

@PumpYork



# *'De-mystifying tech for the diabetes MDT - how to upskill all in pump therapy'*

Rachael Bealey

Insulin Pump and Technology Lead

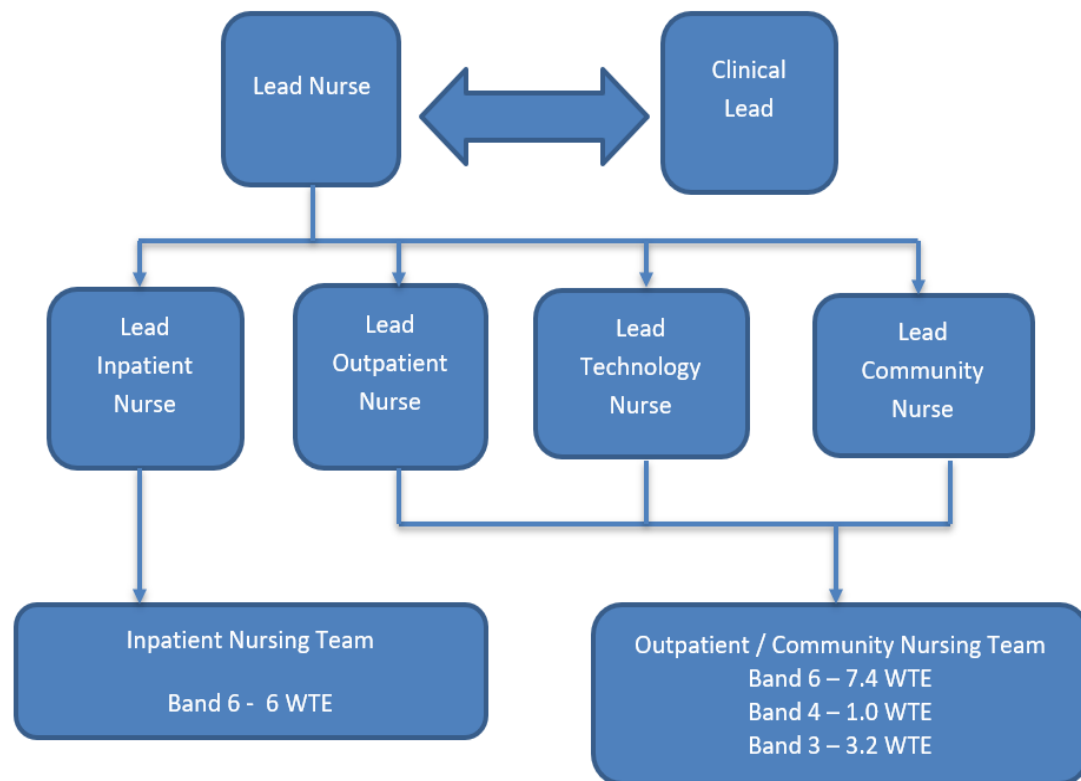
York and Scarborough Teaching Hospitals NHS Foundation Trust

[rachael.bealey1@nhs.net](mailto:rachael.bealey1@nhs.net)

# Background

- ▶ Type 1 diabetes population 1,929
- ▶ Insulin pump users 532
- ▶ Hybrid closed loop 133

# The Team



- ▶ Consultants
- ▶ Registrars
- ▶ Dietitians
- ▶ Pump Administrator

# Insulin Pump and Technology Lead Role

- ▶ Enthusiastic resource!
- ▶ Structure and consistency in information and services
- ▶ Developing the service- new technology
- ▶ Staff education
- ▶ Pump user education

# Staff Education

- ▶ Exposure, exposure, exposure!
- ▶ Expectations v reality

# Challenges

- ▶ Different levels of knowledge/expertise
- ▶ Confidence
- ▶ Time pressures
- ▶ Rapid changes in technology and guidelines
- ▶ Other priorities
- ▶ Working days

# Staff Education

- ▶ Triage calls
- ▶ Pump users in general clinics
- ▶ Glooko Academy
- ▶ In house training sessions and competencies (use industry)
- ▶ Observing education sessions for pump users/pump starts/upgrades/HCL
- ▶ MDT discussions
- ▶ Case reviews/data reviews

