



## Workshop 1 Interpreting Downloads

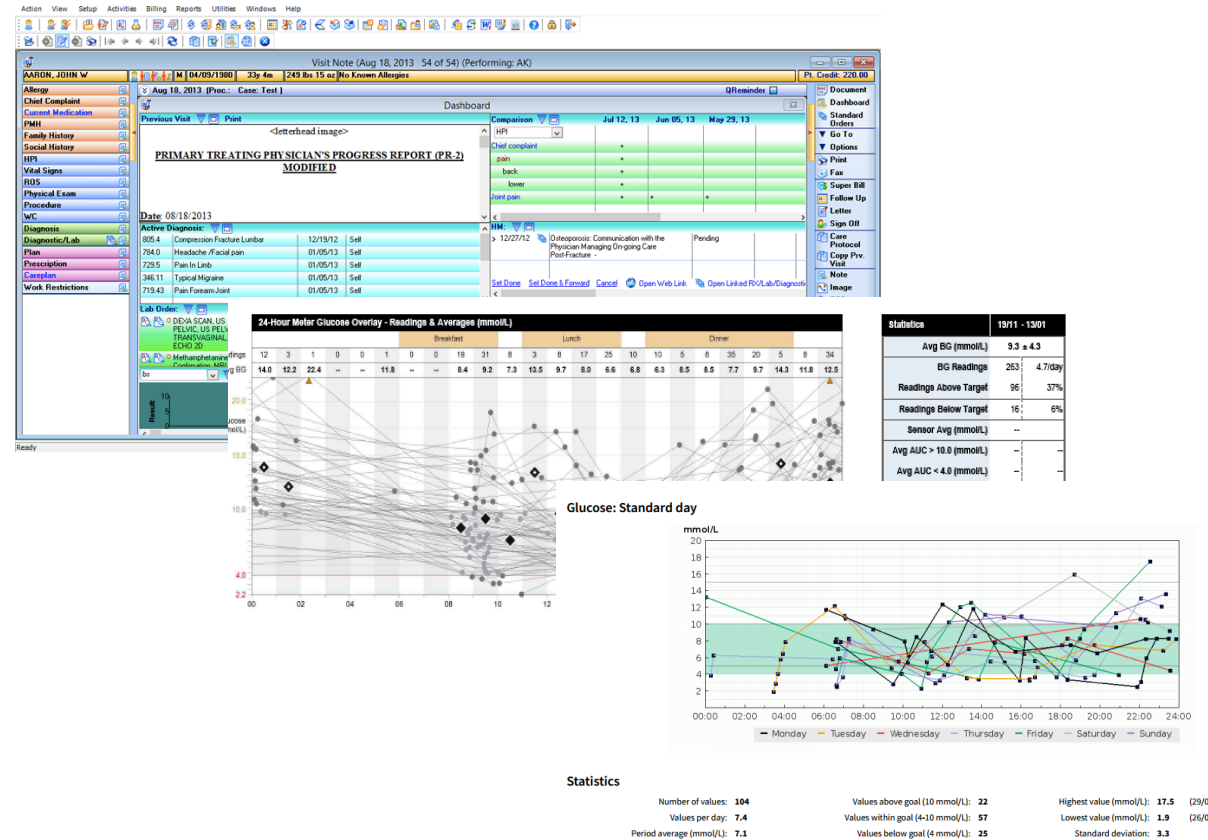
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ABCD Diabetes Technology Network UK

Committee Member



# Self Assessment

How confident are you?

- How confident are you with reading/interpreting a download?
- Could you come to a hypothesis in 90 secs?
- How confident are you doing this across all technologies libre/CGM/CSII?

1 being not at all confident and 7 being extremely confident

Overall, how confident are you that you completed the task successfully?

Not at all Confident							Extremely Confident
1	2	3	4	5	6	7	
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After you have completed this session answer these questions again and see if your answers are different and whether your confidence changes.

# Agenda

- ▶ Golden Rules of interpreting data
- ▶ High Value reports
- ▶ 90 Second Hypothesis

# Which system should I use?



*glooko*

**diasend.com**  
Easy Diabetes Communication





TOO  
MUCH  
INFO



Does this  
look  
familiar?

# Interpreting the data can be challenging...

- **Practice makes perfect**
  - How not to drown in the download
- **What are you trying to achieve:**
  - Confidence to analyse own data
  - Improve self-management skills
  - More accurate decision making
  - Identify areas of hypoglycaemia
  - Reduce glucose variability
  - Increase level and quality of consultation with HCP/team working
  - Patient leading decision making



# Key strategies

- Know what you are looking for
- Know where to find it
- Use high value reports leading to quick analysis
- Statistics
- Scan for patterns
  - Structural issues
  - Outliers
  - Problem areas
- Make a hypothesis
- Dive into data to confirm your hypothesis

**Hypothesis in 90secs**

**Verdict in 5 mins of seeing the download!**

## Golden Rule 1.

### Structural vs Behavioural



#### STRUCTURAL ISSUES

- ✓ Incorrect settings
- ✓ Background Insulin
  - ✓ Overnight
  - ✓ Daytime
- ✓ Carbohydrate ratios
- ✓ Corrections
- ✓ Target levels

