Multifaceted Approach to Diabetes Care

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Learning Objectives

1. At the end of this session, participants will be able to:
   Correctly diagnose the initial presentation of diabetes in a child or adolescent, and initiate the first steps of treatment.

2. Identify the goals of management of type 1 and type 2 diabetes in the pediatric population.

3. Be acquainted with the special demands associated with the treatment of diabetes in this age group.
Diabetes in Youth

• About 208,000 people younger than 20 years have diabetes (type 1 or type 2).
• This represents .25% of all people in this age group, or about 1 in 400
• 18,436 youth are newly diagnosed with type 1 diabetes annually
• 5,089 youth are newly diagnosed with type 2 diabetes annually

ADA, 2015
Type 1 Diabetes Incidence and Prevalence

Pediatric Specialists of Virginia had 134 newly diagnosed Type 1 diabetes in 2015
54% male, 46% female
3-17 years, although most commonly diagnosed at 9 – 12 years

Children are most often diagnosed between January and May
Classification of Diabetes

1. Type 1 diabetes
   – -β-cell destruction
2. Type 2 diabetes
   – - Progressive insulin secretory defect
3. Gestational Diabetes Mellitus (GDM)
4. Other specific types of diabetes
   – - Monogenic diabetes syndromes
   – - Diseases of the exocrine pancreas, e.g.,
     cystic fibrosis
   – - Drug- or chemical-induced diabetes
Warning signs of Type 1 Diabetes

Excessive Thirst
Frequent Urination
Bedwetting or Heavy Diaper
Vision Change + Headaches
Rapid Weight Loss
Increased Appetite
Irritability + Mood Changes
Fatigue + Weakness
Stomach Pain, Nausea + Vomiting
Fruity Breath Odor
Rapid, Heavy Breathing

DKA Mistaken For
Stomach Flu or Virus
Strep Throat
Growth Spurt
Urinary Tract Infection

Ask for a simple urine test or finger prick

Beyond Type 1
@beyondtype1
BEYONDTYPE1.ORG
Criteria for the Diagnosis of Diabetes

Fasting plasma glucose (FPG)
≥126 mg/dL (7.0 mmol/L)

OR

2-h plasma glucose ≥200 mg/dL
(11.1 mmol/L) during an OGTT

OR

A1C ≥6.5%

OR

Classic diabetes symptoms + random plasma glucose
≥200 mg/dL (11.1 mmol/L)

American Diabetes Association Standards of Medical Care in Diabetes. Classification and diagnosis of
Type 1 Diabetes

- One of the most common chronic disorders in childhood
- **Etiology**: Beta cell function destroyed, pancreas no longer produces insulin
- **Onset** can occur at any age but typically occurs in children under the age of 18.
- **Causes**:
  - Genetic factors
  - Autoimmunity
  - Environmental damage
- **Symptoms**:
  - Increased thirst and urination
  - Weight loss
  - Blurry vision
  - Lethargy, feeling tired all the time
Insidious Onset Type 1

Damage to Islet Cells

Diabetes (with elevated blood sugar)

“Honeymoon”

Insulin Production (%)

Time in Months or Years (variable for different people)

Diabetes

UC Barbara Davis
Criteria for Testing for T2DM in Children & Adolescents

- Overweight plus any 2:
  - Family history of type 2 diabetes in 1st or 2nd degree relative
  - Race/ethnicity
  - Signs of insulin resistance or conditions associated with insulin resistance
  - Maternal history of diabetes or GDM
- Age of initiation 10 years or at onset of puberty
- Frequency: every 3 years or more frequently if the BMI is increasing.
- Test with FPG, OGTT, or A1C

Acanthosis Nigricans
Hemoglobin A1C

- Average of blood sugars for the past 3 months
- Pre Diabetes
  - 5.7-6.4%
  - Recommend lifestyle changes
- Diabetes
  - 6.5% or greater
  - Needs to be seen by endo
Prediabetes*

FPG 100–125 mg/dL (5.6–6.9 mmol/L): IFG

OR

2-h plasma glucose 140–199 mg/dL (7.8–11.0 mmol/L): IGT

OR

A1C 5.7–6.4%

*For all three tests, risk is continuous, extending below the lower limit of a range and becoming disproportionately greater at higher ends of the range.

What Can You Do?

• Don’t shy away from discussing weight
  – Just like you discuss height, you MUST discuss weight
  – Show them the growth charts
  – In children, weight maintenance is the first step, then weight loss
  – Maximum of 0.5-2lb per week weight loss
What Can You Do?

