



**Guidelines for Insulin Initiation and
Adjustment in Primary Care in
patients with Type 2 Diabetes:
for the guidance of Diabetes
Specialist Nurses**

**Glasgow Diabetes
Managed Clinical Network**

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Introduction

These guidelines were first produced for use in primary care by a group of diabetes specialist nurses, with feedback from several multi-disciplinary reviewers. This revision was performed by a further group of primary care diabetes specialist nurses acting as a working group of the Glasgow Diabetes Managed Clinical Network Primary/Secondary Care Interface Group, with review and feedback from the rest of the Primary/Secondary Care Interface Group. These guidelines will be due for review every 2 years or sooner as new evidence / information becomes available.

- These guidelines are primarily for use in primary care, however they have been written in consultation with local multidisciplinary colleagues from both Primary and Secondary Care. This version of the guidelines represents a consensus view based on evidence and best practice.^{5 & 6}
- These guidelines are not meant to be exhaustive, but are meant to be practical and an easy to use guide to the initiation and adjustment of insulin therapy in Type 2 diabetes.
- This can be read as a stand-alone guideline. However additional documents will be developed in the near future that will dovetail with this document.
- These guidelines were designed to assist staff in meeting CSBS Standards for Diabetes (November 2001).¹

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Glycaemic targets in Type 1 and Type 2 diabetes

Target HbA1c for intensive insulin therapy derived from the UKPDS and DCCT study is 7.0% or below in Type 1 and Type 2 patients. In elderly patients symptom control and freedom from hypoglycaemia are priorities; however it is unclear if the HbA1c data from the UKPDS study can be transferred to the elderly ^{3&4}

CHANGE TO REPORTING OF HbA1c

From the 1st June 2009 – June 2011, UK Laboratories will report HbA1c in two different sets of units: IFCC (International Federation of Clinical Chemistry and Laboratory medicine) – standardised units (mmol/mol) and DCCT-aligned units (%). After June 2011 HbA1c will only be reported in mmol/mol.

SIGN 55 states it is reasonable to aim for as good glycaemic control as possible bearing in mind co-morbidities, life expectancy and existing micro vascular complications ². Although an HbA1c of around 7.0% or below is the ultimate aim for good glycaemic control, not all patients can achieve this. It may be more realistic, after discussion with the patient, to aim for a mutually agreed target of less than 7.5%, at least initially.

Normal laboratory HbA1c results vary locally, but ideally patients should aim for an HbA1c below 7.5% (a DCCT compatible assay is used). (58mmol/mol)

Elderly patients should avoid hypoglycaemia and symptomatic hyperglycaemia and should aim for an HbA1c of below 8.5% (69 mmol/mol) bearing in mind co-morbidities, life expectancy and biological age.

The incidence of hypoglycaemia and/or hyperglycaemia should be monitored and documented, and the results discussed with the patient.

The aim of drug and insulin therapy is to achieve the best possible glycaemic control without frequent or severe hypoglycaemia or hyperglycaemia.

Initiating insulin therapy in primary care In Type 2 Diabetes

The UKPDS ⁴ demonstrated that;

- Beta cell function declines with time.
- Good glycaemic control reduces the complications of diabetes.
- Optimum glycaemic control becomes more difficult with time and at least 1 in every 25 patients per year need to be transferred to insulin to achieve this.

The decision to start the Type 2 patient on insulin is usually precipitated by

- Worsening symptoms of hyperglycaemia.
- A persistently elevated HbA1c level despite maximal or near maximal doses of oral hypoglycaemic agents.
- Intercurrent illness or patient commenced on steroid therapy.

It is essential to review the patient's diet and compliance with medication prior to making the decision to commence insulin. (CSBS standard 2, 3, 4 & 8) ¹

It is best practice that a registered dietitian should undertake the dietary review.

Step 1

Discuss with the GP or a consultant diabetologist and agree on the appropriate glycaemic target and insulin for the individual patient.

Clarify continuing use or discontinuation of oral hypoglycaemic agents.

Involve the patient in the choice of how often he/she will administer insulin¹.

(CSBS standard 2)

Step 2

Ensure patient understands the broad principle of insulin treatment and is proficient at blood glucose monitoring ¹. (CSBS standard 3 & 4)

Identify patients who may be unable to blood monitor or self administer insulin and involve District Nurses to initially supervise practical skills or continue to visit long term.

Step 3

Ideally instruct the patient on the use of an insulin delivery device about a week prior to commencing insulin. It is important that they overcome their fears at an early stage as this may hamper further education ¹. (CSBS standard 3 & 4)

Step 4

Choose the appropriate regimen and calculate a 'safe' dose of insulin using the following **tables A - D**, for guidance. Ensure a relevant prescription is available ¹.

(CSBS standard 2)

Step 5

If antidiabetic agents are to be discontinued instruct patients to take final dose the evening before starting insulin ¹.

Initiating insulin regimes

Table A

Once Daily – Intermediate regimen

This may be used to supplement the daytime oral hypoglycaemic medication. Use intermediate acting insulin, which provides a low background level of insulin.

Daily insulin requirements = 0.5 units / kg body weight approximately
e.g. 0.5 x 72kg = 36 units

Of which 50% will be basal requirement $36 \times 50\% = 18$ units

Take 60% of this daily dose for 'safety' $18 \times 60\% = 11$ units
Rounded up to 12 units for ease of administration ¹²

A safe starting dose would be e.g. 12 units of intermediate acting insulin, usually given at bedtime.

If a District Nurse is administering the insulin it is usually more convenient to give it in the morning.

For titration of insulin dose refer to Tables 1 & 2 on page 8.

Table B

Once daily – Long acting regimen

The long-acting insulin analogues Glargine and Detemir are now available. The Scottish Medicines Consortium (SMC) has advised on their use in Scotland. Glargine is not recommended in patients with Type 2 diabetes unless they suffer from recurrent episodes of hypoglycaemia, but use of Glargine in the SoloStar device is acceptable for use as a once daily insulin therapy for patients who require carer administration of their insulin¹³. The SMC recommend that Detemir use should be targeted on patients attempting to achieve better glycaemic control, but have accepted the use of Detemir in the InnoLet device for patients who have poor visual acuity and dexterity problems.

For titration of insulin dose refer to Table 3.

See Appendices 3 and 4 for SMC statements about Glargine and Detemir.

