# RISE OF THE MACHINES 3

| Time | Session Details | | |
|---|---|---|---|
| 10.00am | Arrival and Registration | | |
| 10.15am | Introductions | | |
| 10.30am | Highlights from ATTD 2020 | | |
| 10.50am | Getting started with Type 1 Tech - with an eye towards DIY | | |
| 11.20am | What is industry doing in relation to closed loop systems? | | |
| 12:10pm | **Lunch** | | |
| 1:10pm | Lessons from the clinic and real world experience | | |
| 1:45pm | *Putting it into practice - workshop streams* | | |
| 1:45pm | Getting started with Type 1 Tech - where to go and what to look at | Bringing tech up in a clinic appointment - tips, tricks and confidence boosters | DIY systems - what you need to know about CGM and APS |
| 2:30pm | **Coffee Break** | | |
| 2:45pm | DIY systems - what you need to know about CGM and APS | Getting the best out of commercial solutions | Getting the best out of DIY systems |
| 3.30pm | Wrap up | | |
| 4.00pm | **Close** | | |

# Introduction

Ben Moody

# Highlights from ATTD

Advanced Technologies & Treatments for Diabetes

Tim Street

RISE OF THE MACHINES 3

# Key Themes

- The rise of Automated Insulin Delivery (AID) systems
- One size doesn’t fit all
- Making MDI “smarter”
- Longer wearing cannulas
- Psychological care is a key component of diabetes care
- Beyond insulin

# The rise of AID systems


omnipod® HORIZON®
AUTOMATED GLUCOSE CONTROL



omnipod®

TIDEPOOL

*Tidepool Loop, including support for Omnipod DASH™, is currently under development. Tidepool Loop is not currently being marketed or sold.* November 2, 2018.


diabeloop

CamAPS | FX

glooko
diasend.com


Dexcom G6

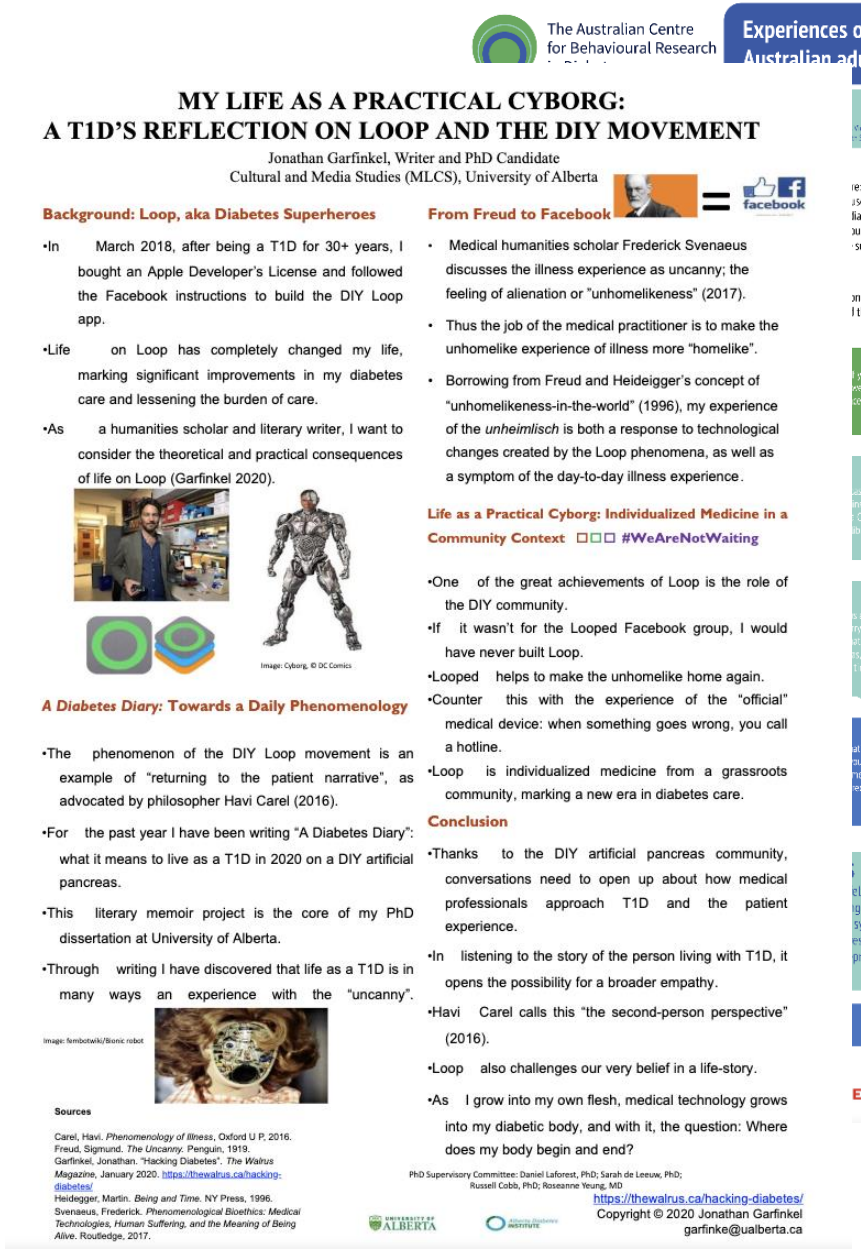
Dana Diabecare RS

Android Smartphone with CamAPS | FX

RISE OF THE MACHINES 3

# DIY continues to play a part

- 10+ posters on DIY systems and the community including Pigs…
- One of the oral poster presentations
- A lunchtime workshop with 59 attendees looking at HCP support of DIY
- Multiple questions and comparisons in main room sessions



MY LIFE AS A PRACTICAL CYBORG:
A T1D'S REFLECTION ON LOOP AND THE DIY MOVEMENT

Jonathan Garfinkel, Writer and PhD Candidate
Cultural and Media Studies (MLCS), University of Alberta

**Background: Loop, aka Diabetes Superheroes**

- In March 2018, after being a T1D for 30+ years, I bought an Apple Developer's License and followed the Facebook instructions to build the DIY Loop app.
- Life on Loop has completely changed my life, marking significant improvements in my diabetes care and lessening the burden of care.
- As a humanities scholar and literary writer, I want to consider the theoretical and practical consequences of life on Loop (Garfinkel 2020).

**From Freud to Facebook**

- Medical humanities scholar Frederick Svenaeus discusses the illness experience as uncanny; the feeling of alienation or "unhomelikeness" (2017).
- Thus the job of the medical practitioner is to make the unhomelike experience of illness more "homelike".
- Borrowing from Freud and Heideigger's concept of "unhomelikeness-in-the-world" (1996), my experience of the *unheimlisch* is both a response to technological changes created by the Loop phenomena, as well as a symptom of the day-to-day illness experience.

**Life as a Practical Cyborg: Individualized Medicine in a Community Context** #WeAreNotWaiting

- One of the great achievements of Loop is the role of the DIY community.
- If it wasn't for the Looped Facebook group, I would have never built Loop.
- Looped helps to make the unhomelike home again.
- Counter this with the experience of the "official" medical device: when something goes wrong, you call a hotline.
- Loop is individualized medicine from a grassroots community, marking a new era in diabetes care.

Image: Cyborg, © DC Comics

**A Diabetes Diary: Towards a Daily Phenomenology**

- The phenomenon of the DIY Loop movement is an example of "returning to the patient narrative", as advocated by philosopher Havi Carel (2016).
- For the past year I have been writing "A Diabetes Diary": what it means to live as a T1D in 2020 on a DIY artificial pancreas.
- This literary memoir project is the core of my PhD dissertation at University of Alberta.
- Through writing I have discovered that life as a T1D is in many ways an experience with the "uncanny".

Image: fembotwiki/Bionic robot

**Conclusion**

- Thanks to the DIY artificial pancreas community, conversations need to open up about how medical professionals approach T1D and the patient experience.
- In listening to the story of the person living with T1D, it opens the possibility for a broader empathy.
- Havi Carel calls this "the second-person perspective" (2016).
- Loop also challenges our very belief in a life-story.
- As I grow into my own flesh, medical technology grows into my diabetic body, and with it, the question: Where does my body begin and end?


**Sources**

Carel, Havi. *Phenomenology of Illness*, Oxford U P, 2016.
Freud, Sigmund. *The Uncanny*. Penguin, 1919.
Garfinkel, Jonathan. "Hacking Diabetes". *The Walrus Magazine*, January 2020. https://thewalrus.ca/hacking-diabetes/
Heidegger, Martin. *Being and Time*. NY Press, 1996.
Svenaeus, Frederick. *Phenomenological Bioethics: Medical Technologies, Human Suffering, and the Meaning of Being Alive*. Routledge, 2017.


PhD Supervisory Committee: Daniel Laforest, PhD; Sarah de Leeuw, PhD; Russell Cobb, PhD; Roseanne Yeung, MD

https://thewalrus.ca/hacking-diabetes/



garfinke@ualberta.ca

The Australian Centre for Behavioural Research

**Experiences of user-led diabetes technologies among Australian adults with type 1 diabetes**

**RESULTS**

- N=23 Australian adults were interviewed:
  - median age: 46 (range: 25-64) years, 10 women
  - n=21 previously using insulin pump, n=23 using continuous glucose monitoring
  - experience with user-led systems: >12 months: n=8, 6-12m: n=6, <6m: n=9
- Themes, sub-themes and illustrative quotes from participants are shown below.

*Glucose Levels*

*Sleep Quality*

*Technical Challenges*

*Lack of Support: Health Care Professionals*

*Lack of Support: Industry*

*Risk*

*Peer Support: Technical*

*Peer Support: Confidence*

Partners for better health

diabetes victoria

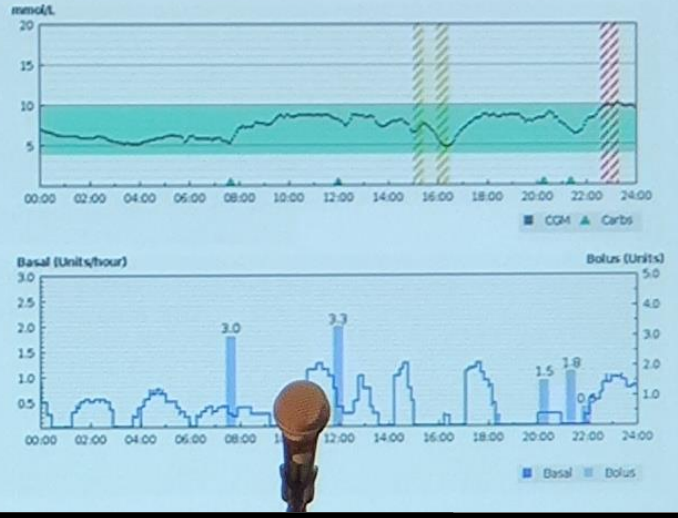
DEAKIN UNIVERSITY

RISE OF THE MACHINES 3

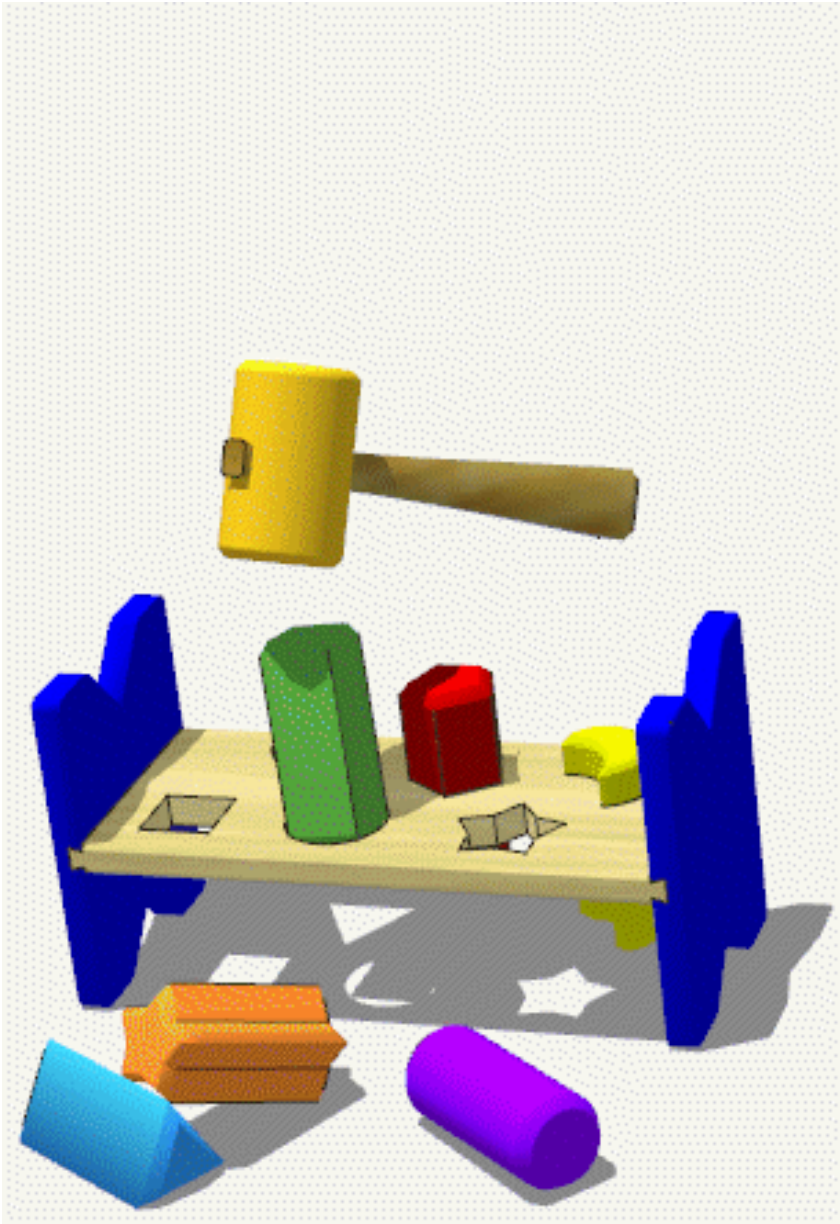
# Which closed-loop system for which person?

- CGM Features – calibrating / factory calibrating
- Device size / burden
- Remote monitoring capability
- Flexibility/adaptability of the algorithm –> more time in Auto Mode
  - Adjustable target glucose and learning
- Other system features
  - Exercise mode
  - Sleep mode
  - Ease Off / Boost

**Individual choice is important**



One Size…..

