

Paediatric Diabetes – Mandatory Training













Safer Use of Insulin Module



In addition to this package, you must complete the Safer Use of Insulin module via E-Learning for Health.

National E-Learning through e-Learning for Healthcare:

Access to this requires your use of your Trust or NHS e-mail address and, where your profession is part of a registered body (e.g. GMC, NMC), your registration number. A step-by-step guide explaining how to register with the portal and complete its online programmes is available for viewing or printing <u>here</u>.





Learning Aims of In-Service Training

- Consolidate learning from Mandatory Training E-Learning Module
- Strengthen links and communication between ward and diabetes team
- Improve ward team's confidence in care of children and young people with diabetes
- Opportunity to share ideas for improving future practice and support for ward team





Paediatric Diabetes Mandatory Training (1)

What is Type 1 Diabetes ? - Causes, Incidence and Symptoms

Key messages for Patients

Presentation and Initial Management

Blood Glucose Testing

Ward Care Plan and Daily Record Sheet

Insulin Therapy

Injections & Pen Devices

Safe Sharps

Carbohydrate Counting





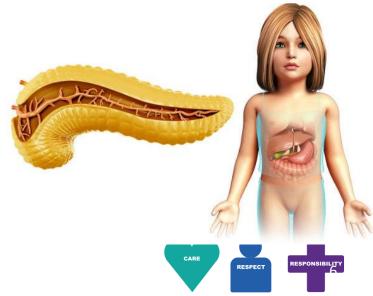
Hypoglycaemia
Hyperglycaemia
Ketones
Support at Diagnosis
HbA1c
Life after Discharge
Admission due to Illness or Surgery
Transition
Pumps and Sensors
Further Support from the Team & Other Sources



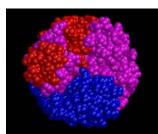


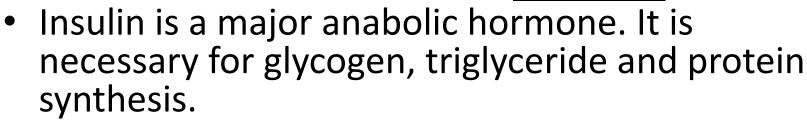
Type 1 Diabetes

- It's not connected with diet, weight or lifestyle it is an auto-immune response.
- The body attacks the cells that make insulin –the Beta cells in the islets of Langerhans in the pancreas.
- Then the body is unable to produce any insulin at all.
- Type 1 diabetes becomes clinically symptomatic when 90% of pancreatic beta cells are destroyed.



Insulin





- Following the consumption of a meal, glucose concentration in the blood rises. Insulin is needed to facilitate glucose entry into cells via glucose specific transporters, particularly in the muscles and adipose tissue.
- Insulin stimulates glycogen synthesis in the liver and muscle and inhibits gluconeogenesis in the liver.



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Insulin Deficiency

- Insulin deficiency in type 1 diabetes leads to hyperglycaemia and glycosuria. This leads to polyuria, urinary losses of electrolytes, dehydration and compensatory polydipsia.
- There is also an increase in the stress hormones adrenaline, cortisol, growth hormone and glucagon, which further increase the blood glucose and metabolic decompensation.
- Fat is broken down in the cells to meet cellular energy needs with resulting ketone body formation.
- Ketones result in metabolic acidosis and compensatory rapid deep breathing in an attempt to increase CO2 excretion (Kussmaul breathing).
- Ketones are excreted in the urine and further increase the osmotic diuresis and dehydration producing the clinical picture of diabetic ketoacidosis.



Cause of Type 1 Diabetes

- Exact cause unknown, but contributory factors from evidence:
 - inherited genetic predisposition
 - preceding viral infection
 - early introduction of cow's milk
- Genetic factor 5-6% increased risk for siblings, up to 20% increased risk if identical twin
- Diabetes CANNOT be cured, but MUST be controlled.





