Diabetes Specialist Nurses
Email kch-tr.diabetesnurses@nhs.net
Tel 02032991353
Out of hours emergency diabetes advice:
Tel KCH switchboard (02032999000), ask for 'operator', then ask for 'Diabetes Consultant-on-call'

INFORMATION LEAFLET ON HYBRID CLOSED LOOP INSULIN PUMP SYSTEM
CamsAPS FX Hybrid Closed Loop (HCL) system

Below is some information, guidelines and reminders that you might find useful about the algorithm on your current pump with the CamsAPS FX Technology and the adjustable settings on this HCL system.

There is also useful guidance and information on additional aspects such as exercise management, hypoglycaemia management, sick day rules management, travel, back up insulin pens and needles and reverting to pens if required, data sharing and best practice tips,
There is also a QR code for the Diabetes Technology Network HCL Information Sheet, which also contains important information on travel guidance, DKA avoidance checklist, management of unexplained hyperglycaemia and sick day rules management pathway/guidance.

Please contact the Diabetes Specialist Nurses, as per above contact information, should have any additional concerns or require any advice between routine scheduled appointments.

Target	Customisable from 4.4-11.1 (default 5.8). Options for different targets set for different times of day. NB 'Person Glucose Target' on App to set/change algorithm target, not glucose target within the bolus calculator section on App.
Automated corrections	This is incorporated into the continuous insulin delivery (basal). Adjusts insulin delivery every 8-12 minutes depending on all factors (target, insulin on board, sensor glucose and direction and predicted value in 30 mins). There is boost function option in addition (if experiencing period of elevated glucose levels ie if stressed, unwell without ketones, hormonal)
Basal insulin suspension within algorithm	Basal auto adjusts as above and will suspend if predicted glucose value in 30 minutes will result in hypoglycaemia. Algorithm will restart automated basal insulin when glucose value predicted to be above safe level in 30 minutes

Adjustable settings within algorithm	Insulin to carb ratio. Increasing the number (g) will deliver less insulin. Decreasing the number (g) will deliver more insulin. Recommend 1g adjustments and review.	Target glucose level. Options as per above.	NB Update weight in App every 6 months or if +/- 5kg

Recommended target and active insulin time according to current diabetes control	Below suggested targets on starting system (with gradual adjustment over weeks/months):	
	HbA1c	**Personal Glucose Target (mmol/L)**
	<7.5% or 58mmol/mol	5.5
	7.6-9.0% or 59-75mmol/mol	6.5-8.0
	>9.0% or 76mmol/mol	8.0-11.1

	*Suggest higher target 8.0-11.1 if active eye disease and HbA1c(or eGMI on sensor data) >9.0% / 75mmol/mol, please discuss with diabetes specialist nurse (DSN) *Suggest discuss with DSN if HbA1c (or eGMI on sensor data) >10% / 86mmol/mol			
Learning mechanisms	Overall insulin needs, continuous daily requirements (diurnal), post meal values.			
Exercise or Activity management (starting guidance only, individual adjustment according to type / intensity / duration)	Recommend using Ease off function 90-120mins prior to activity (if planned), during activity and 15 mins post. This reduces insulin by up to 35% and raises target by 2.5mmol/L and more relaxed algorithm to reduce hypoglycaemia risk. *Can be scheduled for now or in the future *Can also have higher target set in addition to Ease off if required.	Bolus modification: Input less carbohydrates if bolusing within 2hrs pre exercise (so less active insulin on board) or within 2 hours post (as more sensitive), to reduce hypoglycaemia risk. Suggest enter 60-70% of total carbs as starting guidance. Adjust according to response / duration / intensity	Avoid carbohydrate 'pre loading' before exercise as glucose will rise and pump will deliver more insulin in response. Suggest action 15 mins pre exercise: • BG <7.0mmol/L have 10g carb • BG <5mmol/L have 20g carb	If problems with BG dropping despite other adjustments: 'drizzle' effect: 5-10g fast acting carbs at start and every 20 mins during activity. If glucose elevated post activity (usually anaerobic activity), suggest use Boost function.
Hypoglycaemia management	Recommend 5-10g of fast acting carbohydrate every 15 mins until glucose >3.5mmol/mol. Always consider insulin on board and trend arrow.	Enter hypoglycaemia treatment (g) into App using 'add meal' option, then 'hypoglycaemia treatment' to inform algorithm glucose taken on board for that purpose	Recommend using blood glucose meter for hypoglycaemia management: to confirm hypoglycaemia and following treatment due to sensor lag after fast acting carbohydrates (to avoid then over treating)	
Sick day rules management	See attached HCL Information Sheet with sick day rules management guidance	Ensure you have a ketone enabled blood glucose meter with in date ketone strips.	Temporary basal rate accessed on Ypsomed pump (after turning off Automode via App). On pump – go to basal icon – percentage icon – set basal rate NB 100% is baseline basal rate.	
Manual insulin suspension	Whenever disconnect from pump (ie shower, bath, swimming, contact sports), as algorithm otherwise assumes the insulin on board in system and will adjust accordingly. Resume insulin as soon as re-connect to pump.			
Back up insulin pens and needles	Require access to these at all times for use in event of insulin pump failure and	Always take with you when travelling (keep in hand luggage)	To revert back to insulin pens, suggest total HCL basal for last 2 weeks as guide to total daily basal insulin with	

	management of sick day rules (ketones).			pen device. Carb ratio and insulin correction/sensitivity as per pump bolus calculator settings. Contact diabetes team as per above if advice needed.
Travelling	Email diabetes specialist nurses as per above email address to request travel letter for airport security purposes	Insulin pump must NOT go through X-ray machines used for carry on/checked luggage nor the full body scanner. Pump and sensor can withstand exposure to airport metal detectors. Removal of insulin pump at infusion site or screening process not using x-ray is required.	Dexcom or Libre 3 sensor should not go through the full body scanning machine or be exposed to x-ray scanning machine.	See TRAVEL CHECKLIST in HCL Information sheet attached
Data sharing / pump uploads	- Via Glooko platform (https://glooko.com). Ensure your Glooko account is sharing with King's College Hospital. Sharing code: **kings** - CamsAPS FX App - must then link this with Glooko via Share option in menu, add your Glooko account details under User 1 - Auto uploads to Glooko in real time via Cams APS FX App			

Best practice tips	1.Pre meal bolusing 10-15 mins
	2. Bolusing for all carbs to be consumed via bolus calculator
	3. Correct via bolus calculator if required
	4. Responding to alerts and alarms
	5. Timely infusion set changes (2-3days depending on type)
	6. If missed pre meal bolus:
	    • If within an hour after eating, enter half carbs consumed into bolus calculator for bolus dose
	    • If more than an hour after eating, correct via bolus calculator
	
	7. High fat meals: enter percentage of carbs up front into bolus calculator (ie 60%), enter remainder of carbs into App using 'add meal' option, then 'slow absorbed meal' to inform algorithm – will be more aggressive later
	8. Follow unexplained hyperglycaemia guidelines in attached Information sheet if glucose >15 for more than 2 hours.			

DTN HCL Information sheet including sick day rules QR code: