WELCOME TO THE CSHCS ANNUAL MEETING
WELCOME AND OPENING REMARKS

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CSHCS DIVISION DIRECTOR
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OPENING REMARKS

• Welcome
• Housekeeping items
• Meeting overview and purpose
• CSHCS Funding Overview
• CSHCS Enrollment Trends
• 2019/2020 Program Focus Areas
PURPOSE

• Attendees will enhance their understanding of the complexities of caring for children and young adults with diabetes.
• Attendees will enhance their understanding of the techniques and strategies available to alleviate stress and provide evidence-based care.
• Attendees will benefit from face-to-face and group interactions.
# Children’s Special Health Care Services

**DRAFT - FY2020 Appropriation by Fund Source**

<table>
<thead>
<tr>
<th>Appropriation Title</th>
<th>Gross Appropriation</th>
<th>General Fund</th>
<th>Medicaid Federal</th>
<th>HRSA Federal</th>
<th>MCH Block Federal</th>
<th>Payment Agreement Fees</th>
<th>CSN Fund (Private)</th>
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<tbody>
<tr>
<td><strong>PROGRAM ADMINISTRATION</strong></td>
<td>$6,173,400</td>
<td>$2,950,700</td>
<td>$2,434,700</td>
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<td>$106,000</td>
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<td><strong>BEQUESTS FOR CARE &amp; SVC</strong></td>
<td>$1,841,400</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$105,200</td>
<td>$716,400</td>
<td>$1,019,800</td>
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<td><strong>OUTREACH &amp; ADVOCACY</strong></td>
<td>$5,510,000</td>
<td>$2,755,000</td>
<td>$2,755,000</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td><strong>NON-EMERGENCY MEDICAL TRANSPORTATION MILEAGE</strong></td>
<td>$905,900</td>
<td>$755,900</td>
<td>$150,000</td>
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<td>$0</td>
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<td><strong>MEDICAL CARE &amp; TREATMENT</strong></td>
<td>$228,477,000</td>
<td>$101,328,500</td>
<td>$117,398,500</td>
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<td>$6,889,000</td>
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<td><strong>TOTAL APPROPRIATIONS</strong></td>
<td>$242,907,700</td>
<td>$107,790,100</td>
<td>$122,738,200</td>
<td>$682,000</td>
<td>$6,994,200</td>
<td>$3,683,400</td>
<td>$1,019,800</td>
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</table>
CSHCS Total Monthly Enrollment
December 2014 thru December 2018
CSHCS Enrollment – January ‘17 – December ‘18

T5 only

T19

Total
CSHCS ENROLLMENT

Between January 2017 and December 2018:
- CSHCS-Only monthly enrollment increase by 10.9%
- CSHCS/Medicaid monthly enrollment increase by 19.4%
- CSHCS Total monthly enrollment increase by 16.5%

- Annual FY12 CSHCS Enrollment (Oct 2011 – Sep 2012) (before Managed Care)
  - Total enrollment: 35,431
    - CSHCS-Only (non-Medicaid): 10,549
    - CSHCS/Medicaid (including S-CHIP) Duals: 24,882

- Annual FY18 CSHCS Enrollment
  - Total enrollment: 46,816
    - CSHCS-Only (non-Medicaid): 10,613
    - CSHCS/Medicaid (including S-CHIP) Duals: 36,203
ENROLLMENT INCREASE IMPACT ON LHDS

32% increase in caseload leads to increase demands on LHDS:
- Annual contacts, Renewal assistance
- Transportation assistance
- Client issue resolution

Increased complexity among CSHCS clients:
- Assisting clients with billing issues has become increasingly complex
- Assisting clients with navigating the multiple systems has become increasingly complex. (Medicaid Health Plans, local Community Mental Health, local DHS Offices, Schools, and other providers)
- Treatment and technology advances leads to longer life expectancy for clients with medical complexity.

Increased caseloads has led to less time for CSHCS billable services. Overall reduction in billable revenue since the statewide peak in FY2014.
FY19 AND FY20 PROGRAM FOCUS AREAS

• LHD Technical Assistance & Customer Service
• CMH/CSHCS Collaboration and Coordination
• CSHCS/MHP Quality Improvement
• MCH Block Grant Priority Areas/Activities
  • 5-year Needs Assessment
  • Pediatric Transition to Adulthood
  • Medical Care and Treatment
    • CMDS Clinics
    • Telemedicine
FY19 AND FY20 PROGRAM FOCUS AREAS

• Program Promotion - Enhanced Outreach and Communications
• Health Equity
• Palliative Care
• Parent/Family Engagement
PURPOSE

• Attendees will enhance their understanding of the complexities of caring for children and young adults with diabetes.
• Attendees will enhance their understanding of the techniques and strategies available to alleviate stress and provide evidence-based care.
• Attendees will benefit from face-to-face and group interactions.
Current (and Future?) Treatment of Children With IDDM

Bernard M. Degnan, MD
Pediatric Endocrinology
Ascension St. John Health System
I put together a presentation that might interest you.

Ow! Ow! It's so boring, it hurts my head!

My brain is trying to escape through my ear!

I get this a lot.
Some definitions

- Diabetes: to pass through
- Mellitus : sweet (from the Greek word for honey)
- Insipidus: having no taste
- Guess how ancient Greek doctors distinguished between diabetes mellitus and diabetes insipidus??
Insulin Physiology Effects

- **Protein**: Anabolic- enhances muscle amino acid uptake (especially branched chain AAs)
- **Carbohydrate**: Inhibits glycolysis, and stimulates glucose uptake in adipose, muscle, splanchnic tissues
- **Fat**: Inhibits hormone-sensitive lipase, stimulates free fatty acid uptake, and inhibits ketogenesis in liver
Effects and Symptoms of Insulin Deficiency

- **Hyperglycemia:** weight loss, polyphagia, polyuria/polydypsia. Irritability, headache are common

- **Ketosis and/or ketoacidosis (DKA):** abdominal pain, nausea, vomiting, sweet breath (acetone formed via Acetoacetate), dyspnea / Kussmaul respiration

- **Muscle Breakdown for Glucose substrate:** weakness, ill appearance
Diabetes in the US

- 8.5% of US population has type 2 diabetes
- 0.4% have type 1 diabetes (just under 1 million)
- Type 1 diabetes accounts for 2/3 of children <20 with diabetes (80% < 10 yo)
HOW DO WE TAKE CARE OF THIS?

• INTENSIVE INSULIN THERAPY
  - 1980’s: two shots a day with NPH / Regular or maybe Lente or Ultralente
  - 1990’s: HUMALOG led to more frequent shots (lunchtime) and insulin pump therapy
  - 2000’s: Lantus use leads to initiation of intensive therapy at diagnosis
Physiological Serum Insulin Secretion Profile

Plasma insulin (µU/ml)

Breakfast  Lunch  Dinner

4:00  8:00  12:00  16:00  20:00  24:00  4:00  8:00

Physiological Serum Insulin Secretion Profile
Relative Risk of Progression of Diabetes Complications (DCCT)

Lifetime Benefits of Intensive Therapy (DCCT)

- Gain of 15.3 years of complication free living compared to conventional therapy
- Gain of 5.1 years of life compared to conventional therapy

Lifetime Benefits of Intensive Therapy (DCCT)

- Reduce the risk of eye damage by more than 75 percent
- Reduce the risk of nerve damage by 60 percent
- Prevent or slow the progression of kidney disease by 50 percent
- Reduce the risk of diabetes-related heart attack and stroke by 50 percent
DCCT and EDIC

