

# Dr Pratik Choudhary

## CGM optimisation

## Disclosures:

Speaker fees and advisory boards for Medtronic, Abbott, Dexcom, Insulet and Roche.

# Choice of CGM



## Learning objectives :

- Realistic expectations
- Using the arrows
- Using the alarms



# Key principles

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- Simplicity
  - Balance between PRO-active and RE-active
  - Keep the person behind the numbers in mind
  - Value for blood
  - HbA1c for free
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# What should we discuss with pts before starting CGM

- Rt - CGM

- FGM

# Realistic expectations..

# Realistic expectations

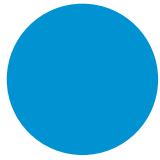
- What the pt wants to achieve
- Getting used to data
- Getting used to seeing the variability
  
- What is a realistic time in range...
- How are we going to react to arrows
- Avoid over-reacting...



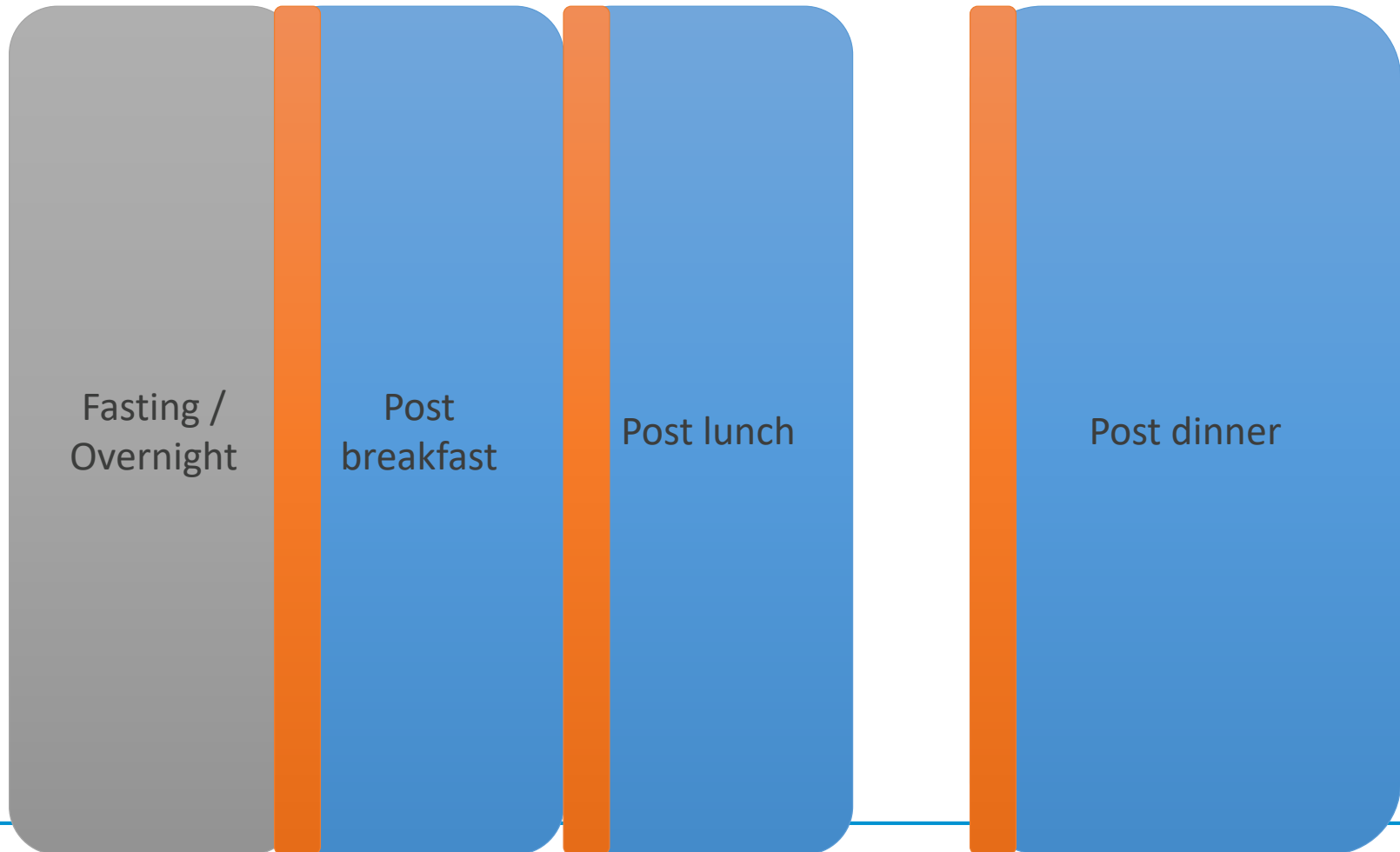
# What do arrows mean

# What do the arrows mean

	Rate of change	How long to change by 1 mmol/l	How much will it change in 30 mins
↑	> 0.11 mmol/l / min	Average 7 mins	at least 3 mmol/l
↗	Between 0.11 and 0.06 mmol/l / min	Average 15 mins	2-3 mmol/l