Table C

Twice Daily Regimen

For twice daily regimens the most frequently used option is a premixed fixed combination of short and intermediate acting insulin or a rapid acting insulin lispro or aspart mix¹¹. A twice-daily intermediate acting insulin is an alternative choice and may be appropriate in the elderly where there is a concern regarding the risk of hypoglycaemia.

Daily insulin requirements = 0.5 units / kg body weight approximately

e.g. $0.5 \times 72\text{kg} = 36$ units

Take e.g. 60% 'for safety' $36 \text{ units} \times 60\% = 22$ units

Split the dose 50%: 50% before breakfast and evening meal. i.e. 11 units bd.
Rounded up to 12 units for ease of administration.

Generally the final insulin dose required will be nearer to 60%/40% divide but this would become apparent when titrating insulin against Table 4 & 5.

Table D

Basal Bolus Regimen

This is the most intensive regime with three pre-prandial doses of short /rapid acting insulin and a bedtime dose of intermediate or long acting insulin. While this regime offers no improvement in metabolic control compared to any other insulin regime, this may be the most suitable regimen for people who do not have a stable daily routine as the time and dose of insulin can be varied according to when the meal is taken and its carbohydrate content.

Generally 30 - 50% of the total daily insulin requirements should be given as intermediate or long acting insulin at bedtime with the remaining insulin being given as short / rapid acting before breakfast, lunch and evening meal depending on the needs of the individual.

Daily Insulin requirements = 0.5 units / kg body weight approximately

e.g. $0.5 \times 72\text{kg} = 36$ units

Take e.g. 60% 'for safety' $36 \text{ units} \times 60\% = 22$ units

When commencing a basal bolus regimen where three pre-prandial doses of short/rapid acting insulin are to be taken prior to breakfast, lunch and evening meal and intermediate acting/ long acting analogue insulin at bedtime the total daily dose may be calculated as follows;

22 units as above. -50% of the total daily dose is basal = 11 units

e.g. 'rounding down' for ease of administration = 10 units

Daily bolus insulin dose therefore is 22 -10 (basal dose) = 12 units of short acting insulin.

This is divided into 3 for pre breakfast, lunch and evening meal = 4 units each meal.

10 units of intermediate/long acting analogue are given prior to bed.

The insulin can then be increased to the requirement of the individual using Table 6. It is generally beneficial to commence the individual with Type 2 diabetes on a twice-daily insulin regimen initially until they feel comfortable with injections.

Insulin Dose Adjustment – Once Daily Intermediate – Bedtime

Table 1

Blood Testing Times	Blood Glucose <4mmol/l or Hypo	Blood Glucose 4-7 mmol/l	Blood Glucose 8 – 14 mmol/l	Blood Glucose ≥15mmol/l
Before Breakfast	Reduce insulin by 4 units	Optimal	Increase insulin by 2 units	Increase insulin by 4 units

Blood glucose should continue to be monitored pre-prandially throughout the day in the initial stages. If blood sugars are elevated at other times of the day consider changing to BD insulin.

Insulin Dose Adjustment – Once Daily Intermediate - Morning

Table 2

Blood Testing Times	Blood Glucose <4mmol/l or Hypo	Blood Glucose 4-7 mmol/l	Blood Glucose 8 – 14 mmol/l	Blood Glucose ≥15mmol/l
Before Lunch and Evening Meal	Reduce insulin by 2-4 units	Optimal	Increase insulin by 2 units	Increase insulin by 4 units

Blood glucose should continue to be monitored pre-prandially throughout the day in the initial stages. If blood sugars are elevated at other times of the day consider changing to BD insulin.

General Advice on Insulin Dose Adjustment

- Blood glucose target range should be set Individually for each patient.
- Adjust according to the chart above and monitor for at least 48 hours to judge the effect before further adjustment.
- Dose adjustment is **individual** and needs to be monitored closely.
- Patients should be educated to adjust their own insulin
- Insulin may need adjusting for exercise, meal composition, patterns in blood sugar levels, during illness and weight loss or gain episodes.
- **Do not adjust dose on a “single” raised blood glucose.**
- Document change of insulin dose in the nursing notes.
- If problems persist in controlling the blood glucose level, seek advice from the General Practitioner or link Diabetologist, as a change of insulin regimen may be required

Basal Insulin Dose Adjustment – Switching to insulin Glargine or Detemir for patients suffering from recurrent episodes of hypoglycaemia.

As stated above, the SMC advised insulin glargine or detemir could be of use in those type 2 patients suffering from recurrent episodes of hypoglycaemia. This should only be done following discussion with the consultant diabetologist or GP. Patients with more than one episode of severe hypoglycaemia (i.e. requiring third party assistance) should be looked after primarily in secondary care.

Although current evidence suggests no dose change is required when converting from a once daily Neutral Protamine Hagedorn (NPH) regime, common custom and practice would be to reduce the insulin glargine dose by 20%. This is to ensure patient safety and maintain patient confidence in the new regime / therapy. Product literature advises no change to initial dose in the first week of therapy. Thereafter, local practice is to titrate the dose, if required, at no sooner than 3 day intervals to assess effect on blood glucose.

Blood glucose should continue to be monitored pre-prandially throughout the day in the initial stages⁷, and if the desired pre-dinner target cannot be reached with insulin Detemir, consider splitting the total dose into 2 injections (morning and evening) according to individual needs as directed by the manufacturers.

Adjustment thereafter:

Table 3

Blood Testing Times	Blood Glucose <4mmol/l or Hypo	Blood Glucose 4-7 mmol/l	Blood Glucose 8 – 14 mmol/l	Blood Glucose ≥15mmol/l
Before breakfast	Reduce insulin by 4 units	Optimal	Increase insulin by 2 units	Increase insulin by 4 units

General Advice on Insulin Dose Adjustment

- Blood glucose target range should be set Individually for each patient.
- Adjust according to the chart above and monitor for at least 72 hours to judge the effect before further adjustment.
- Dose adjustment is **individual** and needs to be monitored closely.
- Patients should be educated to adjust their own insulin
- Insulin may need adjusting for exercise, meal composition, patterns in blood sugar levels, during illness and weight loss or gain episodes.
- **Do not adjust dose on a “single” raised blood glucose.**
- Document change of insulin dose in the nursing notes.