- Epidemiology of Diabetes Interventions and Complications (EDIC) study, has continued to follow DCCT participants for the last 20-plus years. EDIC has shown that there are long-term benefits of early and intensive blood glucose control on the future development of diabetes-related complications such as heart, eye, kidney, and nerve disease, and that early and intensive blood glucose control also lengthens life.
The Basal/Bolus Insulin Concept

- **Basal insulin**
  - Suppresses glucose production / release between meals and overnight
  - 40% to 50% of daily needs

- **Bolus insulin (mealtime)**
  - Limits hyperglycemia after meals
  - Immediate rise and sharp peak at 1 hour
  - 10% to 20% of total daily insulin requirement at each meal
Basal/Bolus Treatment Program with Rapid-acting and Long-acting Analogs

Plasma insulin

Breakfast: Aspart Glulisine Lispro
Lunch: Aspart Glulisine Lispro
Dinner: Aspart Glulisine Lispro

Glargine
Detemir
Degludec
## Comparison of Human Insulins and Analogs

<table>
<thead>
<tr>
<th>Insulin Preparations</th>
<th>Onset of Action</th>
<th>Peak (hr)</th>
<th>Duration of Action (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lispro/Aspart/Glulisine*</td>
<td>5–15 min</td>
<td>1–2</td>
<td>4–6</td>
</tr>
<tr>
<td>Regular</td>
<td>30–60 min</td>
<td>2–4</td>
<td>6–10</td>
</tr>
<tr>
<td>NPH</td>
<td>1–2 hr</td>
<td>4–8</td>
<td>10–20</td>
</tr>
<tr>
<td>Glargine**</td>
<td>1–2 hr</td>
<td>“flat”</td>
<td>~24</td>
</tr>
<tr>
<td>Detemir***</td>
<td>1–2 hr</td>
<td>6-12</td>
<td>12-24</td>
</tr>
<tr>
<td>Degludec****</td>
<td>1-2 hr</td>
<td>“flat”</td>
<td>48Hr?</td>
</tr>
</tbody>
</table>

* “Rapid Insulin Analogs”-Lispro=Humalog/Admelog, Aspart=Novolog,Fiasp Glulisine=Apidra ** Glargine=Lantus, ***Detemir=Levemir, ****Degludec=Tresiba

Note: Action of any insulin varies between and within people
New forms of Insulin in development

- Ultra-long lasting
- Ultra-short acting
  - Intradermal
  - Intraperitoneal
- Oral insulin: more likely beneficial for Type 2
- Inhaled, intranasal
- Smart Insulin: “built-in” glucose sensors
  - Multi-valent glucose binding molecules
Inhaled Insulin
Starting MDI

- Starting total daily insulin dose is based on weight
  
  \[0.2 \text{ to } 1.0 \times \text{ wgt. in kg} = \text{ Units / day}\]

- Bolus dose (aspart/lispro/glulisine) = \sim 20\% \text{ of starting dose at each meal}

- Basal dose (glargine) = 40-50\% \text{ of starting dose at bedtime or in AM (same time each day)}
Estimating the Insulin to Carbohydrate Ratio

TDD = Total Daily Dose

Use the “500 Rule”

Insulin / Carb = 500 / TDD

Anywhere from 5 to 40 g carb is covered by 1 unit of insulin

In younger children, the ratio needed is usually higher than the formula predicts
Correction Bolus (for high glucose)

- Must determine how much glucose is lowered by 1 unit of short- or rapid-acting insulin
- This number is known as the correction factor (CF) or insulin sensitivity factor (ISF)
- Use the 1800 rule to estimate the CF
- CF = 1800 divided by the total daily dose (TDD)
  
  ex: if TDD = 36 units, then CF = 1800/36 = ~50
  
  meaning 1 unit will lower the BG ~50 mg/dl

In younger children, the correction factor is often higher than the 1800 rule predicts due to increased sensitivity
Insulin Pens
Variable Basal Rate: CSII Program

Plasma insulin

Breakfast  Lunch  Dinner
Bolus  Bolus  Bolus

Basal infusion

Time
4:00  8:00  12:00  16:00  20:00  24:00  4:00  8:00
Insulin Pump Profiles

- **Basal rates**
  - 12 AM = 0.8 Units/hr
  - 3 AM = 1.0 Units/hr
  - 9 AM = 0.7 Units/hr
  - 6 PM = 0.9 Units/hr

- **Target**
  - 12 AM = 100-150
  - 6 AM = 90-120
  - 9 PM = 100-150

- **Carb Ratios**
  - 12 AM = 20
  - 6 AM = 12
  - 10 AM = 15
  - 5 PM = 15
  - 9 PM = 20

- **Sensitivity / Correction**
  - 12 AM = 60
  - 6 AM = 50
  - 9 PM = 60
Insulin Pump instead of Syringe/Vial or Pen

Improved accuracy vs. syringes / Pens:

- Insulin Pumps allow for much more flexible dosing, reduced risk of hypoglycemia; pens give 0.5 Unit increments at most.
- Precise insulin delivery (basal rates as low as 0.025 U/hr, boluses to nearest 0.1 unit).
- Multiple basal profiles possible: adjust for sick day, exercise, shift hours, etc.
- Extended boluses (“slow-release insulin dose”) for high fat and high protein meals, or more than one bolus per meal.

- Bolus calculators
  - Once programmed with insulin to carbohydrate ratio (ICR) and Correction factor (CF), mistakes are minimized in dose calculation.
  - Insulin on Board Feature: designed to eliminate insulin dose stacking.
Continuous Glucose Monitor

- 3 basic components
  - Sensor creates the signal (electric current is created based on how much glucose is present)
  - Transmitter plugs into the sensor and sends the signal through the air
  - Receiver shows the signal in a number or graph format:
    - Insulin pump (Medtronic 530G, t:slim G4, Animas Vibe)
    - Separate receiver (Dexcom G4 or G5 Mobile) or iPhone / Android (soon) (Dexcom G5 Mobile)
    - Remote viewing after data is sent to the “cloud”
CGM is not the same as BG monitoring

Your BG meter measures glucose (sugar) levels in your **blood**, and your glucose sensor measures glucose levels in the fluid surrounding the cells in your tissue, which is called **interstitial fluid**.

Most of the time, glucose travels first to your blood and then to your interstitial fluid.

Because of how glucose travels, your BG meter readings and sensor readings will rarely match exactly. This is normal and should be expected.

Usually your BG meter readings and your sensor readings will be close.

However, when glucose levels are rising or falling quickly, you should **expect** to see a larger difference between your BG meter value and the sensor glucose reading. Examples of times when this may occur include:

- After meals or after insulin
- When ↑ or ↓ arrows appear on your pump screen
1. Guardian Connect App: glucose readings every 5 minutes, readout on a smartphone

2. Guardian™ Sensor 3 and Guardian™ Connect Transmitter. Sensor usable up to seven days with a Bluetooth® transmitter

3. Automatic uploads to CareLink™ account; easily accessed on the website.

4. **Smart technology to predict where glucose levels are headed**, the system alerts patients from 10 to 60 minutes before a glucose excursion, so they can take action in advance.

5. Sugar.IQ™ Intelligent diabetes assistant app. Uses IBM Watson™ technology. Reveals hidden patterns to provide **personalized insights** to help patients make smarter decisions.