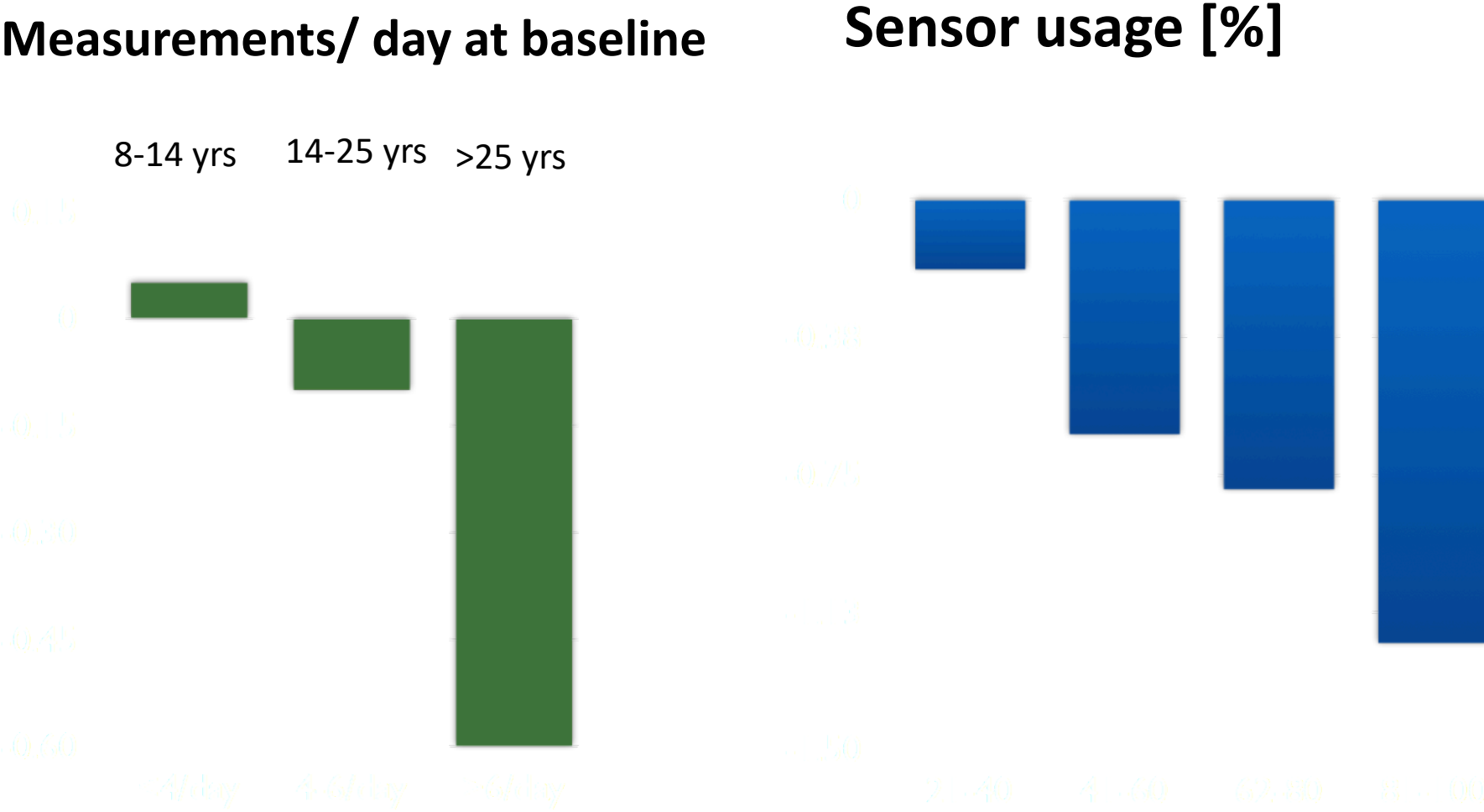
#### BEHAVIOURAL ISSUES

- ✓ Number of BG measurements
- ✓ Number of Quick Acting /boluses
- ✓ Timing
- ✓ Over-rides
- ✓ Frequency of set changes
- ✓ Over-treatment of highs or lows

Don't change structural settings due to behavioural issues

# Golden Rule 1. Structural vs Behavioural

## Factors predicting success



Beck et al; Diabetes Care 2009

## Golden Rule 2. HbA1c for free

- **structural changes that can easily gain some A1c reduction**

- ▶ Cannula and site issues (how often)

### Calculations

- ▶ TDD what you would expect HbA1c/ Weight 0.5-0.8/kg/day
  - ▶  $0.5 \times 40\text{kg} = 20\text{units TDD}$
  - ▶  $0.8 \times 40\text{kg} = 32\text{units TDD}$
- ▶ Basal / bolus split (40-60%)
  - ▶ Low carb (70 grams per day) = 70% basal
  - ▶ Average carb intake (150-170 grams) = 50%/50%
  - ▶ High carbs (200 grams) = 70% bolus

## Golden Rule 2. HbA1c for free

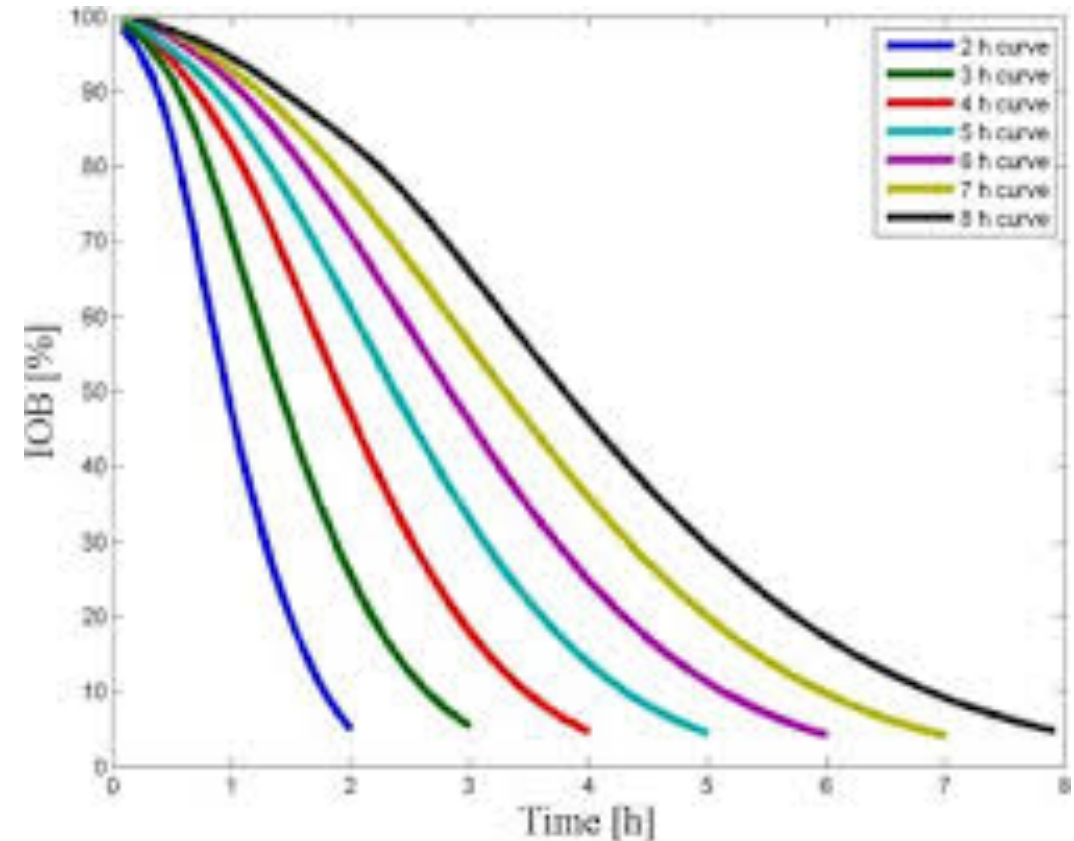
- ▶ Are the settings what you expect
- ▶ Consider re-calculating
- ▶ Aggressive bolus soft correction
- ▶ Aggressive bolus is relatively safer as it is buffered by food (CHO) intake.
- ▶ Most hypos are the result of correction bolus and hence a soft correction reduces this risk
- ▶ CHO ratio 350/TDD (instead of 500/TDD)
  - ▶ For example If TDD is 50 units
  - ▶  $350/50 = 7$  grams carbs per 1 unit Insulin
- ▶ ISF 120/TDD
  - ▶ For example if TDD is 50 units
  - ▶  $120/50 = 2.4$  mmol/l per 1 unit insulin





