

Document Control

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'Sick day rules' Guideline for Children and Young People (0-18 years) with Type 1 Diabetes			
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1. Purpose

- 1.1. The purpose of this document is to detail the process for advising on the management of diabetes during intercurrent illness in children and young people with type 1 diabetes.
- 1.2. The guideline applies to paediatrics medical and nursing staff at North Devon District Hospital. It is for the care of children and young people up to and including the age of 18 years.
- 1.3. Implementation of this policy will ensure that:
 - Children and carers are given clear and consistent guidance from the out-of-hours paediatrics team.

2. Definitions

- 2.1. Normal blood glucose levels are 4-7mmol/l pre-meals and <9mmol/l at other times. Results higher than this are hyperglycaemic. A blood glucose level less than 4mmol/l is hypoglycaemic.
- 2.2. BG = Blood glucose

3. Responsibilities

- 3.1. The Consultant Paediatricians and Paediatric Diabetes Clinical Nurse Specialists are responsible for:
 - Ensuring that medical and nursing staff are aware of the guideline.
- 3.2. The Medical and Nursing Staff on Caroline Thorpe Ward are responsible for:
 - Informing the senior paediatrician on duty (paediatric registrar or resident consultant) of the patient / phone call.
 - **Ensure that the paediatric diabetes team are informed (message left if out of hours) as soon as possible of any, admission, contact or advice given to child or carer so that it can be followed up appropriately (phone 07920235237 07884266159).**

4. When to use this guideline

- 4.1. Children and families are educated to self-manage their diabetes, and will only phone the hospital for advice when additional help and support is required. They have 24 hour access to advice.

- 4.2. During the Clinical Nurse Specialists working hours (8am-6pm Mon-Fri, 8.30am-11am Weekends/Bank Holidays) the child or family will phone them directly. Outside of these working hours, the child or family are advised to phone Caroline Thorpe Ward. **They need to speak to the senior paediatrician on duty (paediatric registrar or resident consultant).**
- 4.3. If a child or young person with type 1 diabetes is admitted to hospital with an intercurrent illness, this guideline may apply.

Background

- 4.4. When children and young people with type 1 diabetes are unwell they may have:
- High blood glucose (hyperglycaemia): Due to missed insulin doses, insufficient insulin (intercurrent illness and stress cause insulin resistance), pump failure, or excessive sugary food/drink.
 - Normal or low blood glucose (hypoglycaemia) - if unwell with reduced food intake, diarrhoea and/or vomiting: The principles in this case are to maintain hydration with regular small sips of sugar-containing fluid (ideally an oral rehydration solution).

Individualised insulin treatment

- 4.5. **Basal-bolus insulin regimen:** Most children and young people do not have fixed doses of insulin. Instead, they use carbohydrate counting to vary the **rapid-acting insulin (bolus dose) e.g. Novorapid** depending on the intake. They will have an individual '**Carbohydrate Ratio**' calculated for each meal / time of the day e.g. 1 unit of insulin for 10 grams of carbohydrate. They will also have a **background long-acting insulin (basal dose) e.g. Lantus**, usually given as a once daily injection or via continuous infusion (if on an insulin pump).
- 4.6. **Total daily dose (TDD) of insulin:** Number of insulin units needed on a normal day, including background and bolus doses.
- 4.7. **Correction ratio:** Each child and young person will have their own 'Correction Ratio' (also called Insulin Sensitivity Factor). Correction ratio = The reduction in BG achieved by giving 1 unit of rapid-acting insulin (assuming no other carbohydrate intake or exercise). E.g. 1 unit reduces BG by 5mmol/l (= 1 unit:5mmol/l).
- 4.8. If the correction ratio is not known by the child/carer, it can be estimated using the equation: $100 / \text{TDD of insulin}$.
- 4.9. The '**Correction Dose**' is the number of units of rapid-acting insulin required to reduce the BG to a normal level (i.e. 6mmol/l).

- 4.10. Rapid-acting insulin has activity for up to 4 hours. Wait at least 2 hours between correction doses of rapid-acting insulin (to avoid dose overlap and risk of hypoglycaemia).
- 4.11. The child or carer should know their treatment details (background insulin, carbohydrate ratios and correction ratio), and they should be programmed on their BG meter. If not, they should be recorded on the most recent clinic letter (on ePro) or the hospital notes. Be aware that the insulin doses may have changed since their last clinic appointment.

5. Assessment and Management

5.1. Questions to ask:

- Name, age, approximate weight.
- Nature of illness and symptoms. Factors which may affect blood glucose levels (e.g. recent insulin dose changes, food, exercise, steroids, stress, growth)
- Location / distance from hospital
- Insulin treatment regimen – multiple daily injections or pump
- Typical total daily dose of insulin
- Carbohydrate ratio and correction ratio.
- BG and blood ketone levels over the last 1-2 days.