6. **Does not replace finger pokes for dosing**
Dexcom G6

- Change site every 10 days
- 2-hour sensor warm-up period
- No calibration is required
- FDA approved to dose insulin
- Data viewable on the receiver or cell phone
- Acetaminophen DOES NOT interfere with glucose readings

We are not allowing phones at camp
**Cgm Glucose Trend Arrows**

**Dexcom**
- **Constant:** glucose is steady (not increasing/decreasing more than 1 mg/dL/min).
- **Slowly rising:** glucose is rising 1-2 mg/dL/min
- **Rising:** glucose is rising 2-3 mg/dL/min
- **Rapidly rising:** glucose is rising more than 3 mg/dL/min
- **Slowly falling:** glucose is falling 1-2 mg/dL/min
- **Falling:** glucose is falling 2-3 mg/dL/min
- **Rapidly falling:** Your glucose is falling more than 3 mg/dL/min

**Medtronic**
- **Constant:** glucose is steady (not increasing/decreasing more than 1 mg/dL/min).
- **Rising:** glucose is rising 1-2 mg/dL/min
- **Rapidly rising:** glucose is rising more than 2 mg/dL/min
- **Falling:** glucose is falling 1-2 mg/dL/min
- **Rapidly falling:** glucose is falling more than 2 mg/dL/min
# PEDIATRIC WORKSHEET

**ADJUSTING INSULIN DOSES USING DEXCOM GS® MOBILE TREND ARROWS**

This is your worksheet based on the Endocrine Society approach for making treatment decisions using the Dexcom GS® Mobile Continuous Glucose Monitoring (CGM) System.

**FOOD + CORRECTION + ARROW = TOTAL INSULIN DOSE**

**STEP 1:** Calculate your rapid-acting insulin dose for food and corrections as prescribed by your healthcare professional.

**STEP 2:** Add or subtract insulin based on your trend arrow.

Do not take any additional insulin until at least _______ hours from last dose.

## ADJUSTING INSULIN DOSES USING TREND ARROWS: PRE-MEAL AND AT LEAST 3 HOURS POST-MEAL.

<table>
<thead>
<tr>
<th>ARROW DIRECTION</th>
<th>CHANGE IN GLUCOSE</th>
<th>CORRECTION FACTOR</th>
<th>INSULIN DOSE ADJUSTMENT (U)</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RAPIDLY RISING</strong></td>
<td>Increasing &gt;3 mg/dL/min</td>
<td>□ less than 25</td>
<td>□ +0.0</td>
<td>Example: If your correction factor is 1:50 you will add 0.0 units of insulin for the double up arrows.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ 25-49</td>
<td>□ +0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ 50-74</td>
<td>□ +1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ 75-124</td>
<td>□ +2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ over 125</td>
<td>□ +3.0</td>
<td></td>
</tr>
<tr>
<td><strong>SLOWLY RISING</strong></td>
<td>Increasing 1-2 mg/dL/min</td>
<td>□ less than 25</td>
<td>□ +0.0</td>
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<tr>
<td></td>
<td></td>
<td>□ 25-49</td>
<td>□ +0.5</td>
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<tr>
<td></td>
<td></td>
<td>□ over 125</td>
<td>□ +3.0</td>
<td></td>
</tr>
<tr>
<td><strong>STEADY</strong></td>
<td>Not increasing/ decreasing &gt;1 mg/dL/min</td>
<td>□ less than 25</td>
<td>No adjustment</td>
<td></td>
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<td></td>
<td>□ 25-49</td>
<td>No adjustment</td>
<td></td>
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<td></td>
<td>□ 50-74</td>
<td>No adjustment</td>
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<td>□ 75-124</td>
<td>No adjustment</td>
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<td></td>
<td></td>
<td>□ over 125</td>
<td>No adjustment</td>
<td></td>
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<tr>
<td><strong>SLOWLY FALLING</strong></td>
<td>Decreasing 1-2 mg/dL/min</td>
<td>□ less than 25</td>
<td>□ -0.5</td>
<td></td>
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<td></td>
<td></td>
<td>□ 25-49</td>
<td>□ -1.0</td>
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<td></td>
<td>□ over 125</td>
<td>No adjustment</td>
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<tr>
<td><strong>FALLING</strong></td>
<td>Decreasing 2-3 mg/dL/min</td>
<td>□ less than 25</td>
<td>□ -0.5</td>
<td></td>
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<tr>
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<td>□ 25-49</td>
<td>□ -1.0</td>
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<td></td>
<td>□ over 125</td>
<td>No adjustment</td>
<td></td>
</tr>
<tr>
<td><strong>RAPIDLY FALLING</strong></td>
<td>Decreasing &gt;3 mg/dL/min</td>
<td>□ less than 25</td>
<td>□ -0.5</td>
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<td></td>
<td></td>
<td>□ over 125</td>
<td>No adjustment</td>
<td></td>
</tr>
</tbody>
</table>
223 mg/dL Average glucose (CGM)
63 mg/dL Standard deviation (CGM)

Hypoglycemia Risk:
- HIGH
- MODERATE
- LOW
- MINIMAL

Time in range:
- 79%
- 26%
- 0%

Sensor usage:
- Days with CGM data: 13 / 14
- Avg. calibrations per day: 0.0

Top Patterns:
1. had a pattern of nighttime highs
   - a pattern of significant highs between 5:35 PM and 5:45 AM.
2. had a pattern of daytime highs
   - a pattern of significant highs between 12:40 PM and 3:25 PM.
3. Draven's best glucose day was February 24, 2019
   - Draven's glucose data was in the target range about 41% of the day.

This graph shows your data averaged over 14 days.
Daily View

Legend
- CALIBRATIONS
- CARBS
- HEALTH
- SAD ACTING INSULIN RESISTANCE
- MULTIPLE EVENTS
- LONG-ACTING HUMULIN
- ALERTS
- EXERCISE

Fri, February 22, 2019

Glucose (mg/dl)

- 12:42 PM
  Rise Rate
- 5:32 PM
  Rise Rate
- 9:47 PM
  Fall Rate
- 10:12 PM
  Urgent Low Soon

Thu, February 21, 2019

Glucose (mg/dl)

- 10:17 PM
  Urgent Low
- 10:27 PM
  Urgent Low Soon
Freestyle Libre

- Less expensive
- 1 hour “warm up”
- No calibrations needed
- 14 day wear
- You must request (swipe) the data
- NO ALARMS
Freestyle Libre Continuous Glucose Monitoring System

✓ No finger stick BG calibration is required for the Freestyle Libre.
✓ If the CGM reading is <80 or >300 mg/dl or if there is any question regarding accuracy, a finger stick BG check should be done immediately.

Users can download an app to iPhone to use the phone as the scanner! FreeStyle LibreLink
Glucose Pattern Summary

Average Glucose

211 mg/dL

Time In Range

Above 180 mg/dL: 66% (above 250 mg/dL: 34.6%)

In Target Range: 70-180 mg/dL: 32%

Below 70 mg/dL: 2%

Coeficient of Variation (CV)

34.6%

Standard Deviation (SD)

73 mg/dL

Ambulatory Glucose Profile

Curves/plots represent glucose frequency distributions by time regardless of date.
MINIMED 670G SYSTEM HIGHLIGHTS.

The MiniMed 670G system with SmartGuard® HCL technology offers two new levels of personalization:

**NEW!** The Suspend before low option avoids lows and rebound highs proactively by automatically stopping insulin 30 minutes before you reach your pre-selected low limits, then automatically restarts insulin when your levels recover, all without bothersome alerts.

**NEW!** The Auto Mode® option automatically adjusts your basal insulin delivery every 5 minutes based on your sugar levels to keep you in target range, all day and night.

