

For Healthcare Professionals:

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

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## 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

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## Document reference group

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

# FOREWORD

By publishing this updated document, the authors clearly describe the difference between type 1 and type 2 diabetes and have set this out in an easy to read table, the signs and symptoms of hypoglycaemia. The authors have included essential information for those people with diabetes who experience hypoglycaemia and those who care for them.

In describing hypoglycaemia, the reasons and explanations of the signs and symptoms are clearly summarized 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 various medications and the effects they have on glucose levels is clearly explained. The impact of having a 'hypo' on lifestyle and driving is described in an easy to read way.

Details for groups of people who are also at risk of hypoglycaemia is clearly written. Information is 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.

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 is extremely helpful to people with diabetes, their family and carers and healthcare professionals.

**Ruth Waxman**

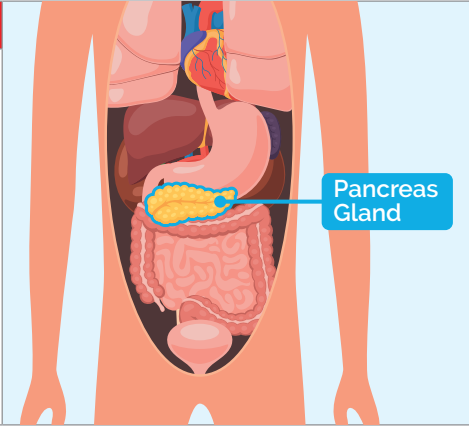
Chair  
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# INTRODUCTION

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.<sup>1,2</sup> Table 1 outlines the two most common types of diabetes.

Table 1: The two main types of diabetes

| TYPE 1 DIABETES                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                    | TYPE 2 DIABETES                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Symptoms of type 1 diabetes develop when the insulin producing cells in the pancreas (beta cells) reach 20% or absolute deficiency of insulin due to beta cell functioning or destruction<sup>3</sup></li> <li>Affects around 8-10% of people with diabetes</li> <li>Treated with insulin injections, a healthy eating plan, and regular physical activity</li> </ul> |  | <ul style="list-style-type: none"> <li>Develops when the pancreas can still produce some insulin but insufficient to control glucose levels, or when the body is resistant to the effects of insulin<sup>4</sup></li> <li>Affects around 90% of people with diabetes</li> <li>Treated by normalising weight where appropriate, eating healthily and taking regular physical activity, tablets, injectable medication and/or insulin may be required</li> </ul> |

## What is hypoglycaemia?

Hypoglycaemia is a lower than normal glucose level.

Hypoglycaemia may occur when people with diabetes eat less, during or after exercise and this may increase with certain medications such as sulphonylureas, prandial glucose regulators (Meglitinides) or insulin<sup>5</sup> (or contraindications with other medications that are taken).

Hypoglycemia could be classified as mild, moderate, or severe based on the person's glucose level and presenting condition. The table below presents the different levels associated with the term hypoglycemia:

- Level 1** (mild) hypoglycemia: Blood glucose is between 3 to 3.9 mmol/L
- Level 2** (moderate) hypoglycemia: Blood glucose is less than 3 mmol/L.
- Level 3** (severe) hypoglycemia: A person is unable to function because of mental or physical changes due to low blood glucose and need help from another person<sup>6</sup>

It is recommended that a glucose level of less than 4 mmol/L should always be treated.<sup>7</sup>

However, it is important to recognize that there are different targets of glucose according to the different presentations and persons characteristics:

|                 |                             |
|-----------------|-----------------------------|
| Frailty         | 6-12 mmol/L <sup>8</sup>    |
| Pregnancy       | 5.3-7.8 mmol/L <sup>9</sup> |
| Type 1 diabetes | 4.4-10 mmol/L <sup>10</sup> |
| Type 2 diabetes | 4.4-10 mmol/L <sup>10</sup> |

It is also important to recognise the changes in guidance to support the use of CGM technologies<sup>11,12,13</sup> in people whom experience regular episodes of hypoglycemia and/or develop hypoglycemic unawareness. These systems are often used in order to support the user or carer to identify or predict lower glucose levels and take the appropriate actions to manage them and prevent ongoing episodes of low glucose. With particular focus being placed on the management of "looming" hypoglycemia in people with diabetes when blood glucose levels are in the range 4.0-6.0mmol/L with trend graph indicators of falling glucose levels.<sup>14</sup>

## 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.<sup>15,16</sup> These signs and symptoms of hypoglycaemia are shown in Table 2.

