Using CGM to Improve Clinical Outcomes

Clinical Reference Handout

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Key CGM Metrics and Targets

Essential CGM Measurements

Time in Range (TIR):

- Target: >70% for adults (70-180 mg/dL)
- Shown as percentage of device readings and hours/minutes per 24-hour day

Glucose Management Indicator (GMI):

- Replaces estimated A1C (eA1C)
- Uses updated formula for converting CGM-derived mean glucose to estimated A1C

Glucose Variability (Coefficient of Variation - CV):

- Target: ≤36%
- Measures how far apart glucose values are from each other

Data Sufficiency:

- Minimum 70% CGM active time over 14 days required for reliable interpretation

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CGM Target Ranges by Population

Standard Adults (T1D & T2D)

- **Target Range:** 70-180 mg/dL (>70% time)
- **High:** 181-250 mg/dL (<25% time)
- **Very High:** >250 mg/dL (<5% time)
- **Low:** 54-69 mg/dL (<4% time)
- **Very Low:** <54 mg/dL (<1% time)

Older/High-Risk Adults (T1D & T2D)

- **Target Range:** 70-180 mg/dL (>50% time)
- **High:** >180 mg/dL (<50% time)
- **Very High:** >250 mg/dL (<10% time)
- **Low:** <70 mg/dL (<1% time)

Pregnancy (T1D)

- **Target Range:** 63-140 mg/dL (>70% time)
- **High:** >140 mg/dL (<25% time)
- **Low:** <63 mg/dL (<4% time)
- **Very Low:** <54 mg/dL (<1% time)

Stepwise Approach to CGM Data Interpretation

Step 1: Is there enough data to analyze?

- **Check:** % Time CGM is Active on AGP report
- **Requirement:** Must have 70% active wear time over 14 days

Step 2: What is the problem?

- **Look at:** CGM metrics in Time in Ranges section
- **Identify:** Hypoglycemia, hyperglycemia, or both
- **Priority:** Always address hypoglycemia first

Step 3: Where is the problem?

- **Review:** Ambulatory Glucose Profile (AGP)
- **Identify:** Time of day when glucose repeatedly deviates from target range
- **Consider:** Fasting vs. postprandial patterns, sleep, exercise timing

Step 4: How to adjust therapy?

- **Examine:** Daily Glucose Data Patterns
- **Assess impact of:** Insulin dose, insulin timing, behaviors (meals, activity)

Treatment Adjustment Guidelines

For Hypoglycemia

Pattern	Adjustment
Fasting/Overnight	Decrease basal insulin dose by 10-20%
Postprandial	Decrease mealtime/bolus insulin dose by 10-20% Reduce insulin-to-carb ratio (e.g., 1:10 → 1:12)

For Hyperglycemia

Pattern	Adjustment
Fasting/Overnight	
- Glucose decreases ≥50 mg/dL overnight	• Adjust carbohydrate amount/meal composition for evening meal • Increase mealtime insulin
- Glucose decreases <50 mg/dL overnight	• Increase basal insulin dose by 10-20%
Postprandial	• Adjust carbohydrate amount/meal composition • Increase mealtime insulin dose • Improve insulin-to-carb ratio (e.g., 1:10 → 1:8)
After correction bolus	• Increase correction factor (e.g., 1:50 → 1:40)

For Exercise-Related Issues

Hypoglycemia around/after exercise:

- Small snacks before/during exercise (no insulin)
- Reduce mealtime insulin if meal within 2 hours of exercise
- Use temporary basal feature on pump

General Correction Strategies:

- Check if meal doses were missed
- Educate on proper hypoglycemia treatment: 10-15g fast-acting carbohydrates

- Adjust correction factors by 10-20% increments

Ambulatory Glucose Profile (AGP) Interpretation

Key Components

1. **Glucose Statistics and Targets** - Summary metrics and target achievement
2. **Time in Ranges** - Visual representation of glucose distribution
3. **Ambulatory Glucose Profile** - 24-hour overlay showing patterns
4. **Daily Glucose Profiles** - Individual day-by-day patterns

Reading the AGP

- **Median line (50%):** Middle glucose value
- **25th-75th percentile band (IQR):** Shows 50% of glucose readings closest to median
- **Target range boundaries:** 70-180 mg/dL marked clearly
- **Time markers:** Help identify meal times, sleep periods

Clinical Decision Points

Priority Assessment

1. **Safety first:** Address hypoglycemia before hyperglycemia
2. **Pattern recognition:** Look for consistent daily patterns
3. **Incremental changes:** Adjust by 10-20% increments
4. **Follow-up:** Reassess after changes with new CGM data

Red Flags Requiring Immediate Attention

- Time below range >4% (adults) or >1% (high-risk)
- Very low glucose episodes (<54 mg/dL)
- High glucose variability (CV >36%)
- Insufficient data for analysis (<70% wear time)

Success Indicators

- Time in range >70% (adults) or >50% (high-risk)
- GMI <7% (or individualized target)
- CV ≤36%
- Minimal time in hypoglycemic ranges

Case Study Summary

Patient: 34-year-old Hispanic woman with Type 1 diabetes
Initial therapy: Glargine 18 units bedtime, Lispro 6 units before meals

Initial Results:

- CGM active: 94% (sufficient data)
- Time in range: 36% (well below 70% target)
- Time above range: 59% (excessive hyperglycemia)
- GMI: 8.5% (above target)

Treatment Modification:

- Increased glargine by 10-20% (2-4 units)
- Patient education on causes and solutions

90-Day Outcomes:

- Time in range: 74% (met target)
- GMI: 6.8% (improved)
- Significant reduction in hyperglycemia

Key Takeaways

1. **Structured approach:** Four-step analysis ensures comprehensive assessment
2. **Safety priority:** Always address hypoglycemia before hyperglycemia
3. **Pattern-based treatment:** Use daily patterns to guide specific adjustments
4. **Incremental changes:** Small, systematic adjustments (10-20%) are more effective

5. **Data quality matters:** Ensure adequate wear time before making clinical decisions

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Remember: 1% of the day equals approximately 15 minutes

Next Project ECHO: Address CGM barriers including psychosocial concerns, troubleshooting, alarm fatigue, skin integrity, and device persistence.