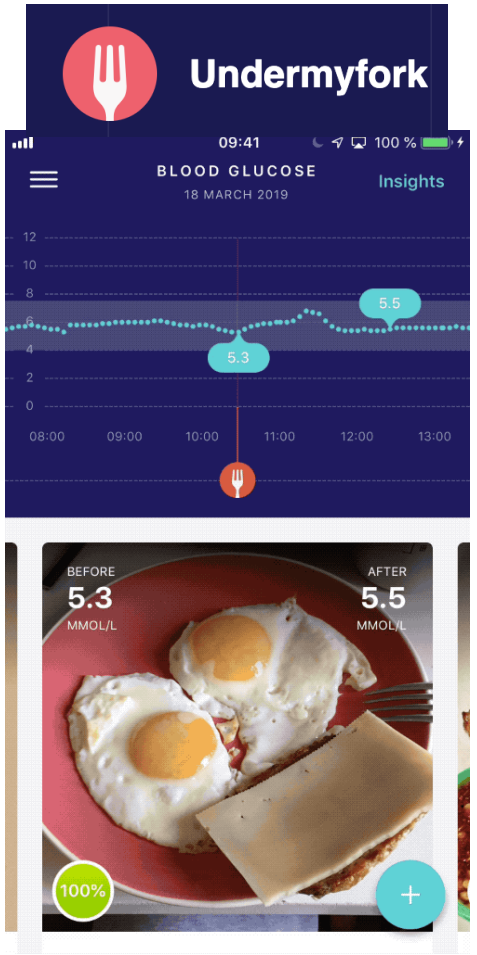


Doesn’t fit all

# Making MDI smarter

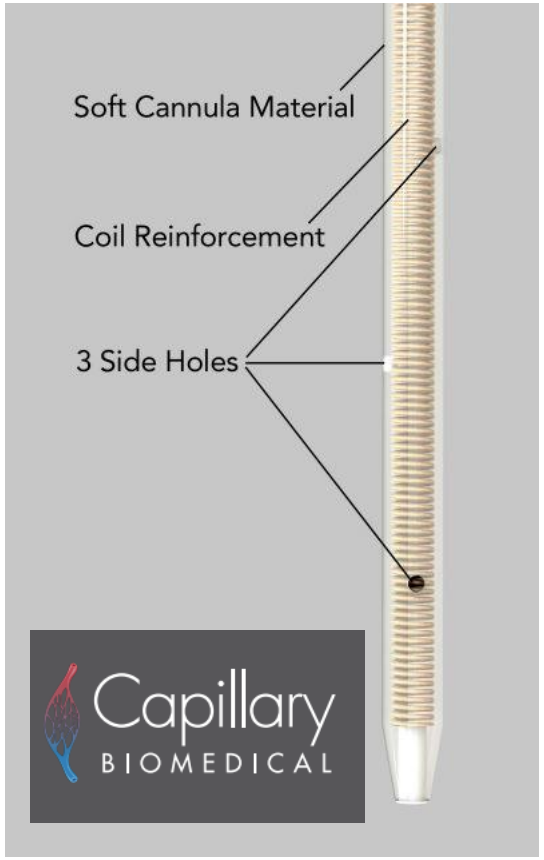



snaq




RISE OF THE MACHINES 3

# Longer Wearing Cannulas



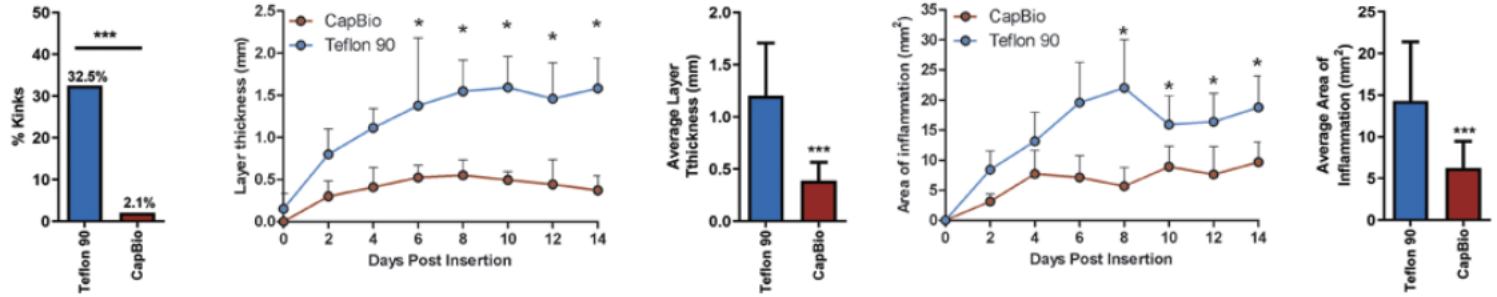



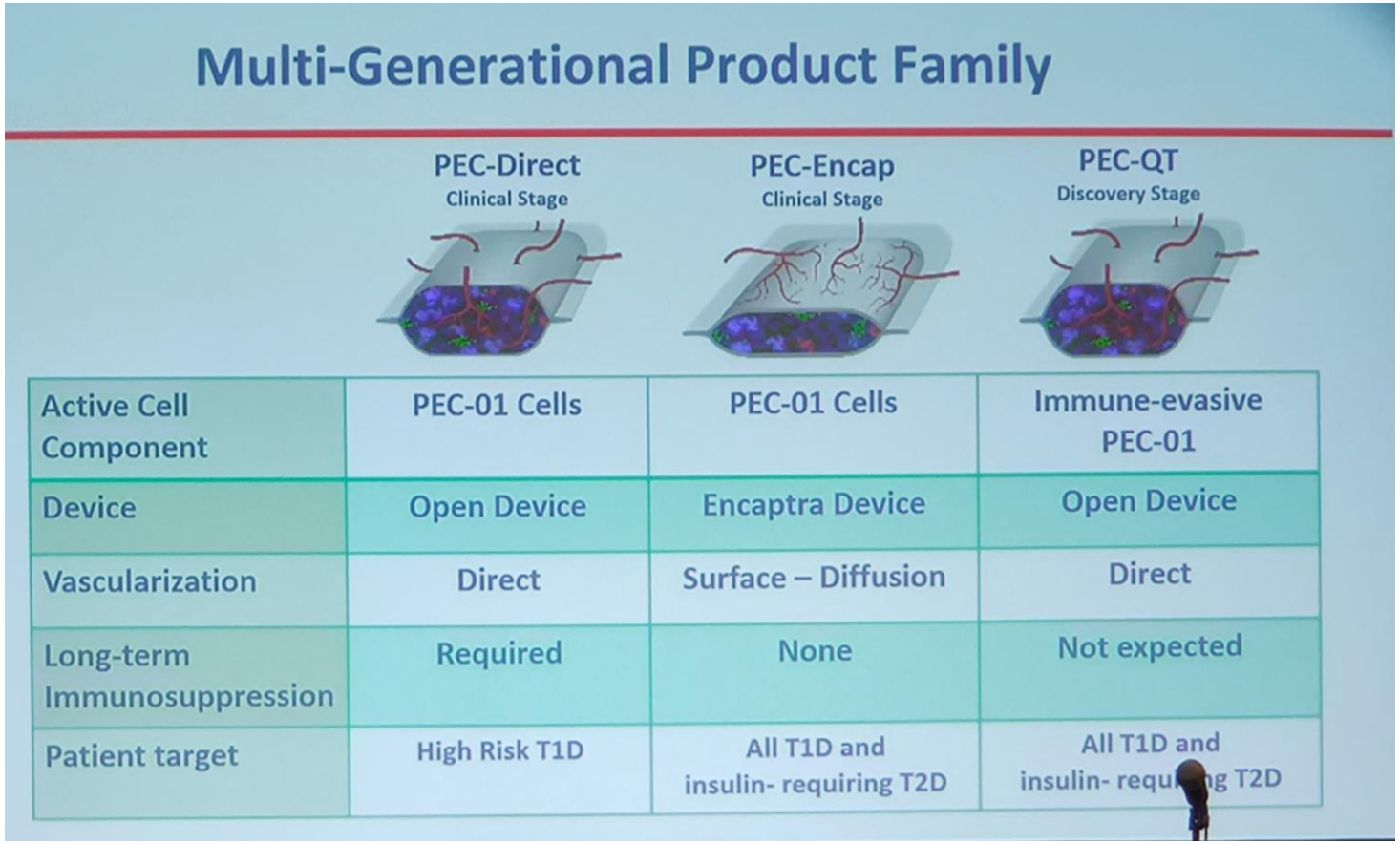

**Figure 2.** From left to right: Incidence of kinking in T90 and CapBio cannulas; thickness of the inflammatory layer over wear time and averaged over 14 days; area of inflammation around the cannula over wear time and averaged over 14 days. (*p<0.05, ***p<0.001; mean ± SD).

- Capillary Biomedical
- Medtronic
- Convatec/Unomedical

# Psychological care


# Beyond insulin…

- URLi – faster insulin still…
- SGLT-2 – the debate
- Embedded beta cells



# Getting started with type 1 tech – with an eye towards DIY

Melissa Holloway

# Agenda

- If closed-loop is the destination, what's the journey?
- Starting points, next steps
- Potential challenges, opportunities

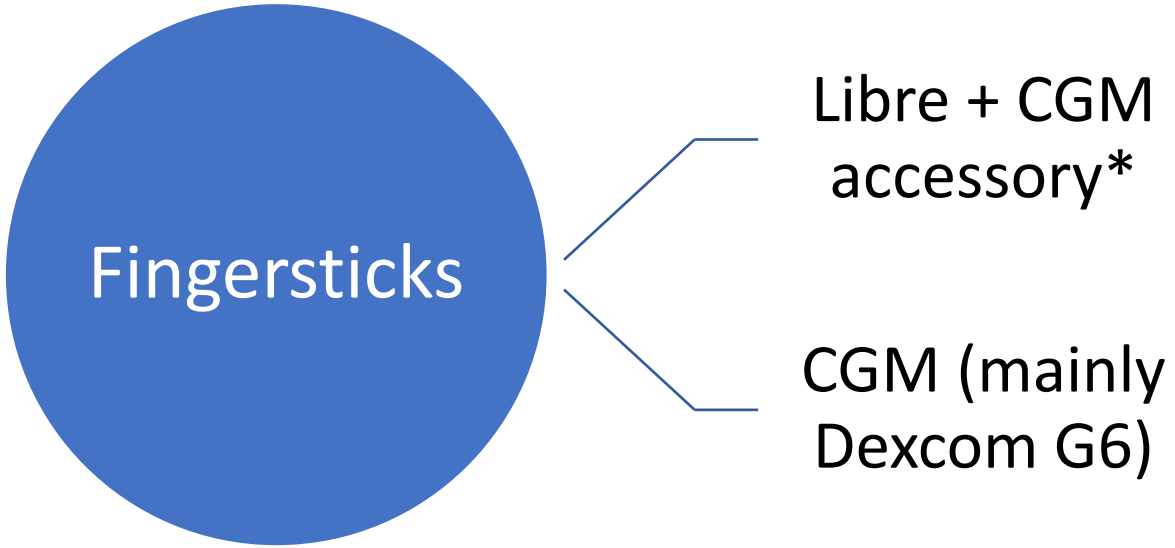
If closed-loop is the destination, what’s the journey?

# If closed-loop is the destination, what's the journey?

- Glucose monitoring
- Insulin delivery
- Algorithm
- Data management

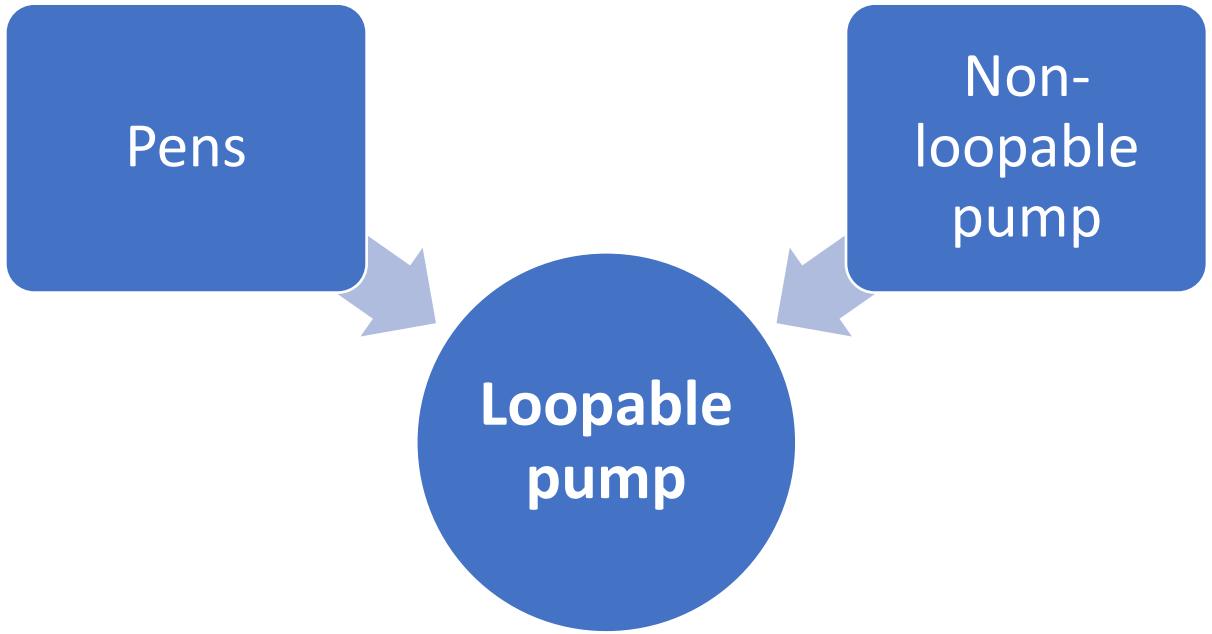
# Starting points, next steps

# Glucose monitoring




**Caveat: Fingerstick calibration may be required for safety*

# Insulin delivery




## What's 'loopable'?

**iOS Loop + RileyLink**
-Old Medtronic 5xx/7xx (specific firmware)
-OmniPod Eros (not DASH)

**OpenAPS**
-Old Medtronic 5xx/7xx (specific firmware)

**AndroidAPS**
-Old Medtronic 5xx/7xx (specific firmware)
-Dana RS
-Roche Accu-Chek Combo or Insight
-OmniPod Eros (not DASH; + RileyLink)

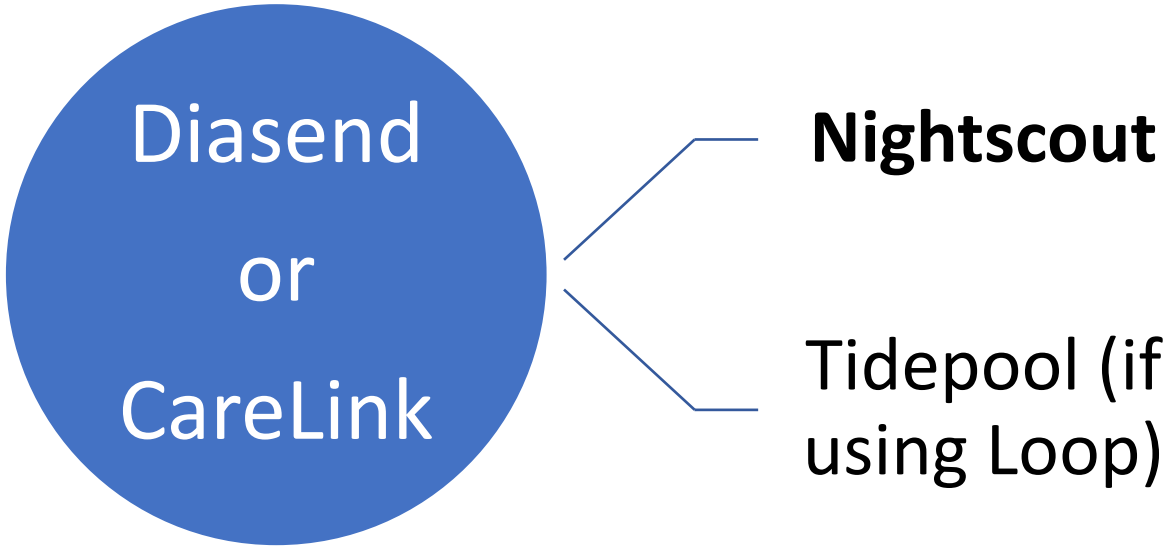
# Algorithm

*n.* A process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.

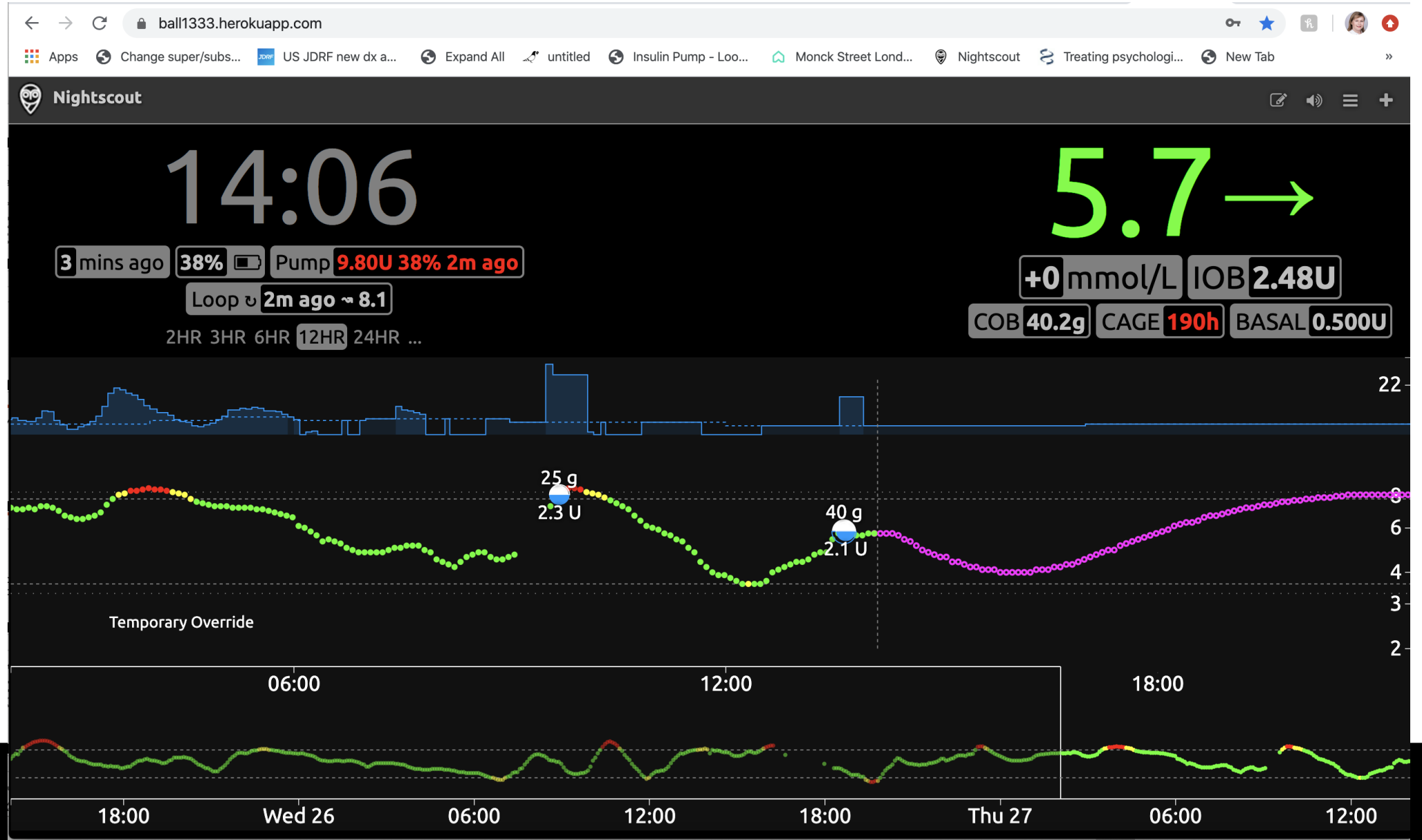
In DIY looping, the algorithm sits on a device you carry with you