• Make specific suggestions
  – Do not say “eat healthy”
  – Start with what they are drinking
    • NO JUICE, NO SODA
    • Change milk to 1% or skim
    • Can flavor water with lime, lemon, cucumber, strawberry, etc
  – Portion sizes
    • Fist is the size of carbohydrate serving
    • Palm is the size of protein serving
What Can You Do?

• Exercise Recommendations
  – Get specific
    • Run, swim, dance, climb stairs, martial arts, Wii, YouTube videos
    • 60min daily of time you are sweating
    • Park far away
    • Take the stairs
    • Make it a family thing
## Classification of T1DM vs T2DM

<table>
<thead>
<tr>
<th></th>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>Throughout childhood</td>
<td>Commonly puberty</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td>Increased in Scandinavians</td>
<td>Increased in Hispanic-, African-, Native Americans</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Parallels general population</td>
<td>85% overweight</td>
</tr>
<tr>
<td><strong>Acanthosis nigricans</strong></td>
<td>Usually absent</td>
<td>Up to 90%</td>
</tr>
<tr>
<td></td>
<td><strong>Type 1</strong></td>
<td><strong>Type 2</strong></td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Birth hx</td>
<td>No association</td>
<td>Association with low birth weight/SGA</td>
</tr>
<tr>
<td>Medical history</td>
<td>Autoimmune disease, e.g. thyroid, celiac</td>
<td>PCOS, hypertension, hyperlipidemia</td>
</tr>
<tr>
<td>Family history</td>
<td>5% with relatives with Type 1; autoimmune disease</td>
<td>85+% with 1&lt;sup&gt;st&lt;/sup&gt; or 2&lt;sup&gt;nd&lt;/sup&gt; degree relatives with Type 2; metabolic syndrome</td>
</tr>
<tr>
<td>Initial presentation</td>
<td>Shorter duration; 30-40% with ketoacidosis</td>
<td>Insidious onset; 25-33% with ketonuria, ketoacidosis</td>
</tr>
</tbody>
</table>
Laboratory Evaluation

• Autoantibodies (α islet cell, α GAD-65, IA-2, insulin, zinc transporter autoantibodies) present in ~85% Type 1
  – Hathout, et. al. (2001) and Umpaichitra, et. al. (2002) reported ~30% patients with Type 2 with at least one positive autoantibody
• C-peptide levels elevated in Type 2 vs. Type 1
Type 2 Diabetes

Progressive Pancreatic B-cell Failure

B-cell Function (%)

Prevention and Early Treatment

UKPDS Data

? Curve for Youth

Years from Clinical Diagnosis
Type 2 Diabetes

- Comorbidities may be present at time of diagnosis.
- At diagnosis, perform:
  - BP measurement
  - Fasting lipid panel
  - Assessment for albumin excretion
  - Dilated eye exam
- Other screening & treatment recommendations similar to T1DM.

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Type 2 Diabetes

• Additional problems may include:
  – PCOS
  – Sleep apnea
  – Hepatic steatosis
  – Orthopedic complications
  – Psychosocial concerns

• ADA consensus report on Type 2 Diabetes in Children & Adolescents

• AAP Clinical Practice Guideline

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Goals for Type 1 & 2 DM Treatment

• Goal to minimize long-term complications from chronic hyperglycemia
  – Hemoglobin A1c <7.5%
  – Fasting Blood Glucose <120
  – Postprandial Blood Glucose <140

• Lipids
  – LDL <100 (treat if >130)
  – Triglycerides <150 (treat if >400)
  – HDL >35

• Blood Pressure
  – Treat if >95%tile with goal <90%tile
  – 1st line after lifestyle: ACE and ARBs (If microalbuminuria is present – start)
Treatment Issues

- Self-monitoring of blood glucose
  - Fasting and postprandial
  - Frequency depends on regimen
- Medical Nutrition Therapy
- Diabetes Education
  - Involves family
    - Direct family supervision produces better glycemic control outcomes
- Lifestyle Coaching
- Preconception counseling
- Immunizations
- Dental care
- Smoking and alcohol counseling

Pediatrics 112:2003 Prevention and treatment of type 2 diabetes in children with special emphasis on Native American Youth
Management