Incidence and Prevalence of Type 1 Diabetes

- Type 1 diabetes accounts for 95% of all childhood and adolescent diabetes, but only 5-10% of overall diabetes (both adults and children)
- The incidence of type 1 diabetes in children under the age of 15 is 196.4/100 000
- 28,597 children and young people in the UK with type 1 diabetes
- The incidence is rising by almost 2% a year. (NATIONAL PAEDIATRIC DIABETES AUDIT 2018/19)





Differences between Type 1 & Type2

	Type 1 Diabetes	Type 2 Diabetes
Cause	Pancreas stops producing insulin	Pancreas produces inadequate amounts of insulin and/or the cells of the body become resistant to insulin
Treatment	Tablets won't work as no insulin is being produced at all. The patient therefore needs to be given insulin, which is a hormone that would be digested if administered orally (hence the need for injections)	Diet and Lifestyle changes. Patients can take tablets to make them more sensitive to insulin that is produced and also to influence the pancreas to produce more insulin. They may also need insulin injections.



Key Messages on Diagnosis





CARE RESPECT RESPONSIBILITY



Initial Symptoms



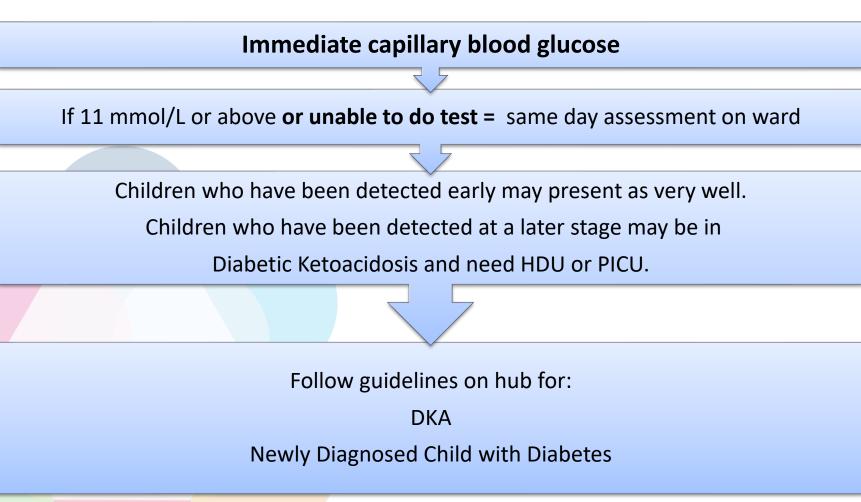
In young children or children with a disability, symptoms may be less obvious.

If in doubt, test blood glucose.





Any suspicion of Type 1 Diabetes?





What can I do to support them before the Specialist Team come?



After medical diagnosis:

• Give "newly diagnosed patient" blue rucksack

 Get the Patient Information Leaflet out and give it to the family (Can be printed from Hub)
 "Diabetes in five minutes – a survival guide for going home Paediatric Diabetes Department"





Blood Glucose Testing

How- Avoid pads of fingers, thumb and forefinger Handwashing is vital – no alcogel or baby wipes – dry well Wipe away first blood drop

When – Pre-meals, 2 hours post meals, Before bed & if symptomatic

Use Fastclix Device in Rucksack (not Unistix – more painful)









Monitors given on diagnosis





Accu-chek Instant Meter

CareSens Dual Ketone Meter

Both have user guides in their boxes and are straightforward to use.