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- If problems persist in controlling the blood glucose level, seek advice from the General Practitioner or link Diabetologist, as a change of insulin regimen may be required

Insulin Dose Adjustment – Pre-Mixed Insulin

Table 4

Blood Testing Times	Blood Glucose <4mmol/l or Hypo	Blood Glucose 4-7 mmol/l	Blood Glucose 8 – 14 mmol/l	Blood Glucose ≥15mmol/l
Before Bed <u>and</u> Before Breakfast	Reduce Evening meal insulin by 4 units	Optimal	Increase Evening meal insulin by 2 units	Increase Evening meal insulin by 4 units
Before Lunch <u>and</u> Before Evening Meal	Reduce morning insulin by 4 units	Optimal	Increase morning insulin by 2 units	Increase morning insulin by 4 units

General Advice on Insulin Dose Adjustment

- Insulin may need adjusting for exercise, meal composition, patterns in blood sugar levels, during illness and weight loss or gain episodes.
- **Do not adjust dose on a “single” raised blood glucose.**
- Adjust according to the chart above and monitor for at least 48 hours to judge the effect before further adjustment.
- Blood glucose target range should be set Individually for each patient.
- Dose adjustment is **individual** and needs to be monitored closely.
- Patients should be educated to adjust their own insulin
- Document change of insulin dose in the nursing notes.
- If problems persist in controlling the blood glucose level, seek advice from GP or link Diabetologist, as a change of insulin regimen may be required

Insulin Dose Adjustment – Twice Daily Intermediate

Table 5

Blood Testing Times	Blood Glucose <4mmol/l or Hypo	Blood Glucose 4-7 mmol/l	Blood Glucose 8 – 14 mmol/l	Blood Glucose ≥15mmol/l
Before Bed <u>and</u> Before Breakfast	Reduce evening meal insulin by 4 units	Optimal	Increase evening meal insulin by 2 units	Increase evening meal insulin by 4 units
Before Lunch <u>and</u> Before Evening Meal	Reduce morning insulin by 4 units	Optimal	Increase morning insulin by 2 units	Increase morning insulin by 4 units

Insulin Dose Adjustment - Basal Bolus Regimen (4 Injections daily)

Table 6

Blood Testing Times	Blood Glucose <4mmol/l or Hypo	Blood Glucose 4-7 mmol/l	Blood Glucose 8 – 14 mmol/l	Blood Glucose ≥15mmol/l
Before Breakfast	Reduce bedtime intermediate insulin by 4 units	OPTIMAL	Increase bedtime intermediate insulin by 2 units	Increase bedtime intermediate insulin by 4 units
Before Lunch	Reduce morning short acting insulin by 2-4 units	OPTIMAL	Increase morning short acting insulin by 2 units	Increase morning short acting insulin by 4 units
Before Evening Meal	Reduce lunchtime short acting insulin by 2-4 units	OPTIMAL	Increase lunchtime short acting insulin by 2 units	Increase lunchtime short acting insulin by 4 units
Before Supper/ Bedtime	Reduce Evening meal short acting insulin by 2-4 units	OPTIMAL	Increase evening meal short acting insulin by 2 units	Increase Evening meal short acting insulin by 4 units

General Advice on Insulin Dose Adjustment

- Insulin may need adjusting for exercise, meal composition, patterns in blood sugar levels, during illness and weight loss or gain episodes.
- **Do not adjust dose on a “single” raised blood glucose.**
- Adjust according to the chart above and monitor for at least 48 hours to judge the effect before further adjustment
- Blood glucose target range should be set Individually for each patient.
- Dose adjustment is **individual** and needs to be monitored closely.
- Patients should be educated to adjust their own insulin
- Document change of insulin dose in the nursing notes.
- If problems persist in controlling the blood glucose level seek advice from the General Practitioner or link Diabetologist.

Available Insulin

Human and Analogue Insulin Preparations

Preparation		Manufacturer
Short acting	Human Actrapid (10ml vial only)	Novo Nordisk
	Humulin S	Lilly
	Insuman Rapid	Sanofi- Aventis
Short acting Analogue	Novorapid	Novo Nordisk
	Humalog	Lilly
	Apidra	Sanofi- Aventis
Premixed insulin	Human Mixtard 30	Novo Nordisk
	Humulin M3	Lilly
	Insuman Comb 15	Sanofi -Aventis
	Insuman Comb 25	
	Insuman Comb 50	
Biphasic Insulin Aspart	Novomix 30	Novo Nordisk
Biphasic Insulin Lispro	Humalog Mix 25	Lilly
	Humalog Mix 50	Lilly
Intermediate acting	Human Insulatard	Novo Nordisk
	Humulin I	Lilly
	Insuman Basal	Sanofi -Aventis
Long acting Analogue	Insulin Glargine (Lantus)	Sanofi -Aventis
	Insulin Detemir (Levemir)	Novo Nordisk

Animal insulin

Bovine		
Short acting	Hypurin Neutral	CP Pharmaceuticals
Intermediate acting	Hypurin Isophane	
Long acting	Hypurin Lente	
Long acting	Hypurin PZI	
Porcine	Hypurin Porcine Neutral	
	Hypurin Porcine Isophane	
	Hypurin Porcine 30/70 Mix	

Animal insulins are no longer used to initiate insulin therapy.

Care pre and post initiation of insulin therapy

Starting insulin is easy – the follow up and education are the major workloads.

Before insulin conversion, patients should be seen by a registered dietitian for dietary education.

Patients starting insulin should be given contact numbers and details of the individual nurse initiating therapy, together with back up contact numbers, numbers for out of hours services (i.e. NHS 24) and staff names.

Patients starting insulin will be contacted/ reviewed by the nurse initiating therapy, or a colleague, within 24 hours of commencing insulin.

Generally insulin initiation in Type 2 diabetics is a planned procedure, therefore **patients should not be started on insulin on Friday unless absolutely essential.**

Education is a continuing process and should be given as and when necessary.

Education prior to commencing insulin should include:

- Advice on recognition, treatment and causes of hypoglycaemia.
- Ensure proficiency in blood glucose monitoring. This may include the patient, family member or carer or district nurse.
- Proposed benefits and aims of treatment, including definition of good glucose control.
- Pen device choice / suitability.
- Dietetic review.
- Advice on informing Driver and Vehicle Licensing Agency (DVLA) and insurance company. Legal implications of not doing so should be emphasised.
- Possible implications for employment should be discussed where appropriate (e.g. LGV and PCV license holders, members of emergency services, armed forces personnel, train drivers, airline pilots etc).
Diabetes UK campaigned against the ban on Group 2 licenses and has secured a concession for C1 and C1+ E. If patient is on insulin they can now undergo a medical assessment to apply for a C1 or C1+E entitlement to be added to their standard car license¹⁰.
- Contact numbers of appropriate healthcare professionals.