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

| Adrenergic                                                                                                                                                                                              | Neuroglycopenic                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Sweating</li> <li>Palpitations</li> <li>Shaking</li> <li>Hunger</li> <li>Anxiety</li> <li>Paraesthesia</li> <li>General malaise: headache and nausea.</li> </ul> | <ul style="list-style-type: none"> <li>Confusion</li> <li>Drowsiness</li> <li>Unusual behaviour</li> <li>Speech difficulties</li> <li>Lack of co-ordination</li> <li>Coma</li> <li>Slurring of speech</li> </ul> |

**Please note: There may also be some more subtle symptoms such as headache and nausea**



## How common is hypoglycaemia?

People with diabetes may under-report their episodes of hyperglycemia, either due to lack of detection (hypo unawareness) by themselves or their carers or through fear / concerns regarding the impact of increased restrictions to their management choices, quality of life, employment<sup>17,18</sup> or ability to drive.<sup>19</sup> 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.<sup>20</sup> The actual number of people with diabetes who experience hypoglycaemia is largely unknown, however, evidence suggests that people who have type 1 diabetes, or people with type 2 diabetes treated with insulin or insulin secretagogues (sulphonylureas and meglitinides) are generally at higher risk. Additionally they suggest that there is a high affiliation with repeated episodes of hypoglycemia following any episode of low glucose.<sup>21</sup> People who have episodes of hypoglycaemia often refer to these episodes as 'hypos'.

## Hypoglycaemia in individuals treated with insulin

Hypoglycaemia is more common in individuals 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.<sup>14,22,23</sup> Severe hypoglycaemia is less common in people with type 2 diabetes but becomes more evident in those individuals who are insulin treated. The rate is similar to the type 1 diabetes population once insulin therapy is commenced.<sup>21</sup>

## Hypoglycaemia in individuals taking sulphonylureas

In 2016 a population-based study 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.<sup>24</sup> This risk increased to 3 fold in people on higher doses or in those with renal impairment (Chronic kidney disease (CKD) 4 and 5).

## Diabetes, hypoglycaemia and cognitive impairment

Hypoglycaemic episodes are also associated with the development of dementia in people with diabetes.<sup>25</sup>

## Mortality risk with hypoglycaemia

Prolonged episodes of severe hypoglycaemia (level 3) can cause coma, hemiparesis and seizures and there is a risk that the neurological deficits may become permanent.<sup>25</sup> Severe hypoglycaemia is associated with increased mortality.<sup>26</sup> Studies 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.<sup>27</sup> Recent studies demonstrate a strong affiliation with mortality relating to the number of episodes of severe hypoglycemia requiring hospitalization in type 1 diabetes<sup>27</sup> and concurrent studies in type 2 diabetes reviewing 5 year mortality found that, reviewing 5 year mortality in people with type 2 diabetes found that severe hyperglycaemia is a marker rather than this resulting in a long-term mortality risk.<sup>29</sup>

## 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.<sup>30</sup> Even if a hospital admission is not required significant costs may still be incurred from paramedic service involvement. Not only does diabetes have a significant economic impact on those living with the condition, but it also imposes a substantial burden on the economy<sup>31</sup> the cost of hypoglycaemia in inpatients admitted with hypoglycaemia the mean length of stay was estimated at 6.3 days at a cost of £1964.81 per day.<sup>32</sup>

Psychological cost of hypoglycaemia and the impact on lifestyle

Fear of hypoglycaemia (FOH), or fear of low glucose levels , is a common concern amongst people with diabetes, (particularly those with type 1 diabetes). The fear can range from mild concerns to a debilitating phobia, which in turn can lead to significantly impacts on a individual's quality of life, emotional health, and diabetes management choices. This fear may lead to the person with diabetes engaging in behaviours like over vigilant glucose monitoring, maintaining high glucose levels (by restriction of medications, consuming additional carbohydrates with meals or as snacks), restriction of activities or over treatment of mild hypoglycaemia to avoid potential severe episodes or repeated episodes of low glucose.<sup>20,33,34</sup>

Weight gain

People who experience multiple episodes of hypoglycaemia, or who fear having an episode, May reduce activity in attempt to avoid low glucose levels or consume additional carbohydrates (either in planned meals or snacks).<sup>35</sup>

People with diabetes may experience some weight gain if they balance insulin and glucose availability. Particularly if their previous insulin doses were insufficient (leading to loss of calories in urine) or storage of excess glucose in the adipose tissue (fat).<sup>36-38</sup>

**Please Note: Other medications such as Steroids, anti-psychiatric medications and some anti hypertensive and epileptic medications are also commonly associated with weight gain.**<sup>39,40</sup>

Which diabetes medications carry an increased risk of hypoglycaemia?