**NEW!** Guardian® sensor 3 continuous glucose monitoring sensor. Introducing the most accurate sensor from Medtronic, now with up to 7 day wear and easy insertion. It is the FIRST and ONLY continuous glucose monitoring sensor FDA approved and trusted to control insulin dosing.

**Exclusive CONTOUR®NEXT LINK 2.4 meter** Get easy and accurate CGM calibration, insulin dosing and remote bolusing with our exclusive meter.
Exit Reason Details

1 - Unidentified
Pump did not enter Auto mode or the origin of the exit cannot be identified.

2 - Auto Mode disabled by user
Auto Mode settings was turned off.
Exit Reason Details

1 - Undeclared
   Pump did not order Auto Mode or the origin of the alert cannot be identified.

2 - Alarms
   Auto Mode reset due to an alarm.

3 - BG required for Auto Mode
   BG was required to continue in Auto Mode.
SENSOR GLUCOSE DISTRIBUTION: MINIMED™ 670G SYSTEM

Data Type: Healthcare Professional (BERNARD M DEGNAN)

U.S. MINIMED™ SYSTEM DATASET*
CareLink™ Personal Data
41 Users
Average Sensor Glucose (SG): 170.7
Time in Auto Mode: 62.9%
Time in Range (Auto Mode): 65.6%

PARAMETER VALUES
Selected Age: All Ages
Selected Dates: All Dates

![Chart showing glucose distribution](chart.png)

* Only data from voluntary CareLink™ Personal or System uploads in the U.S. have been evaluated. Based on 2,212 days of data. Data collection began on March 2017.

** Time in range is the percentage of time glucose levels are between 70-180 mg/dL over a given period of time. Significant difference between SmartGuard™ feature on versus SmartGuard™ feature off (P < 0.05).
T-Slim X from Tandem
**Cgm Hourly | Aug 9 - 22, 2018**

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Low</th>
<th>Below Target</th>
<th>Target</th>
<th>Above Target</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Night (5pm-9am)</td>
<td>Total Readings</td>
<td>4%</td>
<td>36%</td>
<td>50%</td>
<td>12%</td>
</tr>
<tr>
<td>Time to Range (avg)</td>
<td>6 min</td>
<td>60 min</td>
<td>5 min</td>
<td>60 min</td>
<td>3 min</td>
</tr>
<tr>
<td>Avg Glucose (mg/dl)</td>
<td>111</td>
<td>102</td>
<td>74</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>Standard Deviation (mg/dl)</td>
<td>56</td>
<td>60</td>
<td>60</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Avg Readings Per Day</td>
<td>56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Morning (9am-1pm) | Total Readings | 6% | 14% | 63% | 11% |
| Time to Range (avg) | 5 min | 5 min | 5 min | 5 min | 5 min |
| Avg Glucose (mg/dl) | 104 | 98 | 70 | 104 |
| Standard Deviation (mg/dl) | 41 | 30 | 49 | 49 |
| Avg Readings Per Day | 47 |

**Afternoon (1pm-5pm) | Total Readings | 4% | 10% | 57% | 36% |
| Time to Range (avg) | 5 min | 5 min | 5 min | 5 min | 5 min |
| Avg Glucose (mg/dl) | 100 | 93 | 68 | 117 |
| Standard Deviation (mg/dl) | 39 | 39 | 52 | 52 |
| Avg Readings Per Day | 51 |

**Evening (5pm-9pm) | Total Readings | 3% | 19% | 58% | 20% |
| Time to Range (avg) | 5 min | 5 min | 5 min | 5 min | 5 min |
| Avg Glucose (mg/dl) | 98 | 92 | 64 | 118 |
| Standard Deviation (mg/dl) | 37 | 37 | 51 | 51 |
| Avg Readings Per Day | 52 |

**Night (5pm-9am) | Total Readings | 3% | 20% | 52% | 25% |
| Time to Range (avg) | 5 min | 5 min | 5 min | 5 min | 5 min |
| Avg Glucose (mg/dl) | 100 | 92 | 64 | 118 |
| Standard Deviation (mg/dl) | 37 | 37 | 51 | 51 |
| Avg Readings Per Day | 52 |
The Omnipod: Dash and Horizon

Distinguishing Features:

1. The New Pod is 34% smaller, 25% lighter and 16% slimmer
2. Tubeless with a wireless Personal Diabetes Manager (PDM)
3. Waterproof
4. Hands-free, automated insertion and priming—minimizes hassles and errors
5. Built-in FreeStyle® meter
6. Food library of over 1,000 common foods
The next step: Closed Loop

All pumps are developing “personalized” dietary dosing software for their hybrid pumps
(4 years?)
Internalization??
This stuff works!

- Deiss et al, Improved Glycemic Control in Poorly Controlled Patients with Type 1 Diabetes Using Real-Time continuous Glucose Monitoring, *Diabetes Care* 2006 29: 2730-2732
- Bergenstal Et al. Effectiveness of Sensor Augmented Insulin pump Therapy, *NEJM* 2010
Psychosocial Aspects of Type 1 Diabetes

Routine psychological screening in youth with type 1 diabetes and their parents: a notion whose time has come?
Cameron FJ1, Northam EA, Ambler GR, Daneman D.

Psychological care of children and adolescents with diabetes.
Delamater AM1
School Performance and Type 1 Diabetes

Effect of type 1 diabetes on school performance in a dynamic world: new analysis exploring Swedish register data

Emma Persson, Sofie Persson, Ulf-G. Gerdtham, Katarina Steen Carlsson & for the Swedish Childhood Diabetes Study Group

Pages 2606-2622 | Published online: 23 Dec 2018

Download citation https://doi.org/10.1080/00036846.2018.1558347

ABSTRACT

This paper investigates if the effect of type 1 diabetes mellitus (T1DM) on school performance, documented in prior research, has changed in more recent birth cohorts of children using national Swedish population register data. The issue is of interest because management and treatment of the disease have improved over the last decades and, furthermore, because of changes in the educational grading system. Despite these changes, data indicate a persistent negative effect of T1DM on compulsory and upper secondary school grades with a standardized effect size of −0.109 and −0.070, respectively, and the results appear only marginally smaller compared to earlier findings in cohorts completing school under the previous grading system. Moreover, the results are consistent for alternative model specifications and econometric estimation strategies. Whereas access to new treatment technologies and improved diabetes management strategies has reduced the burden of diabetes in daily life, the results from this study indicate that continued efforts are needed to improve the situation in school for children with T1DM to prevent potential long-term socio-economic consequences.
Insulin Pump:
- $5-7,000 for the pump
- $100-200 pre month for infusion sets

Continuous glucose sensor:
- Transmitter: $240 (lasts 6-12 months)
- Sensors: $120 each (1 per week)
Libre

- Scanner: $60-70
  - App available on I-Phones, can use as scanner
- Sensors: $50 each (last 2 weeks)
- PICU hospitalization for DKA: $12,000
- One year of renal dialysis: $53,000
Access to care and technology
Future Topics (No time today…)

- Use of sensor / pump technology in hospital / procedures
- New onset: in or outpatient?
- Starting sensor and/or pump right away
Diabetes Care Tasks at School: What Key Personnel Need To Know

PSYCHOSOCIAL ASPECTS
THRIVING WITH DIABETES

- Students with diabetes can do anything any other student can do
- Students with diabetes are not fragile or sick
- Do not let the fact that the student has diabetes influence your style when interacting with them
  - Remain consistent. Rules are still rules. Expectations are still expectations.
- Strategies to help promote overall development and well-being may vary depending on the student’s age
ELEMENTARY SCHOOL