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Education on initiating therapy should include the above points PLUS:

- Injection techniques, rotation of sites to prevent lipohypertrophy, times of insulin administration, storage of insulin, disposal of equipment and items available on prescription. Emphasise the need to invert the vial/pen device for cloudy insulin at least 20 times in order to mix the insulin completely.
- Sick day rules, illness at home and alternative fluid or diet measures. Awareness of the need to ketone test and action to take if ketonuria present.
- Glucagon administration should be taught to carers/family where appropriate.
- Eating out and appropriate information for adjusting insulin times.
- ID cards.
- Cultural considerations e.g. Ramadan

Continuing Education.

- **Refer to secondary care all women requiring pre-conceptual and pregnancy advice**
- Cardiovascular risk education.
- Smoking.
- Exercise.
- Holidays and travel.
- Retinopathy screening and eye care.
- Information about annual review.
- Dental care
- Foot care.

INSULIN CONVERSION / EDUCATION CHECKLIST

Patient Details _____

DIABETES	Date Sign	Date Sign	Date Sign	Date Sign	HYPOGLYCAEMIA	Date Sign	Date Sign	Date Sign	Date Sign
Discuss Transfer to insulin					What is a hypo				
Risk to health of poor control					Signs, symptoms and treatment of mild, moderate and severe hypo's				
Discuss HbA1c & Complications					Causes of hypo				
Contraception					Glucagon administration				
Blood monitoring					Driving and hypo's				
Seen by dietitian					ILLNESS / SICK DAY RULES				
Oral Agents Continue Y/N					Effects of illness on blood sugar				
Injections/Insulin					Test blood sugar x 4 day				
Demonstration of insulin device					Insulin dose adjustment				
Injection technique					Who to contact for advice				
Injection sites					Never Stop Insulin				
Time of injections					Alternative Foods				
Safe disposal of needles					Miscellaneous				
Storage of insulin					Exercise				
Type & action of insulin					Missed meals				
Dose adjustment					Alcohol				
Discuss work pattern					DVLA / PSV / LGV Insurance				
ID cards given					Travel Advice				
DUK					Out of hours GP service telephone number.				
Cultural considerations					Relevant Company Helpline				
					REFER TO GP / PN				
					REFER TO DN				

HYPOGLYCAEMIA

Recognising Hypoglycaemia

Hypoglycaemia is defined as a blood glucose level of **less than 4 mmol/l**. Individuals with diabetes may experience hypoglycaemia due to the side effects of treatment with Insulin, Glitazones or Sulphonylureas.

Severe hypoglycaemia is defined as any episode requiring external assistance for recovery. (McAulay et al 2001)⁸

The United Kingdom Prospective Diabetes Study (UKPDS)⁴ and the Diabetes Control and Complications Trial (DCCT)³ have conclusively shown that intensive glucose lowering therapy significantly reduces the risk of diabetes related complications.

However, intensive glucose-lowering therapy can also lead to an increased incidence of hypoglycaemia.

Symptoms

Autonomic	Neuroglycopenic	Others
Activating sympathetic or para-sympathetic nervous system	Caused by glucose deprivation to the brain	Non Specific
Sweating	Confusion	Weakness
Tremor/Shaking	Lack of Concentration	Dry Mouth
Palpitations	Drowsiness	Headaches
Hunger	Atypical behaviour	
	Inco-ordination	
	Speech Difficulty	
	Diplopia	

Hypoglycaemia unawareness increases with duration of diabetes. (Diabetes UK)

Severe hypoglycaemia may adversely affect quality of life in patients treated with insulin. Improvements in blood glucose control are associated with improvements in quality of life, providing there is no increase in hypoglycaemic symptoms².

Prevention of Hypoglycaemia

The individual should be informed of the following:

- Blood glucose should be monitored where possible to confirm hypoglycaemia.
- If taking Sulphonylureas, Glitazones or Insulin, carry some form of glucose e.g. dextrose tablets, and a diabetes identification card at all times.
- The importance of eating regular meals.
- Observation and rotation of injections sites.
- Appropriate dosage adjustment and administration of insulin.
- Effects of any external temperature changes.
- Hypoglycaemia risk during and after exercising, including sex
- The risks involved if hypoglycaemic while driving or operating machinery.
- The significance of alcohol related hypoglycaemia.

Identifying the cause of hypoglycaemia

Most patients are more frightened of hypoglycaemia, than mild hyperglycaemia and nothing causes more loss of confidence than a severe hypoglycaemic episode after a doctor or nurse has suggested a change in tablet or insulin regimen.⁸

According to Clinical Standards Board for Scotland 2001 acute complications of diabetes can cause distress, disability and death. Therefore appropriate initial management of diabetic emergencies including severe hypoglycaemia can improve the outcome of the event. (CSBS standard 3, 4, 8 & 10)¹

If there is an explanation for a severe hypoglycaemic episode(s), or for recurrent near hypoglycaemia then appropriate action can usually be taken. Protecting the patients from further severe hypoglycaemia takes precedence over achieving “good” glycaemic control in the short term. Patients who have sustained an episode of severe hypoglycaemia have an increased risk of a further episode of severe hypoglycaemia in the future.

The following points should be considered:

- Is the injection device working properly?
- Was insulin given at the appropriate time before meals?
- Are insulin dosages being missed and overcompensated for later?
- Are tablets being missed and overcompensated for later?
- Are meals being missed?
- Are meals changing in quantity/quality without a planned change in insulin?
- Are hypoglycaemic events occurring at the weekend rather than weekdays?
- Was alcohol responsible?
- Was exercise responsible?
- Was the hypoglycaemia related to pre or postmenstrual blood glucose changes?
- Have the injection sites been checked?
- Does the patient rotate injection sites?
- Does the patient have Lipohypertrophy?
- Is the blood glucose monitoring machine working properly?
- Is blood glucose monitoring technique acceptable?
- Does the patient need a dietary review?
- Does hot weather, bath or showers pre injection affect control?
- Is this insulin regime suitable for this patient?
- Is this oral hypoglycaemic agent suitable for this patient?
- Has the patient recently started taking their tablets?
- If oral hypoglycaemic agents still being taken in conjunction with insulin ensure they are being taken at the appropriate time and dose.

