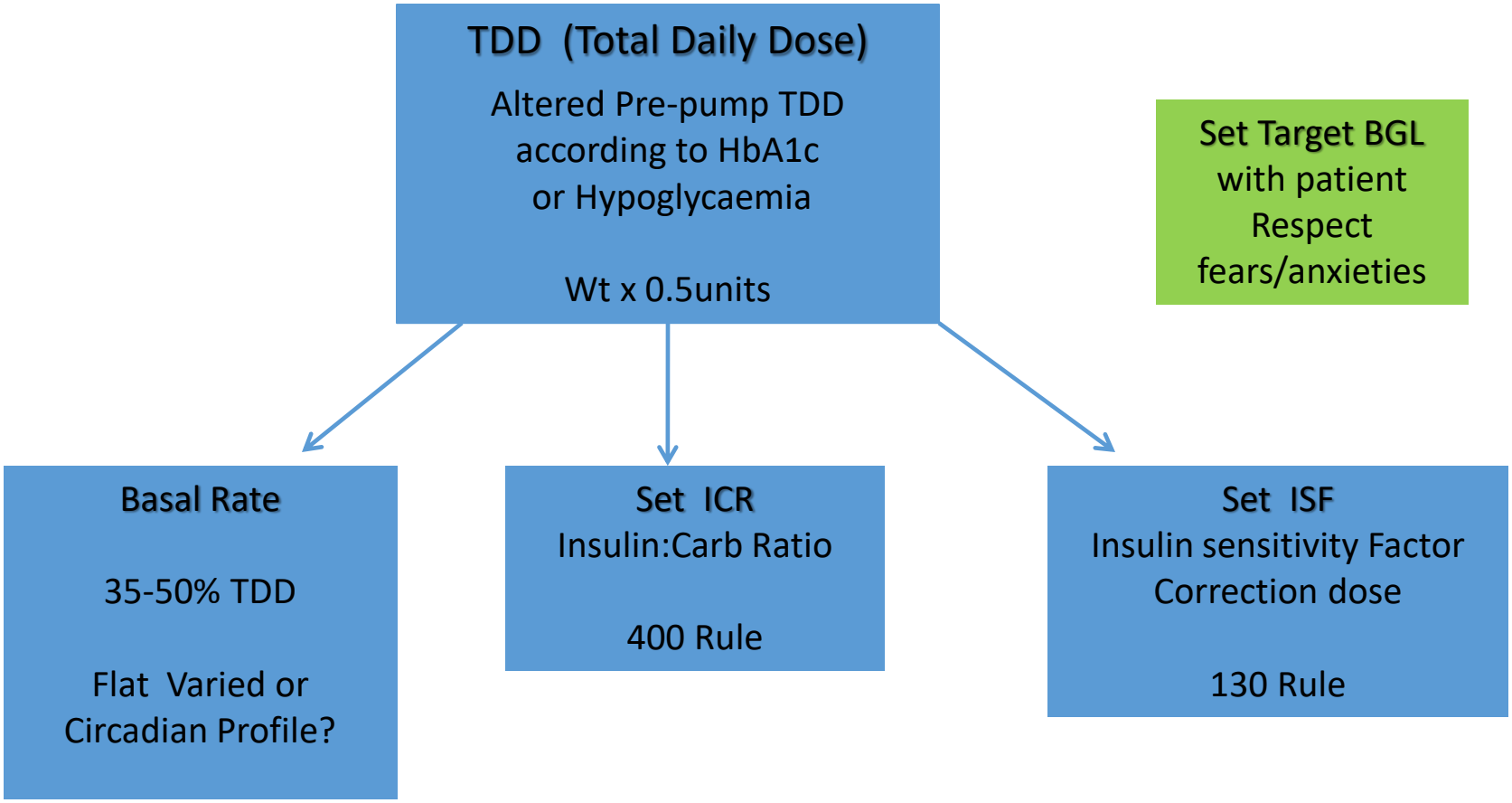
Getting Ready for pump therapy - the calculations!