# Competencies



# Competencies

## **OMNIPOD DASH PUMP COMPETENCIES:**

- Button Functions
- Charging
- Home Screen
- Enter Basal Pattern
- Change basal rates within a Basal Pattern
- Temp. Basal (set and stop)
- Suspend Delivery
- Enter/change Bolus Wizard settings
- Using Bolus Wizard
- Fill and start pod/pod placement
- Access to Virtual Pump Demo App

[Omnipod DASH® Insulin Management System \(omnipod-staging.netlify.app\)](#)

Self-declaration of competence:

Date:

Print:

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## MEDTRONIC 780G PUMP COMPETENCIES:

- Button Functions/Shortcut keys
- Battery type
- Home Screen
- Enter Basal Pattern
- Change basal rates within a Basal Pattern
- Temp. Basal (set and stop)
- Suspend Delivery
- Enter/change Bolus Wizard settings
- Using Bolus Wizard
- Fill reservoir and change infusion set  Sure T  Mio Advance
- Access to Virtual Pump Demo

[Medtronic \(medtronicvirtualpump.com\)](http://medtronicvirtualpump.com)

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## TANDEM T:SLIM X2 PUMP COMPETENCIES:

- Button Functions/Shortcut keys
- Charging
- Home Screen
- Enter Personal Profile
- Change/add settings and time blocks within Personal Profile
- Temp. Basal (set and stop)
- Suspend Delivery
- Using Bolus Wizard
- Fill cartridge and change infusion set  TruSteel  Auto-Soft 90
- Access to Virtual Pump Demo App

[t:simulator™](#) App (Google play/App Store)

Self-declaration of competence:

Date:

Print:

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Verified by:

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# Resources

- ▶ Virtual demo pumps



[Omnipod DASH® Insulin Management System \(omnipod-staging.netlify.app\)](http://omnipod-staging.netlify.app)



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## T:SIMULATOR APPLICATION

Explore the interface of the t:slim X2 pump with our free demo app

Click the badges below to visit the download page for your device.



# Resources

- ▶ Accessibility of information
- ▶ Pump/HCL/CGM folders
- ▶ ‘Crib’ Sheets
- ▶ Pregnancy guides
- ▶ Diabetes Record
- ▶ DTN videos <https://abcd.care/dtn>
- ▶ PANTHER tools <https://www.pantherprogram.org/clinic-tools>



**NHS**  
York and Scarborough  
Teaching Hospitals  
NHS Foundation Trust



### Hybrid Closed Loop Pumps

#### Adjustable Parameters:

#### MEDTRONIC 780G:

- **CAN ADJUST:**
- ICR
- Active Insulin – aim 2 to 3 hours
- Glucose Target- 5.5, 6.1, 6.7
- Can use **TEMP TARGET**- 8.3mmol/L NO auto-corrections
  
- **CANNOT** adjust basal rates, ISF
- **CANNOT** use ~~Lyumjev~~ ~~Fiasp~~
- **NO** extended bolus

#### TANDEM CONTROL IQ:

- **CAN ADJUST:**
- ICR
- ISF (auto corrects up to 60% of ISF every hour as needed)
- Basal Rates
  
- Can use **ACTIVITY** (reduces basal rate if predicted to be below 7.8mmol/L, stops if predicted to be below 4.4mmol/L) , **SLEEP** (NO auto corrections, increases basal rate at lower level of 6.7mmol/L) in addition to different personal profiles which can be set
  
- **CAN** extend boluses up to 2 hours





## Hybrid Closed Loop Pump

### Adjustable P

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- Can use **ACTIVITY** (reduces basal rate to 7.8mmol/L, stops if predicted to be below 7.8mmol/L) (NO auto corrections, increases basal rate to 6.7mmol/L) in addition to different personal basal rates
  
- CAN extend boluses up to 2 hours



**Managing Activity on Medtronic 780G SmartGuard**  
Managing activity on hybrid closed loop pump systems can still be tricky. Below are some of our top tips but please bear in mind that glucose levels respond differently to activity for everyone, so this is just general advice. Some people find that they need to come out of SmartGuard completely during activity. If you would like to discuss this in more detail, please contact us for an appointment.

