Integrating diabetes tech for better health outcomes

Kayce Sol, MA, BSN, RN, CDCES
Lindsay Schlichting, BSN, RN, CDCES
Conflict of Interest: Financial Disclosures

Lindsay Schlichting, BSN, RN, CDCES
Tandem – Certified Pump Trainer (Independent Contract)

Kayce Sol, BSN, RN, CDCES
Insulet Omnipod- Certified Pump Trainer (Independent Contract)
Objectives:

Highlight: Benefits and evidence for integrating diabetes technology into practice

Describe: How insulin pumps work and how they are programmed to deliver insulin

Describe: Components that are needed to successfully introduce and support patients on diabetes technology in Primary Care
The possible future of Diabetes

The prevalence of diagnosed diabetes is projected to increase in the U.S. from 22.3 million (9.1% of the total population) in 2014, to 39.7 million (13%) in 2030, and to 60.6 million (17%) in 2060.

If current trends continue the CDC estimates that 1 in 3 Americans will develop diabetes in their lifetime.

Social conditions are primary determinants of health. 

- **Poverty:**
  - Higher prevalence, A1c, mortality
  - More DKA, higher A1c in T1D

- **Low educational attainment:**
  - Higher incidence, prevalence, and mortality of T2D

- **No health insurance/ low access to care:**
  - Higher risk of undiagnosed diabetes
  - Lower diabetes care quality

- **No sidewalks/ polluted neighborhoods:**
  - Higher incidence and prevalence of diabetes
  - Worse diabetes outcomes

- **Low neighborhood cohesion/ low social support:**
  - Higher incidence of diabetes
  - Increased diabetes mortality and complications

Reviewed by Hill-Briggs et al. 2020 Diabetes Care online Nov 2, 2020; https://doi.org/10.2337/dci20-0053
A day in the life...

What didn’t we list?

1. Anything fun
2. Family obligations
3. Work obligations
4. Dependent care
“Currently, primary care providers (PCPs) deliver clinical care to ~90% of individuals with type 2 diabetes, and this proportion is likely to increase over time.”
Technology is rapidly evolving and has become an integral component of diabetes care.

People with diabetes and clinicians are harnessing a variety of technologies to improve clinical outcomes and quality of life, including:

1. Connected BG meters
2. CGM
3. Insulin pumps with or without automated insulin delivery
4. Data sharing platforms
5. Telehealth
6. Remote monitoring
7. Smartphone apps
8. Smart Insulin Pens

Diabetes tech use is associated with improved outcomes, especially when the individual using tech is supported, knowledgeable, and actively engaged with their care.

- ~50% are meeting generally recommended glucose targets
- ~20% of patients are meeting all 3 targets (glucose, b/p, cholesterol

Insulin delivery

- RCTs demonstrate a modest improvement in A1C
- Observational studies, registry data, and meta-analysis suggest improvement in glucose metrics
  - Reduced rates of severe hypoglycemia
- Pump use may reduce DKA risk and complications
- Treatment satisfaction and quality of life measures may improve
- AID systems may reduce A1C and improve TIR
  - May also reduce risk of exercise-related hypo
  - Psychosocial benefits
  - Preferred (over non-automated pumps) in individuals with T1D

Evidence for diabetes technology

Evidence for diabetes technology

Glucose monitoring

<table>
<thead>
<tr>
<th>Real-time CGM</th>
<th>Intermittently-scanned CGM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple RCTs have been done (results largely positive)</td>
<td>RCT data is more limited</td>
</tr>
<tr>
<td>Reduction in A1C</td>
<td>Reduction in hypoglycemia</td>
</tr>
<tr>
<td>Reduction in episodes of hypoglycemia</td>
<td>Improved treatment satisfaction</td>
</tr>
<tr>
<td>Benefits seen in adults of all ages</td>
<td>Increased frequency of &quot;testing&quot;</td>
</tr>
<tr>
<td>Data in children less consistent but still reduced hypoglycemia (which reduced hypo concerns and diabetes distress)</td>
<td>Mixed results on study endpoints (A1C reduction, rates of hypo or severe hypoglycemia)</td>
</tr>
</tbody>
</table>

ADA: CGM is the standard of care for T1D and T2D on intensive insulin therapy.