## Golden Rule 2. HbA1c for free

- ▶ Active insulin timing is based on bolus size
  - ▶ 1-4 units = 2.5 hours
  - ▶ 4-10 units = 3.5 to 4 hours
  - ▶ >10 units – 4.5 – 5 hours. (Also for CKD)



## Golden Rule 2. HbA1c for free

# Shape of basal profile

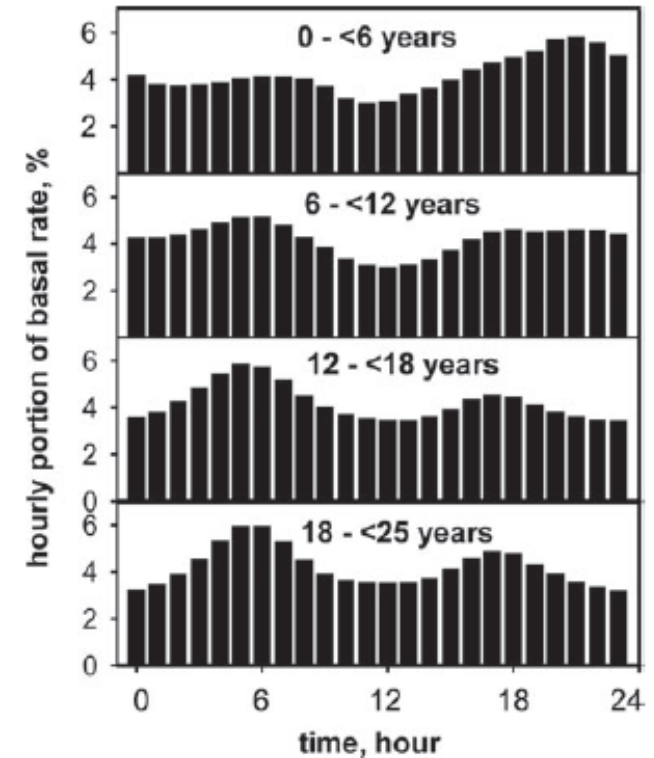
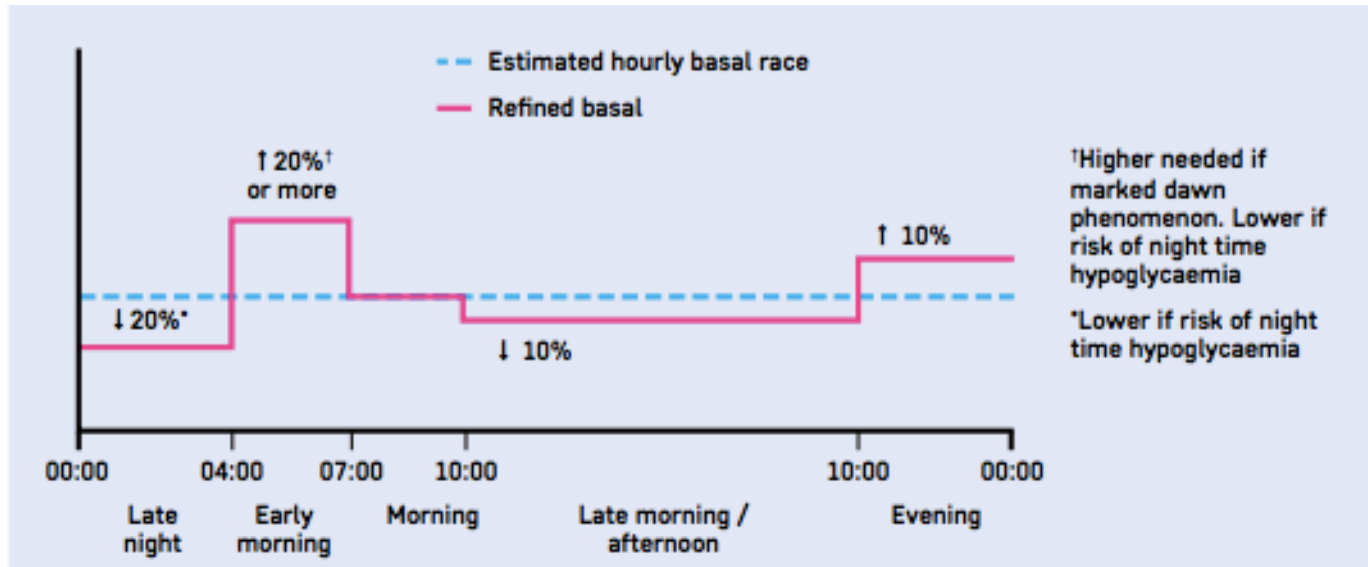
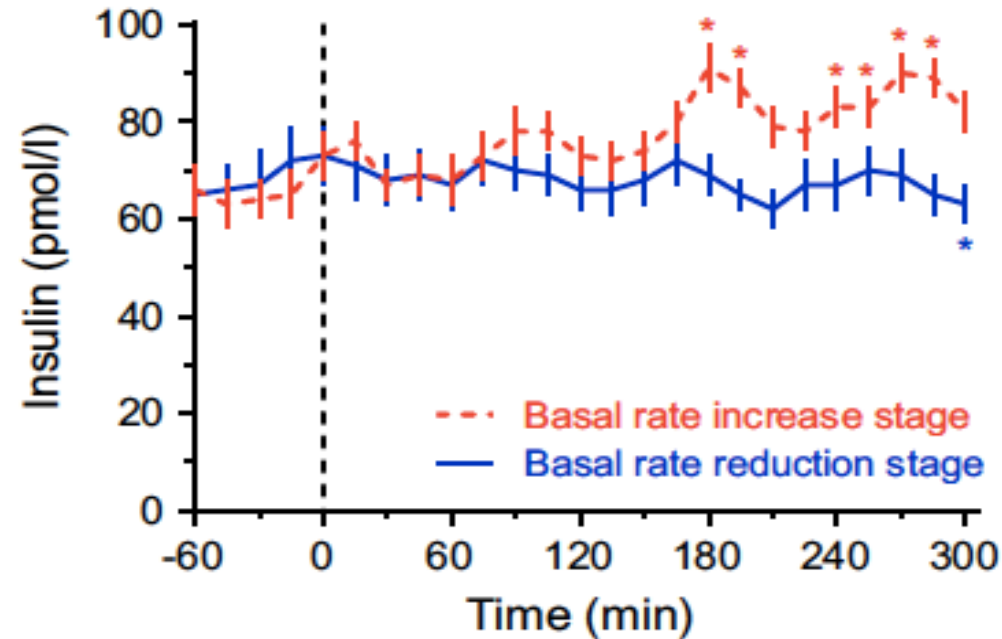


Fig. 1. Circadian distribution of basal insulin in four age groups (% of daily insulin requirement).

