For Healthcare professionals:

HYPOGLYCAEMIA IN ADULTS IN THE COMMUNITY: RECOGNITION, MANAGEMENT AND PREVENTION

Endorsed by:

CONTENTS

RATIONALE AND REMIT

This guidance was developed to advise on the recognition, treatment and prevention of hypoglycaemia in adults with diabetes mellitus living in the community. It is intended to serve as a helpful resource for a range of groups, including those caring for people with diabetes, commissioners, designers of services and healthcare professionals.

Healthcare professionals have an individual responsibility of care to make decisions appropriate to the circumstances of the individual person with diabetes. Decisions should be informed by the person with diabetes and/or their guardian or carer, and taking full account of their medical condition and treatment.

When implementing this guidance, full account should be taken of the local context, and any action taken should be in line with statutory obligations required of the organisation and individual. No part of this guidance should be interpreted in a way that would knowingly put anybody at risk.

ABOUT THIS GUIDANCE

Authors

Debbie Hicks: Nurse Consultant-Diabetes, Enfield Health, B.E.H-MHT, TREND-UK
Jill Hill: Independent Nurse Consultant, TREND-UK
June James: Nurse Consultant-Diabetes, University Hospitals of Leicester NHS Trust, and Associate Professor University of Leicester, TREND-UK

Document reference group

The authors would like to thank the original reference group for their input into this document and also the members of The Enfield Diabetes Support group who kindly reviewed the guidance.

We would also like to thank the following TREND-UK Associate and Advisors for reviewing this document

Jane Diggle: Senior Practice Nurse. TREND-UK Associate
Nneka Agbasi: DSN, Community DSN, TREND-UK Advisor
Erica Richardson: Inpatient DISN, TREND-UK Advisor
Debbie Voigt: DSN, TREND-UK Advisor and Representative for Scotland
Ceri Jones: Community DSN, TREND-UK Advisor and Representative for Wales

About TREND-UK

TREND-UK is a working group of diabetes nurses with different skills and backgrounds, set up in 2009 in response to a request by the diabetes tsar at that time for a collective voice that represented all diabetes nursing groups. The original founding co-chairs of TREND-UK were experienced nurse consultants, working in a variety of settings, and closely involved with most of the organisations representing nurses working in diabetes.

The creation of this guidance was supported by:

The content of these guidelines was generated independently by TREND-UK with support from a **Sanofi Diabetes** grant. **Sanofi Diabetes** had no editorial input into these guidelines. Printing and distribution funded by **Novo Nordisk**. **Eli Lilly and Company** Limited provided financial support for the production of this document. **Eli Lilly** had no editorial input into the content.

FOREWORD

By publishing this document, the authors have added an important contribution to the information available to those people with diabetes who experience hypoglycaemia and those who care for them.

In describing hypoglycaemia, the explanations of the signs and symptoms are clearly defined for which people with diabetes and their carers will find a great help. The causes of hypoglycaemia are set out in a comprehensible way, as are the risks associated with hypoglycaemia. The impact of having a 'hypo' on lifestyle and driving is also described in an easy to read way.

Information is also given for those in a care home or end of life scenario, as well as those who develop dementia to raise awareness that the presentation of hypoglycaemia maybe different.

The various treatments for those having a 'hypo' and when a person can treat their own hypo are detailed, as well as the situation whereby a person would need someone to assist and help. There is also a section on various situations when a person might be more at risk of experiencing hypoglycaemia.

Readers will find most useful the section on preventing a hypoglycaemic episode and the best way to avoid having one. This section also includes advice for healthcare professionals and pharmacists and when a person needs to be admitted to hospital.

This is a very comprehensive document which will be extremely helpful to both people with diabetes and healthcare professionals.

Ruth Waxman

Chair
Enfield Diabetes Support Group

Diabetes UK supports these guidelines. They will help healthcare professionals and those caring for people with diabetes to recognise hypoglycaemia and treat it appropriately. It will be especially useful for supporting vulnerable groups such as the frail and elderly and will reduce hospital admissions and thus the cost, distress and disruption to a person's daily life.

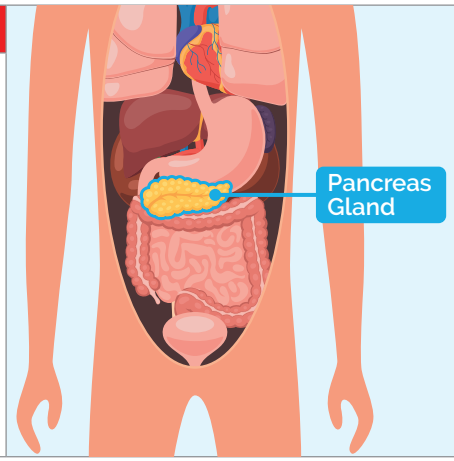
Libby Dowling

Senior Clinical Advisor
Diabetes UK

INTRODUCTION

Diabetes Mellitus is a condition in which the amount of glucose in the blood is too high due to defects in insulin secretion, insulin action or both (Diabetes UK, 2017). Table 1 outlines the two most common types of diabetes.

Table 1: The two main types of diabetes

TYPE 1 DIABETES		TYPE 2 DIABETES
• Develops when the insulin-producing cells in the pancreas have been destroyed and the body cannot produce any insulin • Affects 5 to 15% of people with diabetes • Treated with insulin injections, a healthy eating plan, and regular physical activity		• Develops when the pancreas can still produce some insulin but insufficient to control blood glucose levels, or when the body is resistant to the effects of insulin • Affects 85-95% of people with diabetes • Treated by normalising weight where appropriate, eating healthily and taking regular physical activity, tablets, injectable medication and/or insulin may be required.

What is hypoglycaemia?

Hypoglycaemia may occur when people with diabetes are treated with certain medications such as sulphonylureas, prandial glucose regulators (Meglitinides) or insulin (Cryer and Arbeláez, 2017). Hypoglycaemia is a lower than normal level of blood glucose. It can be defined as:

- **Mild** if the episode is self-treated
- **Severe** if assistance by a third party is required (DCCT, 1993) cited in JBDS 2018 . Any blood glucose less than 4 mmol/L in an individual treated with insulin and/or a sulphonylurea should always be treated.

Diabetes UK recommends that a blood glucose level of less than 4 mmol/l should always be treated.

