Ensuring Equitable Access to Diabetes Technology for Patients with Disabilities

Rohan Maini, MD

Background: IDD

Individuals with intellectual and developmental disorders (IDDs) often experience poorer health outcomes due to limited access to adequate healthcare, greater exposure to polypharmacy, higher rates of poverty, insufficient nutrition, and physical inactivity (1).

- 55,000 individuals with ID found a diabetes prevalence of 8.5% , with the odds of diabetes being 2.46 times higher (2)
- 65,293 Danish persons with ID had double the risk of type 2 diabetes (adjusted hazard ratio 2.15, 95% CI 2.09–2.20), with the strongest associations among women, those born between 1980 and 1999, and individuals with mild intellectual disability (3)

Patients with DM1 and neurodevelopmental disorders (NDD)/intellectual disability have:

- worse diabetes control (HbA1c > 8.5)
- 1.18-fold higher risk of retinopathy
- 2.64-fold higher risk of nephropathy (4).
- Receive recommended diabetes monitoring less often
- 12% higher risk of macrovascular complications (5)
- Hospitalizations for diabetes-related conditions are 2.6 times more likely in adults with IDD (6)

Background: Physical Disabilities

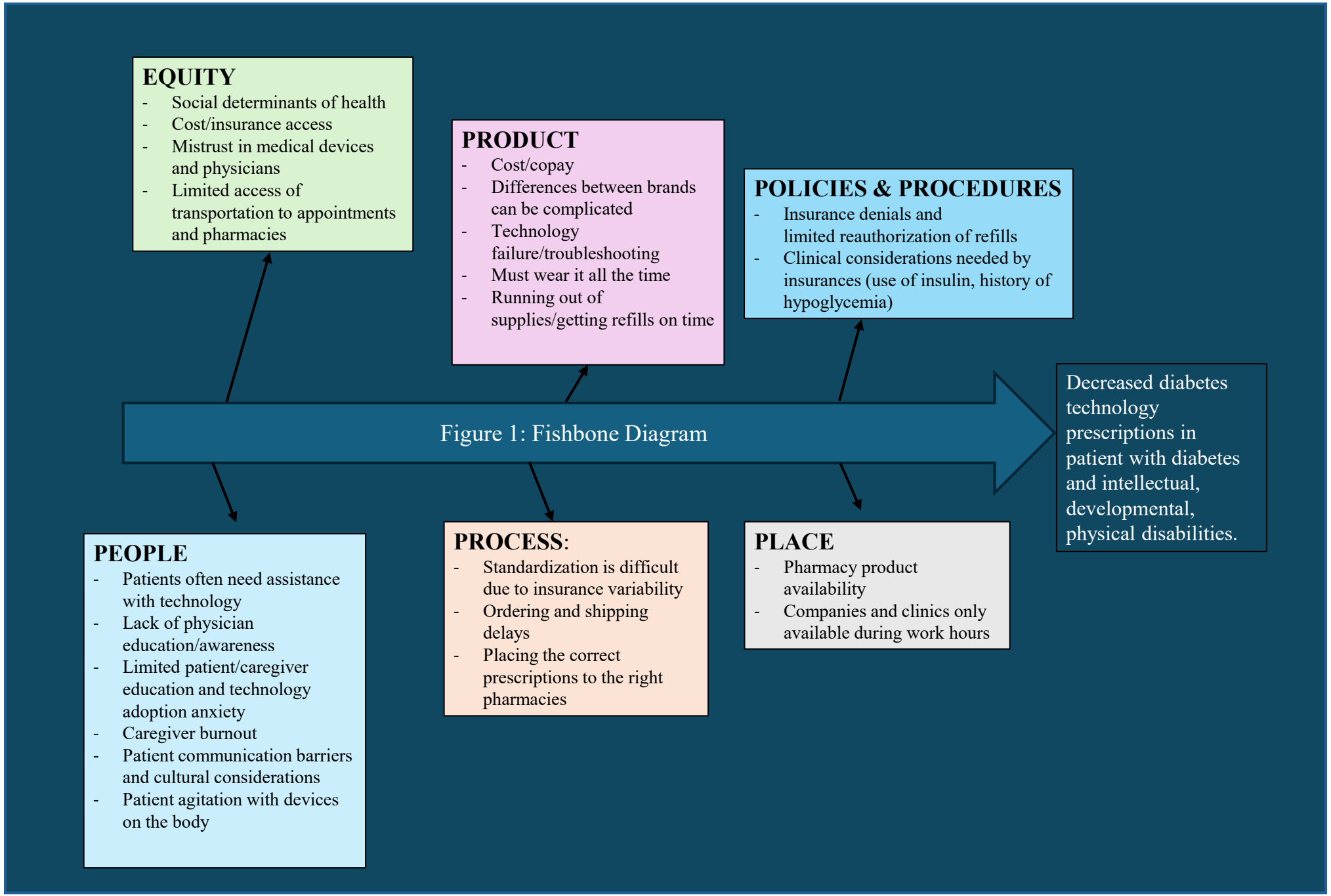
Prevalence of diagnosed diabetes was 5.8% among adults without disability, 9.5% among those with milder disabilities, and 18.3% among those with moderate to severe disabilities. Prevalence increased with the number of disability types and was 4.0-10.3 percentage points higher among those with moderate to severe vision, hearing, mobility, and cognitive disabilities compared to those with milder forms. [7]

