Life after Lucozade

As a result of the UK’s new ‘sugar tax’ many soft drinks companies, including the manufacturer of Lucozade, are reducing the sugar content of their products.

Sarah Alicea and Ruth Poole here examine the implications for the management of patients with diabetes, and provide practical advice on ways in which to address the key issues involved.

Scenario
A patient with type 1 diabetes has always used Lucozade for the treatment of hypoglycaemia. They have recently been told by someone else that it ‘doesn’t work for hypos any more’. They ask you for advice on what they should use now.

Background about the use of Lucozade
Lucozade Ribena Suntory (LRS) has been reformulating its Lucozade drinks since 2016 to contain 50% less sugar, including their famous Lucozade Energy Original.

First launched as Glucozade in 1927, it was marketed for medicinal purposes. The distinctive sweet citrus-flavoured drink underwent significant rebranding in 1983, when the slogan ‘Lucozade aids recovery’ was replaced by ‘Lucozade replaces lost energy’ to change its association with illness to good health and wellbeing.

Lucozade as a treatment for hypoglycaemia
For episodes of hypoglycaemia, treatment is required to quickly restore blood glucose levels to a safe level.

Lucozade Energy Original is sweetened with glucose syrup which contains predominantly glucose as its carbohydrate source. With a glycaemic index (GI) rating of 95, the carbohydrate is rapidly absorbed. It has long been used to treat acute hypoglycaemia in patients within health care settings and as the treatment of choice for many individuals with diabetes.

The second Lucozade variety, Lucozade Sport, was launched in 1990. The carbohydrate source in Lucozade Sport is also glucose, from its main ingredient glucose syrup. LRS has claimed the isotonic carbohydrate-electrolyte drink enhances physical endurance; however, a systematic review found the group of studies behind this claim to be of poor quality and therefore the author was unable to draw firm conclusions about the effect on performance in exercise.

Both Lucozade Energy and Lucozade Sport are available in a range of flavours (many of which contain fructose from concentrated fruit juices in addition to glucose syrup) and meet the brief of a ‘sugary soft drink’ for hypoglycaemia treatment. Both Energy and Sport are also available as low-sugar options supplemented with intense sweeteners (on the label as ‘zero calories’, ‘low cal’ or ‘lite’). Lucozade in oral glucose tolerance tests
For glucose tolerance tests, the precision of the glucose load is important.

The diagnosis of diabetes is an important one and relies on accurate testing, particularly where the patient has few, if any, symptoms. Missing the diagnosis may lead to the development of diabetes complications. Conversely, making a diagnosis where diabetes does not exist can lead to unnecessary screening tests and social and financial limitations such as increased life insurance. Although since 2011 HbA1c has been used in the diagnosis of type 2 diabetes with the convenience of a single blood test, there are many situations where it cannot be used and an oral glucose tolerance test (OGTT) may still be required. These include blood disorders including haemoglobino-pathies and some types of anaemia, patients taking steroids, rapid-onset diabetes (usual in type 1 diabetes) and pregnancy. HbA1c testing may be unavailable or unaffordable in resource-poor settings.

The OGTT relies on giving a standard glucose challenge with measurement of glucose both fasting and 2 hours after the glucose challenge. Diabetes is then defined by a fasting plasma glucose (FPG) of 7.0mmol/L or more or a 2-hour glucose of 11.1mmol/L or more. The same test can be used to diagnose impaired fasting glucose (FPG 6.1–6.9mmol/L) and impaired glucose tolerance (2-hour glucose 7.8–11.0mmol/L). During pregnancy, gestational diabetes is diagnosed when the glucose values fall above 6.0mmol/L fasting or 7.8mmol/L at 2 hours.

Glucose tolerance testing is also used in the diagnosis of acromegaly and reactive hypoglycaemia. In addition, it is used in research studies to stratify participants by degree of glucose tolerance.

A glucose load can be made by mixing glucose powder in water but for convenience a premixed glucose drink has been used for many decades. Lucozade has been widely used since at least the 1980s but was first recommended in international guidelines in 1999 when the World Health Organisation recommended the use of ‘partial hydrolysates of starch of the equivalent carbohydrate content’ as an alternative to 75g of anhydrous glucose or 82.5g of glucose monohydrate for the glucose load for an OGTT.

Lucozade may have originally been used for its improved palatability compared to simple glucose solutions. It is less sweet and therefore causes less nausea. It has also been cheaper to the NHS, particularly where patients provide their own.

