- T1 or T2 diabetes
- SMBG 4+ checks/day
- Insulin treatment with 3+ injections/day or pump
- Insulin requires frequent adjustments
- Freestyle Libre
- Dexcom G5 or G6

Resources

**Dexcom**
https://www.dexcom.com/get-started-cgm/40?stc=701f30000018vibAAA#form
https://www.dexcom.com/dexcom-care

Demo app: Dexcom G6 Simulator
Patient app: Dexcom G6
Patient share app: Dexcom Share2 or Follow

Resources

**Freestyle Libre**
https://www.freestylelibre.us/support/buying-guide.html
https://www.freestylelibre.us/support/overview.html

Freestyle Libre app: Freestyle LibreLink
Patient share app: LibreLinkUp
Case: 28 year old male

- T1DM
- MDI: detemir 20 units BID, aspart 1:13 CHO & 1:30 correction
- A1c 15%
- Non-compliant with insulin and glucose testing
- Hospitalized 4 times in the past 6 mo for DKA
- In clinic complains of hypoglycemia signs & symptoms periodically
- Good candidate for CGM? If so which do you recommend? THINK/PAIR/SHARE

Case: 47 year old female

- T1DM
- A1c 7.4%
- Taking MDI: glargine 44 units HS and aspart for meals and correction (1:9 CHO & 1:30 correction)
- Checks glucose 2-3 times/day before meals or bedtime with infrequent daytime hypoglycemia
- Fasting typically < 130 & bedtime @200
- Some headaches in the middle of the night

Case: 77 year old male

- T2DM x 30 years
- A1c 5.9%
- MDI regimen with degludec 70 units daily and aspart 15 units with meals; metformin
- Checks glucose fasting and before dinner
- Patient states these are “at goal”
- Complains of only rare hypoglycemia symptoms

Questions?

Hands on practice with Dexcom G6® and Freestyle Libre®