→	Less than 0.06 mmol/min	More than 20 mins	< 2 mmol/l
↘	Between 0.11 and 0.06 mmol/l / min	Average 15 mins	2-3 mmol/l
↓	> 0.11 mmol/l / min	Average 7 mins	at least 3 mmol/l



Current rules are built for pre-meal testing –  
*but CGM data fill in the post-meal glucose profiles*



# How should we react to arrows?

GREEN SLOPE

DN 1° RT 1°

160

HOLE 3 PAR 3

BIRD'S-EYE VIEW PRESS AND HOLD HELP BUTTON

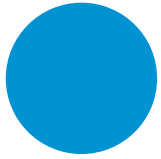
Stroke 1

NOB

E

5

154 y

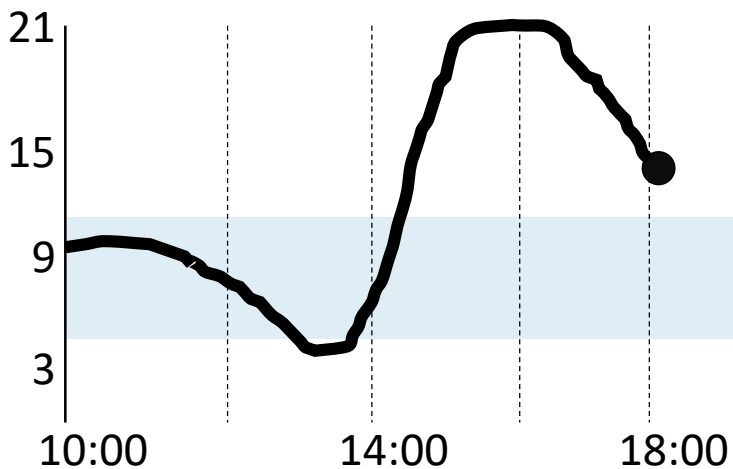


# BOLUS



# 1 - 2 - 3 rule

**15.0**  $\frac{\text{mmol}}{\text{L}}$



- 1 -Hour glucose tells you about the timing of the insulin – did you take it early enough
- 2- hour glucose tells you a little about if you did take enough [ and if too much, is a common time to hypo]
- 3- hour glucose tells you if you had fat / protein in your meal or if you need to take some extra correction.

There is not much corrective action to be taken in the 2 hours post –meal, so not much point in scanning (unless you suspect a carb estimation problem). You should think about scanning between 2-3 hours post meal – that is the time when you may want to make a decision around carbs or insulin based on the results.