- Basic shape of profile
- Does it match physiology of insulin?

## Golden Rule 2. HbA1c for free

# The impact of basal rate changes



**FIGURE 1** Impact of 0.2-unit/h basal rate change at 0 min on circulating free insulin levels. Profiles by study stage. Values are mean  $\pm$  SE. \* $P < 0.05$  vs baseline.

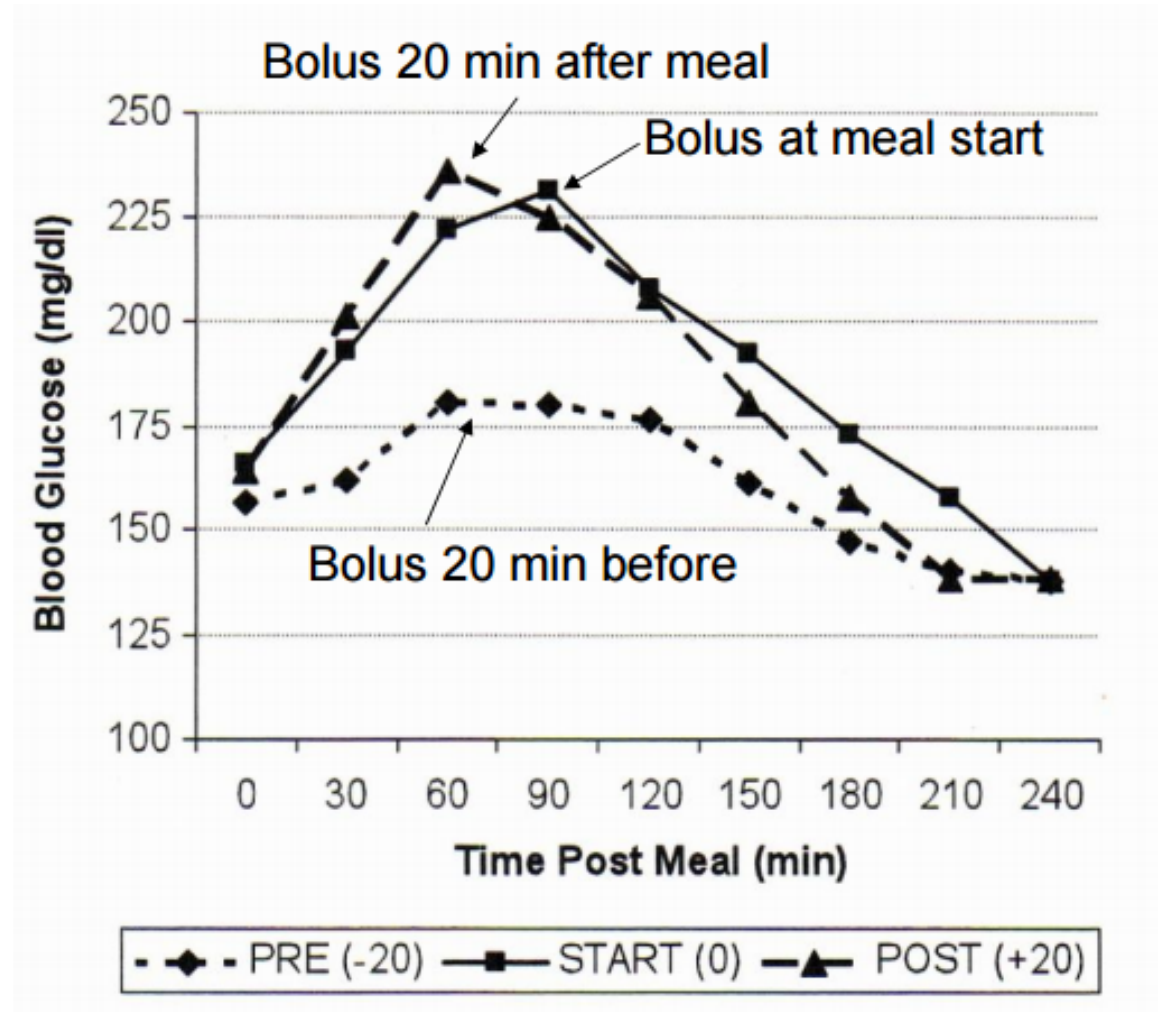
## Golden Rule 2. HbA1c for free

- Use of a bolus calculator (smart meter)
- Correct targets on a bolus calculator – 5.5 mmol/l
- Fine tuning corrections whilst keeping safe



## Golden Rules 3. Value for blood

- The concept of obtaining maximum benefits for BG measurements/flashses
- Timing is everything...  
Bolus 20 minutes before meals