Calculations



DTN UK Best Practice Guide - 2018

Determining Total Daily Dose

1. Based on patients' pre-pump insulin doses

   Average over 4 days combined

   Background dose

   Meal doses

   Correction doses

   Reduce by 5-30% (average 75%) depending on glycaemic control pre-pump, pregnancy or daily carbohydrate intake

2. Based on body weight
   - Wt (kg) x 0.5units

Determining Basal Rate

- The basal insulin on the pump should be roughly 30- 50% of the total daily dose, dependent on carbohydrate intake.

- Anticipated basal % of the total daily insulin dose:

  Basal 40-50% when: - carbohydrate intake 100 - 200g/day

  Basal < 30% when: - high carbohydrate intake (> 200 g/day) or

  - > 10 micro-boluses/day

  Basal > 50% when: - low carbohydrate intake

  - inadequate bolus insulin

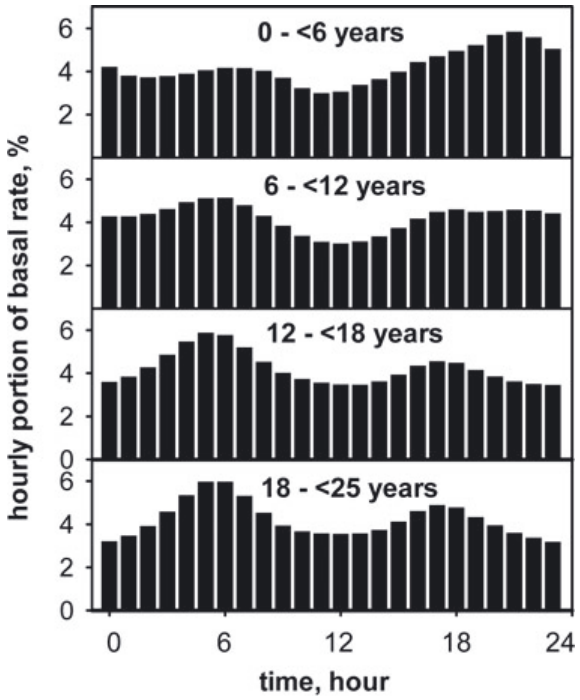
  - using predictive suspend in some cases

  - insulin resistant (TDD > 0.7u/kg)

Flat Rate or Circadian Profile?

Flat Rate

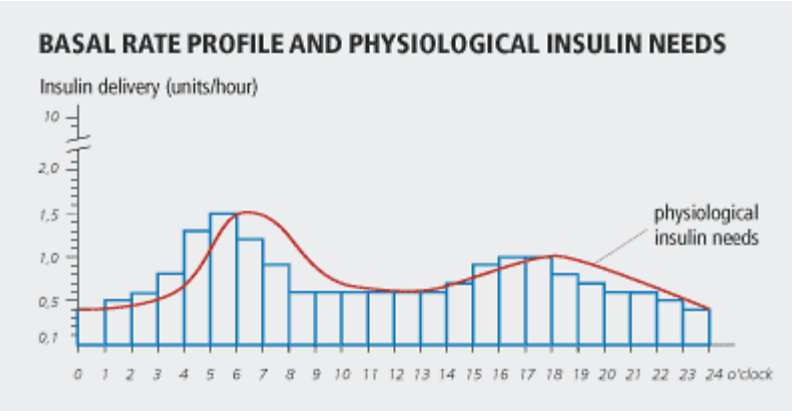
- Simple
- Total Basal /24hrs



Circadian

- More physiological
- Takes account of Dawn effect.
- Total Basal automatically profiled according to age
- Based on Rainer Bachran et al. Pediatric diabetes 2011
- Immediately provides for variable insulin requirements.
- Minimises the changes to optimise control
- Evidence based on paediatric populations