Sick Day Rules

5.2. Basic sick day / illness advice is as follows:

- Do not omit taking usual long-acting / basal insulin.
- Test BG levels more frequently (at least 2-hourly).

- Test blood for ketones (note that ketone levels may be raised even when BG levels are normal, e.g. in gastroenteritis – ‘starvation’ ketones.)
- Maintain hydration.
- Treat the underlying illness.

Treatment pathway

5.3. Could it be diabetic ketoacidosis (DKA)?

YES



- High BG, ketones (>1mmol/l), unwell, vomiting, lethargic, drowsy
- If at home, need to come to hospital
- Assess level of urgency / safety
- 999 to ED or self-transport to Caroline Thorpe Ward
- **Refer to paediatric DKA guideline**

NO



- If BG levels are high (>14mmol/l) refer to separate guideline **‘Hyperglycaemia in Children and Young People with Type 1 Diabetes’**
- If BG levels are low (<4mmol/l) refer to separate guideline **‘Hypoglycaemia in Children and Young People with Type 1 Diabetes’**

Vomiting and dehydration

5.4. If child does not meet criteria for DKA and is vomiting/dehydrated:

- Treat underlying illness and consider giving an antiemetic
- Continue with normal long-acting daily insulin

5.5. If tolerating oral fluids:

- Sip sugar-containing fluids e.g. Dioralyte or apple juice (do not inject insulin for these carbs)
- Check blood glucose 2-hourly
- Give correction doses of rapid insulin every 2-4 hours if required. Rapid-acting insulin has activity for up to 4 hours. Wait at least 2 hours between doses (to avoid dose overlap and risk of hypoglycaemia). On that basis, if a further dose is given sooner than 4 hours it will be necessary to calculate the 'active' insulin and subtract it from the proposed second dose.
- 2-hourly ketone levels until ketones less than 1 then 4-hourly checks until well
- Encourage eating as soon as possible
- Give insulin for carbs in food after eating (to make sure that food tolerated) within 30 minutes of food eaten

5.6. If not tolerating oral fluids:

- Check blood glucose and ketones 2-hourly
- Give correction doses of rapid insulin every 2-4 hours if required. Rapid-acting insulin has activity for up to 4 hours. Wait at least 2 hours between doses (to avoid dose overlap and risk of hypoglycaemia). On that basis, if a further dose is given sooner than 4 hours it will be necessary to calculate the 'active' insulin and subtract it from the proposed second dose.
- Intravenous fluids - use volume of maintenance and rehydration as per departmental fluid guideline
- Use 0.9% normal saline
- Dextrose concentration should be determined as follows:
 - If blood glucose ≥ 14 mmol/L no dextrose included
 - If blood glucose 4-13.9mmol/L add 5% dextrose
 - If blood glucose < 4 mmol/L a bolus of 2ml/kg 10% dextrose should be given and then the dextrose concentrations of the fluids should be increased (i.e. if on only 0.9% saline add 5% dextrose, if on 5% dextrose increase to 10%)
- Continue to monitor blood glucose and ketone levels 2 hourly until glucose stable and ketones < 1 mmol/L then reduce to 4 hourly
- Strict fluid balance
- If symptoms of DKA develop at any stage repeat blood glucose, ketones, blood gas and U+Es

6. Monitoring Compliance with and the Effectiveness of the Guideline

Standards/ Key Performance Indicators

- 6.1. The Paediatric Diabetes Team will monitor the effective use of the guideline.
- 6.2. Reduction of unexpected admissions to hospital for children and young people with type 1 diabetes.
- 6.3. Increased patient satisfaction with out of hours support as recorded in patient feedback.

Process for Implementation and Monitoring Compliance and Effectiveness

- 6.4. Dissemination of guideline to medical and nursing staff in the Paediatrics department, Emergency Department, and onto BOB.
- 6.5. Training to medical staff at induction and an annual update for existing staff.
- 6.6. Staff to be informed of any revised documentation.
- 6.7. Non-adherence to the guideline should be reported by the use of the DATIX system. Incidents to be monitored and reviewed by the clinical governance team and in the Paediatric Diabetes Team meetings.

7. References

- 'Management of Type 1 Diabetes During Illness in Children and Young People under 18 years (Sick Day Rules)' clinical guideline, Association of Children's Diabetes Clinicians (ACDC), 2015
- International Society for Paediatric Endocrinology and Diabetes (ISPAD), Clinical Practice Consensus Guidelines 2014

8. Associated Documentation

- [Southwest Paediatric Diabetes Regional Network Integrated Care Pathway for Children and Young People with Diabetic Ketoacidosis, 2013](#)
- [Hypoglycaemia Guideline for Children and Young People with Type 1 Diabetes, NDDH, 2016](#)
- [Hyperglycaemia Guideline for Children and Young People with Type 1 Diabetes, NDDH, 2018](#)