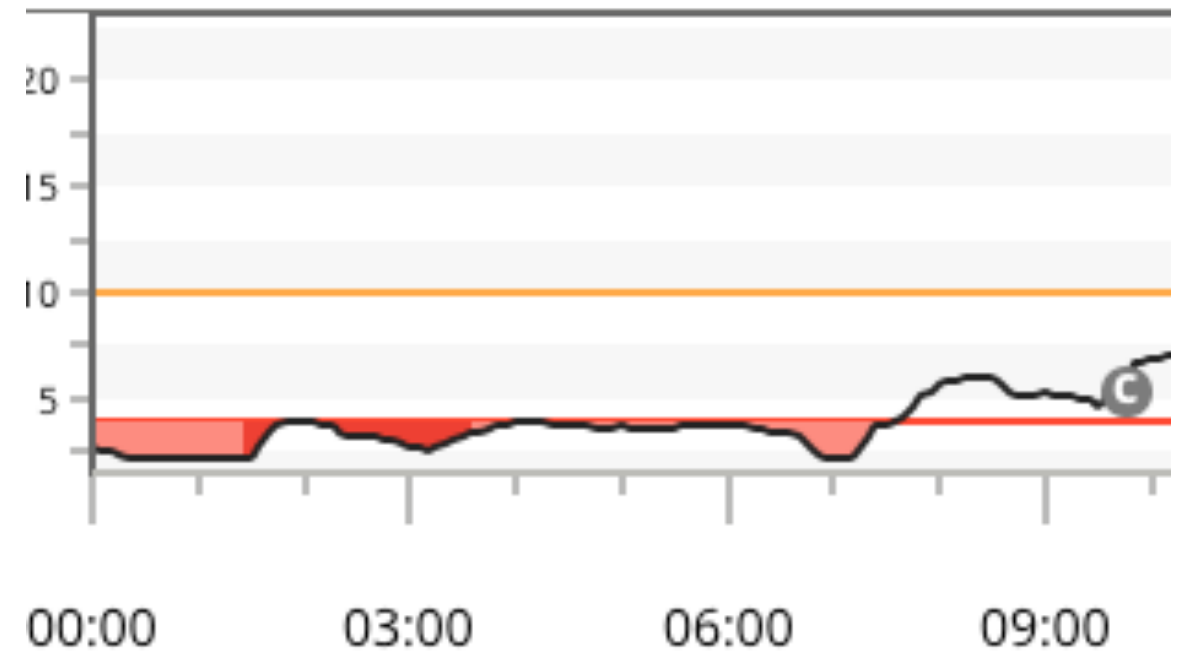
## Golden Rule 4

$\geq 45^\circ$  degree rise or fall in a data

- ▶  $\geq 45^\circ$  degree rise: Carbs without insulin
- ▶  $\geq 45^\circ$  degree fall: Insulin without carbs = Correction bolus at peak glucose