Changes in sugar content and why
As part of the government’s childhood obesity strategy, a new tax on soft drinks is to be introduced from April 2018. The Soft Drinks Industry Levy (SDIL) was first announced at Budget 2016 and was promptly nicknamed the ‘sugar tax’. In essence, the levy compels soft drinks companies to pay a charge for soft drinks containing added sugar, which have a total sugar content of 5g or more per 100ml, and the charge increases at 8g or more per 100ml. Therefore pure fruit juices, which do not contain added sugar, will not be taxed. Drinks containing 75% dairy milk or yoghurt (or plant...
alternatives) are excluded as these products remain an important part of a balanced diet due to their nutritional properties, particularly their calcium content.

In response, LRS has stated ‘all drinks by 2018 will contain less than 4.5g glucose based carbohydrates per 100ml’.\(^{13}\) Lucozade Energy Original was the first of their products to experience a change in recipe and appeared on retailers’ shelves in April 2017. It contains 50% less glucose based carbohydrate, taking the total carbohydrate content of the Original flavour from 17g per 100ml to 8.9g per 100ml; other flavours range slightly from 8.9–8.9g per 100ml.

### Implications of recipe change for hypoglycaemia treatment

Implications of this recipe change include an increase in the volume an individual is required to consume for 10g carbohydrate (110ml), 15g carbohydrate (170ml) or 20g carbohydrate (225ml) as a hypoglycaemia treatment. The cost of a 380ml bottle varies, but can be as little as £0.40 when bought as a multipack. In comparison, a Glucojuice bottle (60ml) providing 15g carbohydrate currently has a recommended retail price of £1.55. Four GlucoTabs (glucose tablets) providing 15g carbohydrate would cost the consumer in the region of £0.40.

For a time old and new products are being sold concurrently, therefore shoppers should check the carbohydrate content on the Lucozade packaging. People with diabetes are advised by LRS to consult their health professional to agree the appropriate volume required for the individual’s hypoglycaemia treatment.\(^{13}\) The implication is that consuming 90–120ml Lucozade Energy, as was the previously recommended volume, would fail to resolve hypoglycaemia with a single treatment. As a result of the sugar tax, many soft drinks companies are reducing the sugar content of their products to avoid the charge, such as Coca-Cola’s Sprite and Fanta, and AG Barr’s Irn-Bru. This makes the NHS Choices recommendation of ‘a small glass of non-diet sugary soft drink’\(^{14}\) an unreliable quantity for treatment of hypoglycaemia and should no longer be a general guide recommended by health care professionals. Unusually, Coca-Cola Classic’s carbohydrate content (10.6g per 100g) has remained unchanged, yet the size of the bottles is being reduced at the same time as applying increase in cost to the consumer.

LRS has supplemented Lucozade with intense sweeteners in an effort to make the taste as close to the original as possible, as have many other soft drinks brands. In the case of Lucozade Energy, aspartame and acesulfame-K have been added. Taste has been established as one of the key factors in an individual’s choice of preferred hypoglycaemia treatments.\(^{15}\) Sales of soft drinks are predicted to drop in response to the SDIS.\(^{16}\) Once the older soft drinks products are no longer available to buy, people with diabetes may be faced with the choice of buying supplemental drink quantities or changing to an alternative hypoglycaemia treatment. Table 1 shows a comparison of hypoglycaemia treatments.

### Implications of recipe change for glucose tolerance tests

Until the change in glucose content, the volume of Lucozade required for a 75g OGTT was 410ml. Since the 2017 changes, this has increased to 950ml. The criteria for performing OGTT require this to be drunk within 5 minutes.\(^{16}\) This is an unrealistic volume to expect people to drink over such a short time scale.

### Alternative treatments for treating hypoglycaemia

In the UK, first-line treatment for hypoglycaemia in adults is recommended by expert consensus to be 10–20g\(^{17}\) or 15–20g\(^{3}\) of quick-acting carbohydrate, followed by a starchy carbohydrate snack or the next meal. In public guidelines, the recommended quantities of quick-acting carbohydrate are translated into easy household measures: a small glass of non-diet/sugary soft drink, between three and five glucose or dextrose tablets, five jelly babies or a handful or sweets, a small carton of pure fruit juice, or a tube of glucose gel.\(^{14,18}\) Commonly used alternatives such as sugar (sucrose) dissolved in water and other specific sweets varieties, such as Skittles and jelly beans, are not mentioned in the guidelines. The quantity of carbohydrate required to adequately treat hypoglycaemia will vary between individuals.\(^{4}\) Certainly, in children the quantity of carbohydrate to treat hypoglycaemia is recognised as being less than in adults and is determined by age group or body weight.\(^{19,20}\)