• Lifestyle changes: diet and exercise
  – Nutritionist visit *strongly* recommended
• Diabetes education:
  – blood glucose monitoring, meal planning
• Metformin
• Insulin
  – if A1C > 8.5% or blood sugar > 250
• Other oral agents
  – Used in adults
Metformin

• FDA-approved “as monotherapy… as an adjunct to diet and exercise to improve glycemic control in patients with Type 2 diabetes” over 10 years
• *Reduces hepatic glucose production*, increases insulin sensitivity, and reduces intestinal glucose absorption
• Not associated with hypoglycemia
• Most common side effect is GI distress
• Lactic acidosis generally not a significant concern in children
Nutritionists in the Area

• Inova Center for Wellness and Metabolic Health
  – 1-877-511-GOAL

• IDEAL Clinic
  – 202-476-7200
  – Fairfax and DC

• Judy Caplan RD
  – www.gobefull.com

• www.EATRIGHT.org
  – Can find expert in the area
  – Not all RD’s accept insurance
Type 1 Diabetes

• ³⁄₄ of all cases of T1DM are dx’d in patients <18 yrs.
• Providers must consider many unique aspects to care & mgmt. of children & adolescents with T1DM.
• Attention to family dynamics, developmental stages, physiological differences is essential.
Figure 1

Four of the major influences on blood sugar control.

All four must be in balance for the best sugar control. Blood sugar control is measured by daily blood/CGM levels and by Hemoglobin A1c (HbA1c) levels done every three months.

Understanding Diabetes, 12th edition, chapter 8, used with permission
# Type 1 Diabetes: Glycemic Control

**Blood glucose goal range**

<table>
<thead>
<tr>
<th></th>
<th>Before meals</th>
<th>Bedtime/ overnight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1C</strong></td>
<td>90–130 mg/dL (5.0–7.2 mmol/L)</td>
<td>90–150 mg/dL (5.0–8.3 mmol/L)</td>
</tr>
<tr>
<td><strong>Rationale</strong></td>
<td>&lt;7.5%</td>
<td>A lower goal (&lt;7.0%) is reasonable if it can be achieved without excessive hypos</td>
</tr>
</tbody>
</table>

1. Goals should be individualized; lower goals may be reasonable.
2. Modify BG goals in youth w/ frequent hypos or hypoglycemia unawareness.

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. Diabetes Care 2017; 40 (Suppl. 1): S105-S113
Goals of Nutrition Therapy

1. Promote & support healthful eating patterns, emphasizing a variety of nutrient-dense foods in appropriate portion sizes, to improve health and to:
   - Achieve and maintain body weight goals
   - Attain individualized glycemic, blood pressure, and lipid goals
   - Delay or prevent complications of diabetes

2. Address nutrition needs based on personal & cultural preferences, health literacy & numeracy, access to healthful foods, willingness and ability to make behavioral changes & barriers to change.

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Carbohydrate counting: the cornerstone to reaching glycemic target

• 15 gm of Carbohydrate raises blood sugar 30 – 45 mg / dL

• Insulin dosing has two basic parts:
  – Coverage for the food we eat
  – Possible correction for an elevated blood sugar

• Resources to aid in correct calculation of carbohydrates:
  – Reading food labels
  – Reviewing school web site
  – Online / apps: Loseit, Myfitnesspal, figwee, Calorie King
Insulin Therapy

• Most patients with type 1 should be treated with multiple daily insulin injection
  – ≥ 3 injections / day prandial or CSII
  – 1-2 injections / day basal or CSII
• Educate patients on matching prandial insulin dose to carb intake, pre-meal glucose, anticipated activity
• Insulin analogs preferable to reduce hypoglycemia risk
• Teach patients how to manage glucose levels under various circumstances (i.e. illness)
• School nurses and designated school personnel must be able to inject insulin if child cannot self-manage or parent/guardian is not available.
Insulin Basics