• Telling others about diabetes
• Feeling different
• Diabetes is unfair
• Handling questions from others
• “Food police”
• Readiness for management
• Building confidence and problem-solving skills
MIDDLE SCHOOL / HIGH SCHOOL

- Telling others about diabetes
- Support from others
  - Friends, peers, online community
- Feeling different
- Diabetes is unfair
- Handling questions from others
- “Food police”

- Puberty
- Readiness for management
- Building confidence and problem-solving skills
- Planning for tests
TIPS

• Talk about normal, regular, every day things before talking about diabetes

• Pay attention to your tone of voice when you discuss diabetes-related topics to make sure it’s not different

• Blood glucose are not “good” or “bad” – merely information to determine the student’s needs

• Praise your students for completing diabetes tasks
  • It’s not easy or fun – the more you praise and reinforce positive diabetes care habits, the better they will do
As a teacher, you can help by:

- Supporting self-care by capable students
- Providing easy-access to diabetes supplies
- Ensuring students eat snacks at a scheduled time and make sure snacks are available to treat low blood sugar
- Allowing students reasonable time to make up missed homework or tests
- Learning about diabetes and complying with the individual student’s 504 and health care plans
“Make The Right Choice The Easy Choice”

Eliminate barriers to diabetes management:

- Become familiar with and follow students’ written plans
- Eliminate barriers to:
  - Snacking
  - Blood glucose checks
  - Access to water and bathrooms
  - Insulin administration
- Avoid “good or bad” judgments based on individual blood glucose readings
- Communicate with parent/guardian and school nurse
Other Classroom Tips:

- Keep a contact sheet of trained diabetes staff at your desk for emergencies
- Create a diabetes info sheet for substitute teachers
- Learn signs and responses to low/high blood sugar levels
- Allow blood glucose monitoring and free access to bathrooms/water during class
- Teach your class about diabetes
- Let parents know, in advance, changes to the class schedule (field trips, special events, etc.)
For More Information:

- Visit [www.diabetes.org/schools](http://www.diabetes.org/schools)
- Visit [www.diabetes.org/safeatschool](http://www.diabetes.org/safeatschool)
- Download the following free tools:
  - NDEP’s Helping the Student with Diabetes Succeed: A Guide for School Personnel
  - ADA’s Diabetes Care Tasks at School: What Key Personnel Need to Know
- Visit [www.diabetes.org/schoolwalk](http://www.diabetes.org/schoolwalk) for free lesson plans about diabetes
School Staff Support + Diabetes Knowledge = Student Success
Diabetes Care Tasks at School: What Key Personnel Need To Know

INSULIN BY PUMP
WHAT IS AN INSULIN PUMP

- Battery operated device about the size of a pager
- Reservoir filled with insulin
- Insulin is delivered by tubing or from a “patch”
- Worn 24 hours per day
- Delivers only rapid-acting insulin
- Can be removed by simply pulling off like a band-aid
INSULIN PUMP THERAPY

• Based on what the body does naturally
  - Small amounts of insulin all the time (basal insulin)
  - Extra doses to cover each meal or snack (bolus insulin)

• Precision, micro-drop insulin delivery

• Flexibility

• Ease of correction for high blood glucose levels
WHAT PUMPS DO

“Bells and Whistles”

• Most pumps will calculate bolus dosages
• Some pumps communicate with blood glucose meters and/or continuous glucose monitors
• Tracking active insulin
• Temporary basal rates

Limitations:

• Pumps rely on accurate input from humans to calculate dosing; the user can override pump-calculated doses
ARTIFICIAL PANCREAS SYSTEMS

More advanced hybrid closed loop systems self-adjust insulin delivery based on sensor data

• The Medtronic 670G System (a pump + a sensor) partially automates insulin delivery to help students stay in a target glucose range
• Can be used in Auto-Mode (hybrid closed loop) or Manual-Mode (basic pump and sensor therapy without automated delivery)
• Blood glucose testing with a meter is still required by student for treatment decisions, per DMMP
• Important to address alerts
  • “enter BG”
  • calibration requests
  – Students must bolus before meals/snacks to stay in Auto-Mode
  – If insulin is given by injection for ketones, Auto-Mode should be disabled
• Students who cannot self-manage independently will require assistance
WHAT KEY PERSONNEL NEED TO KNOW ABOUT AN INSULIN PUMP

- How to deliver routine boluses for carbs and high blood glucose
- Signs/symptoms that pump site may need to be changed
- When an injection by pen or syringe is indicated
- How to disconnect or "suspend" the pump

- In the event the student becomes unconscious or seizes or
- If instructed by the parent/guardian or diabetes care provider, e.g. during P.E.
METHOD OF DELIVERY

• In cases of pump or site malfunction, **always** notify the parent/guardian
  
  – Immediate site change is recommended if a pump site error occurs. For delayed or pump malfunctions, one common response is to provide correctional insulin with injection to reduce risk for hyperglycemia and DKA

**Insulin injection**
- Prescribed insulin therapy
- Prescribed as back-up plan if insulin pump malfunctions
- Prescribed for only certain seasons – determined by student, parent/guardian and provider

**Insulin pump**
- Prescribed and intended year-round use **unless** pump malfunction
- Prescribed and used for only certain seasons – determined by student, parent/guardian, and health care provider
## PUMP SUPPLIES AT SCHOOL

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infusion set</strong></td>
<td>and reservoir (or pod)</td>
</tr>
<tr>
<td><strong>Insulin</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Skin prep items</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Alcohol wipes</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Syringe</strong></td>
<td>(in case of pump malfunction)</td>
</tr>
<tr>
<td><strong>Pump batteries</strong></td>
<td>(or charger -if used)</td>
</tr>
<tr>
<td><strong>Inserter</strong></td>
<td>(if used)</td>
</tr>
<tr>
<td><strong>Manufacturers manual, alarm card</strong></td>
<td></td>
</tr>
</tbody>
</table>

In cases where the pump is disconnected (for example in PE) is should be placed in a secure place as designated in the student’s written plan. In cases of pump or site malfunction, always notify the parent/guardian and back-up plan, per DMMP.
Diabetes Care Tasks at School: What Key Personnel Need To Know

CONTINUOUS GLUCOSE MONITOR TECHNOLOGY
WHAT IS CGM?

CGM have three parts: A sensor, transmitter, and receiver:

• A tiny glucose-sensing device called a "sensor" is inserted just under the skin and remains for 7-10 days

• A transmitter is attached to the sensor and sends the information to a receiver

• The receiver can be a manufacturer-issued display device, smart device or insulin pump

• The system automatically records a glucose value every 1-5 minutes

• Some CGM provide alarms to signal when glucose is out of target range
WHY IS CGM USED?

- Can uncover undetected hypoglycemia and other glucose trends
- Provide direction and rate of change of glucose
- Can provide alerts if glucose is traveling outside target range
- Can contribute to improved glucose control
- Ongoing and frequent use is recommended to maximize benefits
- Can reduce the number of fingersticks
CGM ALARMS

- CGM settings are prescribed by the health care provider with input from the student and parents/guardians
- Some CGM are capable of sharing data real-time with caregiver(s) remotely
  - Data sharing while in school should be specified in the student’s 504 Plan
- Hypoglycemia is an acute risk and is usually set as an audible alarm
  - Other alarms are usually used conservatively to avoid unnecessary disruption of the student’s school activities
CGM ALARMS AND HOW TO RESPOND

• If the CGM alarms for a low or high glucose, follow the instructions in the student’s DMMP to determine treatment
  • CGM data should **not** be used to make treatment decisions unless specifically stated otherwise in the DMMP

• Students identified as capable of managing diabetes independently may choose to respond to alarms and provide treatment without assistance

• Students who cannot self-manage independently will require help responding appropriately to CGM alarms

• All students, regardless of level of independence, may require assistance when they experience severe hypoglycemia
USE BLOOD GLUCOSE OR CGM?