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

Metformin, Pioglitazone, Dipeptidyl peptidase-4 (DPP-4) inhibitors, SGLT2 inhibitors and Glucagon-like peptide-1 (GLP-1) receptor agonists have a 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 and/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.<sup>8,41-43</sup>

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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"><li>• Tight glycaemic control</li><li>• Previous history of severe hypoglycaemia</li><li>• Long duration of type 1 diabetes</li><li>• Duration of insulin therapy in type 2 diabetes</li><li>• Lipohypertrophy at injection sites</li><li>• Inappropriate insulin injection needle size</li><li>• Impaired awareness of hypoglycaemia</li><li>• Severe liver impairment</li><li>• Impaired renal function (including those patients requiring renal replacement therapy)</li><li>• Sepsis</li><li>• Inadequate treatment of previous hypoglycaemia</li><li>• Terminal illness</li><li>• Cognitive dysfunction/dementia</li><li>• Contraindications with other medications i.e. Steroid reduction in people taking insulin or sulphonylureas</li></ul> |
| Lifestyle Issues                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ul style="list-style-type: none"><li>• Increased physical activity</li><li>• Irregular lifestyle</li><li>• Alcohol</li><li>• Increasing age/frailty</li><li>• Early pregnancy</li><li>• Breastfeeding</li><li>• None or inadequate glucose monitoring</li><li>• Social/economic factors</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Reduced Carbohydrate intake/absorption                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <ul style="list-style-type: none"><li>• Food malabsorption e.g. gastroenteritis, pancreatic disease</li><li>• Bariatric surgery involving bowel resection</li><li>• Fasting e.g. during Ramadan</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

Amended from the JBDS, The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus<sup>8</sup>

Not all "at risk" individuals are able to recognise the warning signs of hypoglycaemia. It is important that all people taking glucose lowering medication which carry a risk of hypoglycaemia are assessed appropriately using a recognised assessment tool.<sup>11,12,20,44-46</sup>

# 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 or live alone.

## Driving and road accidents:

Studies indicate that hypoglycaemic episodes can lead to road incidents, though the exact figures are difficult to pinpoint.<sup>47</sup> Data from the Diabetes Control and Complications Trial, demonstrated that the most common major accident related to hypoglycaemia was car accidents. Follow-up analysis also demonstrated that; hypoglycaemia was emphasized as the main cause of car accidents in 64.2% of the cases.

Interestingly, a additional study in America (reviewing a 12 month period of people living with type 1 diabetes) showed; that driving mishaps were related to hypoglycaemia at least once in more than a half of the sample, with 32% of them having two or more events and 5% having six or more driving mishaps.<sup>48</sup> In the UK, hypoglycaemia is implicated in approximately 30 serious road traffic accidents each month and up to five fatalities each year.<sup>49</sup> People who have hypoglycaemia when driving which results in serious harm to others or death will face charges and may be found guilty if they have not taken adequate precautions and be given a prison sentence. Specific recommendations for drivers are shown in Appendix 1. In 2015 it was estimated that following an audit that 66% of individuals in the UK and New Zealand had experienced a hypoglycaemia event while driving.<sup>50</sup>

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 and/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 glucose control needs to be tighter during pregnancy (HbA1c 43 mmol/mol, 6.1% recommended).<sup>9</sup> 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, for example. those with erratic glucose levels, and people whom are acutely unwell or with erratic eating patterns (e.g. dementia / T1DE).

## 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.<sup>51,52</sup> 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.<sup>41,51,52</sup> HbA1c targets in this population are therefore, higher than generally recommended by the National Institute for Health and Clinical Excellence.<sup>11</sup>

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.<sup>8,46,51</sup>



## The Care Home population including people living with diabetes and dementia

In 2022, older adults (65+) comprised 19% of the UK population, with projections indicating a rise to 27% by 2072. More specifically, over 11 million people in England and Wales were aged 65 or older in 2021, representing 18.6% of the population. This trend of an aging population is expected to continue, with the number of people aged 85 and over projected to more than triple by 2066.<sup>53</sup>

It is estimated that there are over 1.7 million people in the UK over the age of 85.<sup>54</sup> It is also estimated that approximately 4 million people over the age of 65 have a long term condition.<sup>55</sup> Over 420,000 people live in care homes; this includes 4% of all 65 years olds increasing to 16% of all 85 year olds.<sup>55</sup>

Up to a quarter of care home residents have diabetes and the prevalence of diabetes increases with age.<sup>55</sup> 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.<sup>8,41,51</sup>

## 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 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. The use of continuous glucose monitoring may be a safer alternative to capillary testing as this option negates the need for painful finger pricking but provides continuous glucose data which can be used to assess insulin needs **Insulin therapy should not be discontinued in people with type 1 diabetes.**<sup>57</sup>