- Loop – iOS device
- AndroidAPS – Android phone
- OpenAPS – rig

# Data management



# My Nightscout – example real-time graph

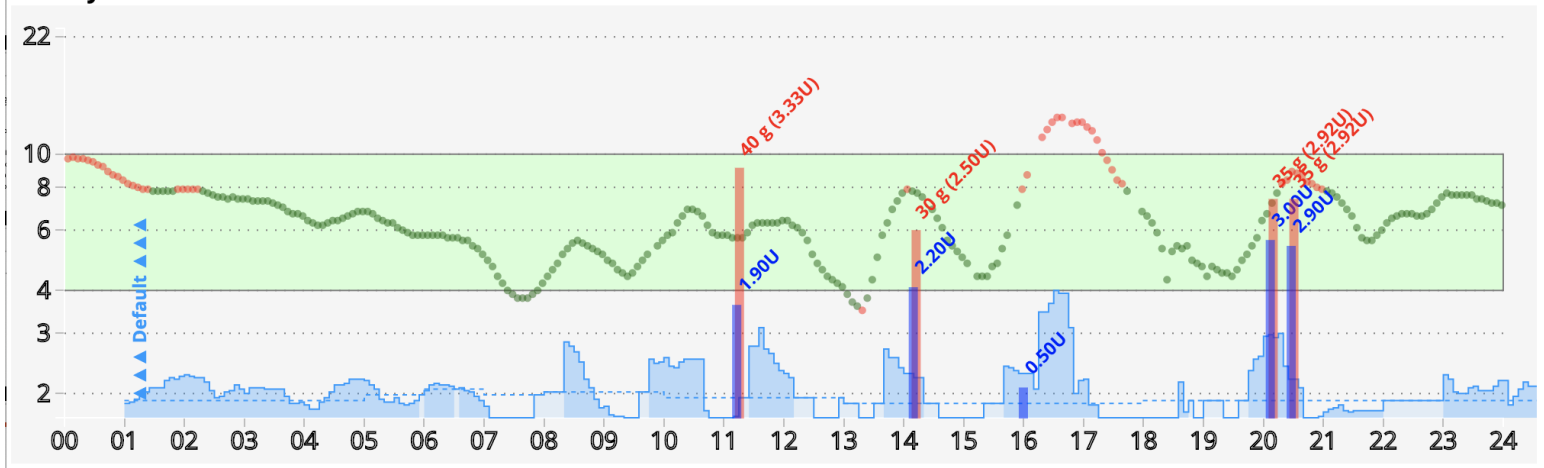


# My Nightscout – last weekend

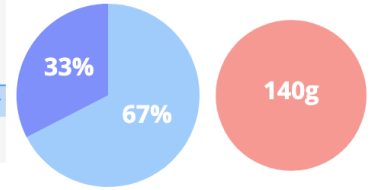
ball1333.herokuapp.com/report

Apps | Change super/subs... | US JDRF new dx a... | Expand All | untitled | Insulin Pump - Loo... | Monck Street Lond... | Nightscout | Treating psychologi... | New Tab

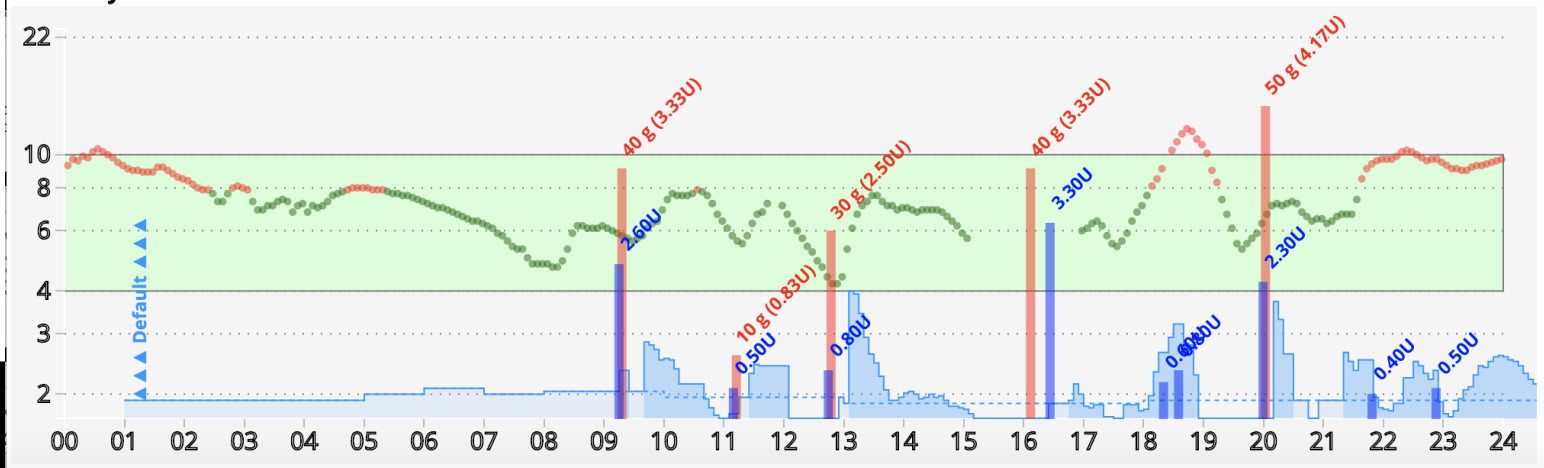
**Sunday 22/02/2020**



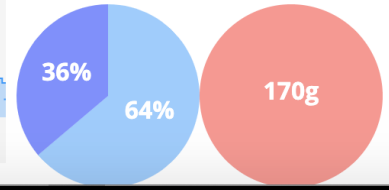

| | |
|---|---|
| **Bolus insulin:** | 10.5U |
| Base basal insulin: | 15.6U |
| Positive temp basal insulin: | 10.4U |
| Negative temp basal insulin: | -4.2U |
| **Total basal insulin:** | 21.8U |
| **Total daily insulin:** | 32.3U |
| Total carbs: | 140 g |
| Total protein: | 0 g |
| Total fat: | 0 g |




**Saturday 21/02/2020**




| | |
|---|---|
| **Bolus insulin:** | 11.8U |
| Base basal insulin: | 15.6U |
| Positive temp basal insulin: | 8.1U |
| Negative temp basal insulin: | -2.9U |
| **Total basal insulin:** | 20.8U |
| **Total daily insulin:** | 32.6U |
| Total carbs: | 170 g |
| Total protein: | 0 g |
| Total fat: | 0 g |



# My Nightscout – distribution report

ball1333.herokuapp.com/report

Apps | Change super/subs... | US JDRF new dx a... | Expand All | untitled | Insulin Pump - Loo... | Monck Street Lond... | Nightscout | Treating psychologi... | New Tab

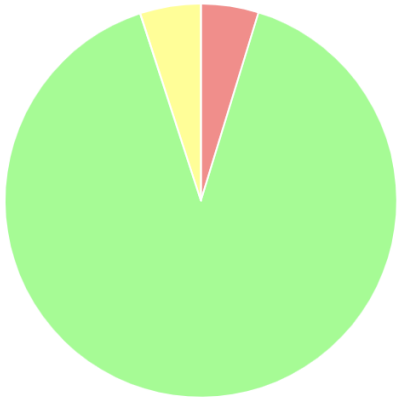
## Day to day

**To see this report, press SHOW while in this view**

Display: ☑ Insulin ☑ Carbs ☑ Basal rate ☐ Notes ☑ Food ☐ Raw ☐ IOB ☐ COB ☐ Predictions ☐ OpenAPS ☑ Insulin distribution Size 1000x300px

Scale: ○ Linear ◉ Logarithmic

## Glucose distribution ( 90 days total )



| Range | % of Readings | # of Readings | Average | Median | Standard Deviation | A1c estimation* |
|---|---|---|---|---|---|---|
| Low (<4): | 4.7% | 1197 | 3.5 | 3.6 | 0.3 | |
| Normal: | 90.3% | 22745 | 6.3 | 6.1 | 1.4 | |
| High (>=10): | 5.0% | 1265 | 11.4 | 11.0 | 1.3 | |
| Overall: | | 25207 | 6.4 | 6.1 | 1.9 | 5.7%$_{DCCT}$ \| 38$_{IFCC}$ |

| Mean Total Daily Change | Time in fluctuation (>0.27 mmol/l/5m) | Time in rapid fluctuation (>0.55 mmol/l/5m) |
|---|---|---|
| 54.56 mmol/L | 18.0% | 5.0% |
| **Mean Hourly Change** | **GVI** | **PGS** |
| 2.27 mmol/L | 1.31 | 14.61 |
| **Out of Range RMS** | | |
| 6.18 mmol/L | | |

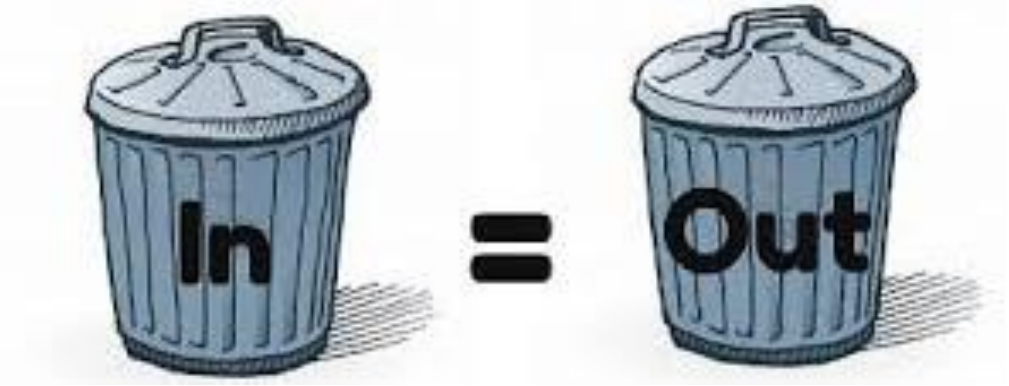
# Potential challenges, opportunities

# Potential challenges, opportunities

- Education and settings
- Clinic support
- Choice of tech and funding
- Ongoing maintenance, forward planning

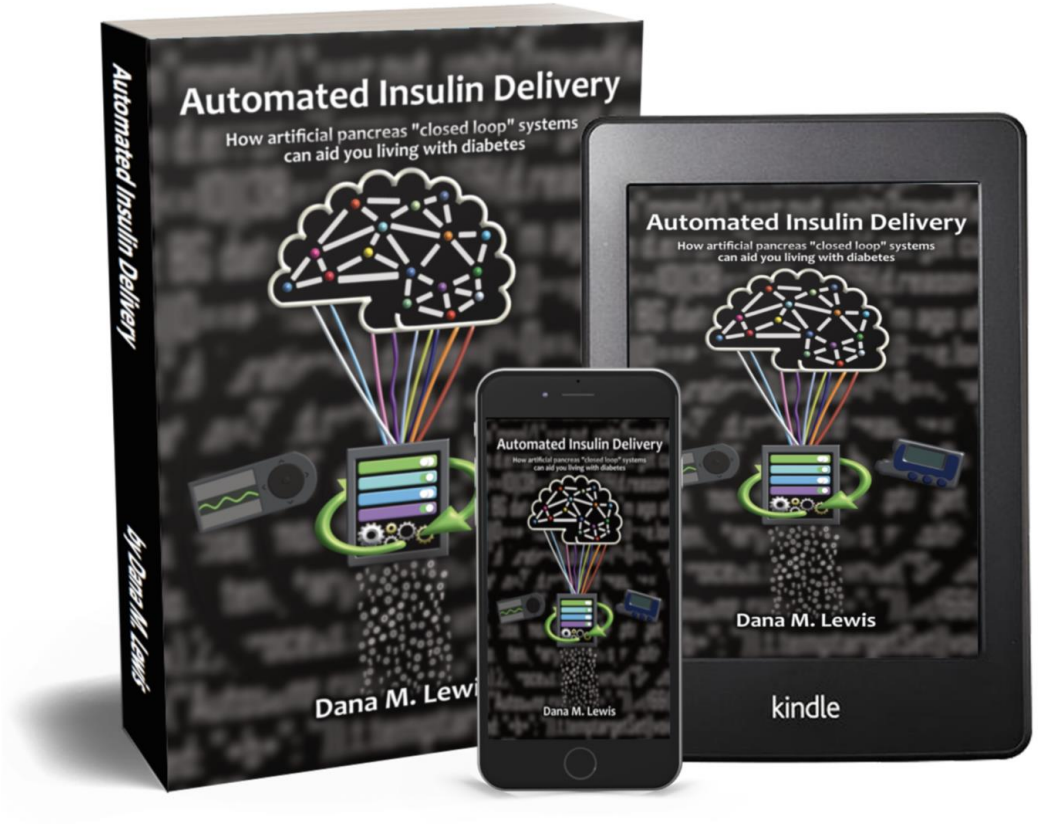
# Education and settings

- If your baseline assumptions and settings are off, a DIY AP system *could make things worse*




- You might have to go back to basics with basals and ratios!
- If MDI → DIY AP, spend some weeks on pump + CGM first
- ‘Read the docs’

# www.artificialpancreasbook.com



# Clinic support

- Sufyan will go into more depth on this topic
- Some clinics/individual HCPs are more *keen* on DIY than others
- Some that are keen have more or less *experience* with DIY
- Your team may be learning *from you*
- What are your expectations of the relationship?
- Safety first!

# Choice of tech and funding

- Being stuck in a pump warranty period <sigh>
- Being out of warranty with your pump <sigh>
- If your team can't offer X make of pump, it may be faster to change clinics
- Libre + MiaoMiao vs Dexcom G6: variety of perspectives
- Pump/CGM funding: 'evidence of benefit' so *be prepared to share your data*

# Ongoing maintenance, forward planning

- Data review and reflection
- ‘DIY doesn’t mean do it alone’
- Back-up planning
- Keeping up to date
- Horizon scanning

# What is industry doing in regards to closed loop systems?

# Medtronic

# Autonomous Type 1 Diabetes management

2020 - 02.29
London

DBLG1

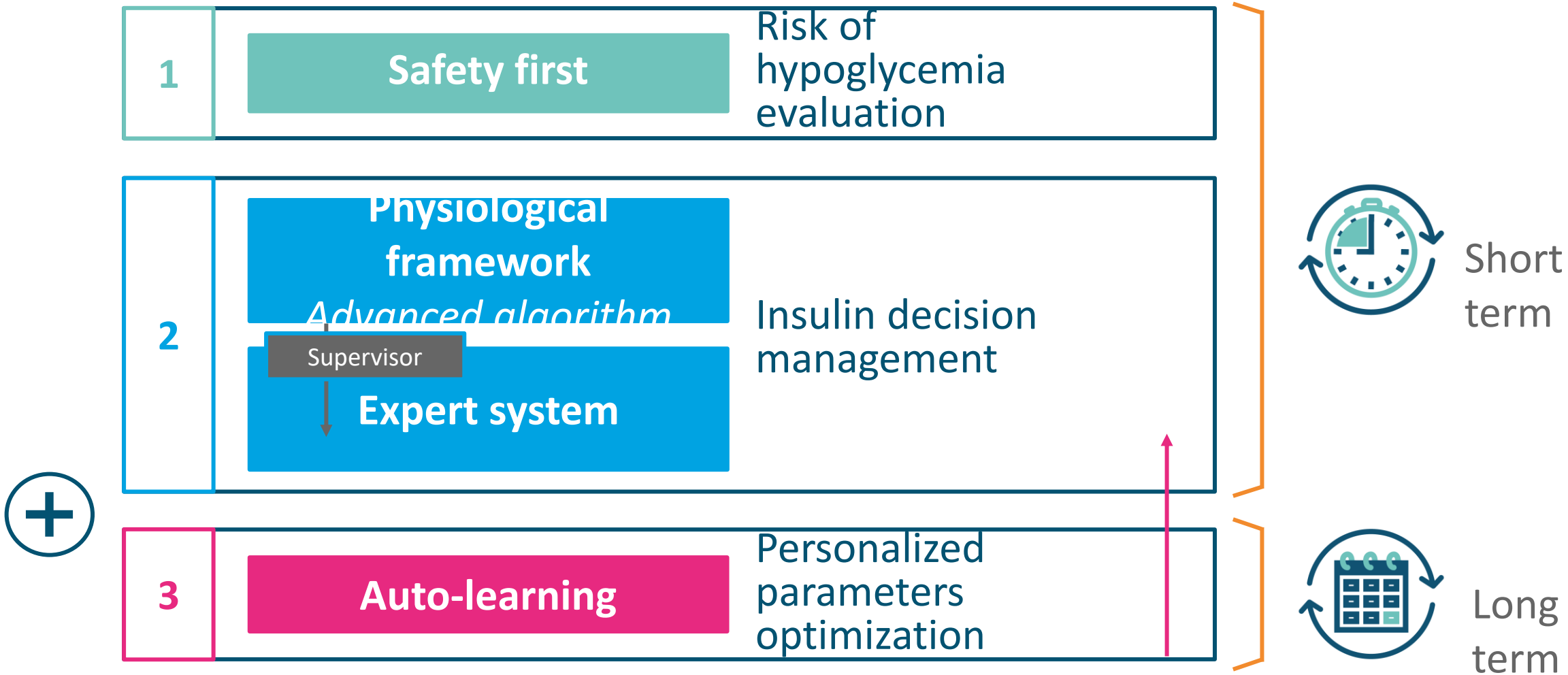
# Personalized system for autonomous T1D management

