Diabetes Technology Update

Presented by Diane Caro RN BSN CDE
Clinical Nurse IV
Patient Health Education
UC Irvine Health
Objectives

The learner will be able to:

1. Cite two resources where the ADA’s “2019 Standards of Medical Care in Diabetes” section on Diabetes Technology can be viewed by health care professionals.

2. State 3 unique advantages and 3 potential drawbacks of the different insulin pumps available in the U.S.
3. **Explain the basics of Basal IQ Technology used in the Tandem t:slim X2 insulin pump.**

4. **Explain the basics of SmartGuard Technology used in the Medtronic MiniMed 670G insulin pump.**

5. **Describe a few differences between the OmniPod System and the new OmniPod DASH System.**
6. Explain the difference between an intermittently scanning CGM and real-time CGM.

7. Explain the difference between Sensor Glucose and Blood Glucose readings.

8. Explain why ongoing education is important for persons with diabetes using an insulin pump and/or CGM.
2019 Standards of Medical Care in Diabetes

Published by American Diabetes Association (ADA)

An evidence-based document

Provides up-to-date recommendations, treatment goals and best practices for improving health outcomes in patients with diabetes
The complexity and rapid change of available diabetes technology can be a barrier to patient and provider implementation.
2019 is the first time the ADA added a dedicated section on diabetes technology to the “Standards of Medical Care in Diabetes”
ADA's grading system uses A, B, C, or E to show the evidence level that supports each recommendation.

- **A**—Clear evidence from well-conducted, generalizable randomized controlled trials that are adequately powered
- **B**—Supportive evidence from well-conducted cohort studies
- **C**—Supportive evidence from poorly controlled or uncontrolled studies
- **E**—Expert consensus or clinical experience

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[https://doi.org/10.2337/dc19-S101](https://doi.org/10.2337/dc19-S101)
Insulin Pump Recommendations

- **Most adults, children, and adolescents with Type 1 Diabetes should be treated with intensive insulin therapy with either multiple daily injections or an insulin pump.**

- **Insulin pump therapy may be considered as an option for all children and adolescents, especially in children under 7 years of age.**

- **Individuals with diabetes who have been successfully using continuous subcutaneous insulin infusion should have continued access across third-party payers.**
Continuous Glucose Monitors
Recommendations

- Sensor-augmented pump therapy may be considered for children, adolescents, and adults to improve glycemic control without an increase in hypoglycemia or severe hypoglycemia. Benefits correlate with adherence to ongoing use of the device. A

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

- People who have been successfully using continuous glucose monitors should have continued access across third-party payers. E
Real-time continuous glucose monitoring should be considered in children and adolescents with type 1 diabetes, whether using multiple daily injections or continuous subcutaneous insulin infusion, as an additional tool to help improve glucose control and reduce the risk of hypoglycemia. Benefits of continuous glucose monitoring correlate with adherence to ongoing use of the device.
Real-time Continuous Glucose Monitor Use in Adults
Recommendations

- 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. A

- Real-time continuous glucose monitoring may be a useful tool in those with hypoglycemia unawareness and/or frequent hypoglycemic episodes. B

- Real-time continuous glucose monitoring should be used as close to daily as possible for maximal benefit. A
Real-time continuous glucose monitoring may be used effectively to improve A1C levels and neonatal outcomes in pregnant women with type 1 diabetes. B

Sensor-augmented pump therapy with automatic low-glucose suspend may be considered for adults with type 1 diabetes at high risk of hypoglycemia to prevent episodes of hypoglycemia and reduce their severity. B
Intermittently Scanned Continuous Glucose Monitor Use Recommendation

Intermittently scanned continuous glucose monitor use may be considered as a substitute for self-monitoring of blood glucose in adults with diabetes requiring frequent glucose testing.
AUTOMATED INSULIN DELIVERY
Recommendation

Automated insulin delivery systems may be considered in children (7 years and older) and adults with type 1 diabetes to improve glycemic control. B
Where to find these recommendations?

professional.diabetes.org website

ADA Standards of Medical Care App - (This app is only available on the App Store for iOS devices.)
Question

What type of insulin is used in an insulin pump?

A. Regular insulin
B. Rapid acting insulin
C. Long acting insulin
Answer

- **Rapid acting insulin**

- **Humalog, Novolog or Apidra**
The Basics of Insulin Pump Therapy

Basal vs. Bolus
Infusion sets
Advanced Carb Counting
Troubleshooting
Infusion site care
Pump setting adjustments
Prevention of DKA
Prevention of hypoglycemia
CSII
Education and Training

Analysis of the MAUDE database suggested that the majority of AEs relate to human factors/user error rather than to technical pump malfunction per se and that preventable AEs may occur more commonly in nonspecialized practices.


https://doi.org/10.2337/dc15-0168
Rational strategies for reducing AEs caused by user error include the following:

- **Appropriate selection of candidates for pump therapy**
- **Providing those beginning pump therapy with appropriate (and ongoing) education and support**
- **Ensuring that health care professionals supporting pump users are themselves well trained and supported**
- **Ensuring that teams supporting pump users contain a critical mass of members with the necessary skill mix (medical, nursing, dietetics, diabetes educators)**
MiniMed 670G System

medtronicdiabetes.com
Reservoirs

Holds up to 300 units of insulin
Insulin Pumps Update

Medtronic- 670G system offers SmartGuard technology which provides two levels of automated insulin delivery

1. AUTO MODE

2. SUSPEND BEFORE LOW
MiniMed 670G system

**Auto Mode:**
Automatically increases or decreases basal insulin delivery based upon CGM values. MUST still administer boluses for food.