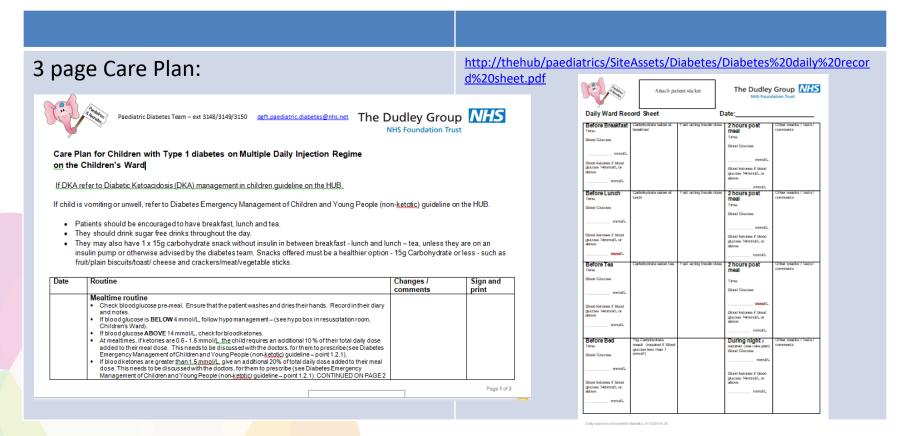




CARE

RESPECT

Ward Care Plan & Daily Record Sheet



These tools have been developed to support the ward team to deliver safe and consistent care. Please use them!

Treatment Aims of Insulin Therapy

- Alleviate primary symptoms and sustain life
- Promote normal growth and development
- Avoid complications
- Enable a good quality of life
- Target range of 4-7mmol/L



All patients commenced on

Multiple Daily Injection (Basal/Bolus) Regime from diagnosis (unless Consultant instructs otherwise)







Multiple Daily Injection/Basal Bolus Regime – aim to imitate normal physiology

Basal Insulins

- Levemir (Detemir) Lantus (Glargine)
- Tresiba (Degludec)

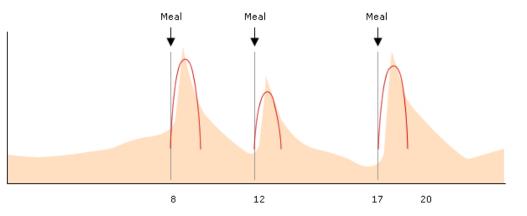
Rapid Acting Insulins

- Novorapid (Aspart)
- Fiasp (Aspart with Vitamin B3)





Bolus Insulin Profile

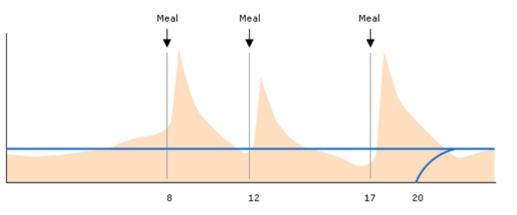


- Red line shows action of Novorapid (Aspart)/Fiasp (Aspart with Vitamin B3)
- Pink background is normal physiological insulin levels
- Bolus Insulin provides rapid increase in blood insulin levels after meals (food bolus) and limits hyperglycaemia after meals
- The dosage required is related to the amount of carbohydrate consumed and the blood glucose level.
- Onset 5-15 mins
- Peak 1-2 hours
- Duration 4 hours





Basal Insulin Profile



- Blue line shows the action of Levemir (Detemir) Lantus (Glargine) Tresiba (Degludec)
- Pink background is normal physiological insulin levels
- Basal Insulin provides relatively constant low blood insulin levels during fasting (taken at 20.00 in this example)
- Controls blood glucose in between meals and overnight
- Provides approximately 50% of the total daily insulin requirement
- Basal insulins are designed to have minimal peak and last at least up to 24 hours



Multiple Daily Injection Regime



- At least 3 fast acting injections of Novorapid
- One long acting injection of Lantus or Levemir or Tresiba
- Flexible mealtimes
- Novorapid Inject 15mins before food/ Fiasp 0-10 mins before food (Toddlers maybe initially during/after eating due to difficulty in predicting intake in hospital)
- Lantus/Levemir /Tresiba- To be given within an hour of the same time each night. Parent/Young person to choose a convenient time.

Eg: 8pm – so can be given between 7-9pm

- No need for snacks if not desired (except bedtime if blood glucose below 7mmol/L, see careplan)
- Some adolescents may be prescribed, in clinic by the Consultant, Tresiba (Degludec) as a long acting insulin.

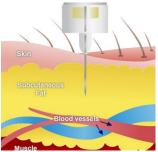
For more information, see <u>https://www.tresiba.com/</u>





Injections

- Sites suitable areas are those with a substantial amount of fat below the skin - thighs, buttocks and abdomen
- Important to rotate sites to avoid injection lumps and poor insulin absorption
- Insulin is injected into the fat layer under the skin short needles mean there is no need to routinely "pinch up" unless it is a very young or lean child. In this case, a gentle skin fold will ensure it does not become an intramuscular injection.
- Must not inject through clothing
- Staff should use Autoshield Safety Needles
- Always give patients 4mm needles













Pen Devices

- Novopen Echo Red used for Novorapid or Fiasp
- Novopen Echo Blue used for Levemir or Tresiba
 0.5 unit increments/max dose 30 units
- Novopen 5 (Silver Novorapid, Blue Levemir or Tresiba) can be used.
 1 unit increments/max dose 60 units)
- Colour of pens are advised by the team for consistency and to reduce errors
- Sanofi Junior Star Blue (0.5 unit increments) or Clikstar Blue (1 unit increments) used for Lantus
- Always do at least a 2 unit air shot before use and be confident insulin is expelled
- All pens come with user guides









NovoPen 5

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Insulin Storage





- Unopened insulin should be stored in a fridge, but refrigerated insulin should be left at room temperature for 1 hour before use.
- Once taken out of the fridge, the insulin can be kept at ambient room temperature for 28 days and must be thrown away after this time.
- Insulin should not be stored near a radiator, in direct sunlight or near any heat source.









It is the responsibility of the ward nurse to supply the sharps box to the patient at bedside at first injection.

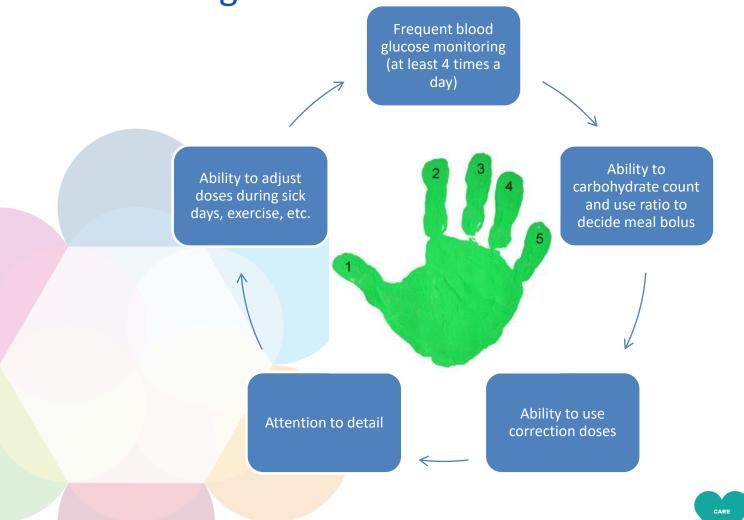
Injection should always be done in close proximity to sharps box.

Sharps boxes should be kept out of reach and with consideration of individual needs of patient, and those in the same area.



A child/their caregiver needs five key skills to achieve good glycaemic control on a basal bolus regime:





Life after the Ward:



- Admission is a golden window of opportunity for education and support from the team. Discharge should be timely but not rushed
- Information has to be repeated and given at the right pace for the family
- More than one carer to be trained where possible
- Negotiating discharge with family are they ready?
- Dietetic Education on ward
- Diabetes Consultant to review before discharge if available
- Order TTO asap to avoid unnecessary delays JAC template
- 2week OPA in Diabetes Clinic
- Initially daily telephone contact from team
- Seen 3 times in first 2 weeks after discharge
- Return to school ASAP following care planning meeting
- Following first OPA, will be seen every 3 months in clinic.