**Diabeloop algorithm, DBLG1:**
hosted in a locked-down handset with a unique user interface.

It connects a continuous glucose monitor (CGM) and an insulin pump to **automate the treatment.**

**Interoperability:**
DBLG1 is already compatible with Dexcom G6 CGM, Kaleido patch-like pump (Vicentra) and Dana-i pump (SOOIL)

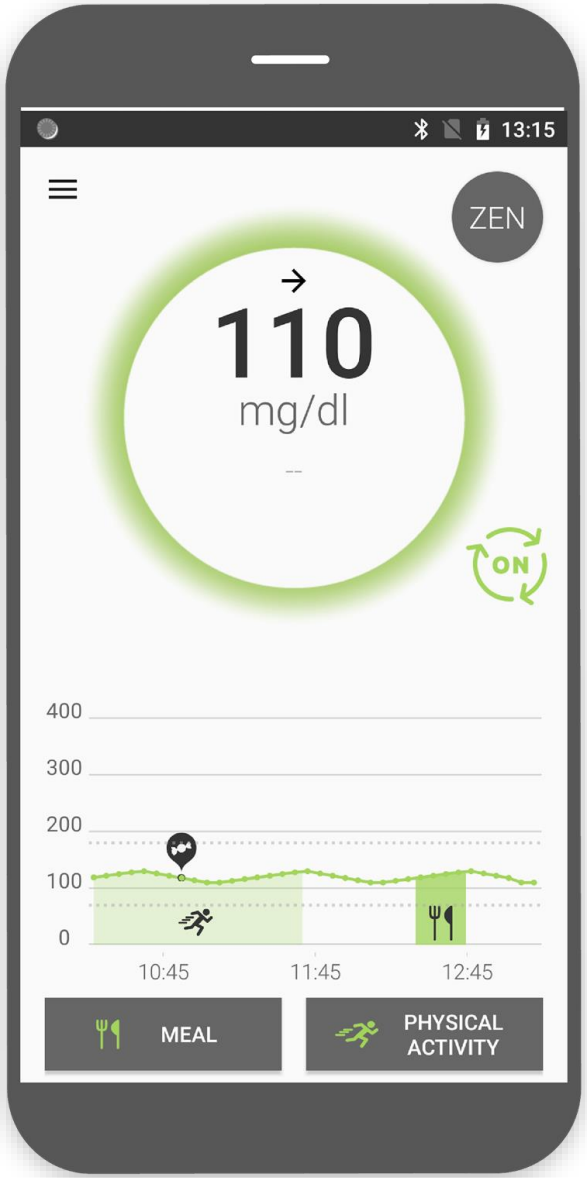
# Artificial Intelligence to safely automate insulin decisions

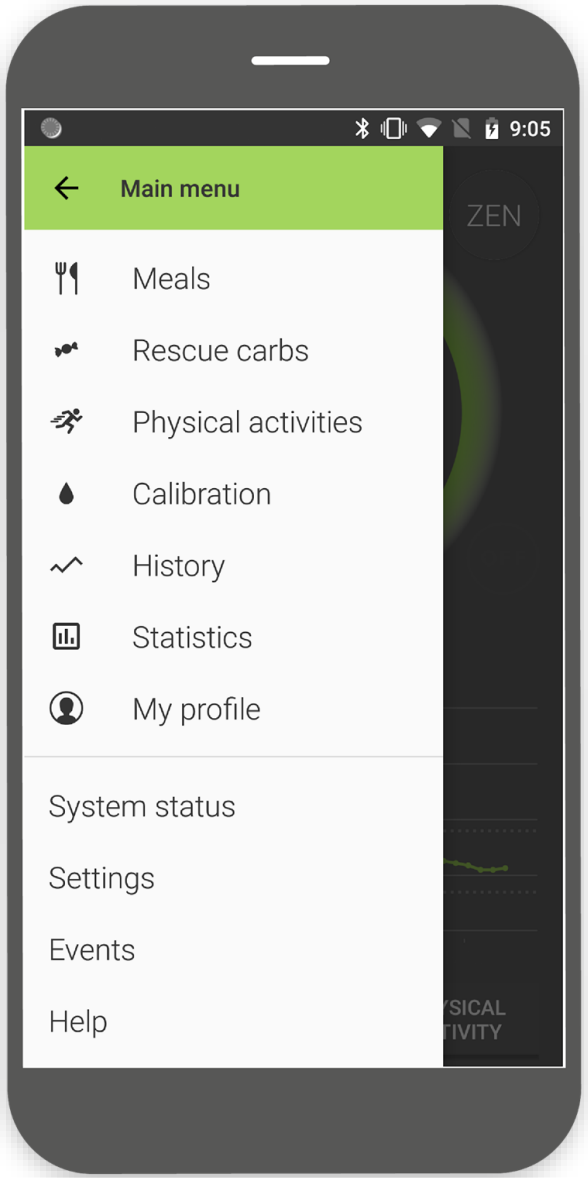


# Easy to set up

**Getting started only requires:**

1. **Weight**
2. **TDD**
3. **Typical meals (in grams of carbs)**



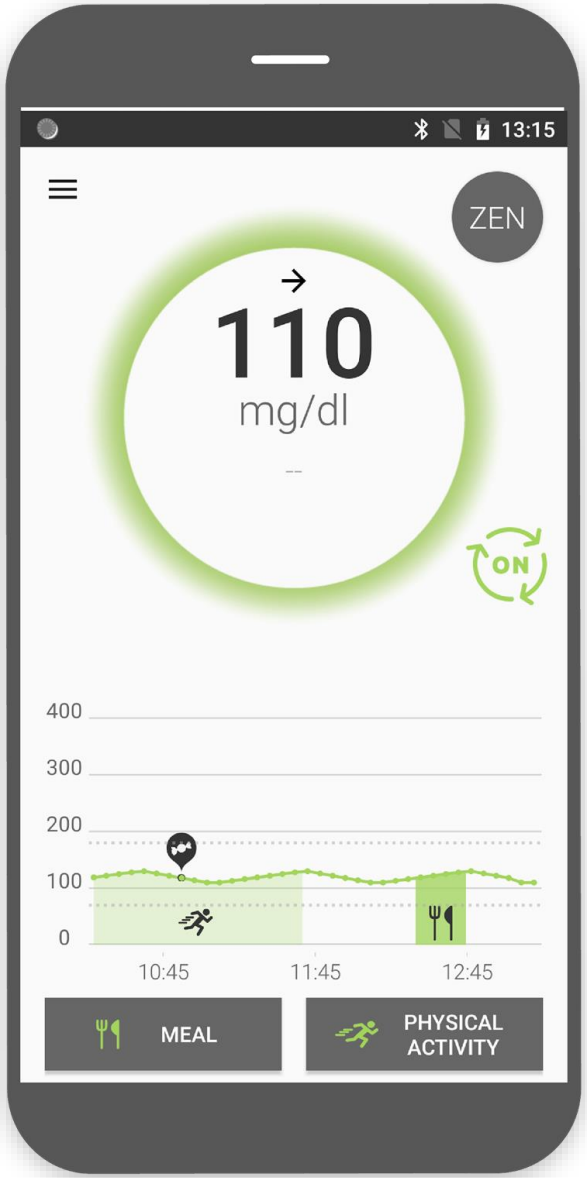
Easy to adjust

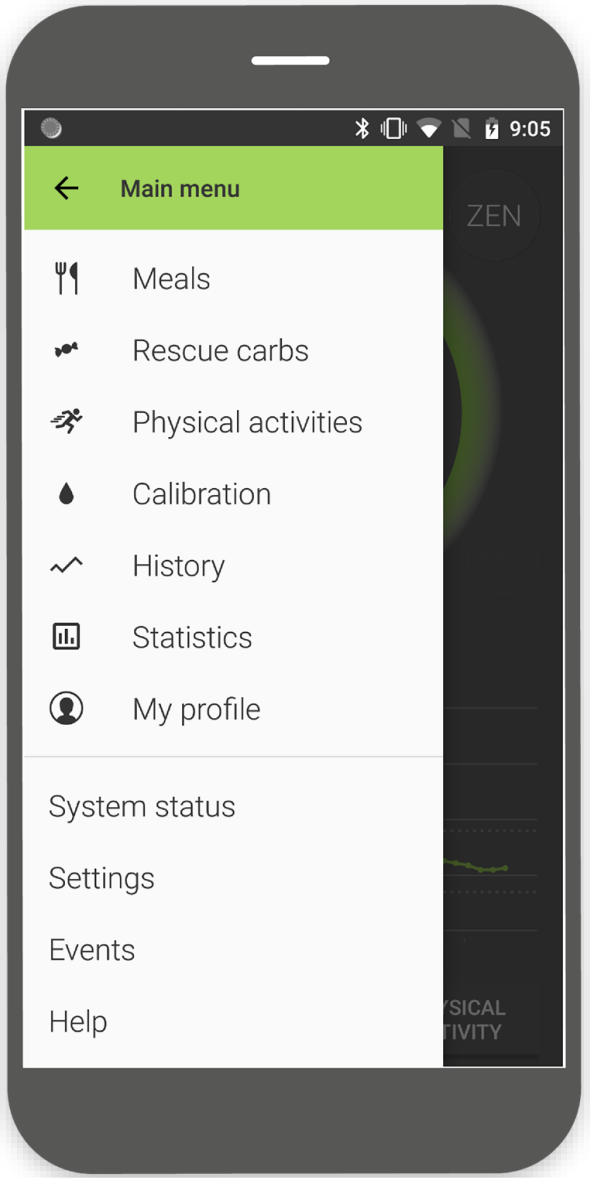
The choice is yours

***The default parameters work great,***
***most people do not adjust them***

**However you can change:**

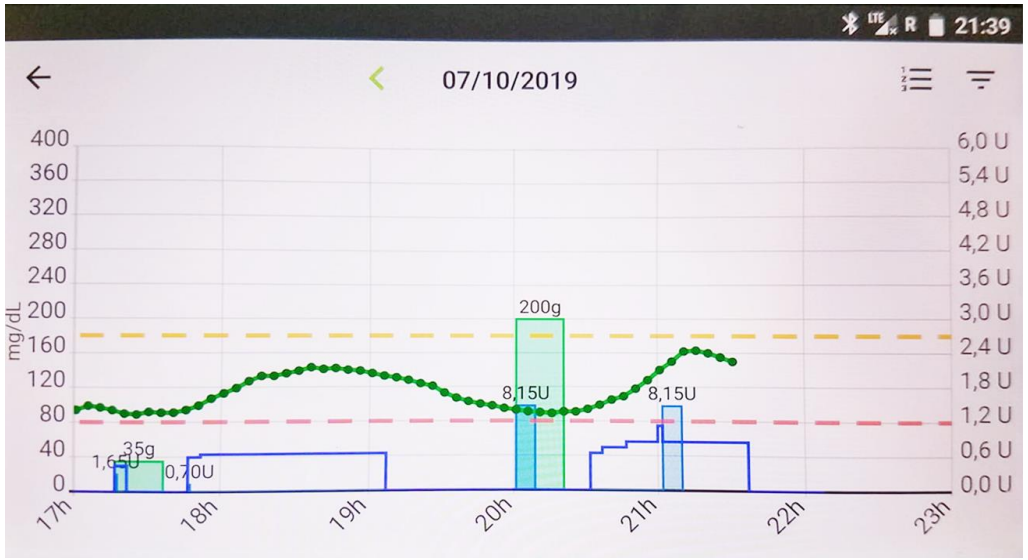
- Target
- Hypo limit
- Aggressiveness of the algo (e.g. average glycemia vs risk of hypo/rescue carb: 50%-150% simple slider)
  - For meals
  - For normoglycemia situations

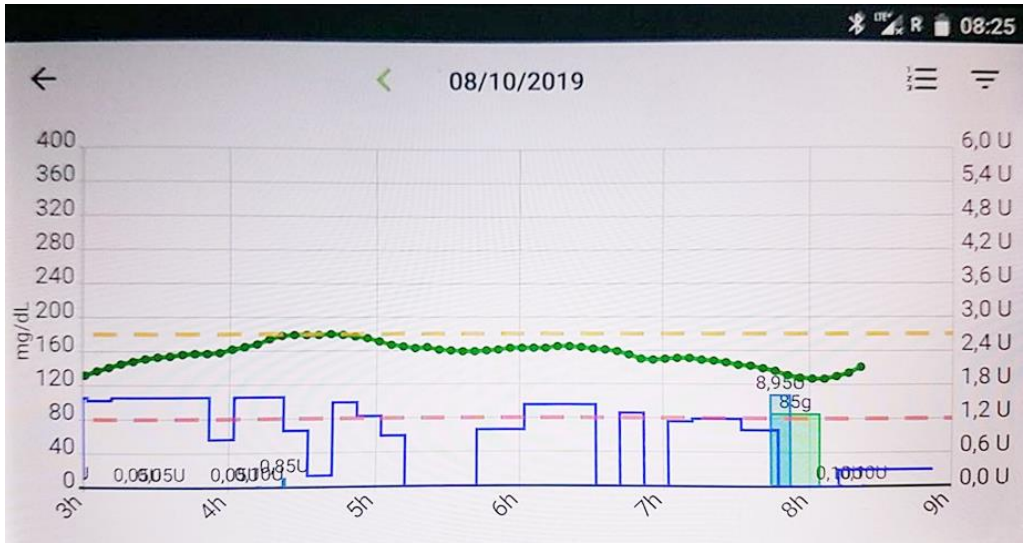


# How does it look like in real life?

# Case #1 - Living life




> *Trying the ultimate test to blow up Diabeloop …*
> *200g of carbs Burger King menu !*

**Results:**

98% time-in-range in the following 24 hours

0 hypoglycemia

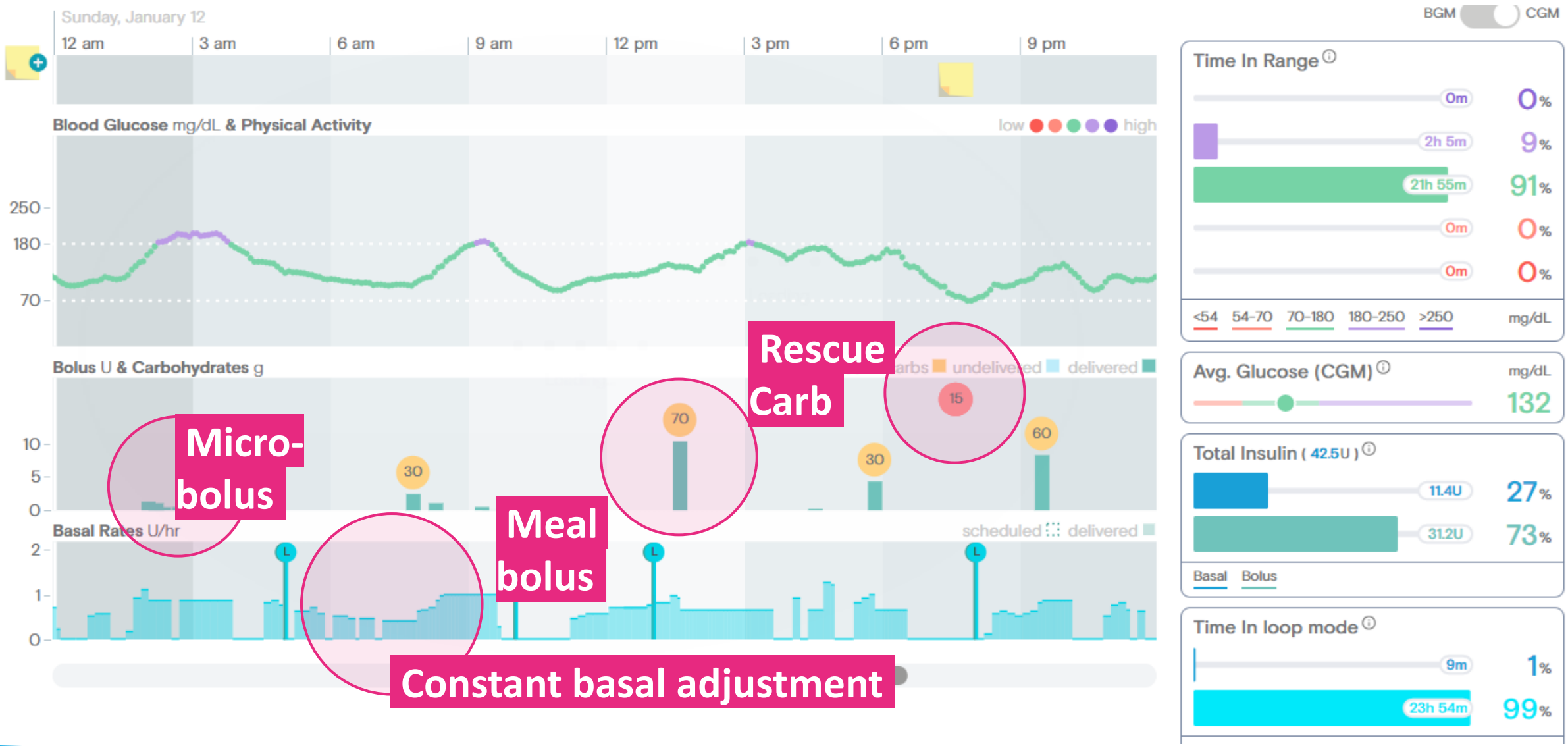
> *Oh yes! Last night I had 2 rescue carbs requests but frankly I'm not going to complain: less weight on my shoulders, curves stable … Makes you completely zen, haven't felt this way in a long time*