## Golden Rule 5. False HbA1c due to hypos

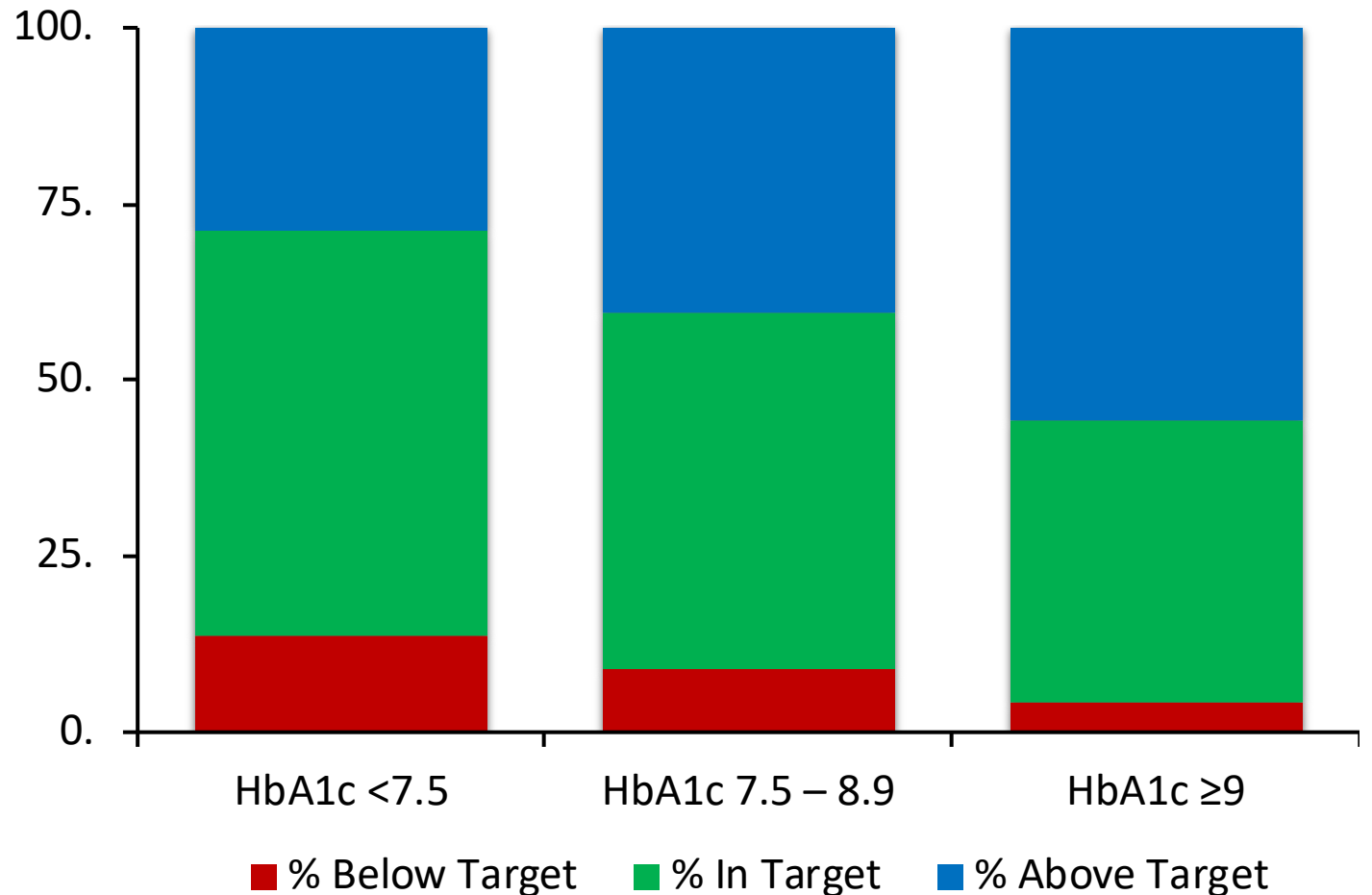


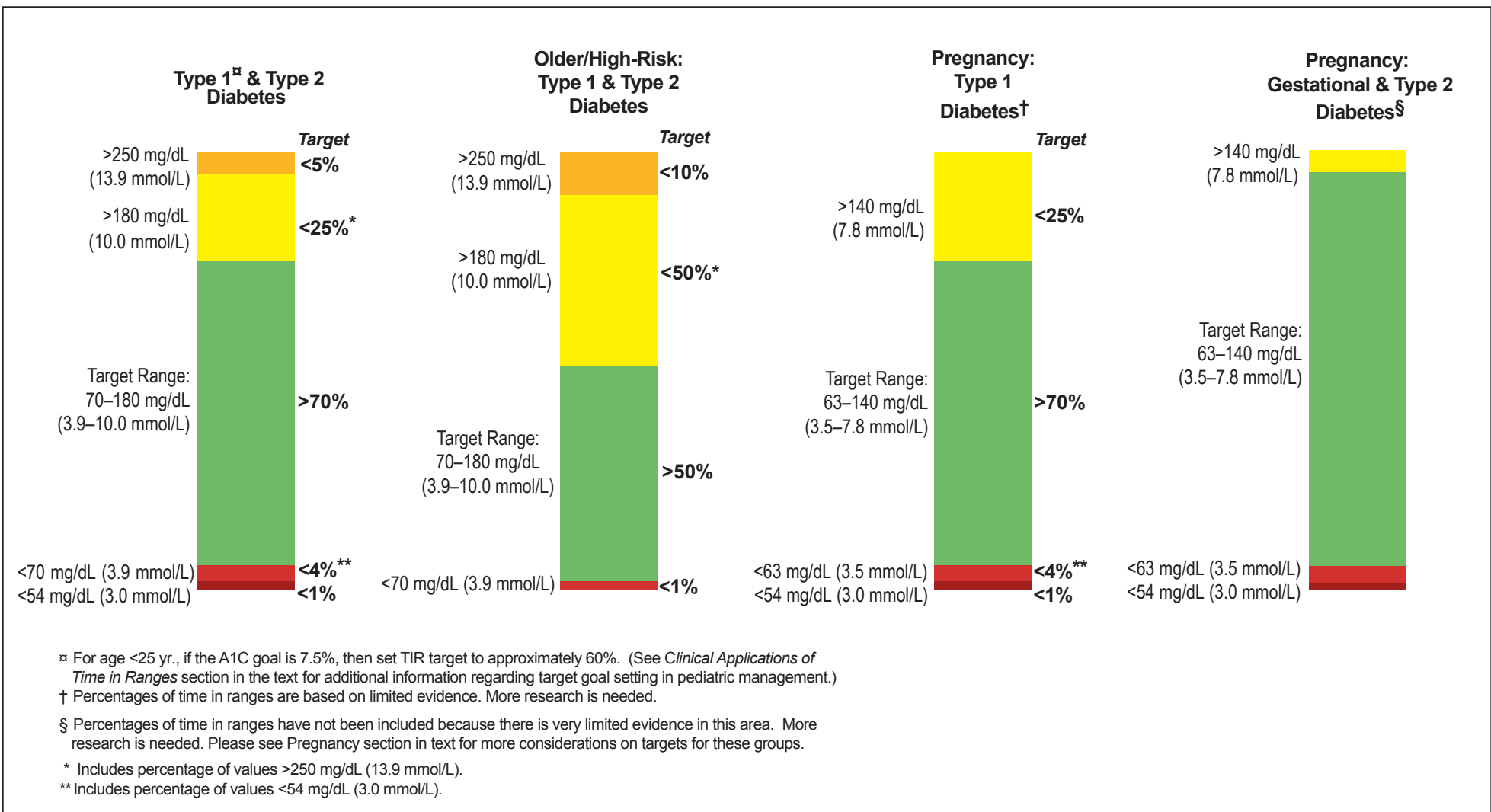


## Golden Rules 6. TIR

- Explain what 70% TIR means to the person with T1D
- 30% time out of range =  $\sim 1/3$  of readings or about 8 hours in a day out of range
- 3 out of your 5/day within 4-10

Figure 1: Proportion of daily CBG results above, below and within the target range amongst the varying HbA<sub>1c</sub> groups.



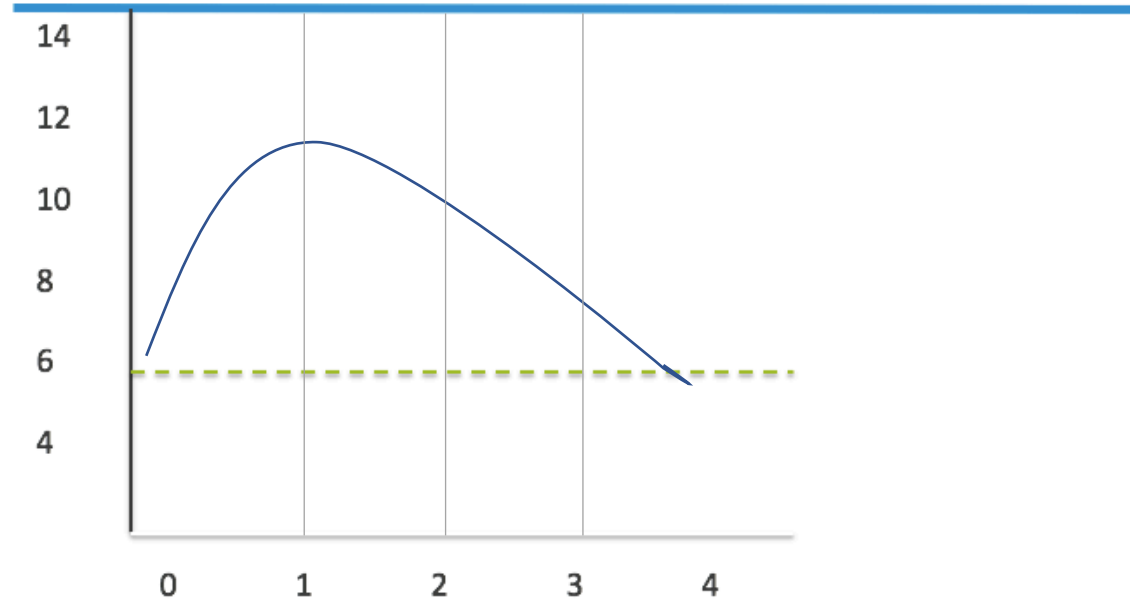


## Golden Rule 7

### 1-2-3 Rule for post meal glucose

- ▶ 1-hour glucose: A reflection of timing of insulin
- ▶ 2- hour glucose: A reflection of adequacy of bolus – did I give enough/too much?
- ▶ 3-hour glucose: A reflection of fat, protein, stress, activity etc.