Plasma Insulin

- Breakfast
- Lunch
- Dinner

Bolus
Basal Infusion

denotes time of bolus activation
## Insulin Comparison Chart

<table>
<thead>
<tr>
<th>Insulin Name ( Trade)</th>
<th>When does it start working? (onset)</th>
<th>When will the effect be the greatest? (peak)</th>
<th>How long will it lower blood glucose? (duration)</th>
<th>Notes for Use</th>
<th>UPHSM Formulary Availability*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rapid Acting Analogs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lispro (Humalog™)</td>
<td>&lt;15 minutes</td>
<td>30-90 minutes</td>
<td>3-5 hours</td>
<td>If mixing with NPH, rapid acting insulin (clear formulation) should be drawn into syringe first. Mixture should be given immediately to avoid effects on peak action.</td>
<td>Formulary – 3mL KwikPen</td>
</tr>
<tr>
<td>Aspart (NovoLog™)</td>
<td>&lt;15 minutes</td>
<td>30-90 minutes</td>
<td>3-5 hours</td>
<td>Nonformulary 3 mL FlexPen®</td>
<td>Nonformulary</td>
</tr>
<tr>
<td>Glulisine (Apidra™)</td>
<td>&lt;15 minutes</td>
<td>30-90 minutes</td>
<td>3-5 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short Acting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular (Novolin R™ or Humulin R™)</td>
<td>0.5-1 hour</td>
<td>2-4 hours</td>
<td>4-8 hours</td>
<td>3 mL vial</td>
<td>3 mL pen (500 units/mL) --- restricted</td>
</tr>
<tr>
<td><strong>Intermediate Acting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPH (NovoLIN N™ or Humulin N™)</td>
<td>1-2 hours</td>
<td>4-10 hours</td>
<td>10-18 hours</td>
<td>Cloudy formulation.</td>
<td>3 mL vial</td>
</tr>
<tr>
<td><strong>Long Acting Analogs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glargine (Lantus™)</td>
<td>1-2 hours</td>
<td>No peak</td>
<td>20-24 hours</td>
<td>Do not mix with other insulin formulations.</td>
<td>3 mL SoloSTAR® pen</td>
</tr>
<tr>
<td>Glargine (Toujeo)</td>
<td>Up to 6 hours</td>
<td>No peak</td>
<td>&gt;24 hours</td>
<td>All are clear formulations.</td>
<td>3 mL SoloSTAR® pen</td>
</tr>
<tr>
<td>Detemir (Levemir™)</td>
<td>1-2 hours</td>
<td>Relatively flat</td>
<td>6 to 24 hours (dose-dependent)</td>
<td></td>
<td>3 mL FlexPen®</td>
</tr>
<tr>
<td>Insulin degludec (Tresiba™)</td>
<td>No peak</td>
<td>&gt;24 hours</td>
<td></td>
<td></td>
<td>3 mL FlexPen®</td>
</tr>
<tr>
<td><strong>Combinations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NovoLIN 70/30 or Humulin 70/30</td>
<td>0.5-1 hour</td>
<td>2-10 hours</td>
<td>10-18 hours</td>
<td>70% NPH +30% regular insulin. Insulin action includes 2 peaks (1 from each formulation). Cloudy formulation.</td>
<td>3 mL vial</td>
</tr>
</tbody>
</table>
| NovoLog Mix 70/30 or Humalog Mix 75/25 or 50/50 | <15 minutes                     | 1-2 hours                                   | 10-18 hours                                    | Insulin action includes 2 peaks (1 from each formulation). NovoLog Mix (cloudy formulation): aspart protamine 70% + aspart 30%  
Humalog mix (cloudy formulation): 75/25-75% lispro prolamme + 25% lispro 50/50=50% lispro protamine + 50% lispro | 10 mL vial — Humalog Mix 75/25 only |

*All insulin preparations are 100 units/mL except concentrated regular insulin U500 containing 500 units/mL.
Onset, Peak, and Duration may vary considerably in different people.
Insulin analogs and analog mix formulations are available in prefilled pens:
- KwikPen® is a disposable pen manufactured for Lilly products including Humalog® and Humalog® Mix.
- FlexPen® is a disposable pen manufactured for Novo Nordisk products including NovoLog® and Levemir®.
- SoloSTAR® pen is a disposable pen manufactured for Sanofi products including Lantus® and Apidra®.

Revised: September 2018.
Pharmacokinetic Profile of Currently Available Single Insulin Products

- Rapid (aspart, lispro, glulisine, inhaled human insulin)
- Short (regular U-100)
- Mixed short/intermediate (regular U-500)
- Intermediate (NPH)
- Long (detemir)
- Long (U-100 glargine)
- Ultra-long (glargine U-300)
- Ultra-long (degludec)

Time (hr)
Plasma Insulin Levels

References:
- Icool TM. J Fam Pract. 2007; 56(suppl 1):S1-S12.
Recommendations: Glucose Monitoring

- Most patients on multiple-dose insulin (MDI) or insulin pump therapy should do SMBG
  - Prior to meals and snacks
  - At bedtime
  - Prior to exercise
  - When they suspect low blood glucose
  - After treating low blood glucose until they are normoglycemic
  - Prior to critical tasks such as driving
  - Occasionally postprandially

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
Why Use Diabetes Technologies?