Hypoglycaemia – <4mmol/L Risk Factors & Signs



Risk Factors:

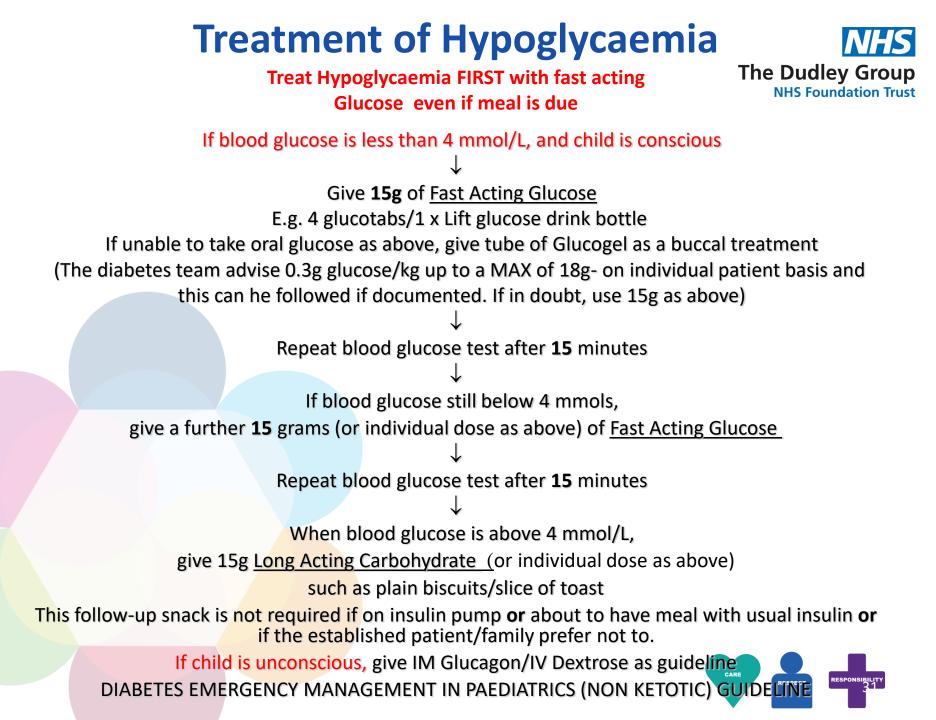
- Missed or delayed meals, Illness, Extremes of weather conditions
- Too much insulin (for various reasons)
- Exercise, which may lead to low blood sugar levels after some hours
- Early signs of a low blood sugar include:

feeling hungry, sweating, tingling lips, feeling shaky or trembling, dizziness, feeling tired, palpitations, becoming easily irritated, tearful, moodiness, turning pale

If not treated, other symptoms may present, such as:

weakness, blurred vision, difficulty concentrating, confusion, unusual behaviour, slurred speech or clumsiness, feeling sleepy, seizures, collapse







Hyperglycaemia

- Symptoms thirst, increased urination, tiredness, blurred vision, headache
- Patients are encouraged to titrate insulin doses to maximise time within range
- If above range **at mealtimes only**, a correction dose should be added to insulin dose for carbohydrate.
- Use patient's correction chart (or will be calculated via the pump if on pump)
- Correction doses should not be given between meals unless on a pump.
- Illness can cause high blood glucose levels see Sick Day Rules Guideline.
- If >14mmol/l, check for Ketones.
- Other reasons for hyperglycaemia:





Ketone Management

- When the body has insufficient insulin to deal with the amount of glucose, it starts to break down other body tissue as an alternative energy source.
- Ketones are the by-product of this process, are poisonous chemicals which , if left unchecked, will lead to metabolic acidosis.
- If blood glucose level greater than 14mmol/L, check for ketones:
- If ketones below 0.6mmol/L, no additional action needed
- If ketones 0.6mmol/L or above, they must have prescribed dose of Novorapid for ketone management – see care plan

Ketones 0.6mmol/L and above – give 10% of Total Daily Dose Ketones 1.5mmol/L and above – give 20% of Total Daily Dose

- Calculate Total Daily Dose by adding together basal insulin + average boluses (excluding correction doses)
- Blood glucose and ketones should be checked 2 hourly until resolved and repeat doses given no more than 2 hourly if required.
- Liaise closely with medical team.



