MANAGEMENT OF DIABETES RISK WITH HIGH DOSE STEROIDS

Adapted from the Joint British Diabetes Societies (JBDS) for Inpatient Care ‘Management of Hyperglycaemia and Steroid (Glucocorticoid) Therapy’ (2014) and NHS Lothian steroid guidance documents. The guidance is designed for use in acute (both inpatient and outpatient) and primary care for patients known to have diabetes and for those who may develop steroid induced diabetes as defined below.

**Steroid induced diabetes** is defined as a blood glucose > 12 mmol/L on two occasions in a 24 hour period.

**Steroid use** is defined as glucocorticoid therapy (>20mg prednisolone or equivalent – see table 1 below) for greater than 14 days.

Table 1: Steroid Dose Equivalents

<table>
<thead>
<tr>
<th>Prednisolone 20mg daily approximately equivalent to:</th>
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<tbody>
<tr>
<td>Hydrocortisone 80mg</td>
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<tr>
<td>Dexamethasone 3mg</td>
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<tr>
<td>Methylprednisolone 16mg</td>
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<tr>
<td>Betamethasone 3mg</td>
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N.B. potency relates to anti-inflammatory action, which may not equate to hyperglycaemic effect.

**NEED FOR A GUIDELINE**

The prevalence of long term steroid use is estimated at 0.78% nationally and rising. Multiple observational and retrospective data sets suggest an incidence of steroid induced diabetes of 18-52%.

There is a risk of the development of hyperosmolar hyperglycaemic state (HHS) or diabetic ketoacidosis (DKA) in the context of steroid use. These are potentially avoidable complications with associated morbidity and mortality.

Adherence to this guidance should:-

- improve patient safety by preventing patients being admitted to secondary care with the above diabetes emergencies;
- improve potential outcomes in terms of morbidity and mortality;
- minimise patients experiencing unnecessary osmotic symptoms due to hyperglycaemia.
RECOMMENDATIONS FOR SCREENING AND MONITORING FOR STEROID INDUCED DIABETES

Will the patient be taking high dose steroids (Prednisolone ≥ 20mg or equivalent) for 2 weeks or more?

NO

No monitoring required, advise patient of symptoms (Appendix 1)

YES

Is patient known to have diabetes?

NO

Patient to be taught blood glucose monitoring (if not doing already).
(This should be done by the practice nurse, Diabetes Centre or inpatient diabetes specialist nurse (DSN) – see notes below)

YES

Blood glucose monitoring
For patients requiring to be taught blood glucose monitoring at the Diabetes Centre, please call 01592 648001.

Patients not known to have diabetes should test blood glucose once daily before evening meals for the first 2 weeks of steroid use and record results (appendix 2).
- If results are more than 12 mmol/L on 2 consecutive occasions, increase testing to 4 times daily pre-meals and consider commencing treatment as per guidance.
- If results are all less than 12mmol/L after 2 weeks, change frequency of testing to once per week while taking steroids.
(Test strips should be prescribed acutely then removed once steroid course complete).

Patients known to have diabetes should test 4 times daily pre-meals.
The need to continue blood glucose monitoring should be individually assessed once steroid course complete.

Inpatients
- Follow above guidance for blood glucose monitoring frequency.
- Follow algorithm for treatment guidance.
- Advise patient to arrange follow-up with practice nurse or to keep in contact with the DSN if they attend secondary care for their diabetes care.

For inpatients requiring to be taught blood glucose monitoring please call the Inpatient DSN on extension 21364 (please note the DSN will then arrange for the patient to be seen – this may not be on the same day of referral).
Patients should be equipped with home blood glucose monitoring and relevant education regarding hypoglycaemia management and driving responsibilities. This is due to the hypoglycaemia risk associated with sulphonylureas (SU) and insulin. Treatment should be tailored on an individual patient basis. This may require the local diabetes service to advise.