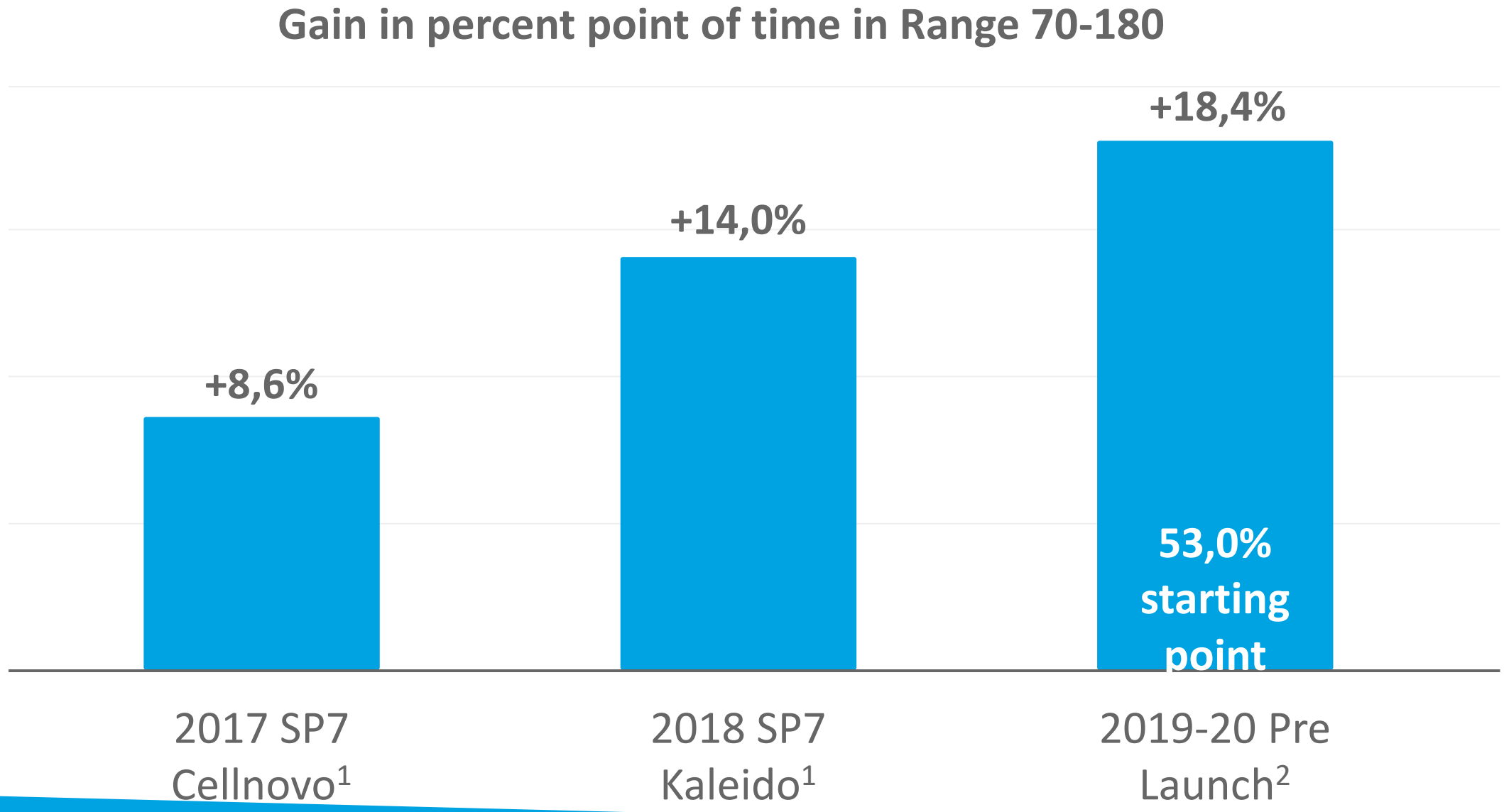


41

# Case #2 - Good results with work



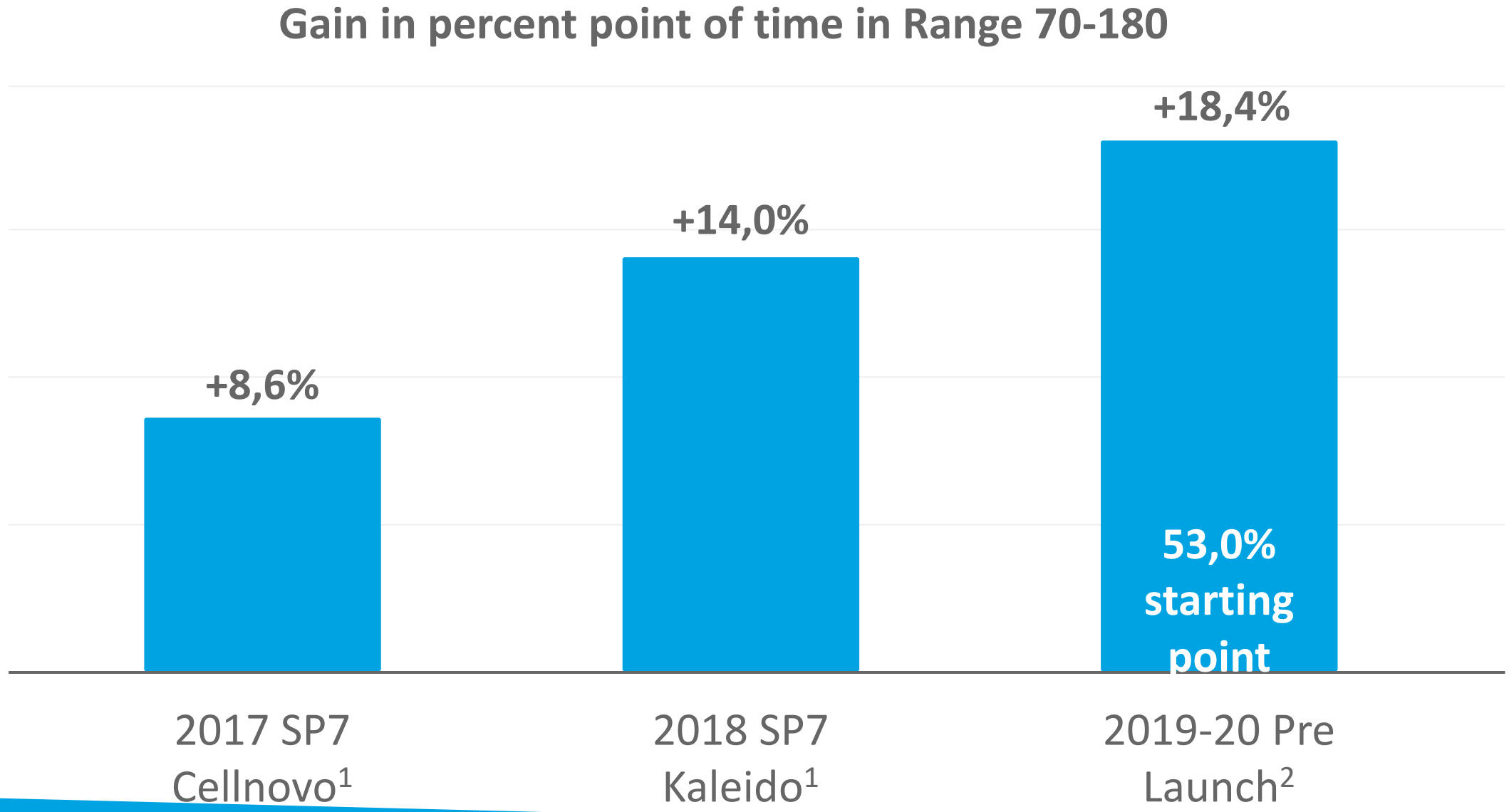
# Results so far






Note: 1-Lancet Digital Health 2019; 1: e17–25 ; 2- Presented at ATTD 2020

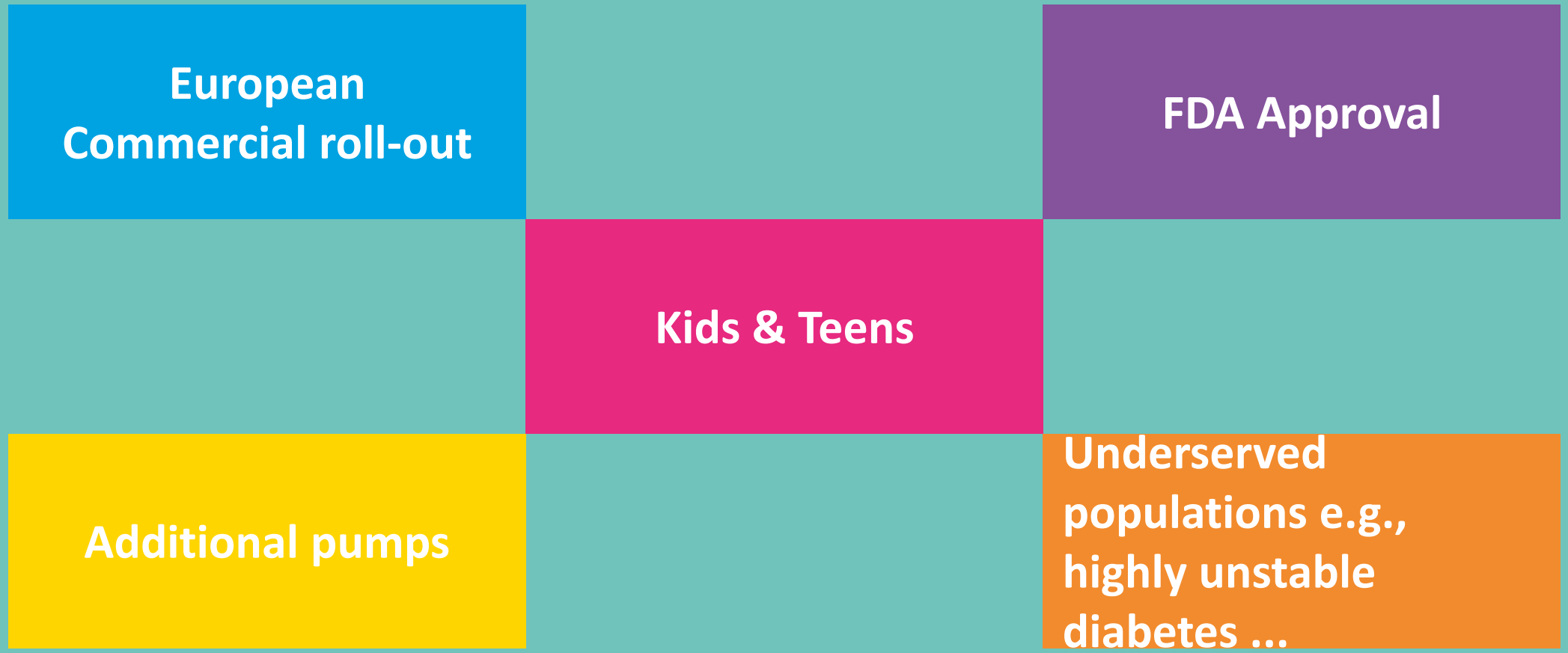
# Results so far






Note: 1-Lancet Digital Health 2019; 1: e17–25 ; 2- Presented at ATTD 2020

# Diabeloop: Next steps




# Many thanks for your attention!

www.diabeloop.com

## Contact details

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@diabeloop

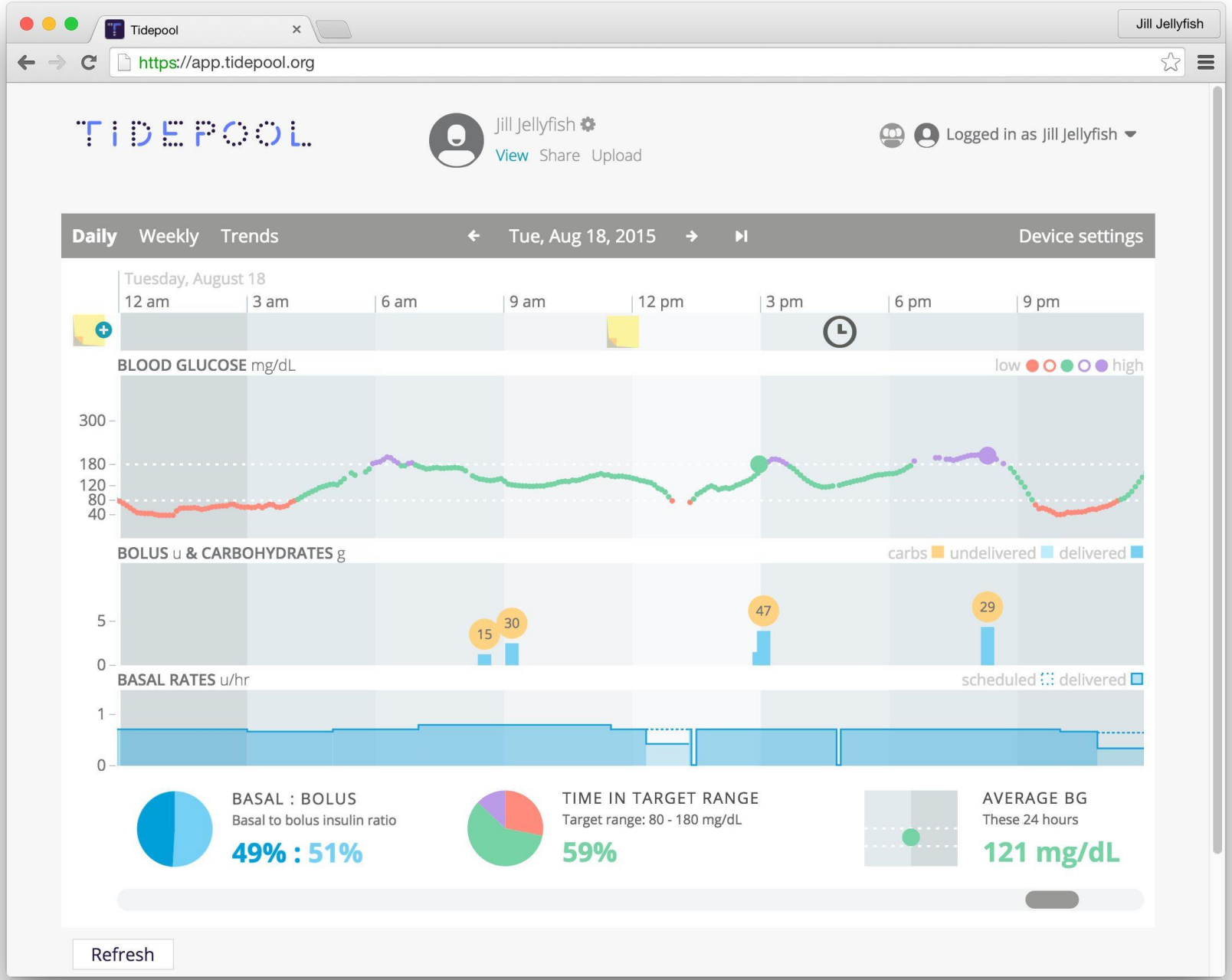
# Tandem

TIDEPOOL

# T1D: Rise of the Machines III

29 February 2020

Gerrit Niezen


Tidepool
Jill Jellyfish
https://app.tidepool.org
TIDEPOOL
Jill Jellyfish
View Share Upload
Logged in as Jill Jellyfish
Daily Weekly Trends
Tue, Aug 18, 2015
Device settings
Tuesday, August 18
12 am 3 am 6 am 9 am 12 pm 3 pm 6 pm 9 pm
BLOOD GLUCOSE mg/dL
low high
300
180
120
80
40
BOLUS u & CARBOHYDRATES g
carbs undelivered delivered
5
0
15
30
47
29
BASAL RATES u/hr
scheduled delivered
1
0
BASAL : BOLUS
Basal to bolus insulin ratio
49% : 51%
TIME IN TARGET RANGE
Target range: 80 - 180 mg/dL
59%
AVERAGE BG
These 24 hours
121 mg/dL
Refresh

Tidepool Uploader

TIDEPOOL

James Jellyfish

Time zone US/Eastern (UTC-5)

Your device times should be approximately 8:08 am

## Upload Devices

**Medtronic 630G, 640G or 670G**

Connect your Contour Next Link 2.4 to your computer


Meter and pump are linked

Upload: last 4 weeks

Upload

**Ascensia (Bayer) Contour Next**

Plug meter into USB port

Upload

See data

Get Support Privacy and Terms of Use Made possible by JDRF

v2.10.1


9:56
202
mg/dL →
1 min ago
9:52 AM
+0.975 U
9:54 AM
9:54 AM
100%
Glucose
Eventually 114 mg/dL
275
225
175
125
75
9 AM
10 AM
11 AM
12 PM
1 PM
Active Insulin
2.61 U
6
4
2
0
Insulin Delivery
10 U Total
3
1
0
-1
Active Carbohydrates
0 g
30
20
10
0


Loop
9:56
202→
114
1m
Carbs
Bolus


DexcomG6

omnipod®

TIDEPOOL


Tidepool Loop, including support for Omnipod, is currently under development.
Tidepool Loop is not currently being marketed or sold.