# Adjusting bolus based on arrows

- As a rule
- if you have an ↗ OR ↑ you may want to add some insulin to the bolus to account for the direction and rate of change
- If you have an ↘ OR ↓ you may want to subtract some insulin to account for the direction or rate of change



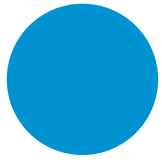
# Possible options

Rate of change	Rule
ISF based rule	Add or subtract a fixed amount of insulin from the calculated dose based on the arrows
Predicted glucose rule	Based on the arrows, predict what the glucose will be in 30 mins and use that glucose value to calculate the dose
10/20% rule	Increase or decrease calculated bolus by 10 or 20% based on the arrows

# How should we react to arrows?

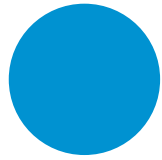
# Which system to use?

- As you can see they all give slightly different results, and none of these are an exact science
- Differences are a little larger for larger meals and those who are less insulin sensitive
- For simplicity, we advise using the ISF [ $\pm 0.5$  or  $\pm 1.0$ ] method...

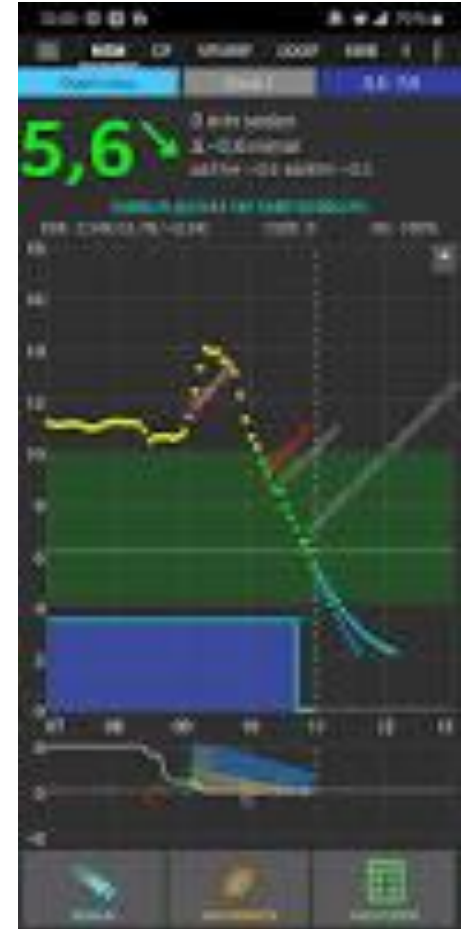
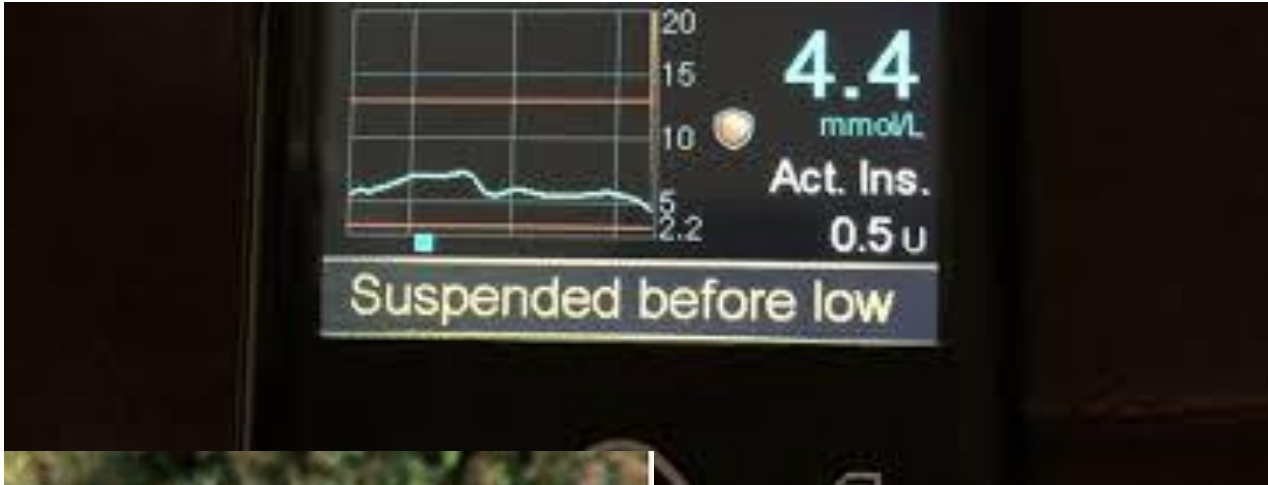


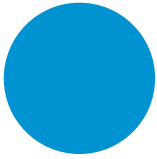
# How to use alarms?