> *People with diabetes tend to under-report hypoglycaemia because they or their carers do not recognise what is happening.*

Signs and symptoms of hypoglycaemia

The signs and symptoms of hypoglycaemia are shown in Table 2

Adrenergic	Neuroglycopenic
• Sweating • Palpitations • Shaking • Hunger • Anxiety • Paraesthesia • General malaise: headache and nausea.	• Confusion • Drowsiness • Unusual behaviour • Speech difficulties • Lack of co-ordination • Coma

Table 2. Examples of early (adrenergic) and late (neuroglycopenic) signs and symptoms of hypoglycaemia

Adrenergic signs and symptoms are those that occur first, as result of the effect of activation of the sympathetic nervous system, including the adrenal medulla. **Neuroglycopenic** signs and symptoms occur as a result of brain glucose deprivation (Cryer and Arbeláez, 2017). These signs and symptoms of hypoglycaemia are shown in Table 2.

How common is hypoglycaemia?

People with diabetes tend to under-report hypoglycaemia because they or their carers do not recognise what is happening. They may also be reluctant to talk about hypoglycaemia due to the risk of increased restrictions to their way of life, such as loss of their driving licence or job (Diabetes UK 2012). However, this means that the actual number of people with diabetes who experience hypoglycaemia is largely unknown (Bailey et al, 2010). Commonly, people who have episodes of hypoglycaemia often refer to these episodes as 'hypos'.

Hypoglycaemia in individuals treated with insulin

Hypoglycaemia is more common in people who are insulin treated. Studies estimate that on average people with Type 1 diabetes experience up to two symptomatic episodes of mild hypoglycaemia each week and up to two serious events per year (Cryer, 2018, Barnard 2015). Severe hypoglycaemia is less common in people with Type 2 diabetes but becomes more common in those individuals who are insulin treated. The rate is similar to the Type 1 diabetes population once insulin therapy is commenced.

Hypoglycaemia in individuals taking sulphonylureas

In 2016 a population based study by van Dalem et al of 120,803 users of sulphonylureas found hypoglycaemia risk in people on these agents to be **2.5** times higher compared with those on Metformin. This risk increased to 3 fold in people on higher doses or in those with renal impairment (CKD 4 and 5).

Mortality risk with hypoglycaemia

Hypoglycaemia can cause coma, hemiparesis and seizures. If the hypoglycaemia is prolonged, the neurological deficits may become permanent. Severe hypoglycaemia is associated with increased mortality. McCoy et al (2012) auditing the impact of severe and mild hypoglycaemia five years after the event, found a 3-4 increase in mortality in people who experienced a severe hypoglycaemia episode compared to those who experienced a mild episode. A UK audit carried out in 2015 of 1182 paramedic call outs in people with hypoglycaemia revealed a 22% mortality in people with Type 2 diabetes within one year of the event (Elwen et al, 2015).

The financial cost of hypoglycaemia

The costs of severe hypoglycaemia are considerable. It has been estimated that the cost of emergency calls for severe hypoglycaemia amounted to **£13.6 million** in England alone (Farmer et al, 2012). Even if a hospital admission is not required, significant costs may still be incurred from paramedic service involvement.

Psychological cost of hypoglycaemia and the impact on lifestyle

Hypoglycaemia impacts upon a number of areas of a person with diabetes' life including: driving, weight gain, medication adherence and psychological feeling of well being. The fear of hypoglycaemia affects many people. Once experienced, the person may adapt their diabetes management to try to avoid a second event (Nash J 2015).

Medication adherence

Fear of hypoglycaemia and particularly when the episode has resulted in loss of consciousness may result in the individual being reluctant to take their medication as prescribed, and therefore not achieve their blood glucose target (Barnard and Rondags, 2014) Other measures that people may take to avoid hypoglycaemia are:

- Relaxing blood glucose to avoid hypoglycaemia.
- Eating more than is needed in an attempt to keep blood glucose levels higher.
- Snacking between meals or eating more
- Restricting activities where a hypoglycaemic episode would be more difficult to deal with, including driving, exercising and travelling on public transport. (Nash J, 2014)

Weight gain

People who experience multiple episodes of hypoglycaemia, or who fear having an episode, may eat additional food to raise their blood glucose levels, leading to weight gain (Ross, 2004)

What causes hypoglycaemia?

Hypoglycaemia is a side effect of glucose lowering therapies such as insulin, sulphonylureas such as Gliclazide, Glipizide Glibenclamide, Glimepiride, Tolbutamide, and prandial glucose regulators (meglitinides) such as Nateglinide and Repaglinide. These all carry a risk of hypoglycaemia.

Metformin, Pioglitazone, Dipeptidyl peptidase-4 (DPP-4) inhibitors, SGLT2 inhibitors and Glucagon-like peptide-1 (GLP-1) receptor agonists have a very low risk of causing hypoglycaemia when used alone, but hypoglycaemia may occur when used in combination with the drugs listed above. Hypoglycaemia should always be suspected in anyone taking sulphonylureas or injecting insulin who is drowsy, unconscious, or who has a sudden change in behaviour. Signs may present differently in older people, as they are more likely to have reduced or late "hypo" awareness (Weinstock et al (2016).

Other medications may precipitate or mask the symptoms of hypoglycaemia (e.g. warfarin, beta-blockers, NSAIDs, quinine, fibrates, Selective Serotonin Reuptake Inhibitors [SSRIs], anti-convulsants and antibiotics).

Hypoglycaemia risk factors

Different comorbidities such as age and renal function all add to the risk of hypoglycaemia . These and other factors are shown in Table 3

Table 3 Hypoglycaemia risk factors

Medical issues
• Strict glycaemic control • Previous history of severe hypoglycaemia • Long duration of Type 1 diabetes • Duration of insulin therapy in Type 2 diabetes • Lipohypertrophy at injection sites • Inappropriate insulin injection needle size • Impaired awareness of hypoglycaemia • Severe liver impairment • Impaired renal function (including those • patients requiring renal replacement therapy) • Sepsis • Inadequate treatment of previous hypoglycaemia • Terminal illness • Cognitive dysfunction/dementia • Steroid reduction in people taking insulin or sulphonylureas
Lifestyle Issues
• Increased physical activity • Irregular lifestyle • Alcohol • Increasing age • Early pregnancy • Breastfeeding • No or inadequate blood glucose monitoring
Reduced Carbohydrate intake/absorption
• Food malabsorption e.g. gastroenteritis, pancreatic disease • Bariatric surgery involving bowel resection • Fasting e.g. during Ramadan

Amended from the JBDS, The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus 3rd edition Revised February 2018

LIFESTYLE AND THE IMPACT ON HYPOGLYCAEMIA RISK

Certain lifestyle factors may lead to hypoglycaemia in people taking sulphonylureas and/or insulin. These include:

- Delayed or missed meals
- Eating less starchy (carbohydrate) food than usual
- Drinking too much alcohol, or drinking alcohol without food
- More physical activity than usual

There are also groups for whom hypoglycaemia has potentially severe consequences. For example, those who drive, work at heights or with electricity (i.e. hazardous occupations) or live alone.