Reduction in Awareness of Hypoglycaemia

Some people, especially with diabetes of long duration, may lose the early warning signs of falling blood glucose and thus be at greater risk of more severe hypoglycaemia.⁸ On average patients with reduced hypoglycaemia awareness are six times more likely to experience severe hypoglycaemia.

Patients with hypoglycaemia unawareness should be referred to secondary care.

Hypoglycaemia and Driving

Individuals with diabetes should be advised not to drive if they have difficulty recognising the early signs of hypoglycaemia. In accordance with current driving regulations, patients experiencing hypoglycaemia unawareness should notify DVLA.¹⁰

For further information refer to Diabetes UK and DVLA websites.

Advise patients to avoid low blood sugars while driving by:

- Checking blood sugar levels before and during your car journey.
- Always carrying some form of fast and slow acting carbohydrate food in your car.
- Not driving for more than 2 hours without eating a snack.
- Not missing, or delaying, a meal or snack.

If hypoglycaemia occurs while driving advise patient to:

- Stop driving as soon as it is safe to do so
- Remove key from ignition and move into the passenger seat (this is to refute any suggestion that you are in charge of a car whilst under the influence of any drugs including insulin)
- Check blood glucose if possible
- Treat hypo with fast acting carbohydrate
- Follow that up with a long acting carbohydrate
- Check blood glucose every 15 minutes
- Wait at least 40 minutes before driving again (studies show that cognitive function does not recover fully until this time)

If a patient has lost or has poor warning symptoms of impending hypoglycaemia or has frequent hypos, they should probably not be driving because of the risk to themselves and other road users. Patient should also notify the DVLA.

Hypoglycaemia and Alcohol

Individuals with diabetes should be made aware of hypoglycaemia risk following significant ingestion of alcohol. Alcohol inhibits the process of gluconeogenesis and blood glucose levels may fall dangerously low. Alcohol can impair hypoglycaemia awareness.

To reduce the risk of hypoglycaemia, give the following advice:

- Do not drink more than 3 units of alcohol (men) per day
Do not drink more than 2 units of alcohol (women) per day
- Ensure some form of long acting carbohydrate is taken along with alcohol
- Have a long acting carbohydrate snack before bed

Nocturnal Hypoglycaemia

Hypoglycaemia can happen during the night, while sleeping, just as it can during the day. How someone reacts to hypoglycaemia during sleep can vary from person to person. It may

- wake them from sleep
- cause vivid dreams
- cause sweating and confusion

Treat it as you would advise for any hypoglycaemic episode.

Others may sleep right through hypoglycaemia, waking in the morning with

- a headache
- a hangover sensation
- a high blood glucose.

This is a result of the body releasing stores of glucose as a response to hypoglycaemia. Family members may recognise symptoms, if person becomes restless, noisy or non-responsive. In these cases it is best to wake the person and get them to treat the hypoglycaemia.

Hypoglycaemia and Exercise

The acute effects of exercise on blood glucose are variable, with some people experiencing a rise in blood glucose (perhaps mediated by catecholamine excretion) while others note a fall in blood glucose, presumably due to increased utilisation of glucose as a metabolic fuel. Most people on insulin therapy are aware of the effects of their own usual exercise pattern and can take steps to avoid hypoglycaemia, either by increasing food ingestion before or during exercise, or reducing insulin doses prior to exercise.

Relevance of using appropriate injection sites prior to exercise should be discussed.

Significant exercise (sustained and/or vigorous) has an effect on the sensitivity of target tissues to the action of insulin, producing increased insulin sensitivity, which lasts for several hours after the exercise and may need to alter food ingestion or insulin dose post exercise as well as pre-exercise. As exercise is often taken during the early evening there is possibility of significant post-exercise hypoglycaemia occurring while in bed, a time when many subjects are at risk of severe hypoglycaemia.

Blood Glucose Monitoring

1. It would be reasonable for Type 2 patients to be carrying out blood glucose monitoring for at least 2 – 4 weeks prior to the initiation of insulin therapy.
2. Clearly this needs to take into account age, other illnesses, physical and mental dexterity etc. Although blood glucose monitoring gives a quantitative measurement that bears some relation to HbA1c, there is no evidence that it improves overall blood glucose control. However many patients welcome the opportunity to know more clearly what their blood glucose control is, and the chance to stop urine testing. Blood glucose monitoring can detect worsening trends in glycaemic control.
3. The pattern of blood glucose monitoring in insulin treated patients depends on the individual patient and the insulin regime they are using. Generally it is useful to have a pre-breakfast blood glucose measurement and a pre-bed time blood glucose measurement to gauge the dose of evening insulin and so that the patient can avoid going to bed with a blood glucose below 8.0 mmol/l. The time of other blood glucose measurements depends on the insulin regime. Measurements of between 4.0 and 7.0 mmol/l pre-breakfast and pre-evening meal, above 8.0 mmol/l before bed and rarely above 8.5 mmol/l⁹ two hours post-prandially are reasonable. Co-morbidities, life expectancy and biological age should be considered when teaching patients about hypoglycaemia.
4. Patients should be warned against making insulin adjustments on a daily basis and should be helped to understand that the HbA1c measurement is by far the most useful assessment of overall glycaemic control.
5. During the initiation of insulin therapy it is necessary for blood glucose measurements to be carried out more frequently to enable the Diabetes Specialist Nurse to suggest the necessary adjustments to insulin doses.
6. It is reasonable to suggest that during periods of illness the diabetic patient should carry out blood glucose monitoring more often.

Patient Education

To achieve the best possible diabetes care outcomes; health professionals and people with diabetes need to work as equal members of a team. It is essential that the person understand their condition to enable them to effectively contribute to the team and be in control of their condition.

Education should be tailored to suit the individual, staged to the appropriate time, and provided when questions are asked. A summary of educational topics covered are outlined under the following headings:

1. Nature of Diabetes
2. Day to Day Management of Diabetes
3. Special Issues
4. Living with Diabetes
5. Educational Resources
6. Monitoring and Management

1. Nature of Diabetes

- Explanation of diabetes, its causes, symptoms, treatment, nature and prevention of long-term complications.
- Discussion of person's feelings regarding diabetes e.g. preconceived ideas, fears of complications, acceptance of diagnosis etc.
- Details of care provision i.e. whether care is provided by hospital only, general practice only or by integrated care: frequency and importance of review.
- The purpose of Diabetes UK and details of how to access it nationally and locally (see Appendix 5).