Flash CGM Is Associated With Reduced Diabetes Events and Hospitalizations in Insulin-Treated Type 2 Diabetes

Richard M Bergenstal, Matthew S D Kerr, Gregory J Roberts, Diana Souto, Yelena Nabutovsky, and Irl B Hirsch

Evidence for diabetes technology
CGM sensors are small, disposable devices applied to the surface of the skin. CGM measures interstitial glucose at regular intervals 24 hours/day via a small wire inserted under the skin during sensor application.
Ambulatory glucose profile (AGP)

- AGP is a 1-page standardized report
- Snapshot of glucose levels (typical day)
  - Big picture view of DM self-management
  - Need a min. 5 days of data
- Cloud-based data management platform
  - Upload glucose from Reader/receiver OR
  - Share glucose data with HCP through app
What's an insulin pump?
You've come a long way, baby!

Dr. Arnold Kadish (1963) with first insulin pump.
MULTIPLE PUMP OPTIONS

FDA-approved pump options from 3 manufacturers:

Medtronic 630G, 670G, 770G, 780G®

Tandem t:slim X2 w/Control IQ®

Omnipod Classic (Eros), Dash, Omnipod 5
Small electronic medical device worn externally on the body that delivers insulin 24 hours a day

Infusion site attached to the body with adhesive

Small cannula under the skin delivers insulin continuously

Infusion set/reservoir (or Pod) is changed every 2-3 days

Pumps are designed and approved to use U-100 rapid-acting insulin only (Humalog®, NovoLog®, Apridra®, Fiasp®, and Lyumjev®)
All pumps deliver rapid-acting insulin in two ways:

1. **Basal rate**: continuous, hourly infusion of insulin that keeps blood glucose stable between meals and overnight

2. **Bolus function**: can deliver additional insulin before eating and/or to correct high blood sugar—amount calculated using programmed pump settings

[Link](https://www.medtronicdiabetes.com/treatments/insulin-pump-therapy)
Automated Insulin Delivery (AID) AKA “hybrid closed loop”

- Pump is integrated with CGM system
- Pumps can operate in “manual mode” or “auto mode”
- All 3 pumps have basal insulin auto-adjustment
- All 3 pumps have adjustable BG targets
- Only T:slim X2 and Medtronic 780G have "auto-bolus" feature
- Announced bolus for meal/snacks is still crucial
- No currently available pump is fully automated
- A small sub-set of patients may use a “DIY” AID pump (not FDA-approved)
- 4th insulin pump is currently under FDA review
Insulin pump parts

**Infusion set/ cannula**
- Infusion sets attach to the body and connect user to the pump
- Different insertion angles and tubing and cannula lengths are available depending on pump type
- Should be changed every 2-3 days

**Reservoir/cartridge**
- Fills with 200-300 units of u-100 insulin
- Should be changed every three days (when sets are also changed)
Data Analysis: Pumps

AGP

Bolus/ Basal Split

Automation
Data Analysis: Pumps
Log books
Set changes
Total Daily Dose
Settings
Advantages of Diabetes Technology

- Research shows reduced hypoglycemia, improved A1C
- Precision care for clinicians
- Realtime feedback in CGM's
- Fewer finger pokes
- Bolus options (normal and extended for gastroparesis or High Fat or other medications)
- Bolus calculator to prevent stacking insulin (Pumps)
- Changing insulin demands, illness, steroids, activity (Pumps)
- Fewer injections, less scar tissue
- Flexibility
- Facilitates better glucose management
- Allow more flexibility in meal planning
- Mimics physiological insulin delivery
- Less insulin variability > Less swings in blood glucose
- May alert/ prevent severe hypoglycemia
- May prevent complications
- May prevent complications
<table>
<thead>
<tr>
<th>Possible Disadvantages of Diabetes Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product/Supply management</td>
</tr>
<tr>
<td>Data Management</td>
</tr>
<tr>
<td>Risk site infection</td>
</tr>
<tr>
<td>Cost (device, supplies, batteries)</td>
</tr>
<tr>
<td>Being attached to a device</td>
</tr>
<tr>
<td>Constant reminder of having diabetes</td>
</tr>
<tr>
<td>Time demands</td>
</tr>
<tr>
<td>Increased risk of DKA (Pump)</td>
</tr>
<tr>
<td>Data Overwhelm</td>
</tr>
<tr>
<td>Technology fragmentation</td>
</tr>
</tbody>
</table>
Expectations vs. Reality

**Expectation**
- Pumps eliminate the need to self-manage diabetes
- Pumps are an artificial pancreas
- Pumps cure diabetes

**Reality**
- Pumps are an alternative way to deliver insulin
- Pumps require different types of daily self-care and management
- Some pumps can provide partial automation for insulin delivery, but users still need to request bolus to address food and/or high BG
- Pumps are tools and user engagement is what typically drives success
CONCLUSIONS

CGM uptake disparities can largely be overcome by eliminating CGM cost barriers. CGM use was associated with improved HbA\(_1c\) across all major racial/ethnic groups, highlighting broad CGM appeal, utilization, and effectiveness across an underprivileged patient population.