Driving and road accidents:

In the UK, hypoglycaemia is implicated in approximately 30 serious road traffic accidents each month and up to five fatalities each year (Choudhary et al, 2011). People who have hypoglycaemia when driving which results in serious harm to others or death will face charges and if found guilty be given a prison sentence. Specific recommendations for drivers are shown in Appendix 1.

People with diabetes who drive may be reluctant to disclose whether they are experiencing hypoglycaemia for fear of losing their driving licence. Other individuals may not understand terminology used when discussing hypoglycaemia. A list of useful questions to use in these situations is shown in Appendix 2.

People at increased risk of hypoglycaemia:

These include those who:

- Have renal impairment and are treated with insulin or sulphonylureas as these medication are excreted by the kidney; excretion may be delayed and result in an accumulation of the drug leading to hypoglycaemia
- Are pregnant as blood glucose control needs to be tighter during pregnancy (HbA1c **43** mmol/mol, 6.1% recommended). Women are often advised not to drive from the 2nd trimester due to hypoglycaemia unawareness
- Have autonomic neuropathy as this can cause delayed stomach emptying, or loss of hypoglycaemia awareness symptoms

Other groups of people with diabetes and other conditions are at increased risk of hypoglycaemia; these include the frail, individuals with dementia or older people.

> ***People may be reluctant to disclose whether they are experiencing hypoglycaemia for fear of losing their driving licence***

Frailty and advancing age

Frailty is now recognised as a new complication of diabetes and may affect 32-48% of adults with diabetes over the age of 65 years. It is associated with poor outcomes and a reduced survival rate. Diabetes is an independent risk factor for frailty. The main aim of treatment for diabetes in the frail is to achieve the best glycaemic control without increasing hypoglycaemia risk (Sinclair et al 2017). HbA1c targets in this population are therefore higher than generally recommended by the National Institute for Health and Clinical Excellence (2015):

HbA1c targets for the general diabetes population are:

- Type 1 diabetes, 48 mmol/mol
- Type 2 diabetes, 48-53 mmol/mol

In the frail and older person, HbA1c targets are more relaxed and set at 59-69 mmol/mol.

Hypoglycaemia can have greater consequences for the older person with diabetes, as they are more prone to falls and fractures. There is a higher risk of mortality following hospital admission, and some may also experience permanent neurological damage (Sinclair et al, 2017).

The Care Home population including people living with diabetes and dementia

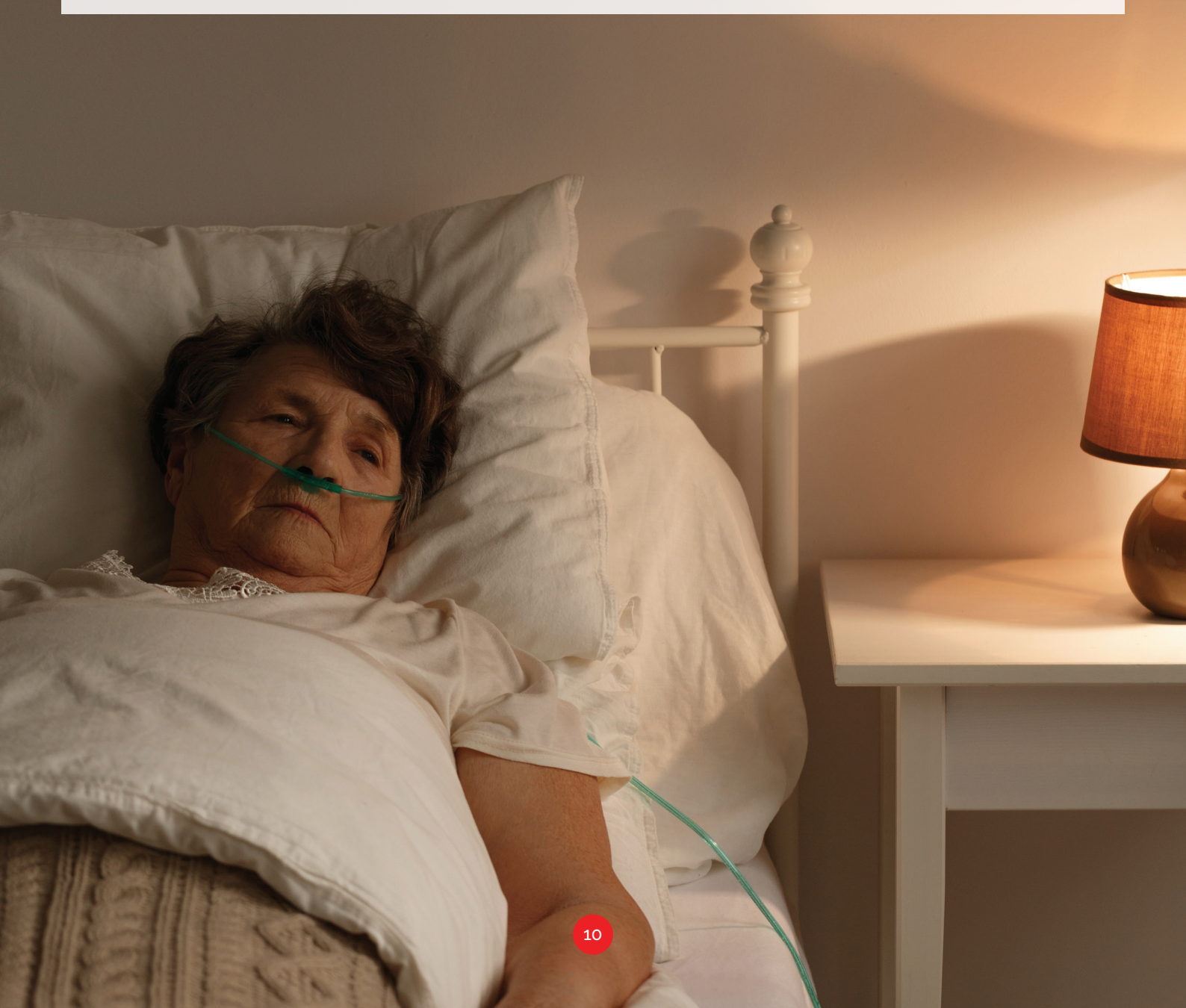
We have an aging population with people over the age of 60 making up 23% of the population. It is estimated that there are 1.6 million people in the UK over the age of 85 (AGE UK ,2018). It is also estimated that approximately 4 million people over the age of 65 have a long term condition (Methodist Homes Association, MHA 2018). Over 420,000 people live in care homes; this includes 4% of all 65 years olds increasing to 16% of all 85 year olds (Laing and Buisson 2015 cited in MHA 2018).