Dexcom®

TIDEPOOL


Tidepool Loop is currently in development and is not available for commercial use.
Tidepool Loop may not be compatible with all Dexcom® Systems.

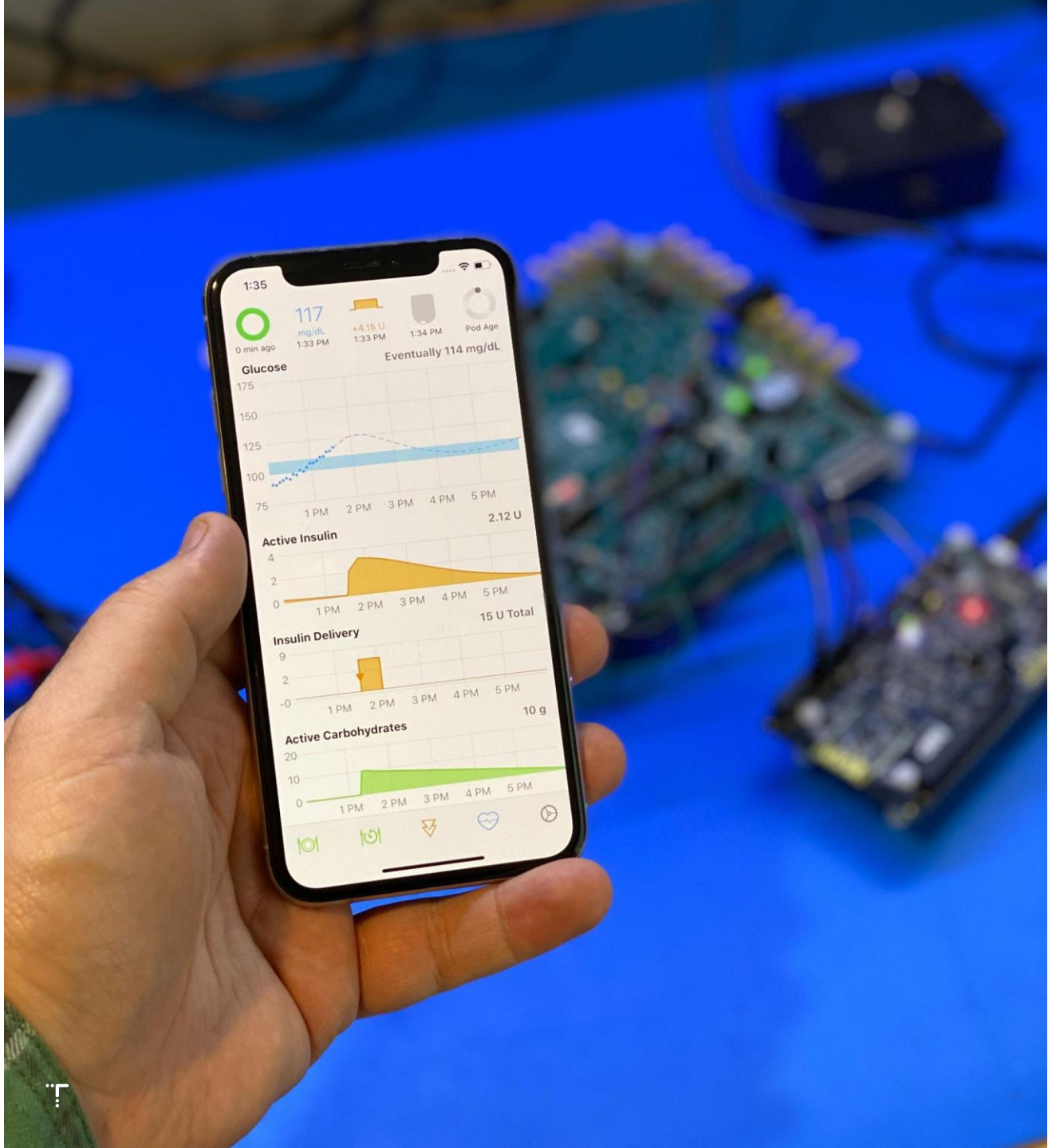
Medtronic

TIDEPOOL


Tidepool Loop is currently in development and is not available for commercial use.
A future Bluetooth-enabled MiniMed™ from Medtronic powered by Tidepool Loop is currently under development.
Tidepool Loop may not be compatible with all Medtronic MiniMed™ Systems.

# We have grown quite a bit.

More than doubled in size to around 45 people, and we’re still growing..




# What we are working on

- Device integration
- Training materials and documentation
- Expanding our customer support
- Developing prescription flows

Focusing on getting cleared by FDA and launching in USA first, then internationally.

# Lunch

# Type 1 technology and looping

## Lessons from the clinic and real world experience

RISE OF THE MACHINES 3

**Dr Sufyan Hussain**

MA MB BChir MRCP PhD

Consultant Physician in Diabetes and Endocrinology and Honorary Senior Clinical Lecturer

Guy's and St Thomas' NHS Foundation Trust & King's College London

#ROTM3 @sugarydoc

# Disclosures

- I have received honorarium for non-promotional educational talks and educational advisory roles for
  - Roche, Medtronic, Dexcom, Abbott, Novo Nordisk & Air Liquide
- The slides and views expressed are my own

# Summary

- My link with tech
- Tech in clinic
- Looping (automated insulin delivery systems)
  - Commercial
  - Open-Source algorithms
- Real world evidence from open-source AID systems
- How to approach
- Common pitfalls
- Measures of “success”

~~AIDS~~
APS –Artificial pancreas system
AID system
HCL – hybrid closed loop

# My link with tech and looping….

- ~30 years with t1D


- 21 years on CSII


- 2012 – occasional CGM



- 2017 – DIY APS?

(open source automated insulin delivery systems)

- 2019



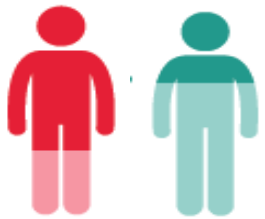
## HELP!!!

- What is this?
- Is this a cult?
- What do I do in clinic???!!!
- What does the team do???
- Who do I ask???
- Who should be using this and who shouldn't?
- Do we support this?
- How do we support this?
- Who is accountable if things go wrong?

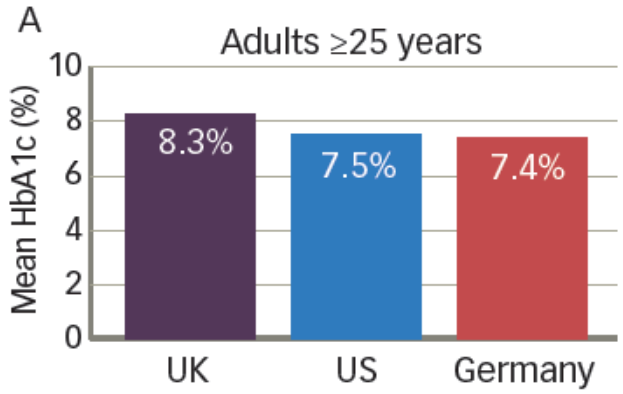
# Type 1 diabetes – current data

**HbA1C 58MMOL (7.5%) OR LESS**

**Type 1 Diabetes**
**30%**

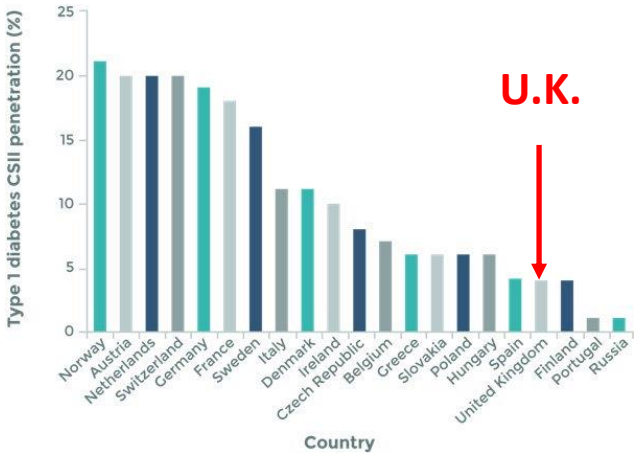


**Type 2 Diabetes**
**67%**




Data from NHS Digital National Diabetes Audit, 2016-17, Report 1: Care Processes and
Top figure adapted from: How good is diabetes care in England and Wales? 2015–16

**Access to technology:**
**Insulin Pump uptake in Europe**

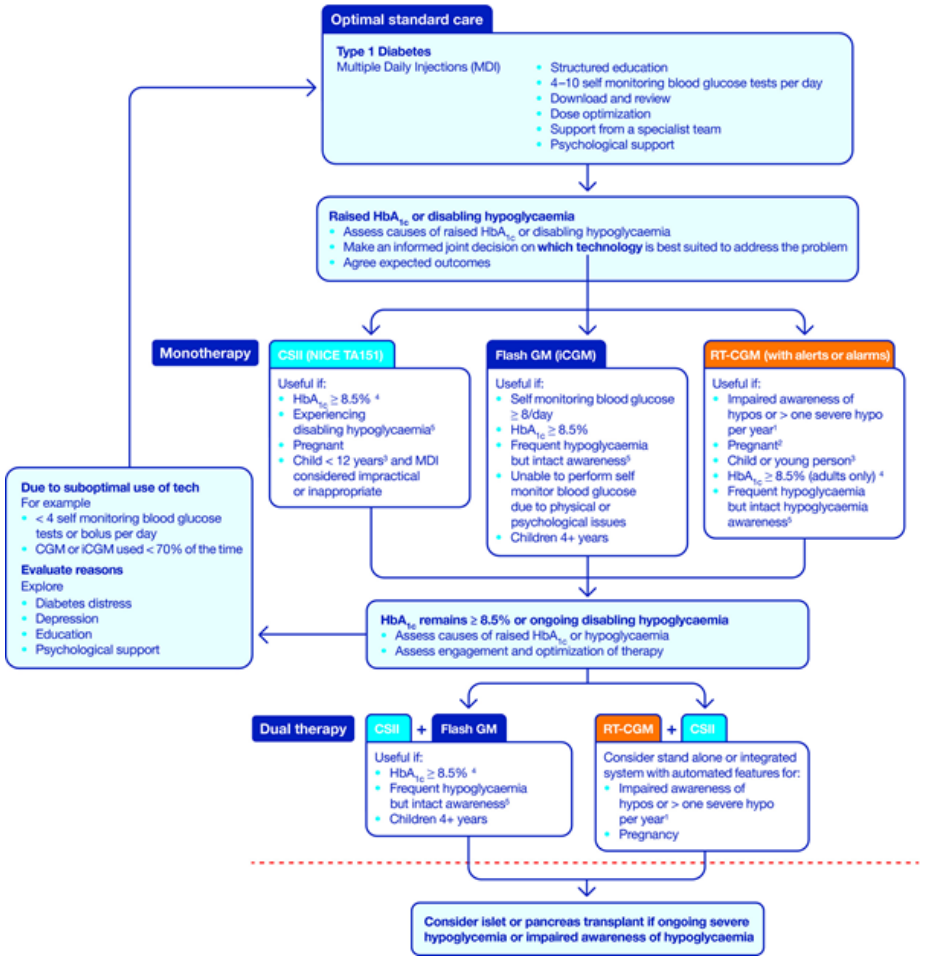



Pozzilli, P.,et al. Continuous subcutaneous insulin infusion in diabetes (2016) Diabetes Metab Res Rev, 32: 21– 39.


**OPPORTUNITIES**

**Structured Education in type 1 diabetes**
**Access to specialist type 1 diabetes services**
**HCP capacity, skills and training for type 1 diabetes**

# Funding is important…

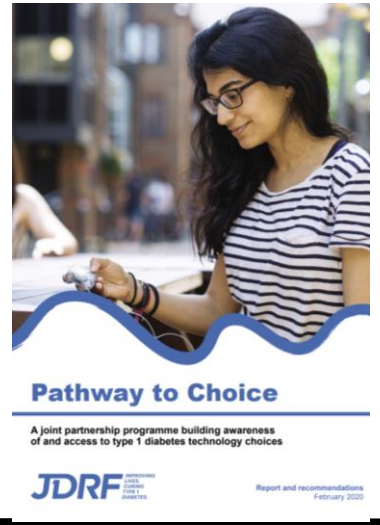



Choudhary et al, Diabetic Medicine, 2019

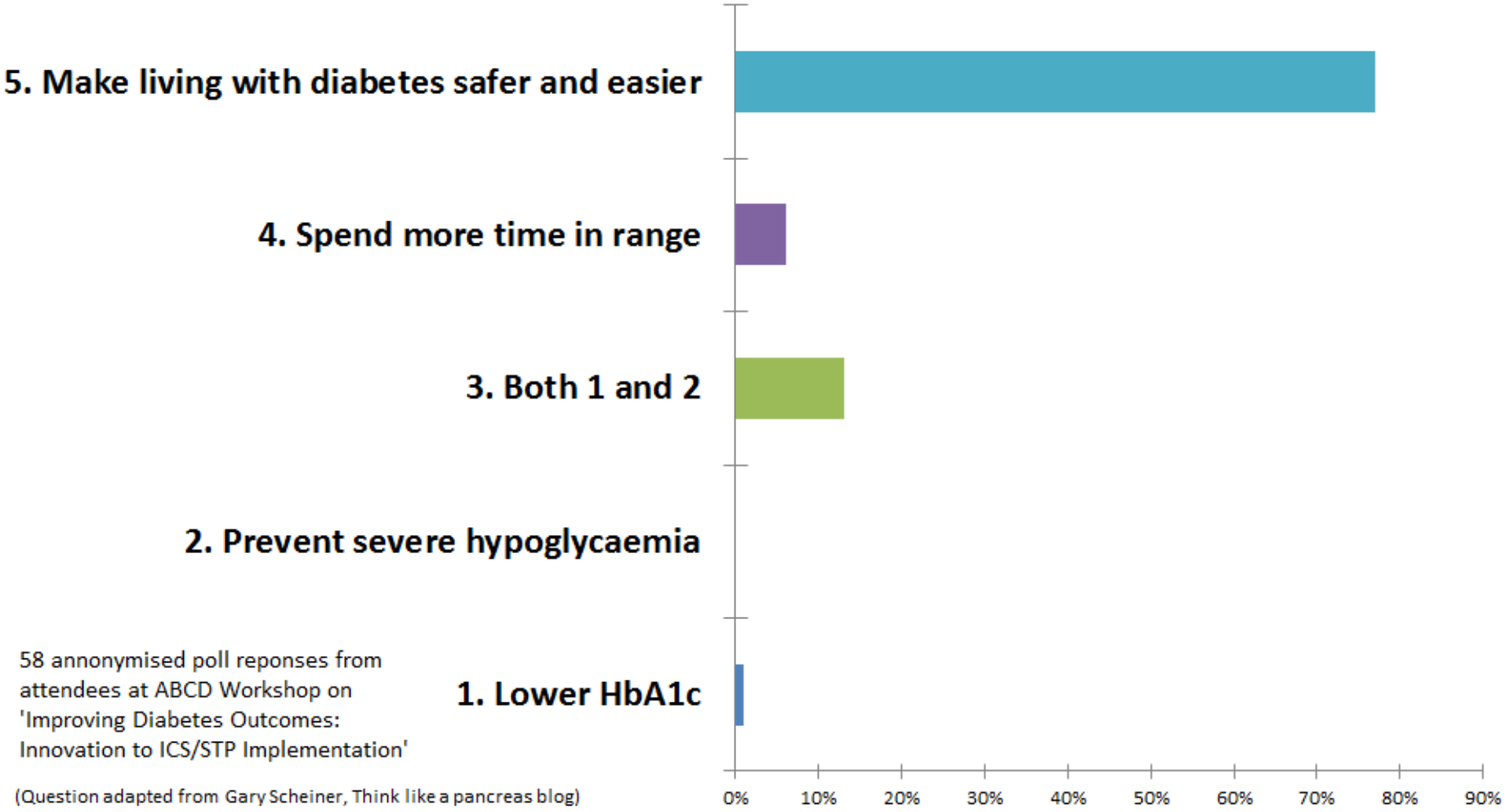
**Further information:**
https://jdrf.org.uk/information-support/treatments-technologies/