Meal times on the ward



- There is no such thing as a diabetes diet.
- The same principles of healthy eating and regular mealtimes apply as to the rest of the population.



 No-one likes cold food – it usually works best to test, select food and leave in oven if appropriate, calculate insulin dose, inject & eat.

In between meals – sugar free drinks & 1 x 10 g healthy snack ONLY without insulin. Insulin will be required by pen or pump if snack more than 10g.



Carbohydrate Counting

- The ward team have a key role in supporting the family to calculate the total carbohydrate content of each meal/snack.
- It is important that you are able to identify which foods/drinks contain carbohydrates accurately.
- This is needed to calculate the meal time dose of prescribed insulin.
- Mealtime insulin is prescribed according to a ratio
 - E.g: 1 unit of Novorapid to 10g Carbohydrate



Tools to support carbohydrate counting on the ward

- Digital Scales
- Carbs & Cals Book
- Diabetes & Diet Patient Information Booklet on Hub
- <u>Carbohydrate Counting DigiBete</u> videos in different languages









Support at Diagnosis





- This will be a very distressing time for the patient and family, that they will always remember.
- Although life is very manageable with diabetes, the pressure of it can be relentless. They can never have a "day-off".
- Managing glucose levels and insulin requirements will be needed every day for the rest of their life.
- The shock of diagnosis is often described as equivalent to a bereavement.
- A listening ear can mean a lot to an anxious family on diagnosis. If you do not know all the answers, it is ok to say so and to find out for them.
- It is so important that they feel that they are getting the same, consistent messages from all professionals. Please use the leaflets, guidelines and care-plans to support you to support the family.

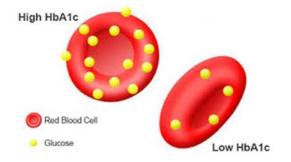




HbA1c

The term HbA1c refers to glycated haemoglobin. It develops when haemoglobin, a protein within red blood cells that carries oxygen throughout your body, joins with glucose in the blood, becoming 'glycated'.

In people who have been diagnosed with diabetes, a glycated haemoglobin (HbA1c) test is often used to show how well their diabetes is being controlled.



The HbA1c test is done every 3 months in clinic and measures the amount of glucose that is being carried by the red blood cells in the body. The higher the levels of glucose in the blood over time, the more glucose will be stuck to the red blood cells. This will result in a higher HbA1c measurement.

An ideal HbA1c level is 48mmol/mol or 6.5%.(NICE Guidelines 2015)

A high HbA1c level (above 9% or 75mmol/mol) means that the patient is more at risk of complications due to diabetes.





Complications of Diabetes

- Diabetic retinopathy leading to visual impairment and blindness
- Diabetic nephropathy leading to hypertension and renal failure
- Diabetic neuropathy leading to pain, paraesthesia, muscle weakness and autonomic dysfunction
- Consequences of macro-vascular disease include cardiac disease, peripheral vascular disease and stroke

Good glycaemic control, screening and treating complications early can improve long term health and minimise complications.



Admission due to Illness or Surgery



See guidelines on hub:

 Diabetes Emergency Management in Paediatrics (Non-Ketotic) Guideline

 Surgery (Paediatrics) for Patients with Diabetes Mellitus Guideline





Transitional Care

- Adolescence is a difficult time for a young person, which can make it more challenging when transferring from a paediatric diabetes service to an adult diabetes service
- Transition is the Purposeful, planned movement of adolescents and young adults with chronic physical and medical conditions from child-centred to adult-orientated health care systems

It has been found that often young people do not have a positive experience of transition to adult services and this can have a negative impact on the management of the young persons diabetes (Diabetes UK, 2015)





The Transition Service at DGFT

- According to the diabetes transition service specification (2016) there are 3 stages of transition:
- 1. Paediatric Preparation
- 2. Planned Transfer
- 3. Support Integration

All of our patients in Dudley are seen in an Adolescent Clinic from the age of 14 years, then from 15-16 years of age onwards they can be moved to a transitional care clinic which is jointly staffed by Adult and Paediatric Diabetes Teams. For more information see the Transitional diabetes clinic -paediatric to adults - standard operating procedure