Up to a quarter of care home residents have diabetes and the prevalence of diabetes increases with age (Sinclair et al 2001). Older people with diabetes are at significant risk of hypoglycaemia due to decreasing appetites. These individuals may lose their warning signs of hypoglycaemia as the body's counter regulatory response become impaired with advancing age. HbA1c targets should be relaxed in this population (Fox and Kilvert 2015).

End of life care

People in end of life care are particularly vulnerable to hypoglycaemia. The management of diabetes in this population is centred on symptomatic relief. Sulphonylureas should be avoided in this group of individuals. Those requiring insulin will need reductions in their insulin dose as their condition deteriorates and should be managed as far as possible without invasive blood glucose testing, such as HbA1c. Capillary blood glucose testing tests can be undertaken once or twice a day to assess for hypoglycaemia and avoid hyperglycaemic complications such as diabetic ketoacidosis or hyperosmolar hyperglycaemic state. **Insulin therapy should not be discontinued in people with Type 1 diabetes** (Diabetes UK 2018).

> ***People in end of life care are particularly vulnerable to hypoglycaemia.***



TREATMENT OF HYPOGLYCAEMIA

The treatment of hypoglycaemia depends on the severity of the episode:

› Mild hypoglycaemia (able to self treat)

There are a variety of treatment options that can be used to treat mild hypoglycaemia (Table 4)

Table 4: Examples of 15 to 20g quick-acting carbohydrate

15 to 20g quick-acting carbohydrate
✔ 60mls Gluco juice
✔ 200ml (a small carton) of smooth orange juice
✔ 5 or 6 dextrose tablets
✔ 5 large jelly babies
✔ 7 large jelly beans
✔ Two tubes of 40% glucose gel inserted slowly into the buccal cavity if the person is unable or unwilling to take other oral treatments - **This treatment cannot be given if the person is unable to swallow**

- If the person does not feel better (or if the blood glucose level is still less than 4 mmol/l) after 15 minutes, repeat one of these treatments to a maximum of three treatments. If after three treatments the blood glucose is still low, seek urgent medical advice

- When the individual feels better and if they are not due to eat a meal (which should contain carbohydrate), they should eat a small starchy snack such as a banana, a slice of bread or 2 plain biscuits, and be monitored afterwards

- In cases of severe hypoglycaemia, the person affected will need the assistance of someone else to provide treatment as they may not recognise the symptoms or may be too incapacitated to be able to treat themselves

Severe hypoglycaemia (requiring 3rd party assistance)

The unconscious person

- Call 999 and seek urgent medical assistance
- If breathing the individual should be placed in the recovery position (on their side with their head tilted back) Check if the individual is breathing if not commence cardio pulmonary resuscitation
- Glucose treatment should **not** be put in their mouth
- Glucagon can be injected if someone is present who is trained to do so (see appendix 3)
- Once the individual is conscious and able to eat give 20g of quick acting carbohydrate as shown in table 4 followed by a 20g starch carbohydrate snack

The NICE Quality Standards for diabetes in adults (NICE, 2011 updated 2017) recommend that people with diabetes receive an on-going review of treatment to minimise risk of hypoglycaemia. If they have experienced an episode of hypoglycaemia requiring medical attention, they should be referred to a specialist diabetes team.

- After a severe hypoglycaemic episode a full medication review should take place. This should include assessment of whether insulin needs to reduced; if so a reduction of 10-20% should be the guide
- In the case of a sulphonylurea induced hypoglycaemic event the drug may need to be reduced or discontinued
- A simple flowchart summarises the advice given for treating mild and severe hypoglycaemia (Appendix 4)
- In the case of a sulphonylurea induced hypoglycaemic event the person should be transported to hospital for assessment and further treatment hospital admission

Treatment of hypoglycaemia in special situations:

People who are enterally (tube) fed:

People who are enterally (tube) fed but who are also able to safely take liquids or solids orally should be treated with one of the recommended hypoglycaemia treatments listed in Table 4 (page 13).

If unable to take oral fluids safely, and the person is conscious and has a feeding tube in place:

- Stop the feed and flush the tube with 30 ml water
- Give 15 to 20g of quick-acting carbohydrate (e.g. 60 ml Glucojuice, 50-70ml Fortijuice or Ensure Plus juice
- Or 2 tubes of Glucogel (not for fine-bore tubes as the gel may cause a blockage)
- Flush the tube with 30ml water
- Wait for 15 minutes and then re-check the blood glucose level. If still less than 4 mmol/l, repeat the treatment
- Once the blood glucose level is above 4 mmol/l, resume the feed

If hypoglycaemia occurs between feeds, treat with quick-acting carbohydrate as above. Once the blood glucose level is above 4 mmol/l, connect the feed and give enough to deliver 20g of carbohydrate (see the feed label to calculate this).

In people receiving bolus feeding, the hypoglycaemia treatment may be less effective if a bolus feed has recently been administered due to slower absorption of glucose. Intramuscular glucagon may be necessary. To prevent recurrence of hypoglycaemia, an additional feed may be needed. Diabetes treatment must be reviewed to prevent further episodes of hypoglycaemia.