#### TOP TIPS:

- Use the TEMP target for activity, means the system tries to keep your glucose levels around 8.3mmol/L and does not do auto-corrections.
- Ideally try to start the TEMP target 1 to 2 hours before activity.
- **DO NOT** eat extra carbohydrates before activity without giving a bolus dose of insulin. SmartGuard will notice a rise in glucose levels and will try to correct this by increasing basal rates and giving auto-corrections if required. If you need to take in extra carbohydrates during activity, we recommend "drip feeding" these- up to 8g (e.g. 2x jelly babies) every 20 minutes as required.
- You may need to keep your TEMP target running for up to 90 minutes post activity





**Hybrid Closed Loop Pump**

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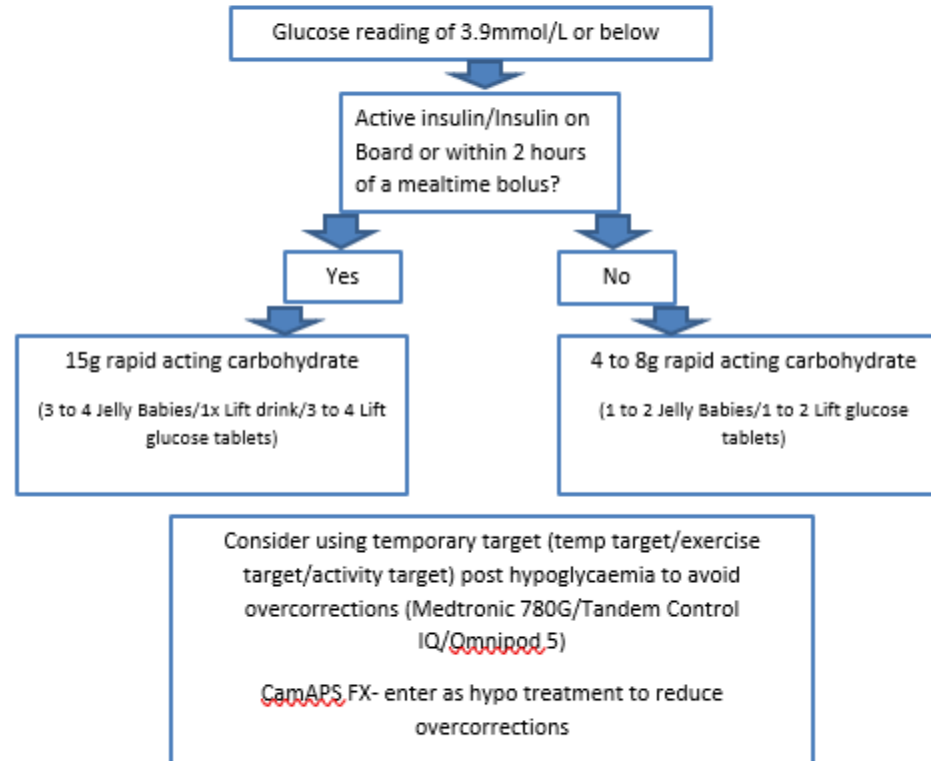
**Managing Activity on Medtronic 780G**  
Managing activity on hybrid closed loop pump. Below are some of our top tips but please be aware that people respond differently to activity for everyone. People find that they need to come out to discuss their activity. If you would like to discuss this at your appointment.

