It's About Time: The Use of CGM for Optimal Diabetes Care

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  - 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

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  - Presenter: Nancy Waldbillig, RDN, CDE
  - No COI/Financial Relationship to disclose
  - Presenter: Mary L. Johnson, RN, CDE
  - Clinical research and/or consultant for: Abbott Diabetes Care, DexCom, Hygieia, J&J, Lilly, Medtronic, MSD/MSD, New Nordic, PDS Diabetes Care, Sanofi Diabetes Care, Sanofi. Ms. Johnson is employed by International Diabetes Center.

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Overview

- Current/future CGM
- Continuous Glucose Monitoring (CGM) guidelines
- Interpreting a CGM report
- Case studies
- Education Pearls
CGMS– current/future

• Abbott
  – Libre
  – Libre with LibreLink, LinkUp
  – Libre2 (with FDA – alarms sent to reader – no add’tl cost)
• DexCom
  – G6
  – G6 Pro (with FDA – blinded & RT)
  – G7 (Verily – much smaller)
• Medtronic
  – Guardian Connect
  – Multiple options (disposable, longer wear, no calibrations)
• Senseonics
  – Eversense – 90 day
  – Eversense XL – 180 day
  – Eversense 365

Who benefits from CGM: Current Guidelines

AACE/ ACE Consensus Statement 2016

“Evidence supports the benefits of CGM in type 1 diabetes and that these benefits are likely to apply whenever intensive insulin therapy is used, regardless of diabetes type.”

“CGM improves glycemic control, reduces hypoglycemia, and may reduce overall costs of diabetes management. Expanding CGM coverage and utilization is likely to improve the health outcomes of people with diabetes”

Who benefits from CGM: Current Guidelines

Endocrine Society 2016:

T1D: We recommend RT-CGM devices for adult patients with T1DM who have A1C levels above target or well-controlled, and who are willing and able to use these devices on a nearly daily basis.

T2D: We suggest short-term, intermittent RT-CGM use in adult patients with T2DM (not on prandial insulin) who have A1C levels ≥7% and are willing and able to use the device.
Who benefits from CGM: Current Guidelines

ADA Standards of Care 2019:

• When used properly, real-time continuous glucose monitoring in conjunction with intensive insulin regimens is a useful tool to lower A1C in adults with type 1 diabetes who are not meeting glycemic targets

• When prescribing continuous glucose monitoring, robust diabetes education, training, and support are required for optimal continuous glucose monitor implementation and ongoing use

• People who have been successfully using continuous glucose monitors should have continued access across third-party payers

How to Effectively Use CGM Data

• Standardize CGM data
• Organize CGM data into a useable report
• Analyze a CGM report in a systematic way
• Use the CGM report to improve glucose

Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range

This report has been endorsed by ADA, AACE, AANED, EASD, EDIC, IDF, IF, SES

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Glucose Management Indicator (GMI): A New Term for Estimating A1C From Continuous Glucose Monitoring

- GMI is an estimate of A1C based on average glucose
  - Ideally based on 14 or more days of glucose data
  - From a period of time when you are doing your “normal” diabetes self-care
  - Trust us when we tell you not to use your average glucose from your vacation cruise!
- GMI may be the same, higher or lower than a lab A1C for a lot of reasons
  - How your body reacts to glucose
  - How long your red blood cells live
  - If you have been sick, stressed or on vacation
- GMI is a quick way to see approximately what your lab A1C would be if you kept doing what you have been doing over the past 2 wks for another 3 mo.
Estimation of A1C for a Given TIR Level of CGM Metric

<table>
<thead>
<tr>
<th>TIR^{70-180}</th>
<th>Estimate (95% CI for the predicted value)</th>
<th>TIR^{70-140}</th>
<th>Estimate (95% CI for the predicted value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70% TIR^{70-180}</td>
<td>7% A1c</td>
<td>70% TIR^{70-140}</td>
<td>6% A1c</td>
</tr>
<tr>
<td>50% TIR^{70-180}</td>
<td>8% A1c</td>
<td>50% TIR^{70-140}</td>
<td>7% A1c</td>
</tr>
<tr>
<td>10% ΔTIR</td>
<td>0.5% ΔA1c</td>
<td>10% ΔTIR</td>
<td>0.5% ΔA1c</td>
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</tbody>
</table>

Beck, Bergenstal, Carlson, Rodbard et al., JDS T 2019

How to Effectively Use CGM Data

- Standardize CGM data
- Organize CGM data into a useful report
- Analyze a CGM report in a systematic way
- Use the CGM report to improve glucose management
They say a picture is worth a thousand words. We agree.

**You are more than a bunch of numbers.**
Your data should be *easy to use* and *tell a story* that can help you live the life you want to live. One not defined by diabetes.