2. Day to Day Management of Diabetes

- Importance of healthy lifestyle e.g. healthy eating, undertaking regular physical activity and avoiding smoking.
- Importance of self-management.
- Outline of normal blood glucose levels, provision of target for good blood glucose control and discussion of factors affecting glucose levels.
- Key Dietary Information.
 1. Individualised advice and encouragement to achieve a low fat, low sugar, low salt, and high fibre diet.
 2. Regular eating patterns.
 3. Regular carbohydrate distribution, use of complex carbohydrates and encourage the use of foods with a low glycaemic index, e.g. porridge, wholegrain bread, peas, beans, lentils.
 4. Individualised realistic targets for weight control and good glycaemic control.
 5. Dietary changes required and their practical application for individuals.
 6. Appropriate use of low kcal, low sugar, and low fat products.

- Blood glucose monitoring
 1. Benefits, when to test and how often.
 2. Interpretation of test results and appropriate action to take.
 3. Sharps Disposal.

3. Special issues relating to Hypoglycaemia and Hyperglycaemia

Symptoms, prevention, action to take:

- Missed insulin (see Appendix 6)
- Illness guidelines/Sick Day Rules. (see Appendix 2)
- Immunisation details as appropriate e.g. tetanus, influenza.
- Anti-hypertensive medication. e.g. beta blockers (hypo unawareness)
- Preconception advice to women of childbearing age.
- Eating out and special occasions

4. Living with Diabetes

- Importance of carrying personal identification e.g. Medi-Alert and a warning card including the name, contact address and telephone number of a person whom can help.
- Driving Issues and Advice.
- Alcohol.
 1. It's effect on blood glucose levels.
 2. Diabetes UK recommendations regarding quantities.
 3. Never drink and drive.
 4. Risk of weight gain.
- Smoking
 1. General risks of smoking and additional risks in diabetes.
 2. Encouragement / support to stop smoking.
- Employment issues regarding diabetes.
- Life Insurance Policy Issues.
- Travel and Holiday Advice.
- Eating on special occasions/celebrations.
- Annual Review – importance and reason for annual review.
- Eye Screening Details.
- Medication details
 1. Name of and reason for use.
 2. When to take and relationship to food.
 3. Prescription exemption details.
 4. Effect of other medication on diabetes.
 5. Importance of taking medication regularly.
- Physical Activity

5. Educational Resources

Any educational resources should also take account of an individual's cultural, physical and educational needs.

Make patients aware of Diabetes UK and educational materials available.

Key Messages:

- Diabetes is a condition, which is for life. Type 2 diabetes evolves with time and requires increasing doses of medication.
- Keeping diabetes well controlled lowers the risk of complications.
- **Smoking is more dangerous for people with diabetes**
- It is important to have a full check-up at least once a year with your doctor.
- Hypoglycaemia is unlikely to occur when you are controlled by diet only or diet plus Metformin.

6. Monitoring and Management

- Regular blood testing provides the information needed to make the right changes to your treatment.
- Eating the right type and amount of food at the right time is essential for good control.
- Illnesses, infection, being overweight and stress can all affect your diabetes.

Appendix 1



Greater Glasgow Primary Care Division

RECOMMENDATIONS FOR GLUCAGON ADMINISTRATION (ADULTS)

These recommendations are intended as a guide for first level District Nurses.

Hypoglycaemia which causes unconsciousness is considered an acute medical emergency and must be dealt with promptly.

For those commencing insulin therapy, or those whose insulin is being administered by District Nurses, it is recommended that “GlugaGen Hypokit” is available, prescribed by the patient’s GP.

“GlugaGen HypoKit” 1mg is the name of the Glucagon that should be kept at home for hypoglycaemic emergencies. It is supplied in kit form.

Glucagon 1mg/1ml can be injected either subcutaneously or intra muscularly for acute insulin induced hypoglycaemia. It increases plasma glucose concentration by mobilising glycogen stored in the liver.¹

Situations where Glucagon should be administered

When a patient has a blood glucose level recorded at less than 4 mmol/L, including one or both below:

- The patient is displaying signs and symptoms of moderate to severe hypoglycaemia e.g. cold, clammy and confused and where encouraging oral intake of fast acting carbohydrate is considered unsafe.
- The patient cannot swallow, is uncooperative, unconscious, or is having convulsions.

Contraindications

- Chronic alcohol abuse¹
- Where the person can safely swallow fast acting carbohydrate (e.g. glass of ordinary coke or lemonade, hypostop or 3 - 4 glucose tablets), followed by a long acting carbohydrate (e.g. sandwich, toast, banana, or next meal)²

Side effects

Nausea, vomiting, diarrhoea, headache and hypokalaemia may occur following administration of Glucagon.¹

Action to be taken following Glucagon administration

On recovery:

- Glucagon can sometimes cause vomiting. Make sure the patient is alert and orientated before sitting them upright.
- Encourage patient to take fast acting carbohydrate (e.g. a glass of ordinary coke or lemonade or 3 - 4 glucose tablets such as Dextroenergy). This should be followed up with some long acting carbohydrate (e.g. sandwich, toast, a banana or next meal) as soon as they are able.
- Check blood glucose levels every 10-15 minutes until patient recovered. Record results in nursing notes/diary. Ensure patient is aware they need to continue to monitor blood glucose and take regular carbohydrate throughout the remainder of the day. Blood glucose levels

Guidelines For Insulin Adjustment In Primary Care

may be erratic for up to 48 hours after administration of Glucagon. Arrange DN revisit to check Blood Glucose if necessary.

- Identify where possible, reasons for “hypo” (e.g. check injection sites, change in insulin regimen, meal patterns, alcohol and general health).
- Severe episodes of hypoglycaemia, requiring Glucagon, should be reported to GP/Diabetes Nurse Specialist for further advice, and, or investigation.³
- Ensure patient has a repeat prescription for GlucaGen
- Ensure adequate supplies of food are available

The nurse can call an ambulance prior to administration of Glucagon if she deems it necessary, but MUST call one for anyone experiencing severe hypoglycaemic symptoms NOT responding to use of Glucagon within 10 minutes. Place patient in recovery position and wait with patient until ambulance arrives.

N.B. Glucagon may be ineffective when administered to patients with chronic alcoholism, malnutrition and where Glucagon has been administered previously. In these circumstances, it is imperative that an ambulance is called without delay.