**TOP TIPS:**

- Use the TEMP target if glucose levels are rising
- Ideally try to avoid activity if possible
- DO NOT increase the dose of insulin if you are having a hypo

**Management of Hypoglycaemia on a Hybrid Closed Loop (HCL)**

**REMEMBER:** the HCL system has already made reductions to your insulin doses so you need **LESS** hypo treatment



Hybrid Closed Loop Pump

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15g rapid actin  
(3 to 4 Jelly Babies/  
gluco:

If blood ketones increase to more than 1.5mmol/L follow algorithm for 'ketones present'  
If you have been trying to correct high glucose and ketones for more than 4 hours with no improvement please seek medical advice: Diabetes Centre 01904 726510 or Out of Hours 111  
Vomiting, abdominal pain and being unable to keep fluids down are RED FLAGS for which you must seek URGENT medical advice through the Diabetes Centre or Emergency Department

Managing High Glucose Levels and Ketones on Hybrid Closed Loop Pumps

Glucose greater than 13mmol/L for more than 2 hours: THINK CANNULA!

Blood ketones negative or trace  
Less than 1.5mmol/L

Stay in closed loop, change cannula & set

- The system will increase basal rates and give auto-corrections to try and manage the raised glucose levels
- Check blood glucose matches sensor glucose
- Give correction if indicated by bolus wizard
- Bolus for carbohydrates as usual
- Check blood glucose and blood ketones every 2-4 hours
- Sip sugar free fluids at least 100mL an hour

Blood ketones present  
Greater than 1.5mmol/L

Come out of closed loop

Blood ketones 1.5 to 3mmol/L

Blood ketones above 3mmol/L

Give 10% of usual Total Daily Dose (TDD) of insulin as a correction via pen or syringe injection of rapid insulin

Give 20% of usual Total Daily Dose (TDD) of insulin as a correction via pen or syringe injection of rapid insulin

Change cannula/set  
DO NOT RESTART CLOSED LOOP  
Check glucose & ketones in 2 hours

Ketones 1.5 to 3mmol/L  
Give 10% of TDD via pump every 2 hours & increase basal by 30% (+ usual bolus for carbohydrates)  
Override bolus calculator

Ketones above 3mmol/L  
Give 20% of TDD via pump every 2 hours & increase basal by at least 50% (+ usual bolus for carbohydrates)  
Override bolus calculator

Sip at least 100mL sugar free fluids per hour  
check glucose & ketones every 2 hours

Once ketones less than 1.5mmol/L wait 4 hours after last manual (pen/syringe) injection acting insulin before res



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**Managing High Glucose Levels and**  
Glucose gra

**Pre-Surgery Guidelines for Insulin Pump Therapy**

**Minor Surgery (less than 2 hours):**

Aim for glucose levels ideally between 6 and 10mmol/L pre procedure. Correct via pump if required (glucose levels above 12mmol/L).

Consider starting a temporary basal reduction of -20% 4 hours before surgery to run throughout the procedure and until eating and drinking normally, if glucose levels are below 6mmol/L.

If using a hybrid closed loop system, consider setting a temporary target (temp target/exercise target/activity target/ease off) 4 hours prior to surgery and throughout the procedure and until eating and drinking normally, if glucose levels are below 6mmol/L.

**Major Surgery (more than 2 hours):**

You will need to remove your pump for major surgery, and you will be started on an infusion of insulin.

When restarting your pump use a new cannula if possible and don't forget to fill the cannula if required. Restart your pump 60 minutes before the infusion of insulin is stopped.

If you need any further support or advice please call the Diabetes Centre on 01904 726510 or email [yhs-tr.diabetesnursespatienttriage@nhs.net](mailto:yhs-tr.diabetesnursespatienttriage@nhs.net) (please include full name and date of birth on email)



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### Pre-Surger

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### Hybrid Closed Loop Pump Systems

If you are new to insulin pump therapy then the recommendation is that you start on the standalone pump initially. This is so you are able to develop a good understanding of how the pump works in its basic form in case there are any incidences in the future where the hybrid closed loop feature stops working. The length of time to be on a pump before you start on a hybrid closed loop is very much based on individual needs but a rough guide would be around 3 months.

These are the hybrid closed loop systems currently on offer. It's called a hybrid closed loop as the system has an algorithm which adjusts the background insulin delivery (basal rates) in relation to glucose levels, but you still need to put the carbohydrates you are eating into the pumps bolus wizard and give the insulin for the carbohydrates around 15 minutes pre-meal.