There are few comparative studies of different treatments for hypoglycaemia. A randomised controlled trial in children with type 1 diabetes found glucose tablets and orange juice to be equally as effective at resolving hypoglycaemia within 15 minutes. However, jelly beans (sucrose) were not as effective and were more likely to require repeat treatment.\(^{20}\) Jelly beans contain natural beeswax which can lower the GI. Conflictingly, in a small study in children, glucose (as tablets) or sucrose (in sweets) were significantly more likely to have brought the blood glucose up to at least 4mmol/L after 15 minutes compared to fructose (dried fruit snack bar).\(^{21}\) In adults, responses after 10 minutes to glucose tablets and solution, sucrose tablets and solution and a polysaccharide drink were similar but with a smaller response from glucose gel and orange juice.\(^{22}\) The rise in blood glucose level from carbohydrate (sucrose) in chocolate is blunted due to the presence of fat\(^{23}\) and is therefore an inappropriate treatment choice.

In the community, patient choice for the treatment of hypoglycaemia is wide including glucose tablets, sweets, fruit, fruit juice, full sugar fizzy or non-fizzy drinks, biscuits, chocolate bars and crisps.\(^{4}\) For patients in hospital, any of these treatments may be used by the patient self-treating hypoglycaemia. Where patients are not able to self-treat, current NHS guidelines recommend fruit juice, Lucozade, dextrose or glucose tablets or sugar dissolved in water.\(^{7}\) Where oral treatment is inappropriate, for example in an unconscious patient, hypoglycaemia is treated with intramuscular glucagon or intravenous dextrose. Most hospital wards and departments as well as GP surgeries are

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**Practice point**

**Life after Lucozade**

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1. Lucozade Energy
2. Glucojuice
3. Glucose tablets
4. Dextrose tablets
5. Jelly beans
6. Fruit
7. Fruit juice
8. Full sugar fizzy drinks
9. Non-fizzy drinks
10. Biscuits
11. Chocolate bars
12. Crisps
13. Glucose tablets
14. Dextrose
15. Glucose gel
16. Suckers
17. Oranges
18. Acerola
19. Aspartame
20. Acesulfame-K
21. Fructose
22. Sucrose
23. Fat
### Practice point
Life after Lucozade