The standard blood glucose target goal is 6-12 mmol/L.
Patients who are elderly, frail, palliative care, end of life, at risk of falling, eating variably or with impaired hypoglycaemia awareness will require a higher target (8-20 mmol/L). The aim for these patients is to avoid hypoglycaemia and symptomatic hyperglycaemia.

**Patients without known DM**

- Blood glucose > 12mmol/L on 2 occasions in 24 hours – consider Gliclazide 40mg in the morning

**Known T2DM not on insulin**

- If no evidence of hypoglycaemia and not on an SU - consider Gliclazide 40mg in the morning.
- If already on SU - progress to titration if required.

**Known T2DM on insulin**

- If on once daily insulin in the evening, change injection to morning and titrate by 10-20% every 2-3 days according to pre-evening meal blood glucose level. If targets are not met consider Humalog 4 units with each meal and titrate by 10-20% every 2-3 days

- If targets not met add in Humulin I or Insulatard 10 units in the morning and titrate by 10-20% every 2-3 days according to pre-evening meal blood glucose level

- If targets not met consider Humalog 4 units with meals and titrate by 10-20% every 2-3 days and stop SU (local diabetes service may need to advise)

**Patients on insulin pumps** – refer to the Diabetes Centre.

**Patients with type 1 diabetes** – remind to check ketones if blood glucose > 14 mmol/L and correct if ketones ≥ 0.6 mmol/L.
TREATMENT WITHDRAWAL AND FOLLOW-UP

TREATMENT WITHDRAWAL
Gradual reduction in insulin or sulphonylurea (SU) therapy will be required during withdrawal of steroids. This should be guided by blood glucose monitoring results with particular emphasis on avoidance of hypoglycaemia. This may require the local diabetes service to advise. (For outpatient advice – contact Diabetes Centre, extension 28001 or 01592 648001).

REDUCING SU
When steroids are reduced it is recommended that SU is reduced by 40mg or 80mg in order to prevent hypoglycaemia. Dose reduction will depend on patient’s blood glucose levels and SU dose at the time.

REDUCING INSULIN
When steroids are reduced it is recommended that insulin is reduced by 10-20% in order to prevent hypoglycaemia. Percentage reduction will depend on patient’s blood glucose levels and insulin dose at the time.

NOTE
For some patients SU or insulin may need to be increased despite reduction in steroid dose. This will depend on patient’s blood glucose levels at the time.

FOLLOW UP
Not known to have diabetes
Patients should continue to monitor blood glucose levels for 2 weeks once steroid course completed to ensure blood glucose levels return to normal range (4-7 mmol/L).
If blood glucose levels remain elevated post steroids and HbA1c pre-steroid treatment is <48 mmol/mol, patient should have an oral glucose tolerance test done in primary care 6 weeks post completion of steroid course

Steroid induced diabetes
If blood glucose levels remain elevated post steroids and HbA1c pre-steroid treatment is >48 mmol/mol, patient should be treated as new diagnosis of type 2 diabetes and treatment initiated as required.

Known to have diabetes
Routine follow up in usual care setting

For inpatients
Contact the inpatient DSN on extension 21364 for advice as required
Appendix 1: Patient information leaflet – Glucose Monitoring For Those Not Known To Have Diabetes

Dear ……………….

Start Date: ..........................

Taking steroid medication can lead to a rise in blood glucose levels which may need to be treated. Therefore, it is important that you regularly monitor your blood glucose levels.

Please measure your blood glucose levels once daily before your evening meal for the first 2 weeks of steroid use and complete the table below.

Week 1

<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME</th>
<th>READING</th>
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- If your blood glucose level is greater than 12 mmol/L on 2 consecutive occasions, increase testing to 4 times daily (before main meals and bed time) and make an appointment with your practice nurse.
- If your blood glucose levels are all less than 12 mmol/L after 2 weeks you can reduce monitoring to once per week while taking the steroid medication.
- If your blood glucose level is over 20 mmol/L and you feel unwell contact your GP surgery or call NHS 24 (dial 111) for advice out-of-hours.

Additional blood glucose level readings can be recorded here.

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