• Some CGM are indicated for treatment decisions – but not all
  • Dexcom G5 and Dexcom G6 are indicated for treatment decisions and FDA approved for those 2 years and older
  • Blood glucose levels should be monitored with a blood glucose meter in accordance with the student’s DMMP
  • A child who uses a CGM may REQUIRE a cell phone for signals to be delivered
SAMPLING OF CGM
CGM SUPPLIES AT SCHOOL

In cases where the sensor/transmitter falls off (for example in PE) it should be placed in a secure place as designated in the student’s written plan. No part of the CGM should be discarded. Sensor placement requires training and is routinely done at home; as such, back-up CGM supplies may not be necessary at school (unless the student manages independently, per DMMP).
Diabetes Care Tasks at School: What Key Personnel Need To Know

DIABETES MEDICAL MANAGEMENT PLAN (DMMP)
DIABETES MEDICAL MANAGEMENT PLAN (DMMP)

Basis for all school-based diabetes care plans

Developed by the student's personal health care team and parent/guardian and signed by a member of student's personal health care team

Individualized

Implemented collaboratively by the school diabetes team:
- school nurse
- the student
- parent/guardian
- other school personnel
DMMP INFORMATION

- Emergency contact information
- Level of self-care
- Blood glucose monitoring
- Insulin/medication administration
- Glucagon administration
- Meal and snack schedule
- Physical activity and sports
- Recognition and treatment of hypoglycemia and hyperglycemia
NEEDS ADDRESSED BY 504 PLAN/IEP

- Location and timing of blood glucose monitoring and insulin administration
- Identity of trained diabetes personnel
- Location of diabetes supplies
- Free access to water and restroom
- Nutritional needs, meals and snacks
- Full participation in all school-sponsored activities
- Access to blood glucose checks and treatment supplies during exams
- Alternative times for academic exams if student is experiencing hypoglycemia or hyperglycemia
- Absences without penalty for doctors’ appointments and diabetes-related illness
- Maintenance of confidentiality and student’s right to privacy
Diabetes Technology

Michigan Medicine
C.S. Mott Children’s Hospital
Pediatric Endocrinology
Objectives

Attendees will be able to verbalize

• The 4 essential elements for successful insulin pumping
• The basic function and components of an insulin pump, and special considerations for pump selection.
• Disease management specific to insulin pump therapy
• What is a continuous glucose monitor (CGM) and its primary function
A successful pump candidate will:

Patient and parent agree to pump therapy and assigned responsibilities

Parents/legal guardians have working knowledge of the insulin pump regardless of the age of the youth and are responsible for daily use of the pump

Monitor and log blood sugar (BG) at least 4 times per day every day

Pump therapy requires monitoring and recording of blood sugars 8-12 times per day at initiation and with dose changes
A successful pump candidate will be:

- Able to interpret Nutrition Fact Labels
- Determine carbohydrate in foods (“Calorie King” book & phone apps)
- Count the carbohydrate in every item that is eaten and dose for all carbs
A successful pump candidate will be:

Demonstrate knowledge of diabetes care and management:

- Basic diabetes education must have been completed
- Strong knowledge in how insulin works/action
- Knowledge of blood sugar targets
- Knowledge of A1c target
- How to prevent hypoglycemia & diabetic ketoacidosis (DKA)
A successful pump candidate will:

Maintain active communication with the diabetes team:

- Minimum of quarterly clinic visits
- Contact diabetes team when blood sugar goals not being met
- Contact diabetes team when moderate or large ketones are present
What is an Insulin Pump?

A microcomputer designed to deliver rapid acting insulin in two ways:

- A programmed **basal** rate delivered in small amounts every few minutes
- A user initiated **bolus** dose of insulin given before meals and snacks, or to correct a high blood sugar
Key Pump
Advantages

- Insulin on Board (IOB)/Active Insulin = how long a bolus lowers the sugar
  - Prevent stacking of insulin doses

- Different Basal Rates
  - Different amounts of basal insulin at different times of the day

- Temporary basal
  - Useful for exercise, illness, stress
Pump Companies

Medtronic
800-646-4633 www.minimed.com

Dexcom (CGM)
877-339-2664 www.dexcom.com

OmniPod
800-591-3455 www.myomnipod.com

Tandem
877-801-6901 www.tandemdiabetes.com
Components

Every 2-3 days, the insulin, reservoir, tubing, and cannula are changed.

- Pump
- Insulin – Humalog, Novolog, Admelog, or Apidra (No Long acting)
- Reservoir/cartridge to hold the insulin
- Cannula (tube in the skin)
- Tubing
- Infusion set
Infusion Sets

**Angled (30°)**
- Inserter available for most sets
- Able to use in areas of little subcutaneous fat
- Less likely to kink
- Less likely to be pulled off

**Straight-In (90°)**
- Inserter is available for most sets
- Easier to insert in hard-to-reach places
Pump Infusion Set Sites

- Infusion sites are the same as you use for injections
- Rotate sites!
- Change sites every 2 to 3 days (insulin stability)
- If a site infection occurs, the patient needs to see their PCP for antibiotics
Pros and cons

Pros

• Improved blood sugar control
• Fewer shots
• Availability and convenience of insulin delivery
• Ease of covering snacks
• Ease of corrections
• Computer software for blood sugar analysis

Cons

• Increased risk for ketones
• Expense
• Risk for skin infections
• Physical/psychological considerations
  • Wearing something 24 hours per day
Special consideration for pump selection

- Cartridge size
- Waterproof vs water resistant
- Lowest available basal rate
- Tubing vs no tubing
- Continuous Glucose Monitoring Capabilities
Increased risk for ketones

Blood Sugar >300mg/dl or if ill, check urine for ketones

If moderate or large ketones

Call the office to determine the insulin dose. Administer insulin dose via syringe/pen
• Change cartridge, insulin, tubing and infusion set
• Trouble-shoot pump
• Push fluids
• Recheck BG in 1-2 hours

Call every 3 hours until ketones clear
Returning to injections

Patient will need to switch back to the use of a syringe and vial (or insulin pen) for the following situations

• If ketones are present
• If off the pump for >24 hours, you must resume Lantus, Basaglar, Tresiba, or Levemir
Medical Discontinuation of Pump Therapy may occur if:

- Quarterly clinic visits are missed
- Blood sugars are not monitored at least 4 times per day
- Ketones are not monitored if ill or blood sugar >300
- Pump and meter(s) are not brought to clinic visits
- Hospital admissions as a result of not following pump therapy guidelines
Multiple options in Infusion Sets

Which pump?

Medtronic Minimed
- Angled
- Straight-In
  - Silhouette
    - Quick Set *
      - Mio
    - Sof-set *

OmniPod
- Infusion set included in pump
  - Sure-T
    - Mio
    - Sof-set *

Tandem
- Angled
  - Autosoft 30
  - VariSoft
- Straight-In
  - TruSteel
  - AutoSoft 90
  - AutoSoft XC

* Inserter needs to be purchased separately

Revised 07/09/2018

Michigan Medicine

Pediatric Endocrinology
Continuous Glucose Monitoring (CGM)

Glucowatch first CGM
Continuous Glucose Monitors

- Abbott Libre
- Dexcom G6
- Medtronic Guardian Connect
- Medtronic Guardian 3
Continuous glucose monitors are medical devices that monitors a person’s glucose levels every 5-10 minutes. They measure the glucose (sugar) in the fluid underneath the skin (the interstitial fluid).