**Suspend Before Low:**
Stops insulin up to 30 minutes before reaching your preset low limits. Automatically restarts insulin when your levels recover without bothersome alerts.
t:slim X2

tandemdiabetes.com
t:simulator™ App
t:slim cartridge

Holds up to 300 units of insulin

Micro delivery technology
t:slim x2 insulin pump

- Large color touchscreen
- Rechargeable battery
- Bluetooth wireless technology
- Updatable software
- May be integrated with the Dexcom G6
Basal IQ Technology

1. Predicts glucose 30 minutes ahead
2. Suspends insulin to help avoid the low
3. Resumes insulin once glucose rises
Holds up to 200 units of insulin & Up to 72 hours of insulin delivery
The Pod

The Pod is a small, waterproof device that you fill with insulin and wear directly on your body. The Pod includes a small, flexible cannula that inserts automatically with the push of a button. The Pod communicates wirelessly with the Personal Diabetes Manager (PDM) to program insulin delivery.
OmniPod DASH System

- Touch-screen bluetooth enabled PDM (personal diabetes manager) display
- Calorie King Food Library
- Multiple Mobile Apps
When a list of covered pump models is determined, the following qualities should be considered:

<table>
<thead>
<tr>
<th>Device Qualities</th>
<th>Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin volume</td>
<td>Does the pump hold enough to last the patient 2-3 days? Are basal rate increments small enough?</td>
</tr>
<tr>
<td>Screen legibility</td>
<td>Can the patient read all on-screen text?</td>
</tr>
<tr>
<td>Alarm and alert recognition</td>
<td>Can the user hear or feel them?</td>
</tr>
<tr>
<td>Water-proof</td>
<td>Is it needed by the user?</td>
</tr>
<tr>
<td>Download capability</td>
<td>Is the software easy for the patient to download and review? Does the download data provide cloud technology to allow the provider to access the data?</td>
</tr>
<tr>
<td>Continuous glucose monitor (CGM) data</td>
<td>Is it linked with CGM? Does it automatically respond to CGM data and is that a desired component?</td>
</tr>
<tr>
<td>Interface with point-in-time blood glucose meters</td>
<td>Does the meter communicate directly with the insulin pump?</td>
</tr>
<tr>
<td>Remote control capabilities</td>
<td>Is it desired/needed by the user or caregiver?</td>
</tr>
<tr>
<td>Bolus calculation parameters</td>
<td>Are the dosage ranges, insulin-to-carbohydrate ratios, correction factors, and insulin-on-board features adequate?</td>
</tr>
<tr>
<td>Infusion device compatibility</td>
<td>Which options are available? Are they suited to the needs of the patient?</td>
</tr>
<tr>
<td>Complexity of user programming</td>
<td>Is the menu layout simple? How many button presses are needed for basic programming?</td>
</tr>
<tr>
<td>Look and feel of the device</td>
<td>Size, weight, color, and wearing options (clips, cases) desirable for patient?</td>
</tr>
<tr>
<td>Special alerts and reminders</td>
<td>Are site change, missed bolus, and customizable reminders and alerts desired?</td>
</tr>
</tbody>
</table>
A CGM sensor measures the glucose in what body fluid?

- A. Interstitial fluid
- B. Capillary blood
- C. Intravascular fluid
What is a CGM?

A CGM works through a tiny sensor inserted under your skin, usually on your belly or arm. The sensor measures your interstitial glucose level, which is the glucose found in the fluid between the cells. The sensor tests glucose every few minutes. A transmitter wirelessly sends the information to a monitor.

Check out: Anatomy of a CGM sensor—Diabetes Forecast, May 2014
This graph shows that the patients blood sugars are in the target range.
Fingerstick vs CGM data

Glucose levels (mg/dL)

Time of day

Target Range

unnoticed high

unnoticed low
Fingerstick is like a still photograph & CGM is like a motion picture or movie

PHOTOGRAPH

PHOTOGRAPH
If the CGM value does not match how you feel:

WHEN IN DOUBT, GET YOUR METER OUT!
Some Features of CGM systems

- *System includes a subcutaneous sensor and transmitter*
- *Wireless system between transmitter and receiver*
- *Waterproof sensors/transmitters (receiver/display not waterproof)*
- *Multiple on-screen trend graphs*
- *Direction and rate of change arrows*
- *Mechanical device used to insert sensors*
- *Warm up period (No Data) at beginning of sensor session*
Freestyle Libre 14 Day System

- Intermittently scanned CGM
- No alerts or alarms
- Accurate for insulin dosing
- One hour warm up
- LibreLink app now available
- Only worn on back of upper arm
STEP 8

Place Sensor Applicator over site and push down firmly to apply Sensor.
Guardian Sensor 3 CGM - Integrates with the MiniMed 670G & 630G

or

as part of the Guardian Connect CGM System
Guardian 3 Sensor and One-press inserter
Guardian connect transmitter

gray charger for transmitter
Guardian Sensor 3

- **Warm up 2 hours**
- **Calibration within 2 hours, within 6 hours, then every 12 hours**
- **Can be worn up to 7 days**
- **Bluetooth transmitter - Rechargeable for a year or more**
- **FDA to be worn either on the abdomen or back of the arm**
2 hour sensor warm up

No calibrations

10 day sensor sessions

May use receiver or phone or both as display device.
Single use sensor inserter
Inserting sensor
Sensor pod
Inserting transmitter
The Eversense Long Term CGM system

Designed to be the first and only CGM with an implantable sensor that lasts up to 90 days.
Thank You