Warranty and pump change cycle ~ 4 years
NICE type 1 guidance – currently being revised

## ….but its more than just funding



# What is the purpose of a diabetes management device?

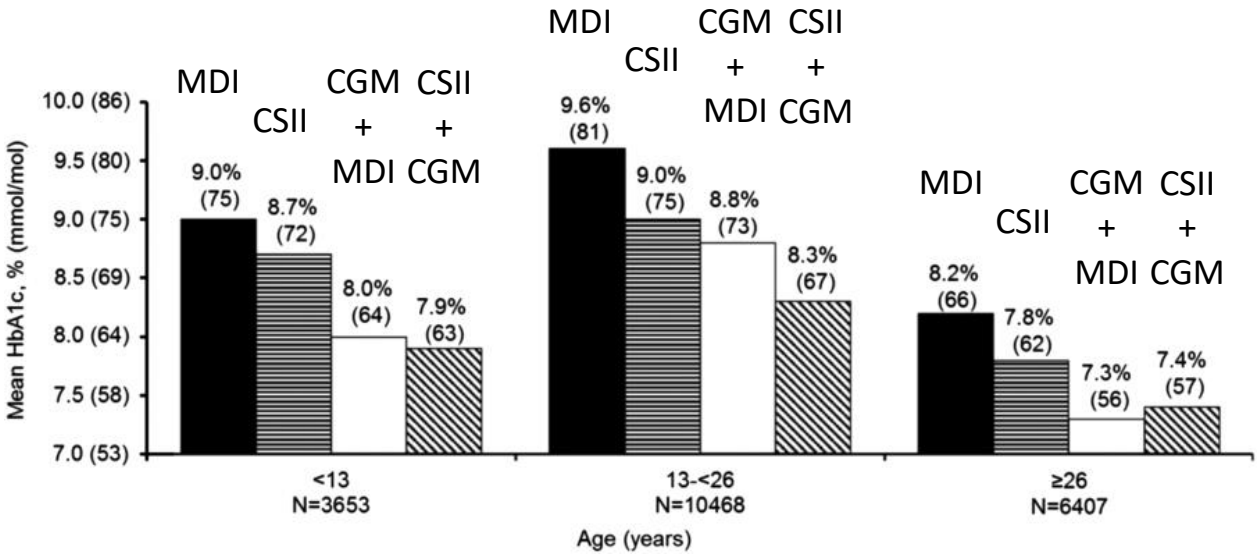



58 annonymised poll reponses from attendees at ABCD Workshop on 'Improving Diabetes Outcomes: Innovation to ICS/STP Implementation'

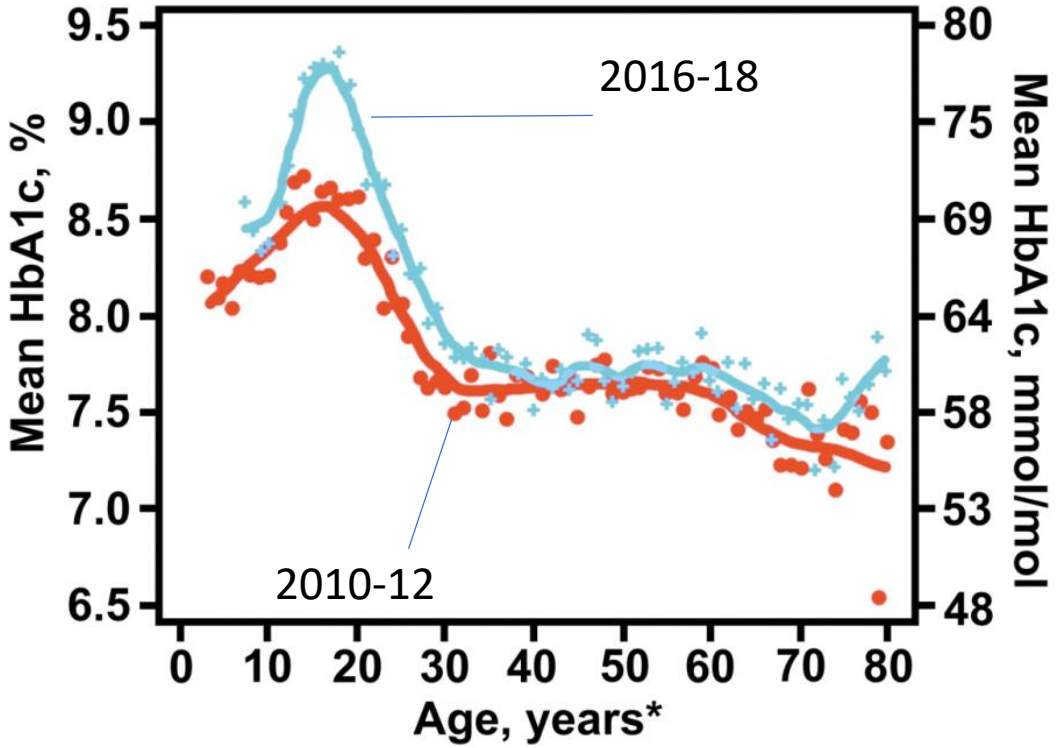
(Question adapted from Gary Scheiner, Think like a pancreas blog)

# Does technology improve diabetes outcomes?

T1D Exchange 2016-2018




Foster et al Diab Technol. Ther. 2019




**Despite increase use of technology, outcomes overall have not improved?**

# The challenge in type 1 diabetes

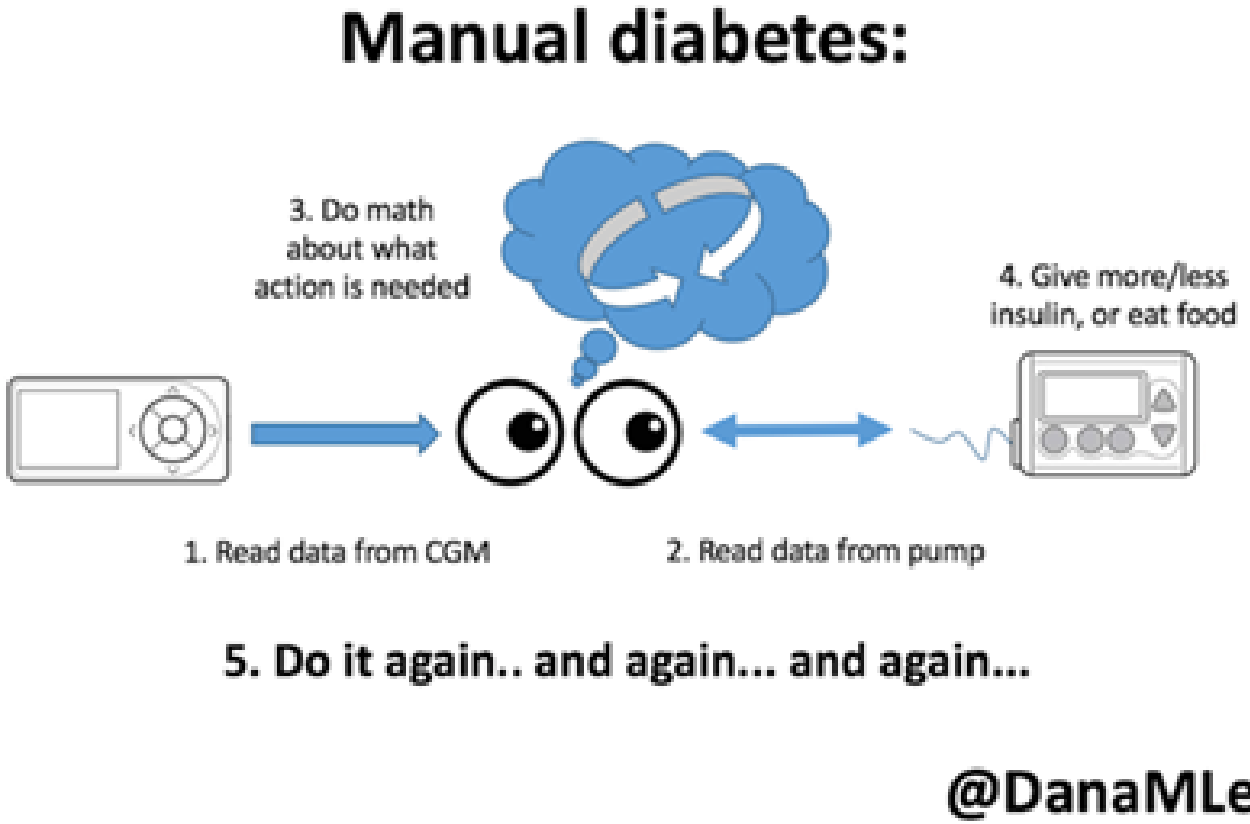



Figure taken with permission from Lewis D, Automated Insulin Delivery, ISBN 9781797763699, https://www.artificialpancreasbook. com Dana Lewis 2019

# Automated Insulin Delivery systems

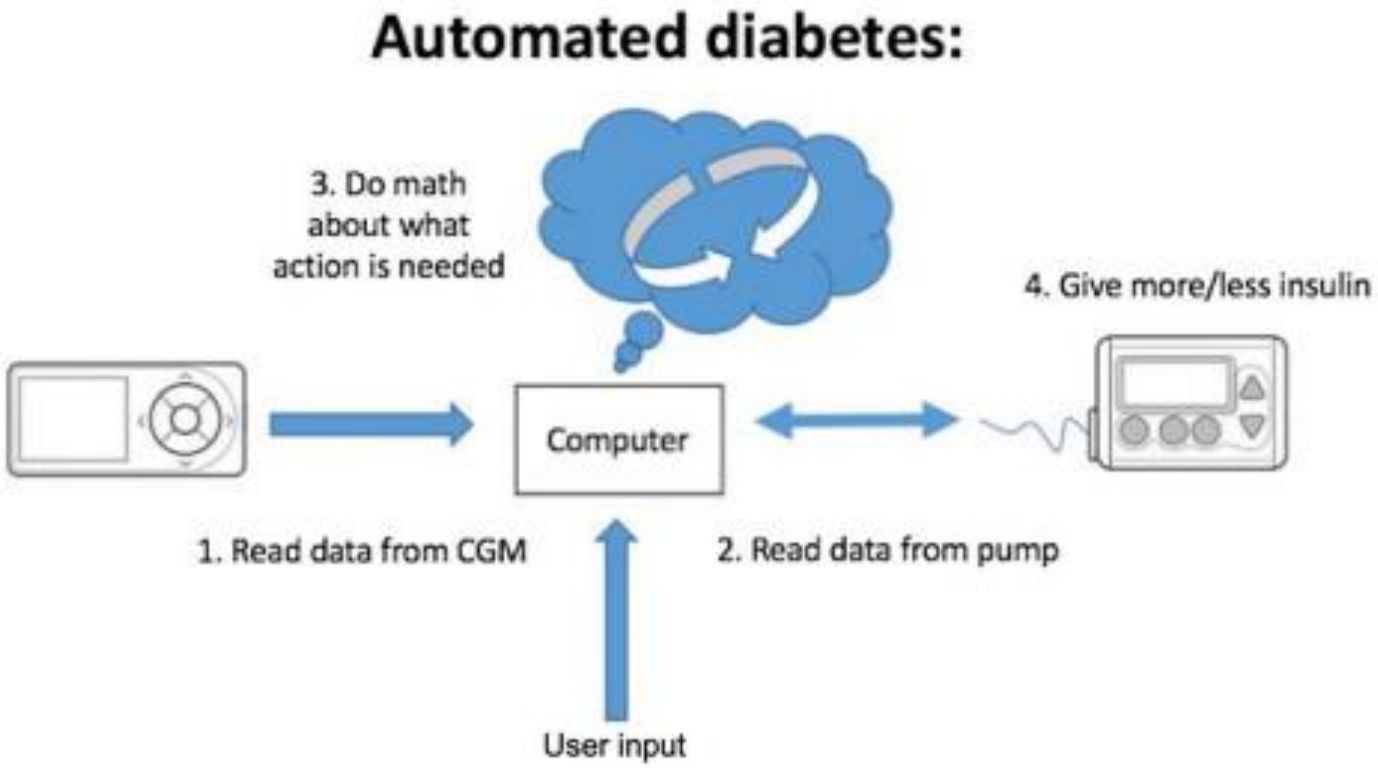


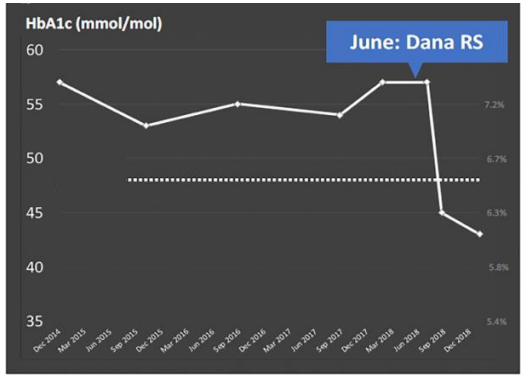

Figure adapted with permission from Lewis D, Automated Insulin Delivery, ISBN 9781797763699, https://www.artificialpancreasbook. com Dana Lewis 2019 and taken from Marshall, Holloway, Korer, Woodman, Brackenridge, Hussain, Diabetes Ther. 2019

# Automated Insulin Delivery systems

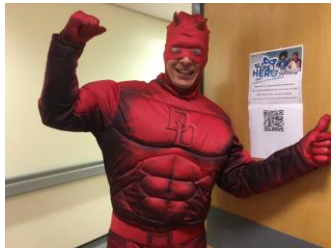
| | Commercial systems | Open source systems |
|---|---|---|
| |  |   |
| **Advantages** | On-boarding program<br>HCP training and support<br>Customer support<br>Less variables / Simple<br>Adaptive algorithms that alter variables (non smartphone based options) | Various Pump/CGM options<br>Lower acquisition and running cost (DIY/ off label CGM , older pumps, free algorithm)<br>Community support<br>Continuous updates<br>Better interoperability |
| **Disadvantages** | Possible additional cost for some algorithms (eg iController)<br>Limitations in pump and CGM options<br>May require a new pump<br>Requires real-time CGM<br>Less adaptable variables<br>Not available or approved in every area | More complex technical setup and on-boarding<br>Range of variables<br>Limited HCP support<br>Static variables (although can adjust variables with autotune)<br>@sugarydoc |

# Do OPEN source systems work?

- Evidence?
  - 24 publications relating to DIY APS or related aspects
  - Mostly data from self-reported outcomes
  - Data from these studies highlight that compared to conventional methods, DIY APS can offer:




- Increased time in range
- Reduced glucose variability
- Reduced episodes of hypoglycaemia



Jennings, Hussain, *JDST* 2019

- Less reliance on accuracy of carbohydrate counting
- Improved overnight control
- **Reduced mental burden**

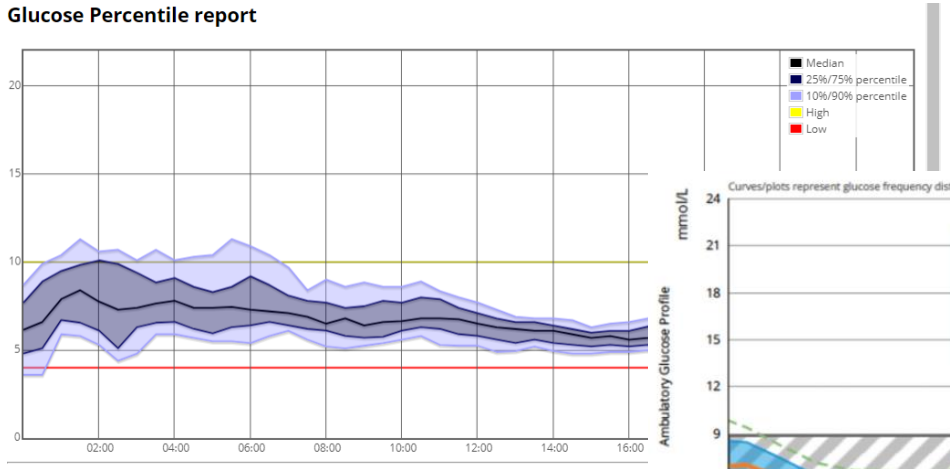

OPEN

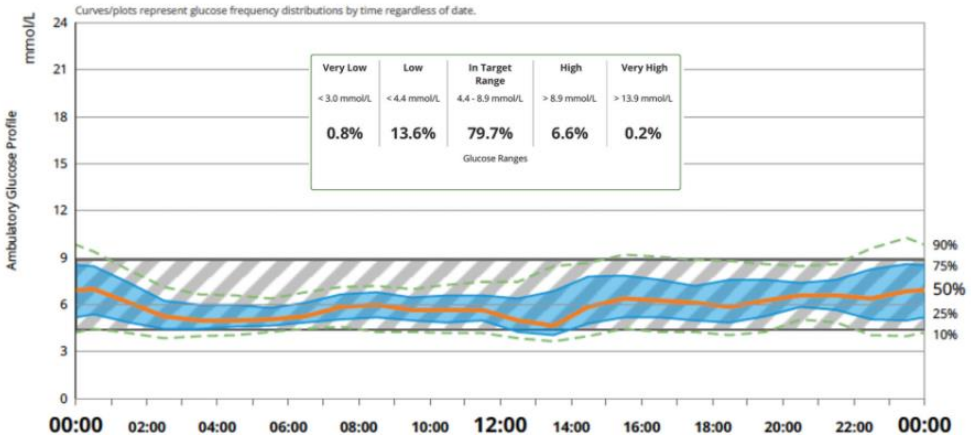
OpenAPS Outcomes

# Clinical experience

- Constraints in commercially approved systems

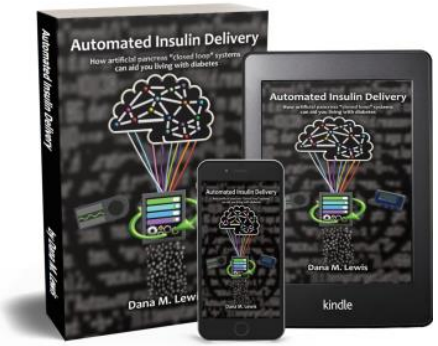
- Experience of DIY APS in clinical situations including:
  - Intensive or prolonged exercise
  - Pregnancy
  - Young infants
  - Steroid treatment
  - Surgery
  - Fasting