The primary function of the CGM is to provide additional information to the user about blood glucose (sugar) levels and trends in real time.

May replace finger pokes
Continuous Glucose Monitors (CGM)

Uses a small sensor that is inserted subcutaneously, similar to a pump catheter/cannula. Two separate sites if on pump therapy.

Confirm blood sugar with finger poke when questioning accuracy of CGM
Follow calibration guidelines per device

Calibration – Blood sugar meter readings are entered into the pump/monitor and are used for calibrations. Calibrations are essential to making sure the glucose sensor maintains its accuracy over time.
Wear your infusion set that was placed today for 3 days.

Notify the office for the following:

- Skin reaction
- Infusion set falls off
- If patient is not present at class, an infusion set must be inserted prior to submitting pump
Technology Breakthroughs in Pediatrics

• Medtronic 670G Closed Loop in June receiving FDA Pediatric Indication for 7 and above, currently researching 2 to 6 year olds.
• Tslim x 2 insulin pump and Dexcom G6 in research process for Closed Loop
• Libre FDA approved for 18 years and up – used off l l
Disclosures

- The *Hybrid Closed-Loop Trial in Type 1 Diabetes* (NCT02463097) and *Safety Evaluation of the Hybrid Closed-Loop (HCL) System in Pediatric Subjects with Type 1 Diabetes* (NCT02660827) trials were funded by Medtronic.

- All principal investigators in both clinical trials received support and compensation for conducting the studies, not Study Coordinators. 😊
Background

- Achieving and maintaining glycemic control as set by the ADA remains a challenge for many, especially children, with type 1 diabetes (T1D).
- Automated insulin delivery systems that help maintain normoglycemia throughout the day are, now, a reality.

- Three-month, in-home use of the MiniMed™ 670G hybrid closed-loop system in T1D patients, 14-75 years old:
  - Reduced A1C from 7.4% to 6.9%
  - Increased time in target glucose range (>70-180 mg/dL) from 67% to 72%
  - Decreased time <70 mg/dL from 5.9% to 3.3%
  - Reduced day and night time glucose variability

- This study investigated the safety of the MiniMed™ 670G system in children with T1D, 7-13 years old.

Insulin Delivery System

- MiniMed™ 670G insulin pump with SmartGuard™ technology.

- Guardian™ Sensor 3 glucose sensor and Guardian™ Link 3 transmitter.

- CONTOUR®NEXT LINK blood glucose meter for calibrations.

**WARNING**: Indicated for type 1 diabetes patients ≥14 years. Medtronic performed an evaluation of the MiniMed™ 670G closed-loop system and determined that it may not be safe for use in children under the age of 7 because of the way that the system is designed and the daily insulin requirements. Therefore, this device should not be used in anyone under the age of 7 years old. This device should also not be used in patients who require less than a total daily insulin dose of 8 units per day, because the device requires a minimum of 8 units per day to operate safely.

The MiniMed™ 670G System is currently approved for use only in the US for T1D patients ≥7 years. A prescription is required.
MiniMed™ 670G Pivotal trials

BASELINE PATIENT CHARACTERISTICS

- Single arm, multicenter, at-home, and in-clinic or hotel investigations
  - A1C <10%, minimum TDD requirement of >8 units/day
  - Pump therapy for >6 months, +/- CGM
  - For ages 7-13 years, diagnosis of T1D for ≥1 year
  - For ages 14-75 years, diagnosis of T1D for ≥2 years

<table>
<thead>
<tr>
<th></th>
<th>Pediatrics (7-13 years) N=105</th>
<th>Adolescents (14-21 years) N=30</th>
<th>Adults (22-75 years) N=94</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>10.8 ± 1.8</td>
<td>16.5 ± 2.3</td>
<td>44.6 ± 12.8</td>
</tr>
<tr>
<td>Sex</td>
<td>49F / 56M</td>
<td>16F / 14M</td>
<td>53F / 41M</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>42.8 ± 13.0*</td>
<td>67.4 ± 13.0</td>
<td>79.9 ± 18.2</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>19.1 ± 4.3*</td>
<td>23.7 ± 3.8</td>
<td>27.1 ± 5.4</td>
</tr>
<tr>
<td>Duration of diabetes, years</td>
<td>5.6 ± 2.9</td>
<td>7.7 ± 4.2</td>
<td>26.4 ± 12.4</td>
</tr>
<tr>
<td>TDD, units/kg/day</td>
<td>0.8 ± 0.2*</td>
<td>0.8 ± 0.2</td>
<td>0.6 ± 0.2</td>
</tr>
<tr>
<td>A1C at screening, %</td>
<td>7.9 ± 0.8</td>
<td>7.7 ± 0.8</td>
<td>7.3 ± 0.9</td>
</tr>
</tbody>
</table>

*One patient's height and weight were not measured at enrollment.

The MiniMed™670G System is currently approved for use only in the US for T1D patients ≥7 years. A prescription is required.
RESULTS

24-HOUR SENSOR GLUCOSE PROFILES

Pediatrics

Adolescents

Adults

Median and interquartile range of SG values are shown.

The MiniMed™670G System is currently approved for use only in the US for T1D patients ≥7 years. A prescription is required.
The Libre — 14 day wear CGM device

Designed to be dispensed at pharmacy, more affordable out of pocket. Scans the sensor as often as desired. Initial 12 hour warm up. Phone app receiver
Tslim x 2
with Basal IQ
Basal IQ Feature

- 31% relative time below 70 mg/dL
- Predicts a low <70 mg/dL 30 minutes prior to be less than 70 mg/dL
- Automatically suspends based on Dexcom sensor information
- Automatically resumes once glucose levels rise
Understanding Insulin Pumps, Continuous Glucose Monitors and the Artificial Pancreas, 3rd edition, 2017
  • By H. Peter Chase, MD

Pumping Insulin: Everything you Need for Success with an Insulin Pump, 6th edition, 2017
  • By John T. Walsh & Ruth Roberts

Think Like a Pancreas: A Practical Guide to Managing Diabetes with Insulin, 2011
  • By Gary Scheiner, MS, CDE

  • By Gary Scheiner, MS, CDE
  • Standards of Medical Care in Diabetes. Diabetes Care, Jan 2019; vol 42:sup 1.
Questions or Concerns?

thank you
CASE STUDIES

Professional Panel Discussion
Bernard Degnan, MD
Contrast of CGM of two patients with similar average glucose on meters.

**Top Patterns**

1. **had a pattern of nighttime highs** had a pattern of significant highs between 3:35 PM and 5:20 AM.
2. **had a pattern of daytime highs** had a pattern of significant highs between 10:00 AM and 12:30 PM.
3. **best glucose day was December 14, 2018**

This graph shows your data averaged over 14 days.
CGM Glucose Pattern Summary

March 19, 2019 - March 28, 2019 (10 Days)

CGM Device: FreeStyle Libre Pro  [NA]% Compliant w/Calibration*  100% Time Worn

*Not applicable to FreeStyle Libre or FreeStyle Libre Pro which do not require calibration.

Summary

<table>
<thead>
<tr>
<th>Glucose Level</th>
<th>Time In Range</th>
<th>Coefficient of Variation (CV)</th>
<th>Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>174 mg/dL</td>
<td>45%</td>
<td>51.1%</td>
<td>88.9 mg/dL</td>
</tr>
<tr>
<td>88-116 mg/dL</td>
<td>43%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 70 mg/dL</td>
<td>12%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Reference ranges calculated from population without diabetes.