The bidirectional relationship between diabetes and vision loss is well known, with diabetes being a leading cause of blindness and vision impairment in turn complicating self-management. [9]

People who are deaf or hard of hearing face significant systemic barriers to diabetes care, including communication challenges and inaccessible health information. (9)

Background: Case Reports

- 30yo F with DM1 and ID (Shwachman-Diamond syndrome) after starting an advanced hybrid closed loop pump (Medtronic):
  - TIR increased to 70-80% without hypoglycemia
  - HbA1c decreased to <7
  - Reduced total daily dose of insulin
  - No hospitalizations for diabetic ketoacidosis.
  - 40-50% of bolus insulin delivery was derived from the algorithm's automatic correction boluses (10).
- 29 yo F with DM1 and Down syndrome after starting insulin pump therapy:
  - HbA1c improved from 9.0% to 6.8% over 2 years
  - Reduced insulin requirements
  - Stable BMI (11).
- 67 yo M with LADA and complete blindness due to retinitis pigmentosa after starting HCL pump (Tandem x2 Control IQ):
  - Improved time in range to 90% with no recorded hypoglycemia
  - Decreased HbA1c to 6.7 (12)
  - Utilized a smartphone-based voice screen reader feature, which would dictate glucose readings, track active insulin, and confirm his carbohydrate bolus inputs.


EQUITY
- Social determinants of health
- Cost/insurance access
- Mistrust in medical devices and physicians
- Limited access of transportation to appointments and pharmacies
PRODUCT
- Cost/copay
- Differences between brands can be complicated
- Technology failure/troubleshooting
- Must wear it all the time
- Running out of supplies/getting refills on time
POLICIES & PROCEDURES
- Insurance denials and limited reauthorization of refills
- Clinical considerations needed by insurances (use of insulin, history of hypoglycemia)
Figure 1: Fishbone Diagram
Decreased diabetes technology prescriptions in patient with diabetes and intellectual, developmental, physical disabilities.
PEOPLE
- Patients often need assistance with technology
- Lack of physician education/awareness
- Limited patient/caregiver education and technology adoption anxiety
- Caregiver burnout
- Patient communication barriers and cultural considerations
- Patient agitation with devices on the body
PROCESS:
- Standardization is difficult due to insurance variability
- Ordering and shipping delays
- Placing the correct prescriptions to the right pharmacies
PLACE
- Pharmacy product availability
- Companies and clinics only available during work hours

Aim & Population

- **Aim**: Increasing diabetes technology prescription by 15% in patients with diabetes and intellectual, developmental, or physical disabilities over 1 year.
- **Location**: Mount Sinai endocrinology clinics (Fellows' clinic and Faculty Practice, including Morningside and BI clinic)
- **Population:**
  - All patients with diabetes (DM1 or DM2) and:
    - Intellectual disability
    - Developmental disability
    - Autism Spectrum Disorder
    - Down syndrome
    - Cerebral palsy
    - Fragile X syndrome
    - Rett syndrome
    - Prader Willi syndrome
    - Angelmann syndrome
    - Turner Syndrome
    - ADHD
    - Visually impaired/legally blind
    - Hearing impaired