If glucose levels are rising out of the pre-set glucose target then basal delivery is increased, if glucose levels are dropping the basal delivery will reduce and suspend if you are predicted to be hypoglycaemic, restarting once glucose levels start to rise. The system will also allow the pump to give small automatic correction doses to reduce glucose levels if needed. The way in which these systems do this depends upon the specific system as they all use different algorithms.

### CamAPS Fx system with Dexcom G6 CGM and DANA i or YPSOpump



- This system uses a phone App to control the pump.
- It is only available on certain Android phones ([Dexcom Compatibility Tool | Dexcom](#)).
- You can give a bolus from your mobile phone App and review data from Dexcom and the pump on the App.
- You can set your glucose target between 4.4 and 11mmol/L
- Advanced features include extended bolus doses and recognition of hypoglycaemia treatment to prevent system responding to rise in glucose levels post hypo treatment, Boost and Ease Off to increase or reduce insulin delivery.

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# INSULIN PUMP PORTFOLIO

A resource for people new to pump therapy



**Pre-Surger**

**Minor Surgery (less than**

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If using a hybrid closed loop target/exercise target/act throughout the procedure levels are below 6mmol/L

**Major Surgery (more than**

You will need to remove on an infusion of insulin.

When restarting your pump fill the cannula if required of insulin is stopped.

If you need any further support 01904 726510 or email [ytdiabetes@nhs.uk](#) include full name and date

**Hybrid Closed Loop Pump Systems**

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# INSULIN PUMP PORTFOLIO

A resource for people new to pump therapy

**Insulin Pumps and Pregnancy**

This is a 'quick tip' sheet for use of pump therapy during pregnancy, labour and delivery, and post-natal.

When you find out you are pregnant you will be offered a face to face appointment in the Diabetes Centre. At this appointment we will check pump warranty, give you a print out of your current pump settings, and create a new basal profile for you to make adjustments to, as your insulin requirements change during the pregnancy. We will also create a -10% and -20% basal profile for post-natal use if needed.

My Pre Pregnancy Pump Settings		
Basal Rates	Insulin: Carb Ratios	Correction Factor
	Breakfast:	Breakfast:
	Lunch:	Lunch:
	Evening Meal:	Evening Meal:

You will also be offered 12 months of continuous glucose monitoring (CGM). Advice for CGM use is different during pregnancy, as glucose targets are much tighter and small variations between sensor levels and blood glucose levels can have an impact. We would recommend that you check your blood glucose a minimum of once a day (usually first thing on a morning) to check the accuracy of your sensor. We also recommend blood glucose checks:

- Before meals to work out bolus doses
- Before treating hypoglycaemia
- Before correcting high glucose levels

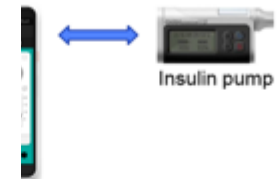
**Loop Pump Systems**

The recommendation is that you start on the standalone pump to gain a good understanding of how the pump works in its own right. In the future where the hybrid closed loop feature stops for you start on a hybrid closed loop is very much more likely to be around 3 months.

It is currently on offer. It's called a hybrid closed loop as the pump provides ground insulin delivery (basal rates) in relation to what you are eating into the pumps bolus around 15 minutes pre-meal.

As your target then basal delivery is increased, if glucose is predicted to be high and suspend if you are predicted to be low. The system will also allow the pump to deliver insulin if glucose levels if needed. The way in which these pumps work as they all use different algorithms.

**CGM and DANA i or YPSOpump**



Smartphone (iOS/Android)

Use the pump. Check the pump settings (Dexcom Compatibility Tool | Dexcom). Use the Dexcom App and review data from Dexcom and the pump.

When glucose is below 4.4 and 11mmol/L, the pump will deliver a bolus dose and recognition of hypoglycaemia to rise in glucose levels post hypo treatment, Boost in delivery.

# Questions?...

▶ [rachael.bealey1@nhs.net](mailto:rachael.bealey1@nhs.net)

@PumpYork