Ambulatory Glucose Profile

Curves/plots represent glucose frequency distributions by time regardless of date

CGM of patient with no symptoms of hypoglycemia.
CGM of patient with no symptoms of hypoglycemia.
Patients with similar morning glucose levels

<table>
<thead>
<tr>
<th>Glucose Management Indicator</th>
<th>mg/dL Average glucose (CGM)</th>
<th>mg/dL Standard deviation (CGM)</th>
<th>Hypoglycemia risk</th>
<th>Time in range</th>
<th>Sensor usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>57%</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>mg/dL</td>
<td>mg/dL</td>
<td>mg/dL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Top Patterns**

1. **had a pattern of nighttime highs**
   - A pattern of significant highs between 2:31 AM and 5:00 AM.
2. **had a pattern of daytime highs**
   - A pattern of significant highs between 6:05 PM and 8:05 PM.
3. **best glucose day was March 28, 2019**
   - Glucose data was in the target range during those times.

The graph shows your data averaged over 14 days.
HbA1c higher than expected based on glucometer readings.

This patient uses an insulin pump.
Libere analysis with high variability.
Patient on 670 G insulin pump in auto mode.
Patient on 670 G insulin pump in auto mode.
Libre analysis on a “pumper”
Sometimes lows are due to not enough insulin!
Libre analysis on a “pumper”

Sometimes lows are due to not enough insulin!
Three Spheres

Child  
Family  
Provider
Factors for Children

- Temperament
- History
- Specific medical issues
Factors for Family

- Parents/Caregivers
  - Temperament
  - History
  - Current stressors
  - Knowledge/resources
  - Child’s response

- Siblings/Extended Family
  - Same as parents
  - Relationship to child & caregivers
  - Degree of involvement
Resilience

- Ability to successfully confront challenges & bounce back from setbacks.

- Resilience can be nurtured & recaptured.
Core Protective Factors

**Capabilities**
- Self-regulation
- Focus
- Self-efficacy
- Adaptive skills

**Attachment & Belonging**
- Mutual support
- Learning together
- Ceremonies/rituals
- Group activities
- Opportunities to give

**Community Culture**
- Community reciprocity
- Social bridging

ACE Interface – R. Anda & L. Porter
Assessing & Supporting Child/Family

- Reduce **Distress**
- Promote **Emotional Supports**
- Remember the **Family**
Building Resilience for Families

- Maintain routines, rituals, and traditions
- Communication – sharing, laughing, crying
- Joint problem solving
- Plan for the day and the future
Building Resilience for Caregivers

- Support
- Knowledge
- Resources
- Control/Self Efficacy
- Self Regulation
Health Care Providers
Why Does This Matter?

- Self = Most important tool
- STS = Occupational Hazard
- Self Care = Personal Protective Equipment
- Increases our resilience and ability to care for others effectively
Secondary Traumatic Stress

The emotional duress that results when an individual hears about the firsthand trauma experiences of another. Its symptoms mimic those of post-traumatic stress disorder (PTSD).
Factors for Health Care Providers

- History
- Occupational stressors
- Resources
- Family Responses
What About You?
A Workbook for Those Who Work with Others

THE NATIONAL CENTER ON
Family Homelessness
for every child, a chance

Nathan A. Miller, Kathleen Czarni
Megan Ostrow Granoff, and Mona Orlov
Three Levels of Care

- **Personal**
  - Warning Signs
  - Self-Assessment
  - Finding Time

- **Interpersonal**
  - Warning Signs
  - Self-Assessment
  - Finding Time

- **Organizational**
  - Warning Signs
  - Self-Assessment
  - Finding Time
Personal: Finding the Time
If You Have…

- 2 Minutes
  - Breathe
  - Daydream
  - Doodle
  - Spend time with your pet

- 5 Minutes
  - Listen to music
  - Chat with a co-worker
  - Step outside for fresh air
  - Enjoy a snack; make a cup of…

- 10 Minutes
  - Write in a journal
  - Tidy your work area
  - Dance
  - Read a magazine

- 30 Minutes
  - Get a massage
  - Spend time in nature
  - Go shopping
  - Practice yoga
Interpersonal: Finding The Time - If You Have...

- **2 Minutes**
  - Leave a message to tell someone you’re thinking of them
  - Let someone know you need to talk with them later
  - Leave a note on the fridge that says “I love you”

- **5 Minutes**
  - Mail a card or e-greeting
  - Send someone a list of dates for getting together
  - Look at pictures of family/friends

- **10 Minutes**
  - Have breakfast with family/friend
  - Research a group you may want to join
  - Talk to someone about a problem/frustration

- **30 Minutes**
  - Read/play a game with a child
  - Go for a walk with a friend
  - Cook/eat with family/friend
  - Write a letter to someone
Organizational: Finding the Time – If You Have...

- 2 Minutes
  - Smile
  - Make coffee
  - Thank someone
  - Sign up for a training opportunity

- 5 Minutes
  - Talk with someone you don’t usually work with
  - Schedule a team meeting
  - Straighten up a common area
  - Respond to an email

- 10 Minutes
  - Discuss a training opportunity
  - Plan a celebration
  - Clean up your workspace

- 30 Minutes
  - Have lunch with colleagues
  - Talk about burn out at a staff meeting
  - Have a “walking meeting” outside
  - Do “A Day in the Life” activity at staff meeting
Three Spheres

Child

Family

Provider
Coping With Diabetes

- History
- Current Stressors
- Supports
- Knowledge & Skills
- Resources
Resources

- Core Protective Factors; ACE Interface, R. Anda & L. Porter, 2017
Listening is where love begins...

Mr. Rogers
Deep Listening

• Is a learned skill that can become a great habit with practice and attention
• Is the number one skill to prevent and diffuse conflict
• Is the primary skill for increasing engagement and motivation
• Is the primary skill for increasing trust with your staff, boss, coworkers, and your family.

DEEP LISTENING REQUIRES: Being mindful of our focus and attitude toward the person speaking and to whom you are listening.

https://www.youtube.com/watch?v=lyUxYflkhzo
Deep Listening

- Intention
- Uncertainty
- Discomfort
Shutting down

• Honor yourself

(Germer, 2009; Neff, 2015)
Active components of Self-compassion

- Self-Kindness
- Common Humanity
- Mindfulness
Starting with me

• Centering
  – Being fully present to the flow within ourselves

• Grounding
  – Being fully present to the flow around us

• Opening
  – Allowing ourselves to be part of the flow
Alternate nostril breathing
Mantra meditation

• Finding your mantra
  – TM
  – Eswarian Mantran handbook
  – How to use meditation as a bedside spiritual intervention
  – Herbert Benson
  – Lessons learned from teaching meditation

• Linking Mantra to a personal affirmation
Fostering Self-Compassion

Affectionate breathing

- Experiencing a sense of love and acceptance with each inhale.
- Allowing yourself to be rocked by the motion of you breathing

(Neff 2015)
Start with Nature
Carry the forest with you

- The consciousness of trees
  - Suzanne Simard PhD
  - Peter Wohlleben PhD
- Shinrin-yoku (forest bathing)
  - Bum-Jin Park PhD
  - Han & Choi

Feeling the earth beneath your feet.
Relational support

- Inspiration
- Influence
- Developing others’ abilities
- Change catalyst
- Conflict management
- Teamwork and collaboration
“Your heart and my heart have been friends a long, long time”

Rumi

Lean on me  Bill Withers