References

British National Formulary 57 (2009), Royal Pharmaceutical Society of Great Britain, London

² Diabetes Update (2002), Diabetes UK, *Hypoglycaemia*, <http://www.diabetes.org.uk/update/summer02/fact.htm>

³ Clinical Standards Board for Scotland, (2002), *Clinical Standards Diabetes*, 2nd edition, Edinburgh

Appendix 2

Sick Day Rules

People with diabetes do not get any more illnesses than other people, but if you do get ill your control may be upset.

Common illnesses such as flu, sore throats or stomach trouble may upset your diabetes control, but blood sugar levels will return to normal once you are better.

What should I do if I am ill?

Your blood sugar may rise even if you are unable to eat your normal food and drink, so never stop taking your insulin or diabetes tablets.

- Test your blood sugar every 2-4 hours and act on the result as discussed with your diabetes nurse or doctor
- Try to drink 3 litres (4-6 pints) of sugar free liquid throughout the day
- If you don't feel like eating, replace your meals with carbohydrate containing drinks such as soup, milk or fruit juice with sugar free drinks in between
- If you are being sick and cannot keep anything down take regular sips of sugary drinks such as lemonade
- Consult your diabetes nurse or doctor if
 - You have ketones in your urine
 - You are vomiting and unable to keep your tablets down
 - Your blood sugar levels remain high or low
 - You don't improve quickly or you are worried

Ketones

If your blood sugar is more than 17 mmol/l twice in a row or if you are vomiting, test your urine for ketones if you are able.

Ketones are acid substances produced when your body is short of insulin. Shortage of insulin means your body cannot get sugar into your cells so you start to burn fat stores to give you energy. This is called ketoacidosis and is dangerous if not treated quickly, so contact your diabetes nurse or doctor.

Can I adjust my insulin?

If you are on insulin and have discussed this with your diabetes nurse or doctor, you should follow their guidelines.

If you are not sure, you should contact your diabetes nurse or doctor.

Be prepared

- Flu vaccines are recommended for some people with diabetes, ask at your GP surgery
- Keep basic medicines in the house such as painkillers and cough medicines
- Keep a supply of test strips and sugary drinks at home for emergencies

Reviewed January 2010

Appendix 3

Scottish Medicines Consortium

insulin detemir (Levemir ò) No. 110/04

Novo Nordisk

Summary of Advice

9 August 2004

The Scottish Medicines Consortium (SMC) has completed its assessment of the above product and advises NHS Boards and ADTCs on its use in NHS Scotland. The advice is summarised as follows:

Advice: following a full submission.

Insulin detemir is accepted for restricted use within NHS Scotland for the treatment of diabetes mellitus.

Insulin detemir is an acceptable basal insulin for patients with diabetes mellitus. Its use should be targeted on patients attempting to achieve better hypoglycaemic control as there may be some benefit related to a reduced intra-individual variation in glycaemic profile for insulin detemir compared with established insulins. It appears to be cost-effective from the base-case of economic modelling, but this is limited by the degree of extrapolation involved and the associated width of the confidence intervals.

Professor David H Lawson

Chairman

Reviewed January 2010

Appendix 3

Scottish Medicines Consortium

insulin detemir, 100 U/ml solution for injection via InnoLet® device (Levemir® in InnoLet®) No. (393/07) Novo Nordisk Ltd

Product Update

6 July 2007

The Scottish Medicines Consortium has completed its assessment of the above product and advises NHS Boards and Area Drug and Therapeutic Committees (ADTCs) on its use in NHS Scotland. The advice is summarised as follows:

ADVICE: following an abbreviated submission **insulin detemir (Levemir®) for injection via the InnoLet® device** is accepted for restricted use within NHS Scotland for treatment of diabetes mellitus in patients for whom insulin detemir is an appropriate choice of insulin and who have poor visual acuity and dexterity problems.

The Scottish Medicines Consortium has previously advised that insulin detemir should be restricted to patients attempting to achieve better hypoglycaemic control as there may be some benefit related to a reduced intra-individual variation in glycaemic profile for insulin detemir compared with established insulins.

Advice context:

No part of this advice may be used without the whole of the advice being quoted in full.

This advice represents the view of the Scottish Medicines Consortium and was arrived at after evaluation of the evidence submitted by the company. It is provided to inform the considerations of Area Drug & Therapeutics Committees and NHS Boards in Scotland in determining medicines for local use or local formulary inclusion. This advice does not override the individual responsibility of health professionals to make decisions in the exercise of their clinical judgement in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

This assessment is based on data submitted by the applicant company up to and including 14 June 2007.

Chairman, Scottish Medicines Consortium

Appendix 4 Scottish Medicines Consortium

Insulin glargine (Lantus®) (No. 11/02) Aventis

Summary of Recommendation

4 October 2002

The Scottish Medicines Consortium (SMC) has completed its assessment of the above product and advises NHS Boards and ADTCs on its use in NHS Scotland. The recommendation is summarised as follows:

ADVICE

Recommended for restricted use within the NHS Scotland.

REASONS FOR ADVICE

Insulin glargine is an acceptable treatment for patients with diabetes mellitus. Pending further studies, its use should be targeted on patients who are at risk or experience unacceptable frequency and/or severity of nocturnal hypoglycaemia on attempting to achieve better hypoglycaemic control during treatment with established insulins. It is also acceptable as a once daily insulin therapy for patients who require carer administration of their insulin. At present the evidence does not support its routine use in patients with type 2 diabetes unless they suffer from recurrent episodes of hypoglycemia or require assistance with their insulin injections.

Professor David H Lawson
Chairman

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Chairman Professor David Lawson



Appendix 4 Scottish Medicines Consortium

insulin glargine 100 units/ml solution for injection in a prefilled pen (Lantus® SoloStar®) (No: 456/08) Sanofi-aventis

Product Update

07 March 2008

The Scottish Medicines Consortium has completed its assessment of the above product and advises NHS Boards and Area Drug and Therapeutic Committees (ADTCs) on its use in NHS Scotland. The advice is summarised as follows:

ADVICE: following an abbreviated submission

insulin glargine 100 units/ml solution for injection in a pre-filled pen (Lantus SoloStar) is accepted for restricted use in the treatment of adults, adolescents and children of 6 years or above with diabetes mellitus, where treatment with insulin is required.

It may be used in patients in whom treatment with this insulin analogue is appropriate and in whom the use of a pre-filled pen offers advantages over a pen and cartridge device.

