

Hypoglycaemia management in hospital: Milk and biscuits syndrome

Jan Watson

Article points

1. 'Milk and biscuits syndrome' describes a common mismanagement of hypoglycaemia in inpatients with diabetes.
2. Inappropriate insulin administration following hypoglycaemia may also be a problem in hospital.
3. Mismanagement of hypoglycaemia can result in mixed messages for patients.
4. Staff education should encourage problem solving based on understanding of the physiological processes, glycaemic index and the action of insulin regimens.

Key words

- Milk and biscuits syndrome
- Inhospital hypoglycaemia

Jan Watson is a Lecturer Practitioner at Dorset County Hospital and Bournemouth University.

Changing glycaemic status, or changes in insulin treatment during a hospital stay may lead to episodes of hypoglycaemia. Although people with diabetes might prefer to provide for, and manage, their own hypoglycaemic episodes while in hospital, there may be times when a 'hypo' has to be managed by somebody else. This article considers the problems that mismanagement of hypoglycaemia – due to 'milk and biscuits syndrome' – may generate, and discusses the importance of the role of the DSN in the education of colleagues to treat hypoglycaemia appropriately.

At the *Diabetes UK Annual Professional Conference* a few years ago, several posters addressed the issue of how hypoglycaemia was managed in hospital. Knowledge about the correct treatment and management of this acute complication was considered to be less than adequate, and in the conversations that pepper the time spent standing by a poster, the term 'milk and biscuits' syndrome was coined – a term which describes not only the immediate care of the hypoglycaemic episode but its subsequent management.

Specialists in diabetes care seem to know immediately what milk and biscuits syndrome is, but, although it may raise a smile, it also highlights potentially serious issues – not least because of the mixed messages that may be given to patients. The patient education programme delivered by the specialist diabetes team can

effectively be overridden by treatment delivered in the hospital setting where the authority of the nurse and doctor may have primacy, thus precipitating a potential risk situation following discharge.

The problem of the 'mixed message'

The successful management of diabetes requires individuals with the condition to apply certain behaviours to daily life. Theoretical models seek to explain the cognitive processes applied to decision making about undertaking such behaviours. Many of these models describe the importance of an individual's beliefs about the severity of a problem, their susceptibility to it and their ability to manage it appropriately (self efficacy; Marteau, 1995). Self efficacy can be reinforced by the feedback obtained through swift resolution of the immediate problem

Page points

1. Information or, in the event of hypoglycaemia, actions which run counter to current knowledge may lead to a state of cognitive dissonance.
2. The implications are that correct self-management may be compromised, and that outside of the supported environment of the hospital ward, people may be put at risk.
3. The rationale underpinning the education of colleagues (and patients) should be derived from the available evidence.

and prevention of further problems – that is, initial treatment, decisions about causation and changes in behaviour or medication to encourage prevention. Thus, the message assumes importance – firstly, because it may help to focus beliefs about hypoglycaemia, and secondly, because it provides the knowledge required to facilitate personal decision making to manage hypoglycaemia effectively. A small study looking at managing cardiovascular risk found that consistency was considered by patients to be important while conflicting or mixed messages were seen as negative, and diluted the importance of the message (Watson, 2002).

Information or, in the event of hypoglycaemia, actions which run counter to current knowledge may lead to a state of cognitive dissonance (Festinger, 1957). This is psychological discomfort which triggers the person to either reject the new information or, more crucially, accept it – particularly if it comes from what is regarded as a reliable or significant source (Naidoo and Wills, 2000). The doctor or ward nurse may well be viewed as a significant source in the hospital. Therefore, if the nurse treats early morning hypoglycaemia with milk and biscuits then this must be the correct treatment in the patient’s eyes. If the doctor then orders breakfast-time insulin to be withheld until blood glucose levels rise, and then increases doses to match post-hypoglycaemia hyperglycaemia then this must also be correct.

The implications are that correct self-management may be compromised, and that outside of the supported environment of the hospital ward, people may be put at risk.