*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, LIFT or Fortijuce                                                                                                                                                                              |
| ✓ 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 - <b>This treatment cannot be given if the person is unable to swallow</b> |
| ✓ 3-4 heaped teaspoons of sugar dissolved in water                                                                                                                                                                  |
| <b>⚠ If using pump therapy half the treatments</b>                                                                                                                                                                  |

- If the person does not feel better (or if the glucose level is still less than 4 mmol/l) after 15 minutes, repeat one of the above treatments to a maximum of three treatments. If after three treatments the glucose levels are 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 given usual medications. Glucose levels should be regularly monitored following an episode of hypoglycaemia in order to determine glucose trends and to avoid a second episode
- 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

- 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
- Call 999 and seek urgent medical assistance
- 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 and ADA 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.<sup>46,58</sup>

- After a severe hypoglycaemic episode, a full medication review should take place. This should include assessment of whether insulin needs to be reduced; if so a reduction of 10-20% should be considered
- Injection technique should be checked and injection sites inspected ([trenddiabetes.online/portfolio/best-practice-guideline-to-support-correct-injection-technique-in-diabetes-care/](https://trenddiabetes.online/portfolio/best-practice-guideline-to-support-correct-injection-technique-in-diabetes-care/))
- 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 11).

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 40% Glucogel (do not use this in 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 glucose level. If still less than 4 mmol/L, repeat the treatment
- Once the glucose level is above 4 mmol/L, resume the feed
- Monitor glucose levels more frequently and observe for symptoms of hyperglycaemia.

If hypoglycaemia occurs between feeds, treat with quick-acting carbohydrate as above. Once the 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 Diabetes website ([trenddiabetes.online/portfolio/diabetes-and-enternal-feeding/](http://trenddiabetes.online/portfolio/diabetes-and-enternal-feeding/))

### 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".



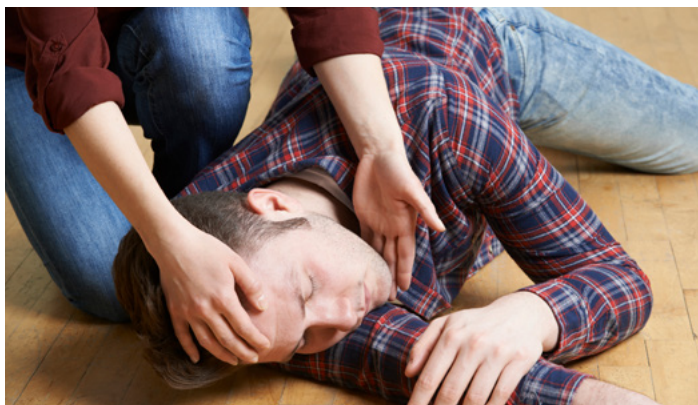
A leaflet containing essential information regarding Ramadan and diabetes is available to download on the Trend Diabetes website ([trenddiabetes.online/portfolio/ramadan-and-diabetes/](http://trenddiabetes.online/portfolio/ramadan-and-diabetes/))

### 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 11
- Once the 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 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 or use temp targets or ease off features in their pump settings.<sup>59,60</sup>

### People with diabetes experiencing a "hypo" who are confused, disorientated or aggressive:

- Some people who experience hypoglycaemia may become confused, disorientated or aggressive. If they can swallow, and it is safe to do so, 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.



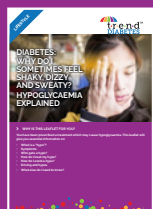
# PREVENTION OF HYPOGLYCAEMIA

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 use insulin pump therapy or 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, page 8). earlier (e.g. increased physical activity, missed meals or mismatched timing of insulin in relation to meals)
- ✓ Always check injection 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 may 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 have understood their therapy requirements (i.e. dose and timing of insulin or oral anti-diabetes medications)
- ✓ Ensure that treatment for hypoglycaemia is readily available and within reach (e.g. in their handbag, next to the driver's seat in the car, on their bedside table)
- ✓ Provide written information for people using sulphonyureas and or insulin as to support any guidance or advice provided verbally



A leaflet containing essential information regarding hypoglycaemia is available to download on the Trend Diabetes website ([trenddiabetes.online/portfolio/diabetes-why-do-i-sometimes-feel-shaky-dizzy-and-sweaty-hypoglycaemia-explained/](https://trenddiabetes.online/portfolio/diabetes-why-do-i-sometimes-feel-shaky-dizzy-and-sweaty-hypoglycaemia-explained/))

- ✓ Advise the person to always carry some identification to alert other people of their diabetes (medical alert 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