Effect of CGM Access Expansion on Uptake Among Patients on Medicaid With Diabetes

Kevin Ni; Carolyn A. Tampe; Kayce Sol; Douglas B. Richardson; Rocio I. Pereira

Outpatient CGM timeline: Foundation & Vision

- Diabetes Champions program (9/18)
- Primary care tip sheet (9/19)
- Presentation to ACS leadership (1/19)
- RN education training (11/19)

Stakeholders: Leadership, Nursing Education, PharmDs, Endocrinology, Clinic RNs, Providers, Pharmacy, EMR
Outpatient Timeline: Experiment, Support & Evaluate

Outcomes:
- Standardization
- Continuous Education Cycle
- Evaluation
- Expansion of teams involved

- ACS clinic pilot (1/21)
- CGM Lunch & Learn (2/21 & 7/21)
- CGM upload kiosks installed (12/21)
- Learning module released: ACS RNs (2/22)
- CGM barriers survey sent (5/22)
Step 1: Assemble your team
Step 2: Patient & Staff Education/Support at Denver Health
Who's eligible?

How to get CGM for Commercial Insurance Patients (cuanschutz.edu)

Prepare for CGM
<table>
<thead>
<tr>
<th>Diabetes Education</th>
<th>CGM</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>G0108, G0109 – Recognized programs</td>
<td>95249, 95259, 95251</td>
<td>99091, 99453, 99454, 99457, 99458</td>
</tr>
<tr>
<td>Payment is low per 30 minutes and a Limited number of units per year allowed</td>
<td><strong>Incident to for medicare, Some commercial payers allow those with NPI to Bill</strong></td>
<td><strong>Incident to billed every 30 days and requires patient consent</strong></td>
</tr>
<tr>
<td>Used for BGM, CGM, Insulin Instruction and pump training DCES can provide</td>
<td>Low if any Co-pay</td>
<td>May apply to Co-pay/deductible</td>
</tr>
</tbody>
</table>
## Newer RPM Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
<th>Frequency</th>
<th>Who can perform</th>
<th>Who can bill</th>
<th>Approx $ (based on 2020 Medicare rates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99453</td>
<td>RPM-Set up and patient education</td>
<td>Once per device - bill first before 99454</td>
<td>Clinical staff - general supervision</td>
<td>MD/DO/ND/NP/PA</td>
<td>$21</td>
</tr>
<tr>
<td>99454</td>
<td>Supply of device with monthly transmission</td>
<td>Monthly must transmit at least 16 days</td>
<td>Clinical staff - general supervision</td>
<td>MD/DO/ND/NP/PA</td>
<td>$64</td>
</tr>
<tr>
<td>99458</td>
<td>Additional 20 minutes and may go up to 60 minutes</td>
<td>Monthly</td>
<td>Clinical staff - general supervision</td>
<td>MD/DO/ND/NP/PA</td>
<td>$44</td>
</tr>
<tr>
<td>99457</td>
<td>RPM communication with patient caregiver - 20 minutes</td>
<td>Monthly</td>
<td>Clinical staff - general supervision</td>
<td>MD/DO/ND/NP/PA</td>
<td>$55</td>
</tr>
</tbody>
</table>

### Reimbursement

For a complete guide to billing and coding, check out Dana on Diabeteseducator.org
Lessons Learned

- Gather stakeholders as a first step
- Patients love their diabetes devices
- Patients who've struggled with MDI can be successful
- Tech support requires time
- Fragmentation = burnout
- The importance of champions
- Standardization
- Know your why!
Reflections on diabetes tech in practice
Resources

Know your reps: Insulet, Medtronic, Tandem, Abbot & Dexcom, Tidepool, Glooko, etc!

Take Courses: Making Diabetes Technology Work | American Diabetes Association - Great new program offered by ADA!

Download Simulation Apps

Diabeteswise.org

Pantherprogram.org

Coverage:
Connect with us!

Lindsay Schlichting, BSN, RN, CDCES
Denver Health
Lindsay.Schlichting@dhha.org

Kayce Sol, MA, RN, CDCES
Denver Health
Kayce.Berke@dhha.org

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- Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes - 2022. Diabetes Care 2022;45(Suppl. 1):S144-S174


- Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Medical Care in Diabetes - 2022. Diabetes Care 2022;45(Suppl. 1):S46-S59


References