AGPreport.org
How to Effectively Use CGM Data

- Standardize CGM data
- Organize CGM data into a *useable* report
- Analyze a CGM report in a *systematic* way
- Use the CGM report to *improve* glucose management
9 Steps to Interpreting an AGP

#1 – check for adequate data
- Ideal: 14 days or more
- Minimum: 7 days

#2 – discuss medication doses/times and meal times

James Smith
56 yo
T1D

Humalog
10 Units
10 Units
15 Units

Lantus
23 Units

B L D Snack

Estimated HbA1c 7.8%, or 62 mmol/mol
9 Steps to Interpreting an AGP

#3 – Ask "What do you see?" Listen.

- CV = 44
- SD = 78
- 250
- 180
- 70
- 54
- 44%
- 5%
- 28%
- 4%
- 19%

Have them look at AGP and time in range (TIR)
Emphasize goal to have >70% time in target range with <4% time in hypoglycemia

Do you need to take action?
Clinical Tip: Focus on time in target range and time in hypoglycemia and let time in hyperglycemia take care of itself!

MGLR

9 Steps to Interpreting an AGP

#4 – Look for patterns of lows

- If 10% line <54, take immediate action
- If 69-54%, consider therapy change to reduce hypo
- Confirm with daily views

Clinical Tip: Focus on time in target range and time in hypoglycemia and let time in hyperglycemia take care of itself!
9 Steps to Interpreting an AGP

#5 - look for patterns of highs

- Humalog: 10 Units, 10 Units, 15 Units
- Lantus: 23 Units

James Smith
56 yo
T1D

Questions:
• How often do you miss your medication?
• Are your highs before or after meals?

#6 - Look for areas of wide glucose variability

GV is about timing or amount
- Timing: meals & snacks, missing meds, work day & weekend, snacking, exercise, stress
- Amount: insulin dose, I:C ratio, inconsistency, exercise intensity

- Humalog: 10 Units, 10 Units, 15 Units
- Lantus: 23 Units

James Smith
56 yo
T1D

Snack
BT
Case Study: Bill

- 47 year old male, Type 2 DM for 17 years
- A1C: 10.0%, BMI 45
- Had previous education several years ago
- Current diabetes medications, reports he’s taking them consistently:
  - Trulicity 0.5 ml weekly
  - Glipizide XL 10 mg daily
  - Metformin 1000 BID
- Anxiety with office visits: “I’m here because my doctor told me I had to come”
- “I am not going to test my blood. I have an aversion to poking my finger”

Me: “How are you feeling about having diabetes?”
Bill: “It s**ks!”
Me: “What are your main concerns today?”
Bill: “Nausea & fullness at evening meal; 3 children, long hours at job, no time for exercise; wife travels with her job.”
“This might be a surprise, but I eat pretty healthy. My wife makes healthy meals.”

Plan: Reviewed Healthy Eating Meal Plan, encouraged activity
Declined changes in medication; willing to start CGM

1 week follow up:
“I was hoping to be surprised by lower numbers”
“I quit using flavored creamer in my coffee”
“My sugar went really high after pizza so when I ate leftovers, I ate half as much”
Step 1: Check for adequate data
Step 2: Review patient factors that affect AGP
Step 3: Talk to patient about their AGP
Step 4: Look for patterns of low glucose levels (none)
Step 5: Look for patterns of high glucose
Step 6: Look for areas of wide variability (evening)
Step 7: Compare with previous AGP (none)
Step 8: Agree on action plan
   “What medication do I need to take to get my numbers down?”
Step 9: Wrap up and document

Plan: stop trulicity, start 26 units background insulin at HS, continue metformin & glipizide

IDC Clinical Guidelines for Initiating and Adjusting Insulin
5 week follow up: individual cancelled appointment but glucose upload found on LibreView

What is your first observation?
Step 4: Look for patterns of low glucose levels

What would you recommend?
• Phone call made to individual instructed him to stop glipizide (he was on vacation in Hawaii and had just returned from hiking to a waterfall)
• He requested order for A1C
• Rescheduled follow up appointment for when he returns from vacation

Follow up visit 2 weeks after stopping glipizide: A1C 5.5%
(Starting A1C 10.0%)
He restarted trulicity because he felt hungry in the evening

Many positive effects of CGM!!!
He saw need for starting insulin
Made positive diet changes, appears motivated to continue to make more willing to see diabetes educators because they no longer ask him to poke his fingers
When asked how he’s feeling about having diabetes “I feel better”

Follow up visit 2 weeks after stopping glipizide: A1C 6.5%
Case Study: Tom

- Type 2 DM since 2016. 5 education visits at diagnosis. His goals: "Lose weight, control diabetes without medication." A1C: 6.8%, BMI 37
- Diet history: skips meals, eating high protein & restricting carbohydrate, not eating fruits/vegetables, eats large meal late in evening after refereeing hockey games
- Visit 5: Difficulty following through with recommendations: i.e. continued to skip meals, restrict carbohydrate, started metformin. A1C 6.5%, BMI 37
- 2018: Returns for follow up education: A1C 7.3%, BMI 39; Metformin 1000 BID
- Testing fasting glucose, refereeing hockey for 3-6+ hours several X’s per week
- Goal: lose weight to help lower A1C to avoid 2nd diabetes medication
- Diet history: high protein, very few fruits/vegetables, restricting carbohydrate, skipping meals, large meal late in evening.
- Visit 3: No meter, no records, A1C 8.3%;
- "Difficulty with busy schedule, not on track with things", asks about CGM.