	Level	Action
Rate of rise alert		
Predicted High alert		
High Alert		
Rate of fall alert		
Predicted low alert		
Low Alarm		

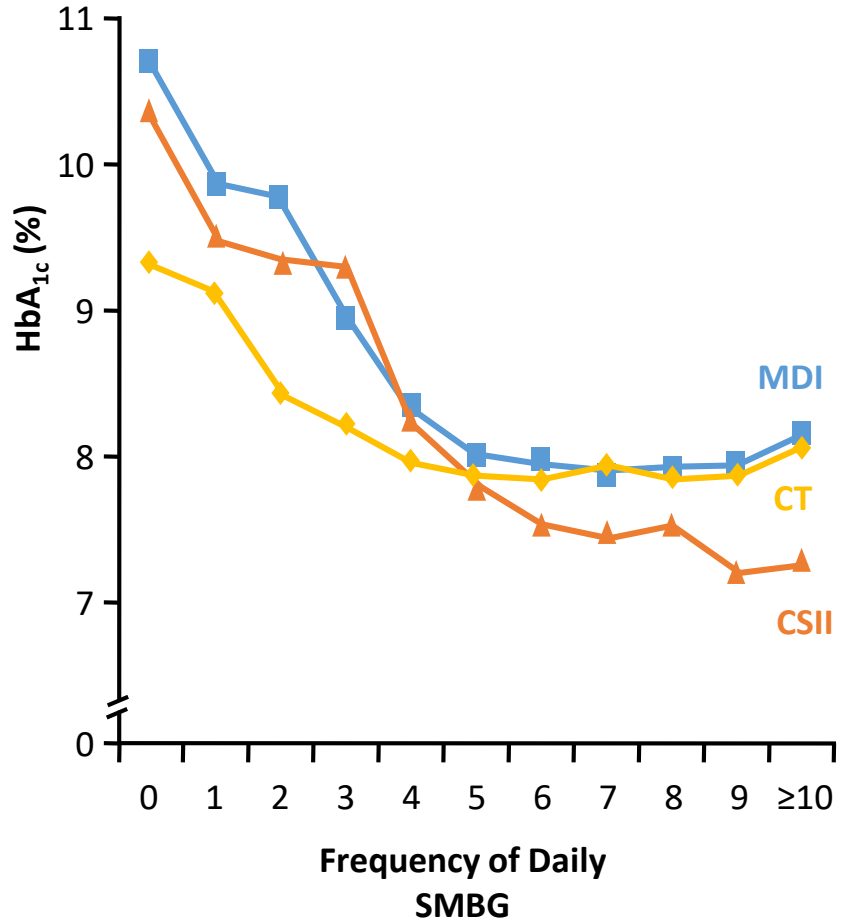
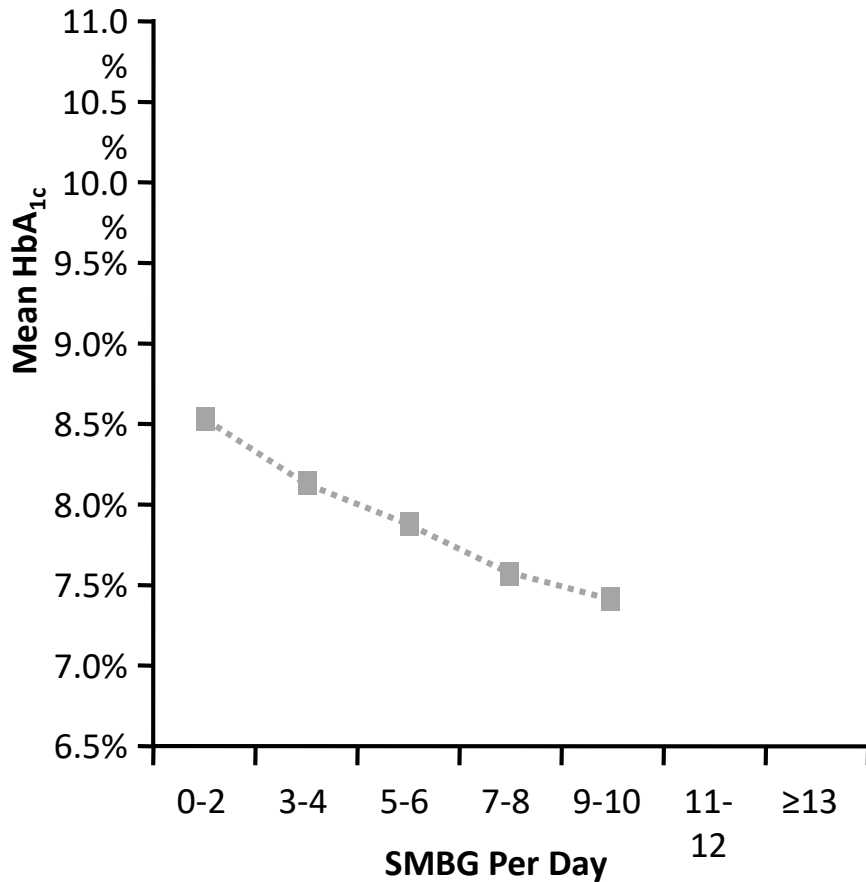