Interventions

PDSA Cycle 1: Interventions for patients/caregivers

- Built database of these patients and dedicated outreach to prescribe:
  - Continuous glucose monitors (CGM)
  - Insulin patch (Cequr)
  - Insulin pump (Tandem, Medtronic, Omnipod, iLet)
  - Smart Insulin Pen (InPen)

PDSA Cycle 2: Toolkit for physicians

- Breakdown of how to prescribe these technologies, order sets for supplies and prescriptions, and description of automated features
- Strategies for counseling and adapting these technologies for this patient population
- Distributed to all fellows, NPs, and diabetes attending physicians

Wearable patches

CGM (Dexcom or Freestyle Libre)

- Decreases caregiver burden for finger sticks, 15 day duration
- Can change location to hard to reach places for agitated patients
- Overpatch can help reinforce the sensor

Cequr insulin patch

- Ideal for patients who have needle phobia or on low doses
- Ideal if caregiver is not able to be present during meals to inject insulin.
- Two button dosing mechanism prevents accidental dosing

Non-invasive technology

Smart InPen

- Avoid inadvertent button presses
- Can set alerts for missed doses and insulin reminders
- Ideal for patients who tend to stack doses or those who don't give enough correction doses.
- Ideal for patients who are at nursing homes; provider gets dose clarification and easier training for nursing staff compared to pumps.

CGM (Dexcom or Freestyle Libre)

- Dexcom Siri read aloud function
- Freestyle Libre text to speech function
- Both have vibration alerts

Cequr insulin patch

- Patient can feel and hear click of bolus buttons

Severe Intellectual and Developmental Disability (IDD)

Mild IDD (autism, ADHD, Turner syndrome)

IDD in nursing home

Visual impairment (legal blindness), hearing impairment

AID systems

Tandem tslim x2/Mobi

- Caregivers can use the simulator app for practice
- Set to 24 hour sleep mode to tighten targets
- Slowing down button presses helps to avoid screen going black
- Mobi bolus button option if don't want to engage with app

Omnipod 5/DASH

- Caregivers can use the simulator app for practice
- Tubeless → ↓ risk of tubing pulls/occlusions for patients who are agitated
- If unable to bolus, can just keep on automatic mode and set target to 110, shorten duration of active insulin (2 hours).
- Counsel to re-enable auto mode if reverted to manual

iLet Beta Bionics

- Meal announcements easier to choose for patient or caregiver, no carb counting
- Algorithm will increase insulin delivery even if you do not announce meals over time
- Can share data with the Bionic Circle app
- Steel infusion set is often easier for patients with disabilities or dexterity issues.

Medtronic 780G

- Can set target glucose to 100 and active insulin time to 2 hours
- Meal detection technology if boluses are missed
- 7 day infusion sets are less burdensome on a caregiver
- Pump has the lowest glucose target on the market

AID systems

- iOS VoiceOver function can read anything on the screen
- Tandem Mobi has bolus button option if cannot input carbs into app
- iLet has less screen engagement, easy to make meal announcements

Data & Outcomes

- Demographics: gender, age, type of diabetes, diabetes duration, IDD category, current diabetes treatment, baseline HbA1c, baseline complications (nephropathy, neuropathy, retinopathy, macrovascular)
- Will use Epic reports to identify this population and gather data.
- Outcomes:

a. outcome measures: prescriptions of diabetes technology, actual receipt and use of technology, HbA1c, admissions to hospital for diabetes, TIR

b. balance measures (unintended consequences): number of technology failures, troubleshooting calls to technology companies, hypoglycemia events