A leaflet about enteral feeding and diabetes is available to download on the TREND-UK website (www.trend-uk.org)

People who wish to fast:

- Ensure that people who wish to fast understand that they must always break their fast if hypoglycaemia occurs. Guidance for the management of mild and severe hypoglycaemia should be followed as per the section entitled "Treatment".

People with diabetes who use insulin pumps:

- In cases of mild hypoglycaemia the insulin pump should be kept running. The guidance for the management of mild hypoglycaemia should be followed as described in Table 4, page 13
- Once the blood glucose has risen to 4mmol/l or higher, these individuals may not need a long acting carbohydrate snack but should take initial treatment as outlined and adjust their pump settings appropriately
- In cases of severe hypoglycaemia the pump should be stopped temporarily and the "hypo" treated When the individual recovers the pump must be restarted
- Observe blood glucose levels closely for the next 24-48 hours due to glucose uptake in muscles and liver. Following severe hypoglycaemia the individual may experience repeated hypoglycaemia and so may need to consider the use of a reduction in basal rates by 10-20% for this period

People with diabetes who are uncooperative:

- Some people who experience hypoglycaemia may become uncooperative. If they can swallow, 40% glucose gel (Glucogel) can be squeezed into the side of the mouth (2 tubes). If they are unable to swallow, glucagon can be injected if available and a suitably trained person is present. Otherwise, call 999 for the ambulance service.

PREVENTION OF HYPOGLYCAEMIA

How can hypoglycaemia be prevented? This section is divided into three parts:

- SECTION 1 provides general advice on the prevention of hypoglycaemia
- SECTION 2 provides specific advice for the healthcare professional
- SECTION 3 provides specific advice for admission prevention

SECTION 1: General advice to give to people who inject insulin or who take tablets that carry a risk of hypoglycaemia

- ⚠ Be aware of situations that increase the risk of hypoglycaemia as listed (Table 3, p6). earlier (e.g. increased physical activity, missed meals or poor timing of insulin in relation to meals)
- ✔ Always check injections sites for signs of lipohypertrophy (fatty lumps) which will affect the absorption of the insulin
- ⚠ Be aware that environmental changes such as hot weather or hot showers/ bath will lead to hypoglycaemia
- ✔ Encourage regular meals. They should include a small portion of starchy carbohydrate with each meal (e.g. potatoes, rice, pasta, bread or cereals)
- ✔ Ensure that they know the early symptoms of hypoglycaemia and how to treat it promptly. Symptoms may vary from person to person
- ✔ Encourage the individual and their carers to always check that they take the correct dose and type of insulin or sulphonylureas
- ✔ Ensure that treatment for hypoglycaemia is readily available and within reach (e.g. in their handbag, next to the driver in the car, on their bedside table)
- ✔ Provide written information for people using sulphonyureas and or insulin as well as verbal advice

A leaflet containing essential information regarding hypoglycaemia is available to download on the TREND-UK website (www.trend-uk.org)

- ✔ Advise the person to always carry some identification to alert other people (e.g. an identity bracelet or insulin safety card)
- ✔ Advise people with diabetes who wish to fast (for example during Ramadan), that they should visit their diabetes nurse or doctor at least one month beforehand for advice about changing the dose, timing and/or type of treatment to reduce their risk of developing hypoglycaemia
- ✔ Advise that insulin should not be omitted following a hypoglycaemic episode. A hypoglycaemic event close to an injection time should always be treated then once the blood glucose level is above 4 mmols/L the usual insulin dose and food should be taken. If the hypoglycaemic event has happened at a similar time previously then the previous dose of insulin may need to be reduced

SECTION 2: Specific advice for the healthcare professional:

- Prescribers and pharmacists should be trained and competent in the recognition, prevention and management of hypoglycaemia (Appendix 4)
- Always discuss and reinforce information about hypoglycaemia, particularly when insulin or a sulphonylurea has been prescribed for the first time

A leaflet containing essential information regarding hypoglycaemia is available to download on the TREND-UK website (www.trend-uk.org)

- Individuals commencing sulphonylureas who drive should monitor blood glucose for the first 3 months (Gallen et al 2012 on behalf of the Association of British Clinical Diabetologists)
- Always check injections sites for signs of lipohypertrophy (fatty lumps) which will affect the absorption of the insulin
- Pharmacists should ensure that the correct insulin is dispensed every time. They should emphasise the importance of eating regular meals and carrying hypoglycaemia treatments when using insulin and/or sulphonylureas
- Avoid including sulphonylureas in "dossett boxes" in people who are frail, forgetful or live alone
- Look for low HbA1c in older people, the frail and those in end of life care treated with sulphonylureas and/or insulin. Avoid sulphonylurea agents in these individuals
- Hypo boxes and glucose treatment for the management of hypoglycaemia should be accessible in residential and nursing care homes (see Appendix 5)
- Healthcare professionals who visit house bound individuals should carry hypoglycaemia treatments with them
- People at risk of hypoglycaemia should have access to blood glucose monitoring equipment and know how to use it
- Always ask about hypoglycaemia in people taking insulin and/or sulphonylurea agents
- Ensure that individuals on reducing doses of steroids are advised about the risk of hypoglycaemia and "hypo" treatments. Sulphonylureas and insulin doses need to be reduced in tandem with any reduction in the steroid doses
- Always document the advice given in the person's medical notes
- In people who have had an episode of hypoglycaemia induced by sulphonylurea, monitor carefully for the following 24 hours as they are at risk of further episodes

Hypoglycaemia and driving:

Hypoglycaemia is a hazard to safe driving. People with diabetes must inform the Driver and Vehicle Licensing Agency (DVLA) if they inject insulin. Specific recommendations for Group 1 and Group 2 drives are shown in Appendix 1. Full details about driving with diabetes can be found on the DVLA website (www.gov.uk/diabetes-driving).

A leaflet about diabetes and driving is available on the TREND-UK website (www.trend-uk.org)

SECTION 2: Admission prevention

People with Type 1 and Type 2 diabetes (insulin treated) who are usually well, and who can self manage their condition and medication, may not always require admission to hospital following a severe hypoglycaemic episode. Insulin dose advice and possible reduction should be given.

- Insulin doses may need reductions of 10-20% depending on the cause and the timing of the hypoglycaemic episode
- People with diabetes using a non analogue preparation may benefit from a transfer to an analogue insulin as recommended by NICE (2015)

The individual and/or their carers should receive education and a leaflet on prevention and treatment of hypoglycaemia and also driving and the DVLA (www.trend-uk.org).