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Predominant carbohydrate varieties (source)</th>
<th>Quantity of carbohydrate (CHO)</th>
<th>Volume for treatment (15–20g CHO)</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dietary treatments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lucozade Energy Original</td>
<td>Glucose (glucose syrup)</td>
<td>8.9g per 100ml</td>
<td>170–230ml</td>
<td>Widely available. High glycaemic index (GI). Multiple flavours available</td>
<td>Volume and cost for hypoglycaemia treatment have increased</td>
</tr>
<tr>
<td>Coca-Cola Classic</td>
<td>Sucrose (sugar)</td>
<td>10.6g per 100ml</td>
<td>140–190ml</td>
<td>Widely available. High GI</td>
<td>Increased cost</td>
</tr>
<tr>
<td>Pure orange juice (fresh or from concentrate)</td>
<td>Fructose (fruit juice)</td>
<td>Variable according to ripeness of fruit, picking season and added sugar content</td>
<td>170–225ml</td>
<td>Widely available. Convenient 200ml carton size</td>
<td>Low GI. High potassium content; not suitable for those with chronic kidney disease</td>
</tr>
<tr>
<td>Sugar granules dissolved in water</td>
<td>Sucrose (sugar)</td>
<td>5g per teaspoon</td>
<td>3–4 heaped teaspoons of sugar</td>
<td>Readily available at home or in health care setting</td>
<td>Requires preparation</td>
</tr>
<tr>
<td>Jelly Babies</td>
<td>Sucrose, glucose (sugar, glucose syrup)</td>
<td>78g per 100g</td>
<td>4–5 sweets</td>
<td>Widely available</td>
<td>Easily squashed</td>
</tr>
<tr>
<td>Skittles</td>
<td>Sucrose, glucose (sugar, glucose syrup)</td>
<td>90.7g per 100g</td>
<td>14–18g</td>
<td>Widely available</td>
<td>–</td>
</tr>
<tr>
<td>Jelly beans</td>
<td>Sucrose, polysaccharides, glucose (sugar, maize starch and glucose syrup)</td>
<td>92g per 100g</td>
<td>14–18g</td>
<td>Widely available</td>
<td>Slower to correct hypoglycaemia than other sweets</td>
</tr>
<tr>
<td><strong>Glucose tablets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dextro Energy</td>
<td>Glucose (dextrose)</td>
<td>90g per 100g</td>
<td>5–7</td>
<td>Small packet size easily carried around</td>
<td>Very dry; may be difficult to eat without fluids</td>
</tr>
<tr>
<td>GlucoTabs</td>
<td>Glucose (dextrose)</td>
<td>90g per 100g</td>
<td>4–5</td>
<td></td>
<td></td>
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<tr>
<td><strong>Oral glucose solution</strong></td>
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<tr>
<td>Glucojuice</td>
<td>Glucose (dextrose)</td>
<td>25.4g per 100ml</td>
<td>1 bottle (60ml)</td>
<td>Convenient bottle size. 2 flavours available. Caffeine-free</td>
<td>Expensive</td>
</tr>
<tr>
<td>Polycal liquid</td>
<td>Polysaccharides, maltose, glucose (maltodextrin, glucose syrup)</td>
<td>61.9g per 100ml</td>
<td>25–30ml</td>
<td>Widely available. 2 flavours available</td>
<td>Expensive</td>
</tr>
<tr>
<td>Polycal powder</td>
<td>Polysaccharides (maltodextrin)</td>
<td>96g per 100g or 4.8g per 5g scoop</td>
<td>14–19g (3–4 scoops)</td>
<td>Widely available. Dissolvable in hot and cold drinks</td>
<td>Expensive. Requires preparation</td>
</tr>
<tr>
<td>Dextro Energy drink</td>
<td>Glucose (dextrose, invert sugar syrup, glucose and fructose)</td>
<td>48g per 100ml</td>
<td>30–45ml</td>
<td>Widely available. Apple flavour. Convenient 50ml package</td>
<td>Expensive. Limited flavour</td>
</tr>
<tr>
<td>GSF-syrup (formerly Hypo-Fit)</td>
<td>Sucrose, fructose, glucose</td>
<td>74.5g per 100g</td>
<td>11–15g</td>
<td>Convenient 18g sachets. 3 flavours</td>
<td>Expensive</td>
</tr>
<tr>
<td><strong>Oral glucose gels</strong></td>
<td></td>
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<tr>
<td>Glucogel 40% gel original (formerly Hypostop). Dextrogel 40% gel. Rapilose 40% gel. YourGLUCO 40% gel. GlucoBoost 40% gel</td>
<td>Glucose (dextrose)</td>
<td>40g per 100g</td>
<td>38–50g</td>
<td>Widely available. Convenient 25g packaging. Available on prescription</td>
<td>Expensive</td>
</tr>
</tbody>
</table>

**Table 1.** Commonly used hypoglycaemia treatments
encouraged to keep a ‘hypo box’ containing treatments for hypoglycaemia for emergency use.3

Although widely available, fruit juice has a lower GI (40–50) than other treatments for hypoglycaemia. This explains why it can take longer to raise blood sugar.22 In addition, it has a high potassium content (150mg per 100g) which makes it unsuitable for patients with significant renal impairment.3,24

**Alternative treatments for glucose tolerance tests**

Alternatives for OGTTs include Polycal and Rapilose. Polycal is marketed as ‘Food for special medical purposes’ to increase caloric intake. It contains a mixture of polysaccharides, glucose and maltose. It is available in 200ml servings of which 113ml are required to obtain 75g of glucose equivalent. This is made up to 200–300ml with water. Rapilose OGTT solution is specifically marketed for use in OGTT and comes in a pre-mixed pouch. It contains both glucose syrup and glucose monohydrate providing 75g of glucose equivalent in 300ml. Polycal is cheaper than Rapilose but less accurate in providing exactly 75g glucose because of the difficulties in measuring precisely 113ml.

**Conclusions**

Lucozade has been widely used both in health care settings and by patients for many decades. As an aid to reducing childhood obesity, the reduction of sugar in soft drinks may have health benefits.

However, for patients with diabetes this reduction in readily available sugar is resulting in a need to review hypoglycaemia treatments for many. There are a wide variety of alternatives, and all patients are encouraged to find the treatment that suits them best.

**Practical recommendations**

- Lucozade may still be used due to its comparatively low cost in relation to alternative treatments but, with greater volume to ingest and a change in recipe/flavour, many individuals will be looking for a different option
- Patients will usually find the particular hypoglycaemia treatment that suits them best based on price, taste, availability and ease of carrying around with them
- Fruit juice is not recommended for patients with renal impairment because of the high potassium content

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**Declaration of interests**

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**References**