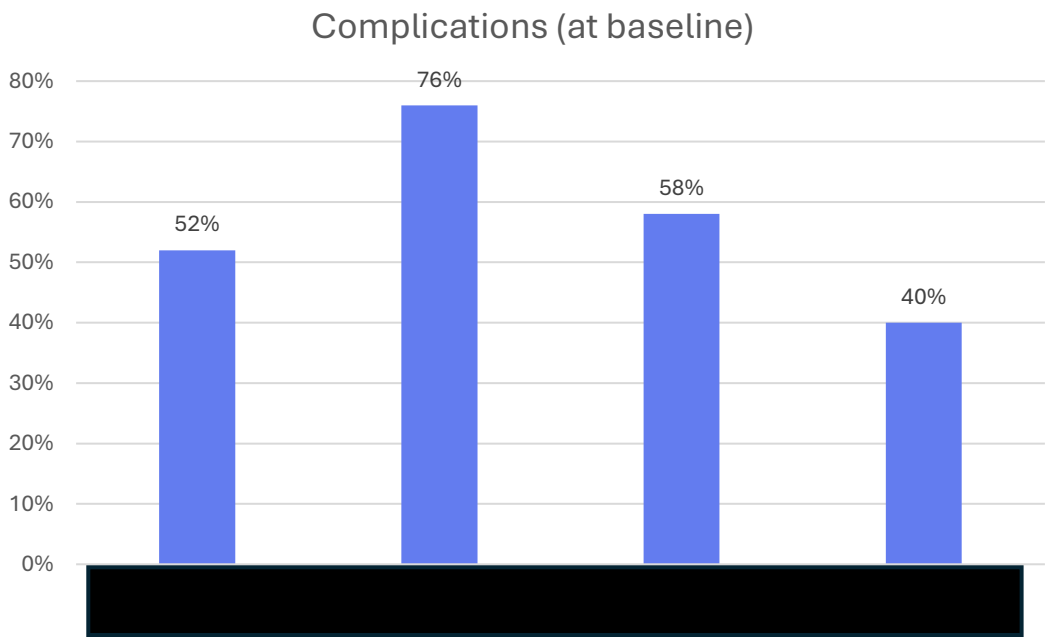
Baseline Results

Characteristic	n = 50 (%)
Age (mean)	
BMI (mean)	
HbA1c (mean)	
Sex	
Male	
Female	
Race	
Black	
Hispanic	
White	
Other	
Diabetes Type	
Type 1	
Type 2	
Steroid-induced	

Category of Disability	
Visual Impairment	(64%)
Autism	10%)
Turner Syndrome	6%)
Memory Impairment	2%)
ADHD	6%)
Intellectual Disability (including Developmental Delay or Downs)	16%)
Physical Disability	2%)
Hearing Impairment	4%)

Baseline Results

Current Insulin Regimen	
Basal + Bolus	(74%)
Basal only or Bolus only	16%)
Mixed insulin	2%)
No insulin	8%)
Insulin Technology at Baseline	
None	(40%)
CGM	(58%)
Insulin Pump	2%)
Other insulin technology	0%)



Insulin Technology	Devices prescribed	Devices received	IDPD Category
CGM	12	7	Visual impairment (6), developmental delay, hearing impairment, Turners, ADHD, autism, Fragile X, Intellectual disability
Tandem Mobi	2	0	Visual impairment (2)
Already on Tandem prior	1	1	Visual impairment
Inpen	2	0	Downs, autism. Both in NH
iLet	1	0	Visual impairment
Omnipod	1	1	Visual impairment
Cequr	2	2	ID and Visual impairment , deaf

Post intervention, there was a 41% increase in prescriptions including 12 sensors, 4 pumps, 2 smart pens, and 2 insulin patches.

Key Discussion Points

- CGMs
  - Agitation and fear that patient will remove the device
  - Can practice with other objects (button)
  - Need to brainstorm other ideas to remedy this
- Insulin pumps
  - Tandem Mobi – quick bolus option for the visually impaired
  - Optimal to prescribe pumps that are easier to use
- InPen
  - A good option for patients in nursing homes, when we have no idea what doses they are getting
  - Organizing a training for all nurses in the home
- Even if A1c is controlled, these interventions can help quality of life
- Patience is key

Next Steps

1. Follow up insurance authorizations and receipt of devices
2. Disseminate toolkit across providers
3. Measure long term outcomes: HbA1c, admissions to hospital for diabetes, TIR, number of technology failures, troubleshooting calls to technology companies, hypoglycemia events

Summary

- Patients with disabilities are more likely to have diabetes and have worse complications.
- ADA recommends early initiation of diabetes technology for all insulin using individuals. AID systems are the preferred insulin delivery system in individuals with DM1 and DM2 on MDI
- Patients with disabilities are underserved and often do not get offered these options
- Call to action: we need to reduce barriers for the caregiver, patient, and provider in order to optimize diabetes care for this population