## BOLUS

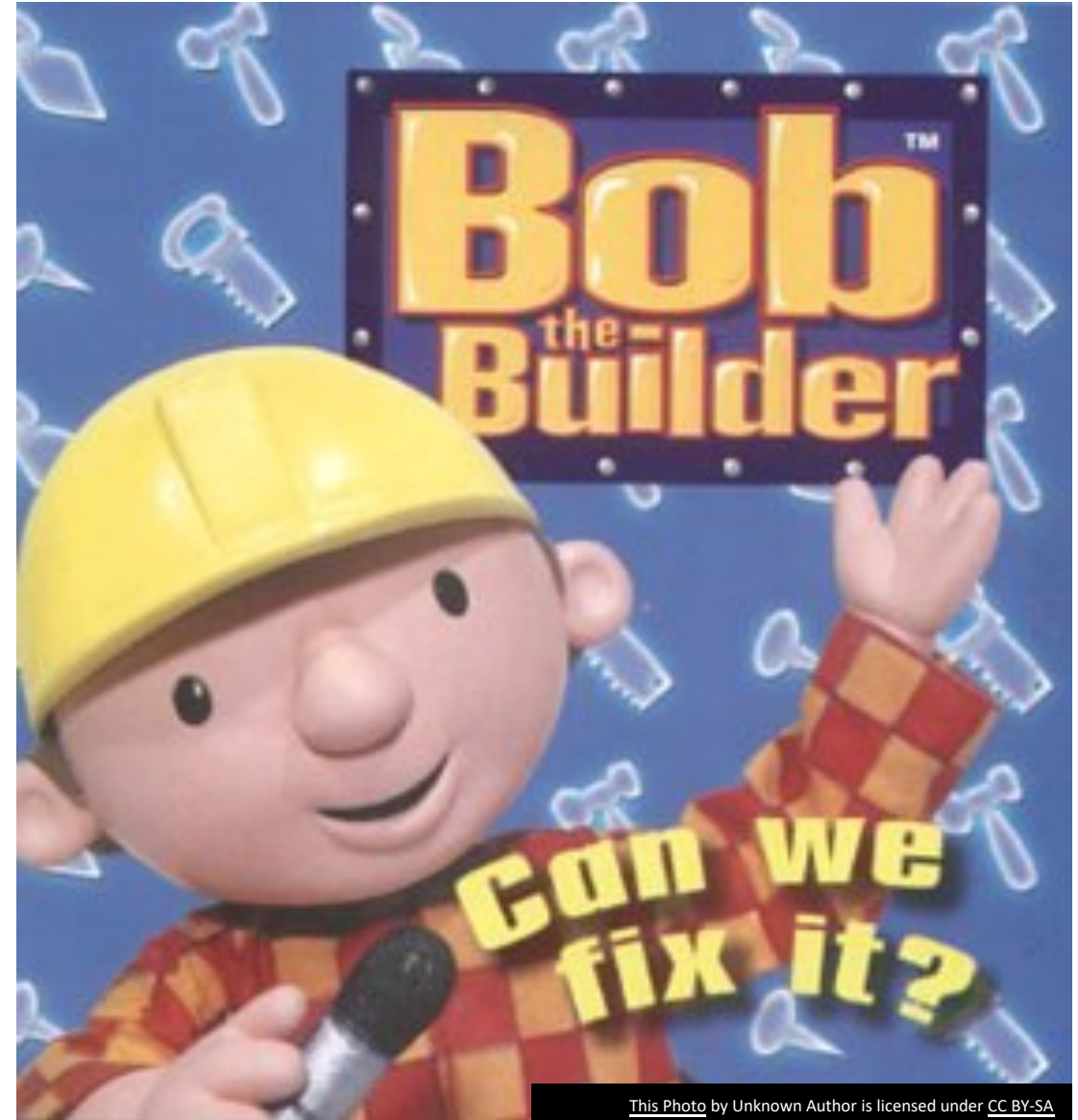


## Golden Rule 8

If it isn't broken don't fix it

Know when not to stick to a rule

If the structure works for the patient and is not causing any distress to do not mess with it.



## Rapid systematic analysis of pump download- Checklist

- SMBG/day vs Boluses/day:
  - SMBG >> Boluses ?anxious
  - Boluses >> SMBG ?snacking
- Set changes
- Suspend durations
- TDD
  - Calculate predicted Carb Ratio, ISF and basal rates from TDD
- basal bolus split
  - Average carbs entered
- Average BG (7.5-8.5mmol/l)
- Generate hypothesis for the dysglycaemia
- Ask a specific question and review SMBG/CGM data to prove or disprove hypothesis
- Make a structural change if needed. If it isn't broken do not fix it!



## Information

	Glucose Measurements		Bolus Events					Priming Events					Suspend Duration (h:mm)
	BG Readings	Sensor Duration (d:hh:mm)	Manual Boluses	Bolus Wizard Events	With Food	With Correction	Overridden	Rewind	Fixed Primes	Fixed Prime Volume (U)	Manual Primes	Manual Prime Volume (U)	
Tuesday 18/03/2008	6	24:00		3	3	3	3						0:02
Wednesday 19/03/2008	6	21:05		3	3	3	3						0:15
Thursday 20/03/2008		0:15											
Friday 21/03/2008	4			3	3			1			1	3.1	
Saturday 22/03/2008	7	19:15		3	3								0:11
Sunday 23/03/2008	5	24:00		3	3	1					1	0.5	0:15
Monday 24/03/2008	8	24:00		5	5	3	1						
Tuesday 25/03/2008	5	24:00		3	3	2							
Wednesday 26/03/2008	7	24:00		5	5	3	2						0:15
Thursday 27/03/2008	3			3	3						1	0.9	
Friday 28/03/2008	4			4	4								0:30
Saturday 29/03/2008	7		1	3	3								0:05
Sunday 30/03/2008	6		1	3	3								0:05
Monday 31/03/2008	5			3	3	1					1	0.9	
Summary	5.8/day	6d 16h 35m	0.2/day	3.4/day	100.0%	39.0%	22.0%	1	0	--	4	0.8U/prime	1:38



Statistics	19/11 - 13/01	
Avg BG (mmol/L)	9.3 ± 4.3	
BG Readings	263	4.7/day
Readings Above Target	96	37%
Readings Below Target	16	6%
Sensor Avg (mmol/L)	--	
Avg AUC > 10.0 (mmol/L)	--	--
Avg AUC < 4.0 (mmol/L)	--	--
Avg Daily Carbs (g)	198 ± 43	
Carbs/Bolus Insulin (g/U)	13.1	
Avg Total Daily Insulin (U)	29.1 ± 3.6	
Avg Daily Basal (U)	14.0	48%
Avg Daily Bolus (U)	15.1	52%

# Use of Virtual Clinic after CSII start

- ▶ 26 year old, Type 1 diabetes
  - ▶ Tertiary referral, 4-5 hrs round trip
  - ▶ travels with work
  - ▶ High HbA1c 8.9% (74mmol/mol)
  - ▶ TDD 80 units
  - ▶ Omnipod
- 
- ▶ What reports?
  - ▶ Compilation page
  - ▶ Settings
  - ▶ Dive into data (day to day/ logbook)