The use of insulin glargine should be targeted on patients with Type I diabetes who are at risk of or experience unacceptable frequency and/or severity of nocturnal hypoglycaemia on attempting to achieve better hypoglycaemic control during treatment with established insulin's. It is also acceptable as a once daily insulin therapy for patients who require carer administration of their insulin. In patients with type 2 diabetes, it should be restricted to those who suffer from recurrent episodes of hypoglycemia or require assistance with their insulin injections.

Advice context:

No part of this advice may be used without the whole of the advice being quoted in full.

This advice represents the view of the Scottish Medicines Consortium and was arrived at after evaluation of the evidence submitted by the company. It is provided to inform the considerations of Area Drug & Therapeutics Committees and NHS Boards in Scotland in determining medicines for local use or local formulary inclusion. This advice does not override the individual responsibility of health professionals to make decisions in the exercise of their clinical judgement in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

This assessment is based on data submitted by the applicant company up to and including 16th January 2008.

**Chairman,
Scottish Medicines Consortium**

Secretariat - Delta House 50 West Nile Street Glasgow G1 2NP
Telephone 0141 225 6989
E-mail: rosie.murray@nhs.net
Chairman Professor David Webb

Reviewed January 2010

Appendix 5

Useful Contacts

Full contact details and services including patient support groups, careline counsellor services, information services and booklets, should be given to the patient.

Contact details include:

Diabetes UK Scotland
Venlaw
349 Bath Street
Glasgow
G2 4AA

Website: www.diabetes.org.uk
Telephone: 0141 245 6380
Email: scotland@diabetes.org.uk

Other helplines available:-
NHS 24 08454 242424

Websites

www.dvla.gov.uk

<http://glasgow.diabetes.scot.nhs.uk/>

www.diabetes-healthnet.ac.uk

www.runsweet.com

<http://www.diabetes.co.uk/travel.html>

Abbott Diabetes Care; www.abbottdiabetescare.co.uk
Patient helpline; 0500 467466 Health Care Professional helpline; 0800 032 1016

Bayer Diabetes Support; www.bayerdiabetes.co.uk
0845 600 6030

BD Medical – Diabetes Care; www.bddiabetes.co.uk
Telephone 01865 748844

CP Pharmaceuticals Ltd.; www.wockhardt.co.uk
Telephone 01978 661261

Diabetes UK; www.diabetes.org.uk
0141 245 6380

Useful Contacts cont.

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Eli Lilly; www.lilly.co.uk
01256 315999

GlaxoSmithKline; www.gsk.com
0800 221441

Lifescan (One Touch); www.lifescan.co.uk
Customer Careline 0800 121200

Menarini Diagnostics; www.menarinidiag.co.uk
0118 944 4100

Medtronic; www.medtronic-diabetes.co.uk
01923 205167

Novo Nordisk; www.novonordisk.co.uk
01293 613555
Patient Helpline 0845 600 5055

Pfizer Global Pharmaceuticals; www.pfizer.co.uk
01304 616161

Roche; www.rocheuk.com
01444 256000

Sanofi-Aventis; www.sanofi-aventis.co.uk
10483 505515
Patient and HCP Helpline 0845 606 6887

BBI Healthcare (Sensocard Talking Meter); www.sensocardplus.com
Customer Careline 0830-1700 Mon-Fri. 01792 229333

Appendix 6

Missed injections

Questions to ask;

What is normal regime?

Insulin long/short acting? – Note: the terms clear and cloudy are no longer applicable

Type 1 or Type 2 diabetes?

Age of patient

? Pregnant

Usual blood glucose levels

How long since last injection? How long since last meal?

Why missed the injection? (deliberate or not?)

Symptoms?

Actions:

- Check blood glucose
- Check ketones
- Give insulin as soon as possible

For once daily regimen

- If within 6 hours of usual time give normal dose.
- If 6-12 hours late give 50% of normal dose
- If > 12 hours late consider omitting dose and monitor blood glucose.

For twice daily premixed or self-mixed regimen

- If within 2 hours of usual time, reduce dose approximately 10% (can give normal dose if BG is high enough)
- If 2-4 hours late, reduce dose by approximately 25% (again if BG high could give normal dose though the evening dose in this case would have been slightly later)
- If 4-6 hours late, reduce dose by approximately 50% or give 50% of short/rapid –acting insulin only, if available.
- If > 6 hours late, omit dose and monitor BG; If BG < 10 mmol/l do nothing. If BG > 10 mmol/l consider advising short/rapid acting insulin if available. May need delay next dose of insulin if a dose of short/rapid acting insulin is given.
- If overslept, take insulin on waking; delay next injection for approx 7 hours.

For basal bolus regimen

a) Bolus

- If within 30 minutes of food and on a rapid acting insulin, give normal dose.
- If within 2 hours of food give up to 50% of short/rapid acting insulin, followed by a snack.
- If more time has elapsed consider taking next short/rapid acting injection early followed by food.

b)

- If within 6 hours of usual time give normal dose.
- If 6-12 hours late give 50% of normal dose.
- If > 12 hours late consider omitting dose and monitor blood glucose.

**Reassure patient that they may take a couple of days to regain normal glucose control.
Continue monitoring.**

References:

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 - ² Scottish Intercollegiate Guidelines Network (SIGN 55) (2001). *Management of Diabetes: a national clinical guideline*. Edinburgh. URL: <http://www.sign.ac.uk/pdf/sign55.pdf>
 - ³ (1993) *The Diabetes and Control and Complications Trial research Group*. New England J. Med. 329(14); 977-986.
 - ⁴ Stratton IM, et al. (2000) United Kingdom Prospective Diabetes Survey (UKPDS) 35. *BMJ* 321; 405-412.
 - ⁵ Norfolk Integrated Diabetes Management Group (NIDM). 2002 Diabetes Management Guidelines for Primary Care in Central Norfolk.
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 - ⁷ Barnett T. *Future Prescriber* (2002)
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 - ¹⁰ Driver and Vehicle Licensing Agency. For Medical Practitioners. February 2009. At a glance Guide to the current Medical Standards of Fitness to Drive. Swansea. URL: <http://www.dft.gov.uk/dvla/medical/ataglance.aspx>
 - ¹¹ Heller S R (2001) 2 Insulin treatment in type 2 diabetes: P 18 Medical Education Partnership 2001. As reported in *Insulin Made Easy* edited by A H Barnett
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 - ¹³ Scottish Medicines Consortium Press Statement; 14th October (2002). The Scottish Medicines Consortium advises on insulin Glargine (Lantus) for diabetes. URL: <http://www.htbs.co.uk/smc/press/index.asp?did=869>
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