Resources

1.) Oyetoro R, Wiemer L, Bardhi O, Louis M, Jacob R. Special Considerations for Management of Diabetes in Adult Patients withIntellectual and Developmental Disabilities. Adv Med. 2023 Jan 30;2023:2955772. doi: 10.1155/2023/2955772. PMID: 36755896;PMCID: PMC9902153.
2)Vancampfort D, Schuch F, Van Damme T, Firth J, Suetani S, Stubbs B, Van Biesen D. Prevalence of diabetes in people with intellectual disabilities and age- and gender-matched controls: A meta-analysis. J Appl Res Intellect Disabil. 2022 Mar;35(2):301-311. doi: 10.1111/jar.12949. Epub 2021 Oct 17. PMID: 34658096.
3.) Thorsted A, Lehn SF, Kofoed-Enevoldsen A, Andersen A, Heltberg A, Michelsen SI, Thygesen LC. The risk of type 2-diabetes among persons with intellectual disability: a Danish population-based matched cohort study. J Intellect Disabil Res. 2025 Jan;69(1):90-102. doi: 10.1111/jir.13190. Epub 2024 Oct 2. PMID: 39359008; PMCID: PMC11621590.
4.) Liu S, Kuja-Halkola R, Larsson H, Lichtenstein P, Ludvigsson JF, Svensson AM, Gudbjörnsdottir S, Tideman M, Serlachius E,Butwicka A. Neurodevelopmental Disorders, Glycemic Control, and Diabetic Complications in Type 1 Diabetes: a NationwideCohort Study. J Clin Endocrinol Metab. 2021 Oct 21;106(11):e4459-e4470. doi: 10.1210/clinem/dgab467. PMID: 34171098;PMCID: PMC8530713.
5.) Baksh RA, Pape SE, Chan LF, Sheehan R, White A, Chauhan U, Gulliford MC, Strydom A. Type 2 diabetes mellitus in people with intellectual disabilities: Examining incidence, risk factors, quality of care and related complications. A population-based matched cohort study. Diabetes Res Clin Pract. 2025 Apr;222:112090. doi: 10.1016/j.diabres.2025.112090. Epub 2025 Mar 7. PMID: 40057045.
6) Balogh RS, Lake JK, Lin E, Wilton A, Lunsky Y. Disparities in diabetes prevalence and preventable hospitalizations in people with intellectual and developmental disability: a population-based study. Diabet Med. 2015 Feb;32(2):235-42. doi: 10.1111/dme.12573. Epub 2014 Oct 7. PMID: 25185567.
7.) Bardenheier BH, Omura JD, Saaddine JB, Hora I, McKeever Bullard K. Prevalence of Diagnosed Diabetes Among U.S. Adults Aged ≥18 Years With Disabilities, 2021-2022. Diabetes Care. 2025 Mar 1;48(3):324-331. doi: 10.2337/dci24-0086. PMID: 39746143.
8) Hwang I, Kim SY, Kim YY, Park JH. Widening disparities in the national prevalence of diabetes mellitus for people with disabilities in South Korea. Public Health. 2024 Jan;226:173-181. doi: 10.1016/j.puhe.2023.11.007. Epub 2023 Dec 9. PMID: 38071950.
9) Hughes AS, Mirus K, Heydarian NM, Litchman ML. Diabetes Care Disparities in Deaf/Hard of Hearing and Blind/Low Vision Populations. Curr Diab Rep. 2024 Dec 30;25(1):14. doi: 10.1007/s11892-024-01565-z. PMID: 39738754; PMCID: PMC11683019.
10.) Taka H, Sugai K, Shikuma J and Suzuki R (2025) Efficacy of an advanced hybrid closed-loop system in a patient with type 1 diabetes and intellectual disability: a case report. Front. Endocrinol. 16:1611540. doi: 10.3389/fendo.2025.1611540
11.) Scaramuzza A, Giani E, Riboni S ...**Insulin pump therapy for type 1 diabetes treatment in a girl with Down's syndrome.** Diabetes Research and Clinical Practice, 85, e16-e18
12) Kubra Tuna, Urja Patel, Mohamad Anas Sukkari, Julio Leey; Eye-Opening Therapy: Insulin Pump Success in a Blind Athlete With Diabetes. *Diabetes, Obesity, and Cardiometabolic CARE* 11 February 2026; 1 (1): 140–142