People with Type 2 diabetes using sulphonylureas and in particular the frail, older person, those with exacerbations of other co-morbidities, those who live alone or people who have sustained an injury e.g. fracture, should be admitted to hospital. These people will be at high risk of further hypoglycaemic episodes in the next 48 hours as sulphonylureas, even when discontinued, are slow to be excreted from the body.

Summary:

Hypoglycaemia is a side effect of particular diabetes treatments and can have a significant impact on the life of a person with diabetes. It is important to provide education for people with diabetes, their carers, and other professionals in the early recognition, treatment and prevention of the condition in the community. Staff visiting frail older people and the housebound need to ensure treatments for hypoglycaemia are available. Simple steps can be taken to prevent harm from hypoglycaemia through prompt and effective management of the condition.

REFERENCES

- AGE UK (2018) Later life in the United Kingdom https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/later_life_uk_factsheet.pdf Accessed 5/5/18
- Alvarez Guisasola F et al (2008) Diabetes Obes Metab 10 (suppl 1): 25-32
- Bailey CJ et al (2010) Br J Diabetes Vasc Dis 10: 2
- Barnett et al (2010) Diabetes and Primary Care 12: 54-63
- Barnard k and Rondags S (2014) Fear of hypoglycaemia Diapedia 6104869430 rev. no. 5. Available from: https://doi.org/10.14496/dia.6104869430.5 Accessed 11/6/18
- Choudhary P et al (2011) Post-graduate Med J 87: 298-306
- Cryer P and Arbeláez AM (2107) in Holt et al (2017) Textbook of Diabetes 5th Ed Ch 35
- Diabetes UK (2010) Incidence of hypoglycaemia, available @ www.diabetes.org.uk https://www.diabetes.org.uk/about_us/news_landing_page/survey-reveals-hidden-incidence-of-hypos-among-people-with-type-2-diabetes (accessed 27.3.2018)
- Diabetes UK (2012) Driving and the new medical standards for people with diabetes https://static1.squarespace.com/static/53b1670ee4b0be242b013ed7/t/543d8b44e4b048b8ecb43ddd/1413319492054/Driving-diabetes-professional-guidance0212.pdf Accessed 23/7/18
- Diabetes UK (2017) @ https://www.diabetes.org.uk/diabetes-the-basics (accessed 27.3.2018)
- Donnelly et al (2005) Diabetic Medicine 22: 749-55
- Farmer et al (2012) Diabetic Medicine @ https://onlinelibrary.wiley.com/doi/full/10.1111/j.1464-5491.2012.03657.x (accessed 29.3.2018)
- Forum for Injection Technique UK , FIT UK (2016) The UK injection technique recommendations 4th ed http://www.fit4diabetes.com/files/4514/7946/3482/FIT_UK_Recommendation2016 2016s_4th_Edition.pdf Accessed 5/5/18
- Fox C, Kilvert A (2016) The state of diabetes in residential home Journal of Diabetes Nursing 20(4) http://www.thejournalofdiabetesnursing.co.uk/media/content/_master/4596/files/pdf/jdn20-4-142-6.pdf accessed 28/4/18
- Gallen I, Amiel S, Robinson A, McKnight J and (on behalf of the Association of British Clinical Diabetologists (ABCD) committee (2012) Driving and hypoglycaemia: questions and answers. Practical Diabetes 29(1): 13-14
- Joint British Diabetes Societies -IP(Forum for Injection technique (2017) JBDS-IP, 2018) The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus 3rd edition Revised February
- McCoy RG, Van Houten HK, Ziegenfuss JY et al ,(2012) .Increased mortality of patients with diabetes reporting severe hypoglycemia.Diabetes Care 2012;35:1897–1900
- Methodist Homes Association, MHA (2018) Facts and Stats https://www.mha.org.uk/about-mha/management-and-governance/ accessed 24/4/18
- NICE (2011) Quality standards for diabetes in adults (QS6) updated 2016 available @ https://www.nice.org.uk/guidance/qs6 (accessed 27.3.2018
- Ross SA (2004) Diabetes Res Clin Prac 65: S29-34
- Sinclair et al (2017) available @ http://www.jfrailtyaging.com/all-issues.html?article=609 (accessed 27.3.2018
- Strachan et al (2014) Hypoglycaemia in clinical diabetes 3rd edition. Chichester. John Wiley and Sons Ltd
- UK Hypoglycaemia Study Group (2007) Diabetologia 50: 1140-7
- Van Dalem J , Brouwers,M CGJ et al Stehouwer C D A (2016) Hubert G M Leufkens,6 Johanna H M Driessen,1,3,6 Frank de Vries,1,6 Andrea M Burden1,3,6 Risk of hypoglycaemia in users of sulphonylureas compared with metformin in relation to renal function and sulphonylurea metabolite group: population based cohort study

USEFUL RESOURCES:

- www.trend-uk.org
- www.diabetes.org.uk
- www.diabetes.co.uk

APPENDIX 1

Information for drivers (For car or motorcycle - 1, 2 or 3 year licences (Group 1)

The following criteria are required for people using insulin or taking a tablet that carries a risk of hypoglycaemia:

- They should have an adequate awareness of hypoglycaemia signs
- They should not have had more than one episode of severe hypoglycaemia while awake in the preceding 12 months, or the most recent episode occurred more than 3 months ago
- They must practice appropriate blood glucose monitoring

For bus and lorry drivers (Group 2):

- They must have full awareness of hypoglycaemia symptoms
- They must not have had any episodes of severe hypoglycaemia in the previous 12 months

General advice for drivers who take glucose lowering therapies that carry a risk of hypoglycaemia

- People with insulin-treated diabetes should carry their blood glucose meter and glucose testing strips with them, and check their blood glucose before driving no longer than 2 hours before starting their journey. On long journeys, they should stop driving and test their blood glucose every 2 hours
- People on sulphonylureas who drive may need to test if they are at risk of hypoglycaemia
- Take a snack before driving if their blood glucose level is 5 mmol/l or less. Do not drive if the blood glucose is 5 mmol/l or less or if there are signs of hypoglycaemia
- If the blood glucose is less than 4 mmol/l treat for hypoglycaemia
- If hypoglycaemia develops while driving, the person should stop driving their vehicle as soon as possible in a safe location. They should treat the hypoglycaemia and not resume driving until **45 minutes** after the blood glucose has returned to above 5 mmol/l
- A supply of fast-acting carbohydrate such as glucose tablets or sweets, and slow acting carbohydrate such as biscuits, should be kept within easy reach in the vehicle.
- Regular meals, snacks and rest periods should be built into long journeys, and alcohol should always be avoided