- In year:
  - 1,460 finger pricks
  - 365 long acting insulin injections
  - 1,095 short acting injections
### Factors That Affect BG

**Food**
- 1. Carbohydrate quantity
- 2. Carbohydrate type
- 3. Fat
- 4. Protein
- 5. Caffeine
- 6. Alcohol
- 7. Meal timing
- 8. Dehydration
- 9. Personal microbiome

**Biological**
- 20. Insufficient sleep
- 21. Stress and illness
- 22. Recent hypoglycemia
- 23. During sleep blood sugars
- 24. Dawn phenomenon
- 25. Infusion set issues
- 26. Scar tissue and lipodystrophy
- 27. Intramuscular insulin delivery
- 28. Allergies
- 29. A higher glucose level
- 30. Periods (menstruation)
- 31. Puberty
- 32. Celiac disease
- 33. Smoking

**Medication**
- 10. Medication dose
- 11. Medication timing
- 12. Medication interactions
- 13. Steroid administration
- 14. Niacin (Vitamin B3)

**Activity**
- 15. Light exercise
- 16. High-intensity and moderate exercise
- 17. Level of fitness/training
- 18. Time of day
- 19. Food and insulin timing

**Environmental**
- 34. Expired insulin
- 35. Inaccurate BG reading
- 36. Outside temperature
- 37. Sunburn
- 38. Altitude

**Behavioral & Decision Making**
- 39. Frequency of glucose checks
- 40. Default options and choices
- 41. Decision-making biases
- 42. Family relationships and social pressures
Long Term Effects of Hyperglycemia

- Retinopathy
- Neuropathy
- Nephropathy
- Heart disease

The graph shows the relative risk of complications (Retinopathy, Nephropathy, Neuropathy, Microalbuminuria) as a function of Hemoglobin A1c (%). The risk increases significantly with higher Hemoglobin A1c levels.
Insulin Pump Evolution

1964

1964

1978

2010
Insulin Pump

- Infusion set - continuous insulin dosing
- Cannula - plastic needle in skin
- Plastic tubing - insulin delivery
- Computer aided dosing - basal and bolus
- Unit containing insulin
Wireless Insulin Pump

- **Infusion set**: continuous insulin dosing (contains insulin)
- **Cannula**: plastic needle in skin
- **Computer aided dosing**: basal and bolus
**Insulin Pump**

**Basal insulin**
- Short acting insulin delivered hourly
- If added over 24 hours equal to long acting insulin dose (ex. Lantus)
- Can program different profiles
  - Example: decreased basal for days with more activity
Insulin Pump

Bolus insulin
Insulin to carbohydrate ratios
Correction (sensitivity) factors
Blood sugar target
Active insulin time
<table>
<thead>
<tr>
<th></th>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
<th>Daily Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12AM</td>
<td>1AM</td>
<td>2AM</td>
<td>3AM</td>
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<td>11/18/2011</td>
<td>270</td>
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<td>11/20/2011</td>
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<td>Tuesday</td>
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<tr>
<td>11/29/2011</td>
<td>255</td>
<td>150</td>
<td>160</td>
<td>50</td>
</tr>
</tbody>
</table>

- **Below Target**: <70mg/dL
- **Above Target**: >140mg/dL
- **Manual bolus or bolus with correction**: Threshold Suspend
- **Partial day**: Pump round
- **Time change**: Skipped meal

**Carbohydrates**

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Insulin Pumps

**MiniMed 670G System**
The world's first hybrid closed loop system.

**MiniMed 630G System**
New features and customizable options for a greater sense of freedom.

**MiniMed 530G System**
Fully integrated with a glucose sensor to give you advanced diabetes control.
Glucose Monitoring

- Hemoglobin A1C is traditional method for assessing DM control
  - Does not reflect intra- and inter day glycemic excursions (hypo or hyperglycemia)
  - Does not provide information on how to treat the patient

- Self monitoring blood sugar
  - Requires multiple daily fingersticks
  - Provides information on a single point in time
    - No information on direction or rate of change
Evolution of Blood Glucose Monitor