Insulin Pumps

- A CSII is a programmable pump and insulin storage device that gives fast-acting insulin by a subcutaneous needle or cannula.
- The pump can be programmed to deliver a basal rate of insulin throughout the day/night, with higher infusion rates triggered by the push of a button at meal times and to correct high blood glucose levels.
- The insulin pumps used in Dudley at present are Omnipod 5, Omnipod Dash, Medtronic 780 and Tandem with Control IQ (Air Liquide).
- All children and young people are eligible for pump therapy. The decision of when to start is made on an individual basis by the MDT to meet patient needs safely.
- Pump therapy requires intensive management. Patients and their families must complete rigorous education before commencement. The family must be motivated and engage well with the team. The team work hard to provide support required for individuals so there are no barriers to access this technology.
- The team can provide further input to the team about pumps as needed.

Please see the guideline on the Hub:







Continuous Glucose Monitors

All of our patients are now offered this technology soon after diagnosis to improve their diabetes control and quality of life. (Dexcom, Libre or Medtronic Guardian Sensors are used) Some patients use these sensors as "stand alone sensors" alongside their injections.

Hybrid Closed Loop Pumps

Within the next 3 years, all children and young people in Dudley with Type 1 Diabetes, as per NHSE guidance, will be offered Hybrid Closed Loop Pump Therapy at a time that the MDT assess as safe for the individual child/young person. (currently 56 users)

A hybrid closed loop system takes readings from a continuous glucose monitor and uses an algorithm to tell an insulin pump how much insulin to deliver. It does this 24 hours a day. The user/carer must enter carbohydrate when eating. Here is a link for more information. <u>Technology & Innovation - Hybrid Closed Loop Systems -</u> DigiBete









Paediatric Diabetes Specialist Team

- Dr Anjali Petkar, Dr Radhika Puttha, Dr Udeni Kollurage Consultant Paediatricians
- Jo Elford Lead Paediatric Diabetes Specialist Nurse
- Rachel Ellis Paediatric Diabetes Specialist Nurse
- Sam Northern Paediatric Diabetes Specialist Nurse
- Cat Robinson Paediatric Diabetes Specialist Nurse
- Adam Jones Paediatric Diabetes Specialist Nurse (secondment)
- Hannah McOnie Dietitian (Mat leave covered by Kim Lewis & Ines Jabir)
- Jill Danks & Ferne Roberts Admin Support
- Vacant Post Psychologist



Paediatric Diabetes Specialist Team

- We are here to offer support to the ward team with the aim of improving care for our patients.
- We can offer further training and practical demonstrations
- Please contact us:
- <u>dgft.paediatric.diabetes@nhs.net</u>
- 01384 456111 ext 3148/3149/3150
- We work weekdays 09:00 17:00 and provide a newly diagnosed review service via telephone at weekends for newly diagnosed patients on the ward and for 7 days post discharge after new diagnosis..
- Based in Paediatric Clinical Nurse Specialists Office near Children's Outpatients





Further Sources of Information:

- E-learning for Health have a free online Paediatric Diabetes Course
- <u>https://portal.e-lfh.org.uk/</u>
- www.digibete.org essentials videos in many languages
- www.diabetes.org.uk
- www.jdrf.org.uk
- www.bpsed.org.uk
- www.ispad.org





Employee Confirmation Paediatric Diabetes Mandatory Training

You must confirm that:

- I have reviewed the Paediatric Diabetes Education Package
- I have also completed Safer Use of Insulin E-Learning for Health Module
- Either:

Print this page, complete the details below manually, and return the page via: Learning and Development Department, 1st Floor Clinical Education Centre, Russells Hall Hospital, Dudley, DY1 2HQ

Name: Ward / Area / Department: Date of Review:

Or:

2) Send an email from your NHS. net account to dgft.learning@nhs.net to confirm your completion as above, identifying your name and Ward/Department.

