Guidelines on the Management of Diabetes & Intercurrent Illness
(Sick Day rules) for Adults

Children with diabetes and intercurrent illness should be referred to the
paediatric diabetes team or the children's emergency dept. for advice and
support.

Derby

For new presentations refer to Derby Children’s Hospital, telephone the
paediatric registrar on call via switch board on 01332 340131.

For known patients where advice is required regarding treatment / 'sick day'
rules / gadgets etc, the paediatric diabetes nurses can be contacted Monday
to Friday 08:00 - 20:00 and Saturday 08:00 - 14:00. Their numbers are
01332 786963 if anyone is in the office, 0776 6802481 for Sue Doherty,
0776 6802472 for Carol Metcalfe, 0779 9337771 for Helen Smart. The
patients should all have these numbers written down. The phones should be
diverted through to whoever is on call. Queries can also be discussed with
the nurses in the Paediatric Department on 01332 786808.

If you need to speak to one of the consultants, please ring the secretary to
Dr T Tinklin and Dr J Smith on 01332 786824 and either Dr Tinklin or Dr
Smith will get back to you as soon as possible

Chesterfield

New presentations are made by the clinician directly to the paediatric
registrar and children get seen on Nightingale ward on the same day.
Hospital number is 01246 277271. Nightingale Ward is 01246 512329.

Dr Roby Mathew looks after children with diabetes the team includes Nikky
Short - diabetes Nurse Tel 07778368757 or 01246 513091 and Julia
Wilders, dietitian. Nikky offers 9 -5 support for known children with type 1
diabetes. During out of hours parents or DHU clinicians should call
Nightingale ward and speak to the paediatric registrar on call. The advice
given is then followed up by Nikki.
Introduction

The stress of illness can increase insulin requirements in all types of diabetic patients.

Relative or absolute insulin deficiency in the presence of catabolic counter-regulatory ‘stress’ hormones (catecholamines, cortisol, glucagon and growth hormone) leads to hepatic overproduction of glucose and ketones. Insulin lack and stress hormones together promote lipolysis, with the release of non-esterified fatty acids from adipose tissue into the circulation. In the liver these fatty acids are partially oxidised to ketone bodies.

*Ketoacidosis is a serious condition with mortality of 5–10% in Western Countries and is particularly dangerous in older people.*

Patients who have residual endogenous insulin (type 2 diabetics) are at risk of marked hyperglycaemia (usually greater than 50 mmol/l) and dehydration, without significant Ketosis and acidosis. The absence of ketosis may be because of either the residual endogenous insulin in type two diabetics, hyperosmolality suppressing lipolysis or because counter-regulatory hormone responses are less developed in these patients.

However note that type two diabetics who are on insulin therapy due to a relative or absolute deficiency of endogenous insulin can be at risk of either Ketoacidosis or hyperosmolality non-ketotic diabetic coma (HONK).

Patients on Metformin need extra careful consideration during periods of dehydration or acute illness due to the risks of lactic acidosis.
Fundamental Principles of diabetes management during intercurrent illness

- Increase monitoring of capillary-glucose monitoring to at least 4 hourly for all Insulin dependant patients. Patients whose blood sugars are rising rapidly or who are increasingly unwell should monitor hourly.
- Initiate monitoring, at least 4hourly of either urinary or capillary ketones
- Adjust Insulin according to monitoring results (see below). DO NOT ROUTINELY STOP IT. Continue with usual basal (long acting) dose e.g. Glargine, Levemir, Insulatard, Humulin I
- Routinely discontinue metformin in acutely unwell patients or those with dehydration.
- Adjust other diabetic medication according to monitoring results (see below).
- Treat the underlying cause of the intercurrent illness sufficiently.
- Anti-emetics may be useful for symptomatic treatment of vomiting but establish the likely cause of the symptoms first and admit if necessary.
- Drink plenty of water or sugar free drinks during the illness (at least one glass per hour)
- Maintain carbohydrate intake using sugary drinks or fruit juice, soups or snack foods if the patient has difficulty eating.
- Keep a low threshold for regular follow up or admission as the situation can deteriorate rapidly.
- Consider admission in patients with anorexia or recurrent vomiting who cannot or will not take oral fluids/sugars.
- Admit ill insulin-dependent diabetics who have significant ketosis despite supplemental insulin and optimal management.
- For medico legal reasons keep good record of how diabetes being monitored and managed.
- Admit or seek advice from diabetic/acute medical team if unsure.
Specific diabetic treatment scenarios and management plan

Metformin only

- Aim to monitor blood glucose four hourly
- Stop metformin in acute illness, restart slowly as illness subsides (e.g. 500mg od) and gradually build up to previous dose
- Consider temporarily starting sulphonylurea if sustained hyperglycaemia
- Admit if no improvement, patient lives alone or is unable to manage such measures at home

Sulphonylurea only

- Aim to monitor blood glucose four hourly
- Consider increasing sulphonylurea to maximum dosage according if persistent hyperglycaemia
- Admit if no improvement, patient lives alone or is unable to manage such measures at home