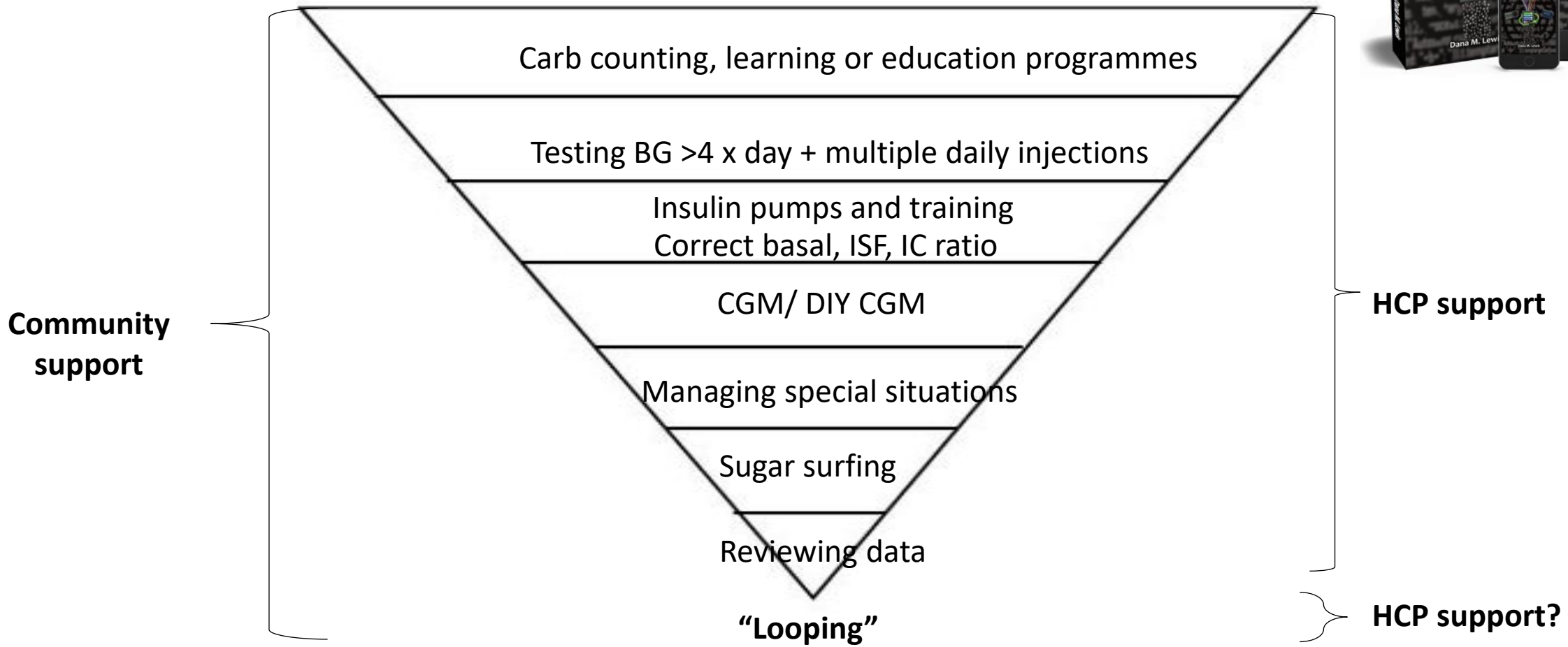




Marshall, Holloway, Korer, Woodman, Brackenridge, Hussain, Diabetes Ther 2019
Jennings, Hussain *JDST*

# Steps to looping (for most UK adults)



# HCPs – how to use AID systems in clinic

Work intuitively with  attention to variables
Safer and easier than manual diabetes
But an AID “system” requires training

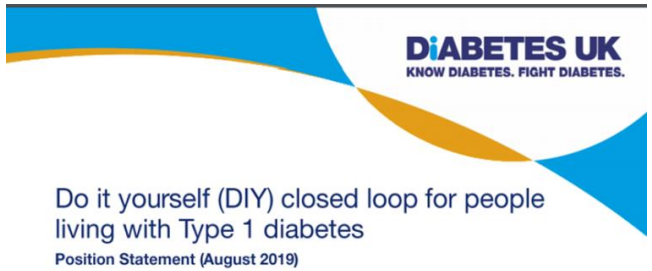
Greater support needed for on-boarding and changes using open source systems

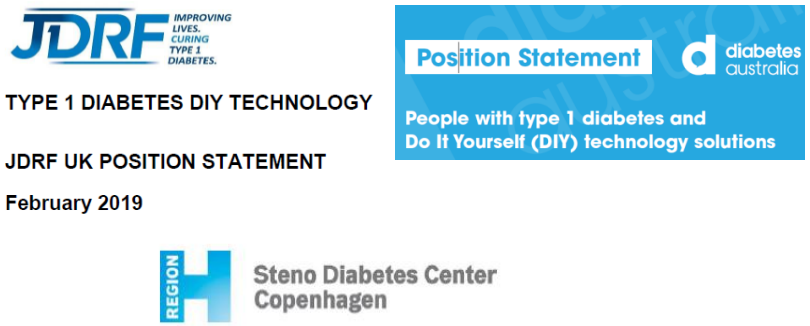
Requires an understanding and adjustments of key variables and how to use the “system”
- Pump + CGM use, correct baseline settings, duration of insulin action, insulin model, carb absorption model, **glucose targets,** safety parameters / delivery limits, profiles, advanced features, device connectivity, app updates, etc


“Read the docs” – For Clinicians

# HCP role for supporting open source systems - limited by current position statements

**Accountability, ethics, legality and regulation?**




**Consensus from various statements produced on open source technology use for HCPs**

| Issues | Guidance for Healthcare professionals |
|---|---|
| Prescribing | Not regulated and not medically approved |
| | Cannot prescribe, promote, initiate or recommend |
| | Must only recommend authorised technology |
| Discussing | Should discuss if discussion raised by person with diabetes or carer, especially risks and medically unregulated status |
| Supporting | Respect the right of individuals to choose how they wish to manage their or their dependant's diabetes |
| | Continue to support and provide regulated devices (pump, CGM, flash GM) if meet criteria even if patient intends to pursue DIY |
| | Cannot help with procurement of medical equipment other than approved systems |
| | Can help with evaluation of glucose values and insulin dosing via information from DIY platforms but may not provide advice on DIY settings |
| | Cannot refer to unregulated information sources |
| | Should direct PWD to online DIY technology communities for advice |
| Documenting | Ensure clear documentation of discussions with patients or carers, especially discussions regarding risks and unregulated status of DIY technologies |

Jennings, Hussain *JDST* (2019)

**Need for strong professional body statement in supporting involvement of HCP**

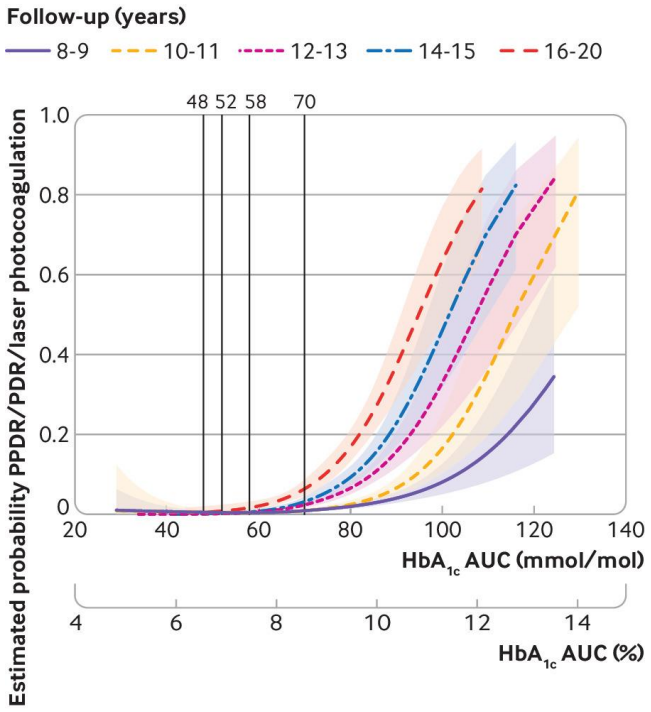
# Common pitfalls and advice from the clinic

1. Automated insulin delivery “system” (rather than artificial pancreas)
2. DIY doesn’t mean doing it alone!
   - Community support especially for technical setup and on-boarding
   - HCP support: in on-boarding and special situations (pregnancy, complex scenarios, exercise)
3. Hypos
   - First step should be to minimise these
   - Aim for time below range <3% for most?
4. Timing of insulin before meals
5. Understanding duration of insulin action
6. Working through correct basal, IC, ISF settings (refining ± autotune)
7. Cannula and cannula site health
8. Sensor health and calibrations
9. Back-up planning
10. Realistic goals and avoiding gamification

Need for HCP and Doctor reviews – other things still important!

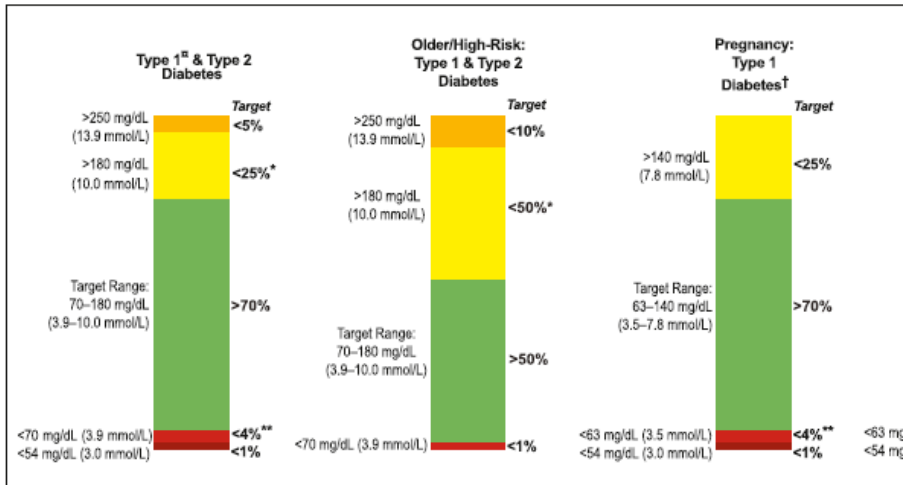
# Setting realistic goals

## Swedish population registry




Lind et al, BMJ 2019

## Consensus on Time in Range




Battelino et al, Diabetes Care 2019

**Communication and understanding of time in range key**

**For HCPs**

1. Not targets – goals need to be individualised
2. Can use to focus on areas for the consultation (triage tool)
3. Still need to review other data metrics (and the person!)

**For PWDs and carers**

1. Not your target! Set personal goals. Most PwD may find this difficult to achieve
2. If doing better than this ask yourself:
   I. Is it coming at expense of mental burden, workload, hypos or lipids?
   II. Is it coming by restricting aspects you may find enjoyable?

**For commissioners and funders**

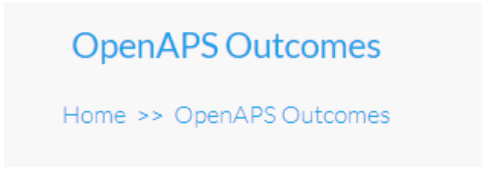
1. Can we align commissioning with clinical practice please?

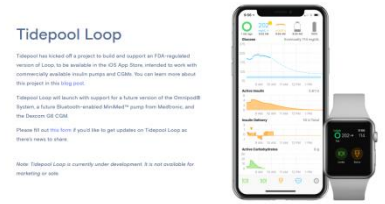
# Measures of success

1. What are your goals for type 1 diabetes?

2. What are your goals for looping?

# Automated diabetes – ~~the future?~~ The present

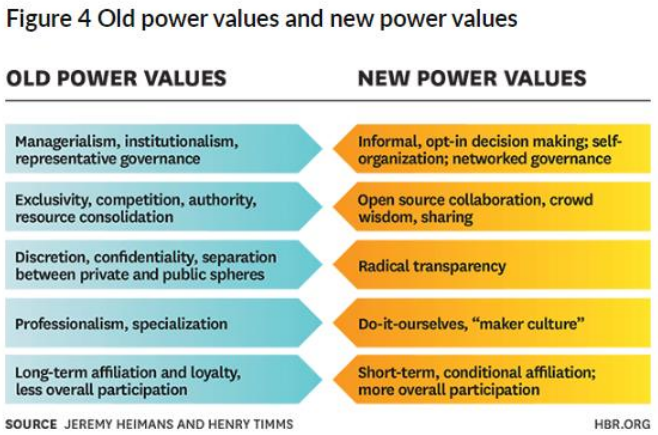

ABCD
Association of British Clinical Diabetologists

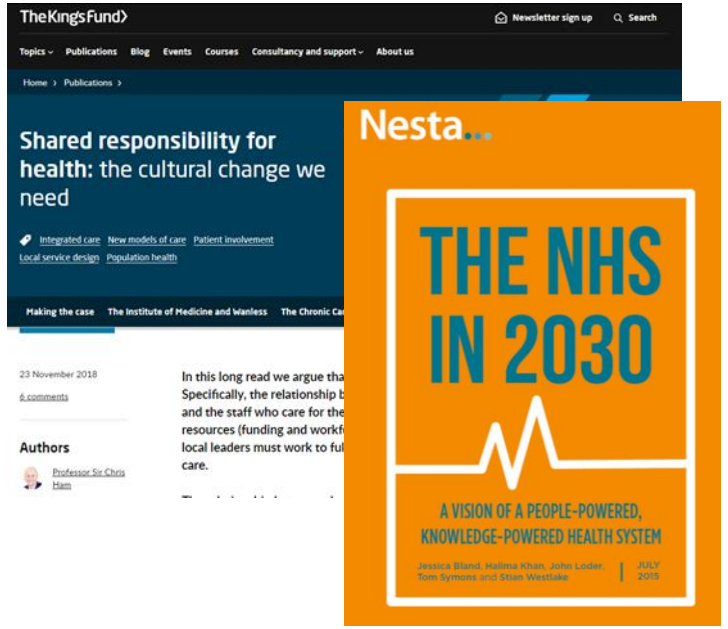
DTN UK
collaborate · evolve · support


**Simplification and wider applicability?**
**Need for empowerment for PwD still key**
**HCP training and HCP capacity for technology**
**Access to technologies for type 1 diabetes**
**Further evidence and professional consensus**
**HCP role in supporting this is vital**

# Personal reflections on Open source systems

- **Technology driven and patient led care models**




- **Great avenue for learning, sharing and developing**

**PAY IT FORWARD**

# Acknowledgements


- Diabetes  team at Guy's and St Thomas
- Diabetes  team at King's College Hospital
- Colleagues at ABCD DTN
- Dr Peter Jennings
- DIY community and users
  - Dana Lewis, Alasdair McLay, Melissa Holloway, Tim Street, Kev Winchcombe and others
- OPEN team
  - Dr Katarina Braune and colleagues


NHS Guy's and St Thomas' NHS Foundation Trust

KING'S College LONDON

DTN UK collaborate · evolve · support

OPEN

**Coming soon!**

**Podcast with Dana Lewis**

**London Course for HCPs**

# Workshops session 1

| *Putting it into practice - workshop streams* | | |
|---|---|---|
| Getting started with Type 1 Tech - where to go and what to look at | Bringing tech up in a clinic appointment - tips, tricks and confidence boosters | DIY systems - what you need to know about CGM and APS |

# Coffee

# Workshops Session 2

| *Putting it into practice - workshop streams* | | |
|---|---|---|
| DIY systems - what you need to know about CGM and APS | Getting the best out of commercial solutions | Getting the best out of DIY systems |

# Wrap up

Partha Kar

# Post Event Drinks
# Punch Tavern