A leaflet containing essential information regarding Ramadan and diabetes is available to download on the Trend Diabetes website ([trenddiabetes.online/portfolio/ramadan-and-diabetes/](https://trenddiabetes.online/portfolio/ramadan-and-diabetes/))

- ✓ Advise that insulin should not be omitted following a hypoglycaemic episode. A hypoglycaemic event close to an injection time should always be treated then usual insulin dose and food should be taken (once glucose level is back above 4mmol/L). 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, 5)
- ✓ 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 Diabetes website ([trenddiabetes.online/portfolio/diabetes-why-do-i-sometimes-feel-shaky-dizzy-and-sweaty-hypoglycaemia-explained/](http://trenddiabetes.online/portfolio/diabetes-why-do-i-sometimes-feel-shaky-dizzy-and-sweaty-hypoglycaemia-explained/))

- ✓ People living with diabetes taking medications that are known to increase the risk of hyperglycaemia should be provided appropriate means to monitor glucose levels, particularly if driving<sup>19,46,58</sup>
- ✓ Always check injection sites for signs of lipohypertrophy (fatty lumps) which will affect the absorption of the insulin
- ✓ HCPs 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 GP Practices, Health Centres, residential and nursing care homes (see Appendix 6)
- ✓ Healthcare professionals who visit house bound individuals should carry hypoglycaemia treatments with them
- ✓ Always ask about symptoms, frequency and management of 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 and ensure the person with diabetes has understood discussions/agreement
- ✓ 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 drivers are shown in Appendix 1. Full details about driving with diabetes can be found on the DVLA website ([www.gov.uk/diabetes-driving](http://www.gov.uk/diabetes-driving)).



A leaflet about diabetes and driving is available on the Trend Diabetes website ([trenddiabetes.online/portfolio/diabetes-safe-driving-and-the-dvla/](http://trenddiabetes.online/portfolio/diabetes-safe-driving-and-the-dvla/))

## 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/ADA.<sup>19,46,58</sup>

The individual and/or their carers should receive education and a leaflet called **Diabetes: Why do I sometimes feel shaky, dizzy and sweaty? Hypoglycaemia explained** on prevention and treatment of hypoglycaemia from [www.trenddiabetes.online/resources/](http://www.trenddiabetes.online/resources/).

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 or an environment that would enable closer observation, assessment and support. 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.

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## USEFUL RESOURCES:

 [www.trenddiabetes.online](http://www.trenddiabetes.online)

 [www.diabetes.org.uk](http://www.diabetes.org.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 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
- ⚠ They must test at least twice a day even on days that they are not driving
- ⚠ These drivers must not rely on continuous glucose monitoring or Flash Glucose meter systems to measure glucose levels they should use a traditional glucose meter with an adequate memory facility

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

- People with insulin-treated diabetes should carry their glucose measuring device and glucose testing strips with them, and check their glucose before driving no longer than 2 hours before starting their journey. On long journeys, they should stop driving and test their 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 glucose level is 5 mmol/L or less.
- Do not drive if the glucose is 5 mmol/L or less or if there are signs of hypoglycaemia
- If the 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 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](http://www.gov.uk/diabetes-driving)

Please note that this guidance changes every 6 months

## APPENDIX 2: QUESTIONS TO ASK TO IDENTIFY HYPOGLYCAEMIA UNDERSTANDING

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

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

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

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**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 glucose levels?

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**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?

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**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?

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**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?

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**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?
-