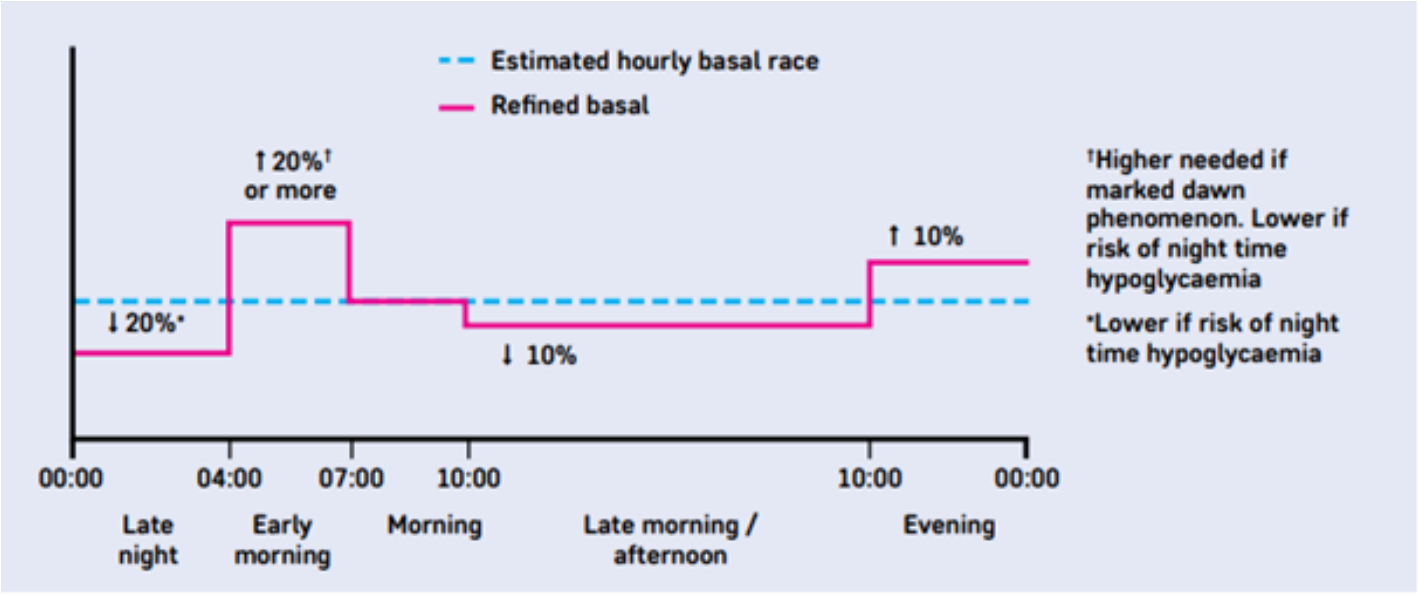
Roche Configuration



- Easy
- Can set up 1 to 5 profiles with 5-10% increase / decrease in total basal dose to allow for easier changes in the first few weeks.
- NB: patients still need to understand how to self adjust

Modified Basal Rate Profile

From DTN UK Best Practice Guide – adapted from Hussain & Oliver: Insulin pumps and continuous Glucose Monitoring Made Easy, 1e, 2016, Elsevier Ltd



Calculating insulin:Carb Ratio (ICR)

(King et al 2016)

400 Rule

$$\frac{400}{TDD}$$

- Post prandial BG levels target
- Expect BGL to rise by 2-4mmol/l 2 hrs after eating
- Variability according to meal composition e.g. Glycaemia load

More accurate calculations
Important effectiveness
E.g. change from 1:10g to 1:9g can lower postprandial BGL by 1.8-2.9mmol/l at a meal of 60-100g CHO.

Calculating ISF -Insulin Sensitivity Factor (Correction Ratio) (King et al 2016)

130 Rule

$$\frac{130}{TDD}$$

How much 1 unit insulin lowers BGL by (mmol/l)

Goal to return BGL to target by 4hrs post-correction

Pre meal blood glucose target

- Agree individual targets with patients
- Target should be realistic and not too low for first two weeks
- The aim for first 2 weeks is for level blood glucose readings
- Patients can set BG testing reminder alarms

Bolus Calculators

Consist of:

- Target BG (Range)
  - *In agreement with patient – encourage regular evaluations*
- ICR
- ISF
- Active Insulin Time
  - Length of time calculator tracks active insulin following bolus (correction & bolus)
  - Adults - 4-5hrs
  - Children - 3-4hrs

Patient Confidence?

Summary & Considerations

- Accurate calculations important for effective glycaemic control in pump therapy – with all pump systems!
- Patients level of glycaemic control pre-pump
- Different calculations options
- Patients' perspective/health beliefs. Need to problem solve and agree targets etc.
- Can patient comprehend the maths?
- Do they need to (bolus calculators)?
- Are they able to review & adjust settings as they progress?
- Don't forget importance of effective insulin absorption – good cannula care/avoid LH!

Good luck with your calculations!