ESTABLISHING AN INFRASTRUCTURE FOR A VIRTUAL CLINIC FOR THE MANAGEMENT OF PATIENTS WITH TYPE 1 DIABETES

Under the guidance of: Prof. Amir Tirosh Prof. Orit Pinhas-Hamiel







## **INSULIN PUMPS**









1963 - Dr. Arnold Kadish designed the first insulin pump to be worn as a backpack

Mid 80s

2014

Hybrid closed-loop system - 2017

# THE AMOUNT OF DATA COLLECTED AT A SINGLE DAY USING A GLUCOSE SENSOR AND A PUMP...















#### **BARRIERS TO DIABETES MANAGEMENT**

- ► Among 1771 T1DM patients, mean age, 15±5.2 years
- During a two-year period, roughly 15% of the scheduled appointments resulted in a cancellation or no-show
- ► 61% of patients missed ≥1 visit
- ► Those with ≥2 missed appointments had higher mean HbA<sub>1c</sub> (9.3±1.7 vs 8.3±1.1%, p<.0001) than those with <2 missed visits
- ► Older adolescents (16.1±5.0 vs 15.4±5.4, p=0.005) and females were more likely to miss ≥2 appointments (OR=1.4, 95% CI=1.2-1.7)

Markowitz JT, Volkening LK, Laffel LM, Care utilization in a pediatric diabetes clinic: cancellations, parental attendance, and mental health appointments. J Pediatr. 2014;164(6):1384-9.

The process of transitioning from child to adult services is often associated with a deterioration in health of adolescents with chronic conditions



Current challenges:

1. Lack of specialized adult T1DM clinics.

2. Rapid advancements in technology reults in lack of expertise by physicians.

3. Regular visits required, just for the adjustment to insulin regimens, resulting in wasted working days and hassle.



#### A VIRTUAL CLINIC FOR ADVANCED TECHNOLOGIES FOR T1DM PATIENTS

The Vision: A leading multidisciplinary virtual clinic for patients with T1DM, promoting an efficient clinical care, teaching and research in type 1 diabetes

**Goals:** 

- 1. Delivering excellent clinical care for patients (nationwide and international) using a digital/virtual methodologies.
- 2. Improving ongoing follow-up and 'just-in-time' resources for patients with T1DM.
- 3. Providing most medical care at home saving time and resources for patients.
- 4. Improving quality of life.
- 5. Training and teaching health care teams at all aspects of care in T1DM.
- 6. Using the rapidly growing database to promote R&D.

#### A model for virtual clinic for T1DM - Sheba



# **KEY PLATFORM FEATURES:**

- 1. Transmission of pump and sensor downloads
- 2. Secure messaging between patients and providers
- 3. Uploading encrypted health documents
- 4. Maintenance of online health maintenance checkboxes
- 5. Setting modifiable alarms
- 6. Prescription of tele-educational modules
- 7. Patient questionnaires
- 8. Chat room for peer support
- 9. Video visits

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## **STUDENT'S ROLE**

- Creating a database of all patients joining the virtual clinic.
- Measuring the effects of virtual care on:
  - Metabolic outcomes: HbA1c, 'time in range', rate of hypoglycemia, etc.
  - Patient reported outcomes and quality of life
  - Patient satisfaction
- Outcome measures will be collected at baseline, 3 and 12 months of the intervention.

#### CHALLENGES

**Bureaucracy & Regulations** : Pump information is stored on the cloud with servers located outside of Israel.

- **Technical difficulties**: some devices only work with proprietary software
- **Safety:** can we count on patient of correctly change the setting?

# PATIENTS

- Non-pregnant young adults (ages 18-35) with T1DM for at least 6 months, with insulin pump + sensor
- Followed at Sheba Endocrinology Clinic or in Maccabi North
- Patient resources: home computer, home internet, smart phone
- Patient devices: pump, with or without sensor

# PATIENTS (N=69)

#### M:F - 1:1.5

- Average age: 28.7
- Mean Hb A1C: 7.09 +/- 1.098
- Mean Glucose: 168 +/- 51.01
- Mean visits (2 years): 6 (range 1-15)
- Mean BMI: 25.2 +/- 6.8
- % with co morbidities:16%
- % with prior DKA (last 2 years): <1%
- ER visits: 1
- Hospitalizations: 1

## **ROLL OUT**

- 1. Mini pilot: 10 Sheba clinic patients using Medtronic or Omnipod Pumps and various sensors. Goal= technical testing.
- 2. Full pilot: 20 patients to be involved in virtual clinic development ( by the end of this month) . Goal= research if involvement in designing clinic empowers this group and improves their outcomes.
- 3. Full roll out at end of year: enroll a total of a minimum of 100 patients from Sheba + additional number of Maccabi patients from North