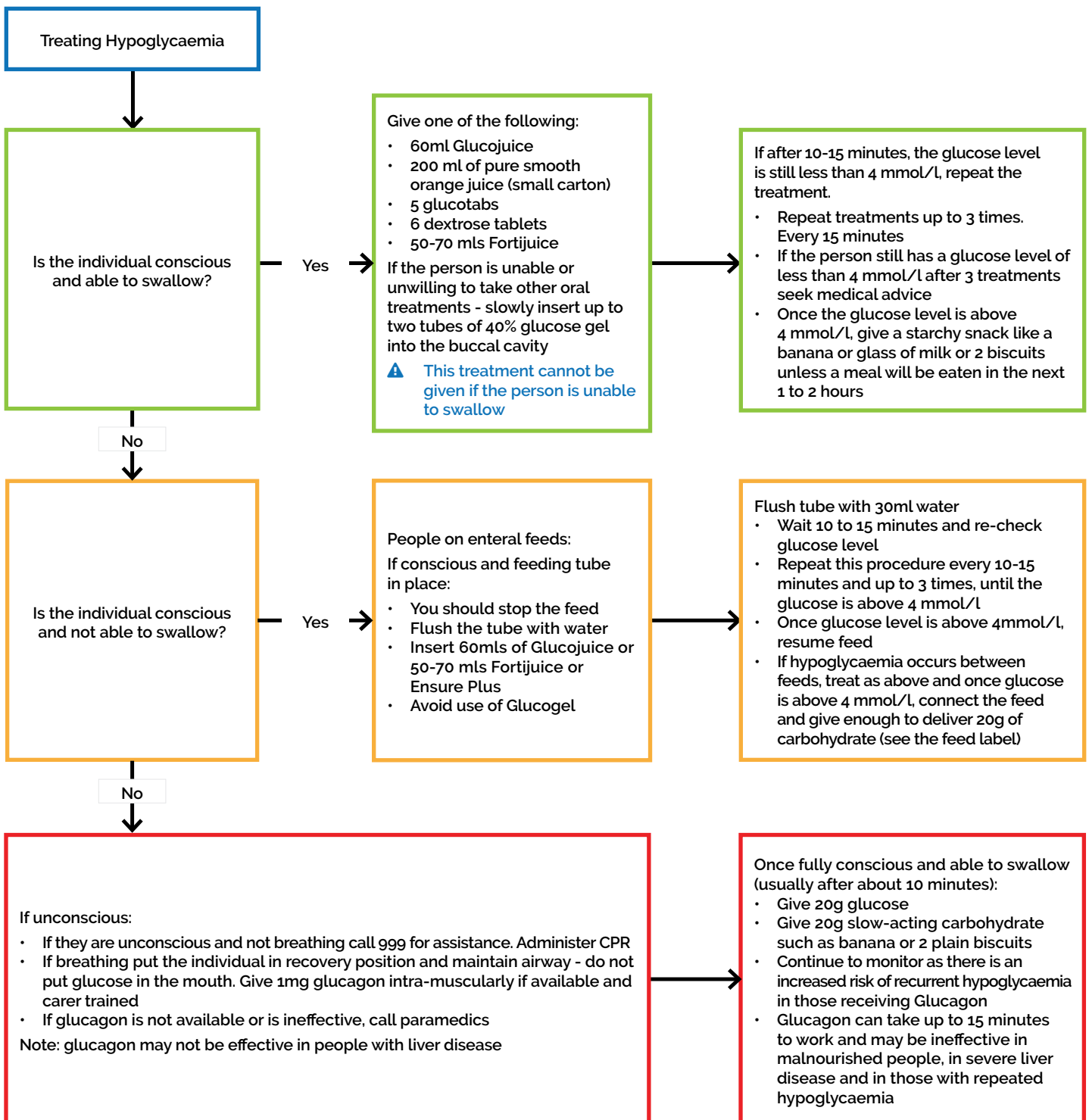
## APPENDIX 3: HOW TO ADMINISTER A GLUCAGON INJECTION