Further guidance can be accessed at the DVLA:

www.gov.uk/diabetes-driving

Please note that this guidance changes every 6 months

APPENDIX 2

Questions to ask to identify hypoglycaemia understanding:

Questions that can be asked to explore hypoglycaemia with a person with diabetes (adapted from Barnett et al, 2010)

People with diabetes may not understand the term hypoglycaemia or the concept of low blood glucose:

- ✔ What do you understand by the term "low blood glucose"?
- ✔ What do you call it when you have a low blood glucose?
- ✔ What do you understand by the term "hypo" or "hypoglycaemia"?

People with diabetes may not understand that hypoglycaemia is caused by their glucose-lowering medication rather than their diabetes:

- ✔ What do you think causes hypoglycaemia/low blood glucose levels?

People with diabetes may not realise they have experienced hypoglycaemia or know what to look for:

- ✔ How would you recognise a "hypo"?
- ✔ Have you ever felt shaky and sweaty, maybe when you haven't eaten for a long time?

People with diabetes may not appreciate the implications of hypoglycaemia:

- ✔ What do you think the effects of hypoglycaemia are?
- ✔ Do you drive, cycle regularly or operate machinery?

People with diabetes may not understand what to do if they experience hypoglycaemia:

- ✔ Have you ever had a hypo and how did you feel?
- ✔ How many times have you had a hypo in the last month?
- ✔ How would you treat a hypo?

People with diabetes may not carry glucose with them in case of hypoglycaemia:

- ✔ If you had a "hypo" now, how would you treat it?
- ✔ Are you carrying glucose with you now?

APPENDIX 3

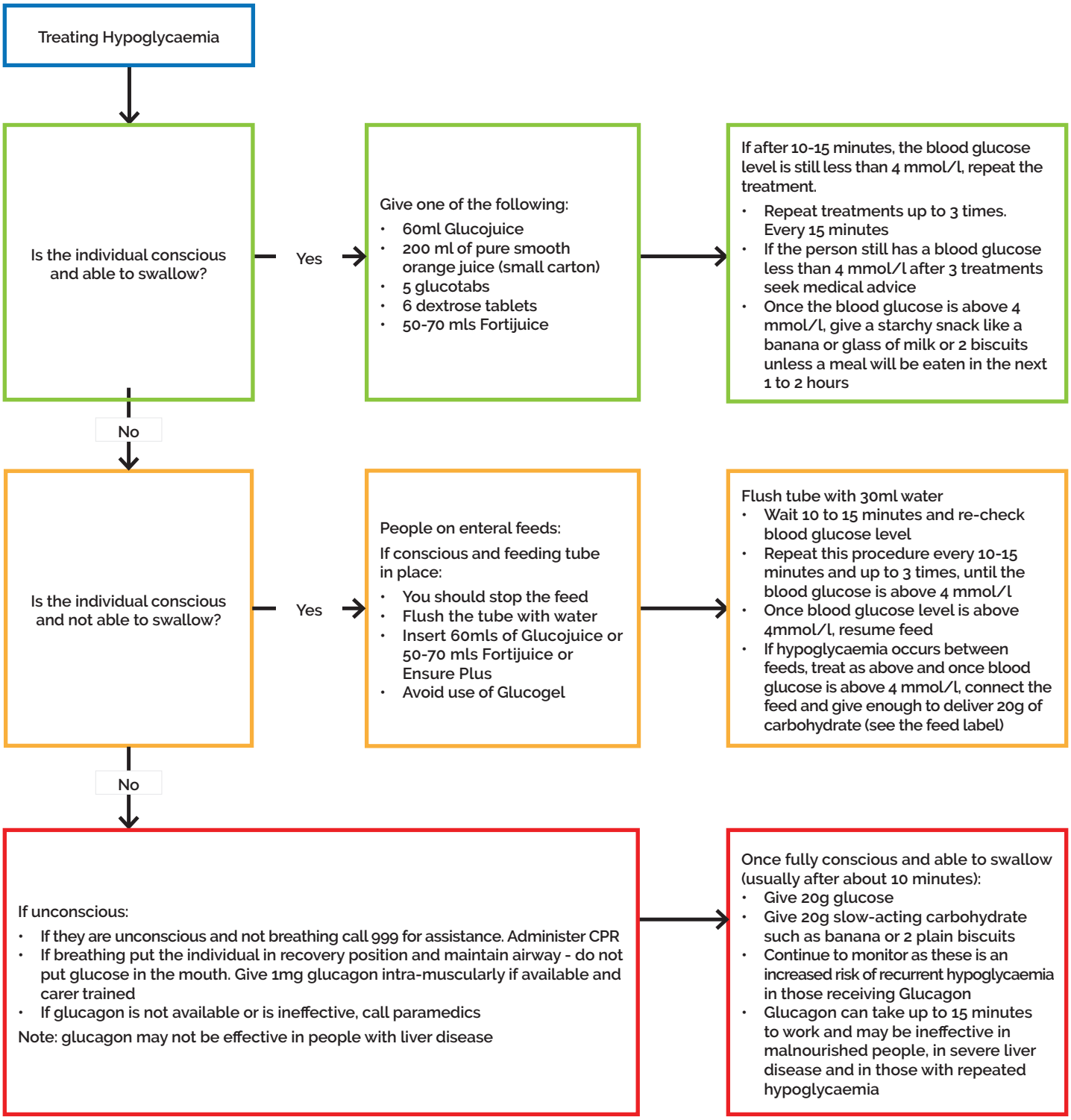
How to administer a Glucagon injection:

You should not administer glucagon unless you have been trained to do so

- Wash your hands and check the expiry date on the glucagon kit. Open the box
- Flip off the seal covering the top of the vial containing glucagon powder
- Remove the cover from the needle of the syringe containing water
- Insert the needle into the rubber stopper of the vial. Inject the water into the vial by depressing the plunger of the syringe
- Remove the syringe and dissolve the powder in the water by gently shaking the vial. The solution should be clear with no residual particles of powder in the vial
- Insert the needle back into the vial through the rubber stopper. Turn the vial upside down (so the fluid fills the neck of the vial). Pull down the plunger slowly to withdraw the fluid into the syringe
- Remove the needle from the vial. Hold the syringe with the needle pointing upwards. Tap lightly to move any air bubbles to the top. Carefully push the plunger up until the air bubbles have been dispelled
- Inject into muscle in the top of the arm or the outer upper quadrant of the buttock or thigh

APPENDIX 4

Hypoglycaemia treatment flowchart:



⚠ Always review medication following an episode of hypoglycaemia : If hypo episode more than once within same time frame with unknown cause consider reducing insulin and/or sulphonylurea doses

Adapted from Diabetes UK (2018) Diabetes and End of Life Care: Clinical Care Recommendations

APPENDIX 5

Career and Competency Framework (TREND-UK): **HYPOGLYCAEMIA**

For the identification and treatment of hypoglycaemia you should be able to:	
1. Unregistered practitioner	• State the normal blood glucose range and describe the level at which it would be appropriate to treat as hypoglycaemia. • Recognise which individuals are at risk of hypoglycaemia. • Describe the signs and symptoms of hypoglycaemia, including both mild and severe. • Recognise that some people may not demonstrate or recognise clear signs and symptoms of hypoglycaemia (e.g. older people, those with longer duration of diabetes and those who have experienced recurrent episodes of hypoglycaemia). • Demonstrate competent use of blood glucose monitoring equipment to confirm hypoglycaemia. • Know how to access and administer appropriate treatment for hypoglycaemia as per local guidelines. • Document and report the hypoglycaemic event to a registered HCP. • If the person is unresponsive, ensure their airway is clear and call emergency services.
2. Competent nurse	As 1, and: • Recognise and provide appropriate treatment for the different levels of hypoglycaemia. • Describe the possible causes of hypoglycaemia and any factors that can increase risk (e.g. alcohol consumption, increased physical activity and poor injection sites). • Ensure episodes of hypoglycaemia are followed up appropriately and according to local policies. • If using insulin therapy, check injection technique and injection sites according to recommended correct practice (refer to the The FIT UK Injection Technique Recommendations, 4th edition). • Describe methods of hypoglycaemia avoidance and explain how to implement these to minimise risk. Identify medications most likely to cause hypoglycaemia • Describe what should be done if hypoglycaemia is not resolved and blood glucose levels remain low. • Demonstrate knowledge of current driving regulations and how they relate to hypoglycaemia (see DVLA, 2018). • Ensure appropriate hypoglycaemia treatments are accessible to individuals and in date. • Be aware of appropriate and recommended blood glucose targets for people with Type 1 and Type 2 diabetes, and during pregnancy. • Be aware when tight glycaemic control is not recommended (e.g. in the frail or older person or those in end-of-life care).
3. Experienced or proficient nurse	As 2, and: • Identify people with diabetes at high risk of hypoglycaemia, advise and adjust therapy accordingly. • Give advice regarding driving regulations and hypoglycaemia (i.e. according to current DVLA guidelines and with reference to DVLA, 2018). • Discuss hypoglycaemia (including hypoglycaemic unawareness and frequent hypoglycaemia, and possible causes, with the person with diabetes or their carer. • Work with individuals to prevent recurrent hypoglycaemia. • Participate in educating other HCPs and carers of people with diabetes in the identification, treatment and prevention of hypoglycaemia. • Interpret blood glucose levels and HbA1c results within the context of the clinical presentation to identify unrecognised hypoglycaemia.
4. Senior practitioner or expert nurse	As 3, and: • Educate individuals , their carers and HCPs on the impact that hypoglycaemia has in relation to their occupation, safety to drive, as a barrier to intensification of treatment and psychological impact). • Provide expert advice on complex cases. • Identify and teach appropriate strategies for prevention of hypoglycaemia during and after exercise and under special circumstances (e.g. during Ramadan or periods of fasting). • Act as an expert resource for information on hypoglycaemia for other HCPs. • Work in collaboration with A&E or the ambulance team to identify people with diabetes frequently presenting with severe hypoglycaemia.

APPENDIX 5

Career and Competency Framework (TREND-UK): **HYPOGLYCAEMIA (continued)**

5.	**Consultant nurse**	As 4, and: • Work with stakeholders to develop and implement local guidelines for the avoidance and management of hypoglycaemia, promoting evidence-based practice and cost-effectiveness. • Lead on developing, auditing and reporting on patient-related experience and patient-related outcome measures, and be able to produce information on the incidence and outcomes of hypoglycaemia episodes, including contributing to national data collections and audits. • Initiate and lead research in effectiveness of diabetes nursing and hypoglycaemia through leadership and consultancy. • Identify service shortfalls in prevention and management of hypoglycaemia and develop strategies with the local commissioning bodies to address them. • Identify the need for change, proactively generate practice innovations and lead new practice and service redesign solutions to better meet the needs of people at risk of hypoglycaemia, the diabetes population as a whole and the diabetes service. • Lead on liaising with local and national emergency networks and diabetes teams in the development of diabetes integrated care pathways, including the development of integrated IT solutions and systems for diabetes that record individual needs to support MDT care across service boundaries. • Influence national policy regarding prevention and management of hypoglycaemia. • Work in collaboration with higher educational institutions and other education providers to meet educational needs of other HCPs.

- See: The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus (www.diabetologists-abcd.org.uk)
- See: The UK Injection Technique Recommendations, 4th edition, 2016 (http://fit4diabetes.com)
- See: Diabetes: Safe Driving and the DVLA (www.trend-uk.org/resources.php)
- See: Diabetes: Why do I sometimes feel shaky, dizzy and sweaty? (www.trend-uk.org/resources.php)

APPENDIX 6

Hypo boxes (contents)

⚠ **100mls of Lucozade was a previous choice for use in treating hypoglycaemia but in 2017 the glucose content was reduced, therefore, a greater volume is required and the benefit/effect is delayed so this is no longer advised**

trend UK™
TRAINING, RESEARCH AND EDUCATION FOR NURSES IN DIABETES

info@trend-uk.org

www.trend-uk.org

@_trenduk