Metformin and Sulphonylurea

- Aim to monitor blood glucose four hourly
- Stop metformin in acute illness, restart slowly as illness subsides (e.g. 500mg od) and gradually build up to previous dose
- Consider increasing sulphonylurea to maximum dosage according if persistent hyperglycaemia
- Admit if no improvement, patient lives alone or is unable to manage such measures at home

Other anti-diabetic medication i.e. Rosiglitazone, Repaglinide, Acarbose

- Aim to monitor blood glucose four hourly
- If significant progressive hyperglycaemia seek further advice from On Call medic Secondary Care
**Insulin +/- Metformin**

- Monitor blood glucose at least 2-4 hourly
- Initiate monitoring, 2-4 hourly of urinary/capillary ketones
- Stop metformin in acute illness, restart slowly as illness subsides (e.g. 500mg od) and gradually build up to previous dose
- **Do not stop Insulin** - adjust dose as detailed below
- Admit if no improvement, significant levels of ketones and/or vomiting with inability to hydrate or take oral carbohydrates or patient lives alone or is unable to manage such measures at home

**Dose adjustment for the adult unwell insulin-dependant diabetic who can tolerate fluid/foods**

*The scheme below can be used to help home self management of diabetic patients.*

- Firstly, calculate the total daily dose (TDD) of all types of insulin used in standard units.
- Calculate 10%, 15%, 20% of this TDD and give SOLUBLE INSULIN eg. Novorapid in addition to the normal insulin regime according to the table below.*
<table>
<thead>
<tr>
<th>Capillary blood glucose mmol/l</th>
<th>Urinary Ketone Stick reading</th>
<th>Capillary blood Ketones</th>
<th>Action requires</th>
<th>Supplemental Soluble Insulin dose every four hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 3.9</td>
<td>-</td>
<td>nil</td>
<td>Normal Insulin, however if blood glucose persistently low due to symptoms of Gastroenteritis then reduce premixed Insulin (intermediate acting e.g. Mixtard 30) by 25% each dose and reduce multiple daily injections (short acting e.g. Novorapid) by 50% each short acting dose. Leave long acting insulin dose as usual. Manage hypo as normal. If vomiting supplement with carbohydrate substitutes hourly. See below for examples.</td>
<td>Nil</td>
</tr>
<tr>
<td>4-16</td>
<td>-</td>
<td>Less than 0.6</td>
<td>Normal Insulin. If vomiting supplement with carbohydrate substitutes hourly. See below for examples.</td>
<td>Nil</td>
</tr>
<tr>
<td>4-16</td>
<td>+</td>
<td>Greater than 0.6</td>
<td>Take supplementary fast acting insulin every 2-4 hours day and night. Monitor 2-4 hourly and adjust dose accordingly.</td>
<td>10%</td>
</tr>
<tr>
<td>Greater than 16</td>
<td>- or +</td>
<td>Less than 0.6</td>
<td>Take supplementary fast acting insulin every 2 hours day and night. Monitor 2 hourly and adjust dose accordingly.</td>
<td>10%</td>
</tr>
<tr>
<td>Greater than 16</td>
<td>++</td>
<td>0.6-1.4</td>
<td>Take supplementary fast acting insulin every 2 hours day and night. Monitor 2 hourly and adjust dose accordingly.</td>
<td>15%</td>
</tr>
<tr>
<td>Greater than 16</td>
<td>+++ or greater</td>
<td>1.5-3.0</td>
<td>Take supplementary fast acting insulin every hour day and night. Monitor hourly and adjust dose</td>
<td>20%</td>
</tr>
</tbody>
</table>
If Ketones exceed +++ or greater than 3.0mmol then consider admitting as an emergency for IV fluids and IV sliding scale Insulin.

**Red Flags for diabetes management and intercurrent illness**

- Suspicion of underlying diagnosis that requires hospital admission e.g. MI, sepsis, intestinal obstruction
- Inability to swallow or keep fluids down-admit if persists more than a few hours
- Significant ketosis in type 1 diabetic despite optimal management and supplementary insulin. Any clinical signs of ketosis or worsening condition e.g. Kussmaul respiration, severe dehydration, abdominal pain, drowsy, headache
- Patients who live alone and have no support and risk slipping into unconsciousness or unable to manage required adjustments and monitoring

**Recommended Carbohydrate Substitutes to be given hourly if vomiting**

- Dextrose tablets 8 tablets
- Lucozade 150mls
- Ribena sparkling (not diet) 190mls
- Unsweetened fruit juice 210mls
- Coke/Pepsi (not diet) 250mls
- Cup of tea with 5 level teaspoons sugar
- 1 mug drinking chocolate made with milk
- Ordinary strawberry milkshake 100mls
- 4 scoops ice-cream
- Ordinary fruit yogurt 125mg pot
- Toast 2 slices
- Angel delight 165g (1.5 pots)
- Mashed potato 4 tablespoons
Clear fluid as opposed to milky fluids/puddings may be easy to tolerate when vomiting.

References Used

4. Diabetic team-Children’s Hospital (2005) Paediatric DAFNE Theory Booklet

Angela Stevenson
Clinical Practitioner
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