**⚠ 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

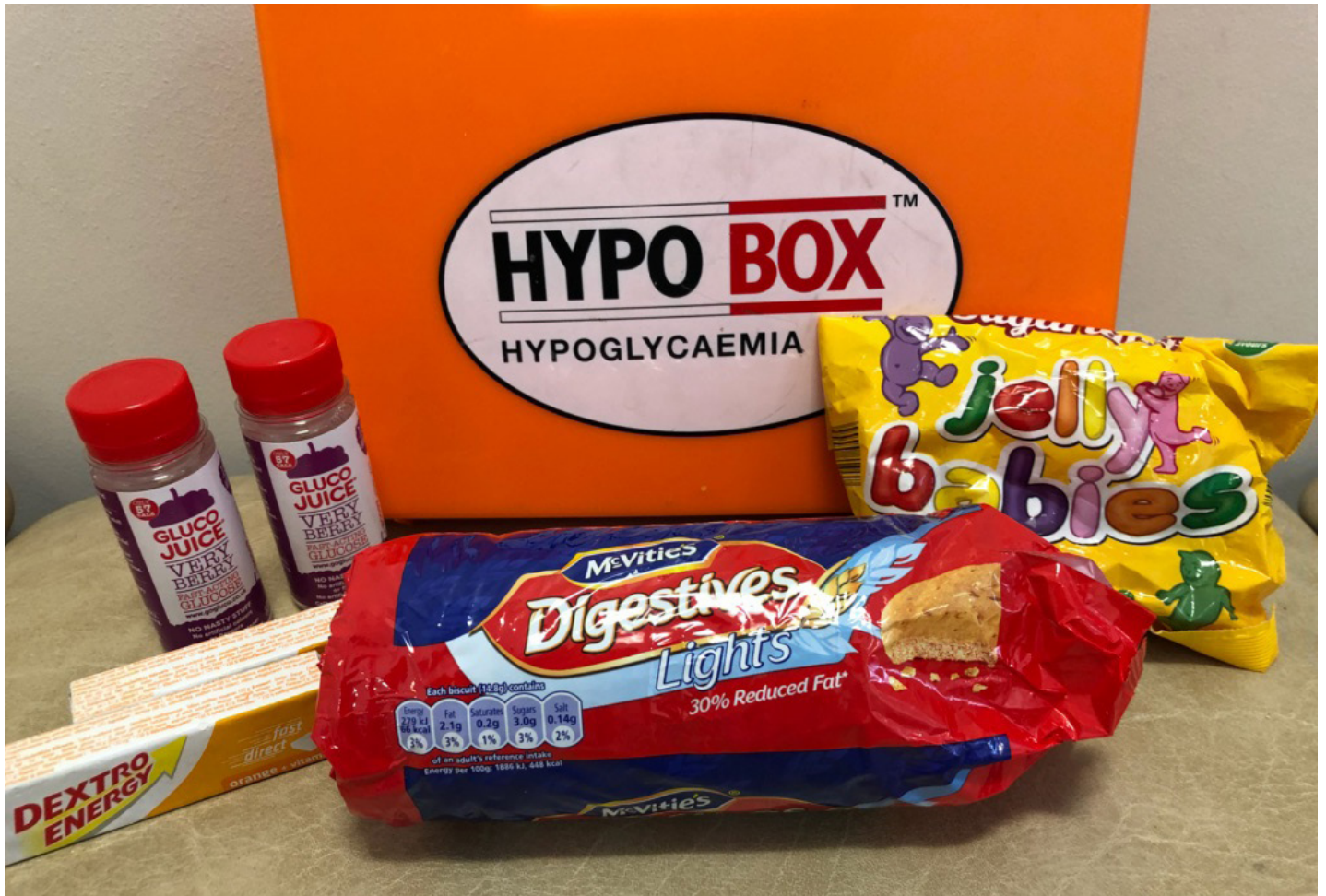
## APPENDIX 5: CAREER AND COMPETENCY FRAMEWORK (TREND DIABETES) - HYPOGLYCAEMIA

| For the identification and treatment of hypoglycaemia, you should be able to:                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Unregistered practitioner / care assistant</b><br><b>2. Pre-registration student nurse / student nurse associate</b><br><b>3. Nursing Associate</b> | <ul style="list-style-type: none"> <li>• State the normal glucose range and describe the level at which it would be appropriate to treat as hypoglycaemia.</li> <li>• List the signs and symptoms of hypoglycaemia, and describe what is defined as mild, moderate, moderate and defined as severe.</li> <li>• Recognise that some people may not recognise symptoms of hypoglycaemia Impaired awareness of hypoglycaemia (IAH) (e.g. older people, those with a long duration of diabetes, and those who have experienced frequent episodes of hypoglycaemia).</li> <li>• Recognise risk of looming hypoglycaemia in people who have a glucose level of 4.0-6.0mmol</li> <li>• Demonstrate competent use of glucose monitoring equipment to confirm hypoglycaemia.</li> <li>• Know how to access and give appropriate treatment for hypoglycaemia.</li> <li>• Ensure appropriate hypoglycaemia treatments are accessible and within the expiry date.</li> <li>• Document and report the hypoglycaemia event to a registered nurse.</li> <li>• If the individual is unresponsive, ensure their airway is clear and call emergency services.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>4. Proficient registered nurse</b>                                                                                                                     | <p>As 1,2,3 and:</p> <ul style="list-style-type: none"> <li>• Recognise and list appropriate treatment for mild, moderate and severe hypoglycaemia.</li> <li>• Assess level of Impaired awareness of hypoglycaemia (IAH) (Hypo Awareness) using a validated tool (e.g. GOLD score).</li> <li>• Describe what should be done if hypoglycaemia is not resolved and glucose levels remain low.</li> <li>• Ensure episodes of hypoglycaemia are followed up appropriately.</li> <li>• Identify which medications have a risk of hypoglycaemia and explain how this may be minimised.</li> <li>• Describe the possible causes of hypoglycaemia and any factors which can increase risk (e.g. alcohol consumption, unplanned physical activity, poor injection sites, altered dietary intake, frailty, impaired kidney function and medications insulin and sulfonylurea).</li> <li>• Check the injection technique and sites of injections in those individuals using insulin therapy according to recommended practice.</li> <li>• Describe methods of hypoglycaemia avoidance and explain how these can be implemented to reduce future risk.</li> <li>• Demonstrate knowledge of the current driving regulations for people with diabetes and how they relate to hypoglycaemia.</li> <li>• Be aware of the recommended glucose targets, Time in Range (TIR) for type 1 and type 2 diabetes and in pregnancy.</li> <li>• Be aware when tight glycaemic control is not recommended (e.g. in the frail or older person, or those in end-of-life care).</li> </ul> |
| <b>5. Experienced registered nurse</b>                                                                                                                    | <p>As 4, and:</p> <ul style="list-style-type: none"> <li>• Identify individuals at high risk of hypoglycaemia, advise and adjust glucose-lowering therapy accordingly (e.g. those with HbA1c below target).</li> <li>• Provide advice regarding driving regulations and hypoglycaemia, according to current DVLA guidelines.</li> <li>• Describe hypoglycaemia unawareness Impaired awareness of hypoglycaemia (IAH) and its possible causes including frequent episodes of hypoglycaemia.</li> <li>• Interpret glucose levels, Time in Range (TIR) and HbA1c results to identify unrecognised hypoglycaemia.</li> <li>• Discuss possible alternative therapies that carry a lower risk of hypoglycaemia and added impact on CV and CKD risk.</li> <li>• Discuss the use of technologies demonstrated to reduce risk associated with hypoglycaemic unawareness?</li> <li>• Work with individuals to prevent recurrent episodes of hypoglycaemia.</li> <li>• Advise on adjustment of oral therapies and insulin dose where appropriate.</li> <li>• Participate in educating other HCPs, people with diabetes, and carers of people with diabetes in the identification, causes, prevention and appropriate treatment of hypoglycaemia.</li> <li>• Monitor and support junior staff to ensure they have appropriate competence.</li> </ul>                                                                                                                                                                                                                     |