First Generation
- Reflectance Meters
- Qualitative results

Second Generation
- Smaller blood volume,
- Less pain, shorter test time,
- Better accuracy/precision,
- Miniaturisation

Third Generation
- Continuous Glucose Monitoring (CGM)
- Invasive & minimally invasive

Fourth Generation
- Non-invasive monitoring

Cost-effective
Comfort
Convenient

Continuous Glucose Monitor

• Continuous glucose monitors:
  – Monitors sugar in interstitial fluid
  – Readings every 5 minutes
  – Reports direction of blood sugar changes
  – Access to monitoring software to help see patterns
  – Can see what is happening at times when you don’t typically check (ex. overnight)
  – Possible tendency to over-react and over treat
Dexcom G5
Dexcom G5

• Need to do calibrations with fingersticks
  – At least 2 daily
• Can set alarms for high or low blood sugar
• Can be worn up to 1 week
• Able to share on other devices (mom/dad’s phone)
Welcome to the world of real-time CGM

*If your glucose alerts and readings from the G6 do not match symptoms or expectations, use a blood glucose meter to make diabetes treatment decisions.

*dexcom G6®

Welcome to the world of real-time CGM

*If your glucose alerts and readings from the G6 do not match symptoms or expectations, use a blood glucose meter to make diabetes treatment decisions.
Freestyle Libre

The sensor filament is less than 0.4 mm thick

For illustrative purposes only. Image not drawn to scale.
Freestyle Libre

Each painless,¹ one-second scan shows:

- **A trend arrow** showing the direction your glucose is heading
- **A number** representing your current glucose reading
- **A trend graph** depicting the latest 8 hours of glucose history

¹ The scan is painless for most users.
Freestyle Libre

• Does not require fingerstick calibrations
• Can be worn up to 14 days
• Does not alarm if high or low
• Cannot share with another device (mom/dad’s phone)
Continuous Glucose Monitor

• Real Time Continuous Glucose Monitor
  – Improves glycemic control
    • Improves A1C
    • Decreases time spent in hyper and hypoglycemia
    • Reduces DM related complications
  – Improves quality of life
  – Must be worn to see benefits

• Intermittently Viewed Continuous Glucose Monitor
  – Studies show improvement in hypoglycemia, time in range, user satisfaction
Artificial Pancreas (Hybrid Closed Loop)

- Insulin pump and CGM work together to control blood sugars
- System continuously adjusts the amount of insulin delivered based on sensor glucose values and rate of change
- System learns over time
- Patient must STILL give bolus for meals
Medtronic 670g

- Auto Mode
  - Automatically adjusts basal insulin every 5 minutes based on CGM data

- Suspend before low
  - Stops insulin 30 minutes before reaching preset low limits
  - Automatically restarts when levels increase
Now with Basal-IQ™ Technology

Predicts and helps prevent lows with zero fingersticks
A day in the life of a diabetic
Type 1 Diabetes: Psychosocial Issues

- Encourage family involvement in diabetes mgmt. tasks for children & adolescents, as premature transfer of diabetes care can result in nonadherence and deterioration in glycemic control.
- Mental health professionals should be considered integral members of the pediatric diabetes multidisciplinary team.

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Depression

• Consider annual screening with age-appropriate depression screening measures.
• Beginning at dx of complications or when there are significant changes in medical status, consider assessment for depression.
• Referrals for treatment of depression should be made to mental health providers with experience using evidence-based treatment approaches.

American Diabetes Association Standards of Medical Care in Diabetes Comprehensive Medical Evaluation and Assessment of Comorbidities. Diabetes Care 2017; 40 (Suppl. 1): S25-S32
Disordered Eating Behavior

- Consider reevaluating the treatment regimen in people with diabetes who present with symptoms of disordered eating.
- Consider screening for disordered eating using validated screening measures when hyperglycemia and weight loss are unexplained based on self-reported behaviors.

Recommendations: Transition from Pediatric to Adult Care

• Health care providers and families should begin to prepare youth in early to mid-adolescence and, at the latest, at least 1 year before the transition to adult health care.

• Both pediatricians and adult health care providers should assist in providing support and links to resources for the teen and emerging adult.

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
with strength, courage + resilience!
- Abel
Tell Me Town: Providing Comfort and Education to Children and their Families
http://tellmetetown.com/
Guidelines

- Full version
- Abridged version for PCPs
- Free app
- Pocket cards with key figures
- Free webcast for continuing education credit

- Professional.Diabetes.org/SOC
Questions

Thank You