# Alarms in integrated systems





# Relationship Between CBG Frequency and HbA<sub>1c</sub>



Left chart: Adapted from Miller et al. Diabetes Care 2013; 36:2009-2014.

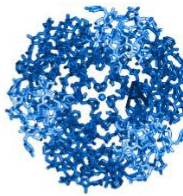
Right chart: Ziegler; Ped Diabetes, 2011 Feb.

# Summary

- Best times to scan are
  - Pre meal to help calculate the dose
  - About 2-3 hours post-meal – to make sure you are not going low OR to decide if you need to correct
- If glucose rising – think where you will be in 30 mins
- If glucose falling – think how long it will take you to reach hypo levels and what action is needed
- Small doses of carb to prevent hypos
- Can also adjust rapid acting insulin based on allows pre- meal



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3. **Getting started with FreeStyle Libre** – Dr Peter Hammond, Harrogate [Watch now](#) (11:58)
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5. **Basal insulin** - Dr Emma Wilmot, Derby [Watch now](#) (7:54)
  - with insulin pens
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  - Introduction
  - Fats and Protein and the Freestyle Libre (online only)
7. **Bolus insulin** – Dr Jackie Elliott, Sheffield [Watch now](#) (13:10)
  - with insulin pens
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  - **Hypoglycaemia** - Dr Pratik Choudhary, London
  - **Understanding arrows** – Dr Pratik Choudhary, London



<https://abcd.care/resource/pen-therapy>

<https://abcd.care/resource/reviewing-data>

# ISF rule [ for those with ISF 2.5 - 4 mmol/l

ISF 2.5 - 4	Calculation	Adjustment for arrows
↑	Calculate dose based on carbs and current glucose	Add 1 Unit
↗	Calculate dose based on carbs and current glucose	Add 0.5 units
→	Calculate dose based on carbs and current glucose	-
↘	Calculate dose based on carbs and current glucose	Subtract 0.5 unit
↓	Calculate dose based on carbs and current glucose	Subtract 1 unit

If insulin resistant {ISF < 2 or total daily dose > 60 units} – double the adjustment for arrows to 1 and 2 units respectively

If very insulin sensitive [or total daily dose < 25 units] take ½ the amount – ie 0.2 and 0.5 units respectively