4 weeks after starting CGM: 5# weight loss
- Averaging 7 scans per day
- Started eating consistent meals
- Drinking more water, less alcohol
- Bringing healthy snacks to have at hockey games
- Asks "What else do I need to do to get my numbers into target?"
- Willing to start SGLT-2

9 weeks after starting CGM:
- 16# weight loss, A1C 7.7%
- Smaller portions at meals, eats meal before going to hockey and minimal snacks when he gets home
- Eating well balanced diet, including fruits, vegetables, whole grains
- States, "I’m just more aware of what I put into my mouth. I realize that I am going to the pantry out of habit and I’m not even hungry, so I stop myself!"
Case Study: Jean

- Jean is 72 years old with type 2 diabetes for 12 years, HTN, Dyslipidemia, history of ASCVD
- SMBG occasionally, working on lifestyle changes (BMI 32) and would like to lose weight, doesn't report hypoglycemia
- Current labs
  - A1C 8.7%
  - eGFR >60; Alb/Creatinine= 21 mg/g
  - ALT normal range
- Current diabetes therapy
  - Metformin 1000 mg BID
  - Gliclizide XL 20 mg
Lab A1c = 8.7% ; GMI = 7.2%

Be careful of an increased risk for hypoglycemia if you intensify therapy

Shared Decision Making:
Treatment Gets Personal

Step 8: Agree on an action plan with patient.

The agreed upon plan for Jean was to:
1. Reinforce lifestyle modifications
2. Discontinue glipizide XL
3. Start a GLP-1 agonist (semaglutide)
4. Professional CGM in 3 months

Jean’s second professional CGM 3 months later
Case Study: Henry

- 44 year old male, chemical engineer, been in very good health
- Presented with rapid weight loss, polyuria and fatigue 3 years ago
- HbA1c = 11.3%, initially diagnosed as T2D, started orals
- SMBG did not improve, referred to endocrine: GAD65+, c-peptide low for ambient glucose
- Started insulin, HbA1c down to 8.2% after a few months
- Checks SMBG 3 times/day, keeps detailed log
- After review of CGM systems, decides on Libre in Dec 18

Case Study: Muriel

- 67 year old female with T1D for 58 years
- Complicated by CKD III, retinopathy, neuropathy, and CVD
- Extreme impaired awareness of hypoglycemia
- HbA1c 8.3-8.8% in last 3 years
Case Study: Muriel

- Dexcom G6 early 2019
- Able to see, respond to overnight hyperglycemia
- Increased overnight basal rates
- More confident with boluses

CGM or Insulin Pump?
CGM or Insulin Pump?

• Patient Education Time
• Cost
• Quality of Life
• Glycemic Outcomes

Emotional Distress and A1c – 1040 adolescents and their parents

- Emotional distress
  - CGM alone was associated with lower emotional distress than
    - No technology
    - CSII
    - CSII+CGM

- A1c
  - CGM was associated with a lower A1c than
    - No technology
    - CSII
  - CGM was associated with an equivalent A1c
    - CSII+CGM

CGM or Insulin Pump Recommendation

• Advocate for CGM to be initial technology.
• If TIR improvement or less hypo needed, recommend insulin pump, with consideration for hybrid closed-loop.

Education Pearls

• CGM can help motivate patients to make changes in lifestyle plus help them be more open to adding/changing medication.
• CGM increases educator confidence with making recommendations for medications.
• If patient is not testing and has an elevated A1c, consider using the Libre Pro and the soon to come DexCom G6 Pro to look for patterns.

Education Pearls

• Use a skin barrier if patient is having skin irritation under sensor i.e. skin tac provides a barrier plus adhesive for Libre; IV3000 works well with Dexcom.
• Libre sensor must be scanned at least every 8 hours. If missing a lot of data, TIR may not be accurate. Silence reader so that it does not beep with every scan, if helpful.
• Generally, Medicare covers CGM if taking 3 or more shots of insulin daily plus testing at least QID.
Education Pearls

• Standardized CGM metrics and Time in Range targets can help patients and educators work together to achieve agreed upon goals
• Using both the data and the story told in an AGP report can help personalize glucose management decisions

More Green, Less Red
MGLR

Flat Narrow & In Range
FNIR

Thank you!

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