**For the identification and treatment of hypoglycaemia, you should be able to:**

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| <p><b>6. Senior / advanced clinical practitioner*</b></p> <p><b>* Includes nurse consultant role</b></p>                                                                                                                                                                                                                                                                                                                                                                                        | <p>As 5, and:</p> <ul style="list-style-type: none"> <li>• Educate people with diabetes, their carers and other HCPs on the impact that hypoglycaemia has on the individual (e.g. in relation to their occupation, safety to drive, as a barrier to intensification of treatment, and psychological impact).</li> <li>• Provide expert advice and ongoing review for individuals with complex hypoglycaemic issues.</li> <li>• Identify and teach appropriate strategies for prevention of hypoglycaemia during and after exercise and under special circumstances (e.g. during periods of fasting).</li> <li>• Act as an expert resource for information on hypoglycaemia for other HCPs.</li> <li>• Work in collaboration with A&amp;E staff and emergency service leads to identify and support people frequently presenting with severe hypoglycaemia to proactively develop pathways for appropriate management of hypoglycaemia</li> </ul>                                                                                                                                                                                                                         |
| <p><b>Suggested examples to assess competence in this area:</b></p> <ul style="list-style-type: none"> <li>✓ List the adrenergic and glycopaenic signs and symptoms of hypoglycaemia.</li> <li>✓ Identify suitable treatments for hypoglycaemia from a range of foods and drinks.</li> <li>✓ Provide examples of anonymous care plans developed for individuals with recurrent hypoglycaemia or hypoglycaemia unawareness, to demonstrate effective management and advice was given.</li> </ul> | <p><b>Useful resources:</b></p> <p>Mild/ moderate and severe - JBDS: <a href="https://abcd.care/sites/abcd.care/files/site_uploads/JBDS_HypoGuideline_4th_edition_FINAL.pdf">https://abcd.care/sites/abcd.care/files/site_uploads/JBDS_HypoGuideline_4th_edition_FINAL.pdf</a></p> <ul style="list-style-type: none"> <li>• Why do I sometimes feel shaky, dizzy and sweaty? (leaflet about hypoglycaemia)</li> <li>• Hypoglycaemia in adults in the community: recognition, management and prevention (for healthcare professionals)</li> <li>• Diabetes: safe driving and the DVLA</li> </ul> <p>Available at <a href="http://www.trenddiabetes.online/resources/">www.trenddiabetes.online/resources/</a></p> <p>Exercise for Type 1 Diabetes: <a href="https://extod.org">https://extod.org</a></p> <p>DAFNE Type 1 structured education: <a href="https://dafne.nhs.uk">https://dafne.nhs.uk</a></p> <p>Time in range: A best practice guide for UK diabetes healthcare professionals in the context of the COVID-19 global pandemic: <a href="https://onlinelibrary.wiley.com/doi/10.1111/dme.14433">https://onlinelibrary.wiley.com/doi/10.1111/dme.14433</a></p> |

## 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.
- ⚠ Be aware the Pepsi have reduced the glucose in some of their products by more than 50% so always advise to check labelling before recommending as a treatment for hypoglycaemia.



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