# Use of Virtual Clinic after CSII start

## Compilation

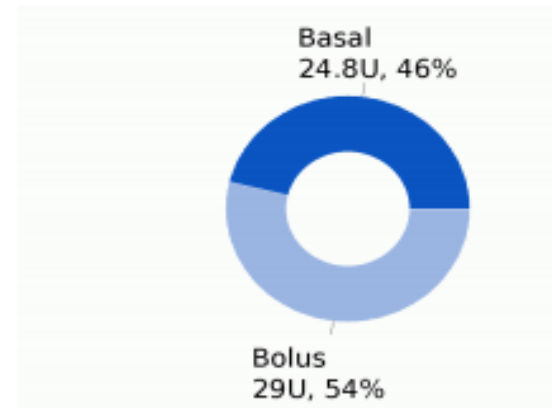
Glucose		CGM		Insulin		Carbs		Activity	
Average		Average		Average daily dose		Average carbs / day		Avg steps / day	Avg kcal / day
<b>7.1</b>		<b>9.4</b>		<b>53.8 U</b>		<b>152 g</b>		<b>0</b>	<b>0</b>
mmol/L		mmol/L						steps	kcal
SD = 3.3	# = 104	SD = 3.8	# = 1297	SD = 14	# days = 14	SD = 48	# = 54	0% of 10000 (target)	0% of 2500 (target)
Avg # / day = 7.4		Avg # / day = 92.6		Avg # bolus doses/day = 6.1		Avg # / day = 3.9			

## Insulin

Insulin doses summary	
Average daily insulin (U)	53.8
Standard deviation (SD)	14.2
Average daily basal (U)	24.8
Average daily bolus (U)	29
Average bolus doses/day	6.1
Average days between cannula fills	-
Average days between primes	-

Carb summary	
Avg # carbs/day	152 g
Standard deviation (SD)	48

Bolus calculation summary	
Avg # Normal Boluses/day	4.4 (73%)
Bolus overrides/total boluses	0%
Avg # bolus overrides/day	0



Values below goal (4 mmol/L)	96
Average daily CGM sensor duration	23:15 (97%)
Total CGM sensor duration	13 days 12:15

# Settings

## Insulin: Pump settings

Insulin pump settings for serial number: 130279144 (OmniPod). Upload date: 03/10/2017 08:15 (Europe/London)

### Bolus

Setting	Value
Suggestion bolus	Enabled
Bolus Reminder Options enable	Disabled
Max Bolus	30 U
Extended	%

### Basal

Setting	Value
Max Basal	2.5 U/h
Temp basal mode	%
Active basal program	1

### General

Setting	Value
Min BG for calcs	3.9 mmol/L
BG goal low	4 mmol/L
BG goal high	10 mmol/L
Insulin action	240 min
Reverse correction	Enabled
Low reservoir level	50.0 U
BG reminder	Disabled
Pod expiration	360 min
Auto-off alarm	Disabled
Reminder alerts	Enabled
Confidence alerts	Enabled
BG unit	mmol/L
BG sound	Enabled
Bolus increment	0.05 U
Language	English

TDD 53.8 units  
Basal = 1.1 units/hr  
CHO = 6.5grams  
ISF = 2.4 units

## I:C ratio settings

Start	1 U: [g]
1 00:00:00	7
2 05:30:00	6
3 11:30:00	7

## ISF programs

Start	ISF [mmol/L]
1 00:00:00	2.1

## BG target range settings

Start	Target [mmol/L]	Threshold [mmol/L]
1 00:00:00	6.5	6.5
2 06:30:00	5.5	5.5
3 22:00:00	6.5	6.5

## Basal profiles

Program: 1

Start	Rate
1 00:00:00	0.900
2 06:00:00	1.000

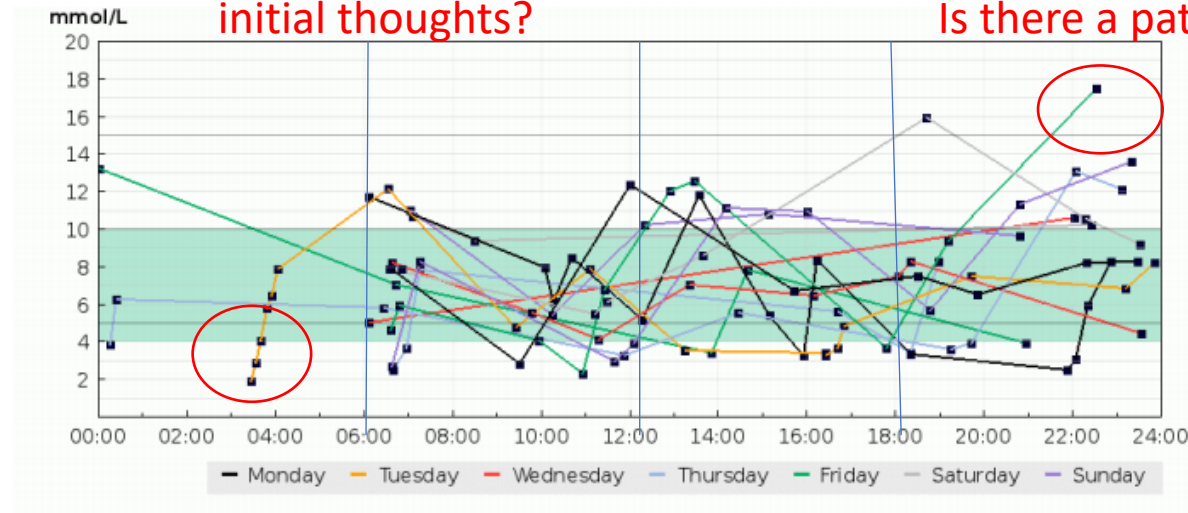
Sum: 23.400 U

# Use of Virtual Clinic after CSII start

Glucose: Standard day

What are your  
initial thoughts?

Outliers?  
Is there a pattern?



## Statistics

Number of values: **104**  
Values per day: **7.4**  
Period average (mmol/L): **7.1**

Values above goal (10 mmol/L): **22**  
Values within goal (4-10 mmol/L): **57**  
Values below goal (4 mmol/L): **25**

Highest value (mmol/L): **17.5** (29/09/2017 22:32)  
Lowest value (mmol/L): **1.9** (26/09/2017 03:26)  
Standard deviation: **3.3**

# Dive into the data to confirm your hypothesis

## Comparison : Day by day overview