The rationale for appropriate care

The two problems identified (inappropriate carbohydrate source for initial treatment of hypoglycaemia, and mismanagement of insulin doses after the episode) probably owe more to tradition – ‘we’ve always given milk and biscuits’ and logic ‘why give more insulin when the blood glucose level is already low’ than to ignorance per se, since these approaches may not always yield adverse outcomes. The rationale underpinning the education of colleagues (and patients) should be derived from the available evidence. However, while there is a dearth of specific evidence to support recommended practice, a basic understanding of simple physiological mechanisms can provide a rationale to support an appropriate approach to care.

Hypoglycaemia – a working definition

The definition of hypoglycaemia given to people with diabetes commonly relates to groups of symptoms caused by physiological responses to a fall in glucose levels. These symptoms should act as a warning to the individual to take carbohydrate in order to restore their blood glucose levels to recommended values (Deary, 1999). Studies exploring the relationship between symptoms of hypoglycaemia and blood glucose levels have typically identified a level of 3.9mmol/l or lower as hypoglycaemic (Cox et al, 1993) – commonly translated to 4mmol/l or below for self-management purposes. These symptoms derive from both autonomic and neuroglycopenic responses, each of which come into play as blood glucose levels continue to drop (see *Box 1*).

The production of counter-regulatory hormones including glucagon and adrenaline facilitates gluconeogenesis and glycogenolysis, in an attempt to stabilise and maintain blood glucose levels. This simple description of the basic physiology generates two important issues in understanding the management of hypoglycaemia. Firstly, that the recognition of one or more symptoms is likely to indicate a blood glucose level of less than 4mmol/l which may still be falling, and secondly that the counter-regulatory response, coupled with the ingestion of extra carbohydrate, may lead to a subsequent rise in blood glucose levels in

Box 1. Common symptoms of hypoglycaemia.	
Symptoms relating to the autonomic response	Symptoms relating to the neuroglycopenic response
Pallor	Feeling light-headed
Palpitations	Confusion
Sweating	Altered behaviour
Shaking or trembling	Paraesthesia
Hunger	Drowsiness
	Coma

Page points

1. Most people with diabetes are aware that treatment should be instigated at the first sign of trouble!
2. If an insulin dose is due close to the incident, this may be withheld because of concerns about the prior low blood-glucose level.

the hours following the hypoglycaemic episode.

The case against milk and biscuits

The author believes that most people with diabetes are aware that treatment should be instigated at the first sign of trouble! If not, neuroglycopenic symptoms may affect the ability to make an appropriate response. Common sense would suggest that immediate oral treatment needs to be in a form that is both easily ingested and quickly absorbed in order to arrest the fall in glucose.

Glycaemic index (GI) is a scale which demonstrates how quickly a carbohydrate source is likely to raise blood glucose levels (Foster-Powell et al, 2002). Reference tables allocate a value to individual carbohydrate foods, and the higher the score, the swifter the rise in blood glucose levels is likely to be. A carbohydrate food in the high-GI range (above 70) which is easy to ingest should, therefore, raise blood glucose levels relatively quickly for people who are conscious and able to take treatment orally.

The GI values of some foods used to manage hypoglycaemia are shown in *Box 2*. It can be seen that glucose and lucozade are high-GI foods, whereas both skimmed and whole milk are classified as being low-GI. Digestive biscuits are a moderate GI food with a value of 59. Therefore, offering milk and biscuits as a primary treatment

for a falling blood glucose level might not trigger a corrective rise in glucose as quickly as foods with a high GI value that are also easily ingested. Thus, the individual may be put at risk of serious hypoglycaemia, requiring more invasive treatment.

The recommended treatment of 20–30 g of a high GI carbohydrate food in a form that is easily ingested would equate to 3–5 glucose tablets, 50ml of lucozade, a glass of ordinary cola or fruit juice or a proprietary glucose gel.

However, once the symptoms have subsided and the blood glucose level has recovered to 'normal', the combination of milk and biscuits would be an appropriate snack to maintain it if a main meal is not due.

The case against withholding insulin

The second strand of treatment relates to the management of diabetes medication after the hypoglycaemic event – in particular, insulin doses. If an insulin dose is due close to the incident, this might be withheld because of concerns about the prior low blood-glucose level. The person with diabetes may also be frightened by the event and concerned that the dose may exacerbate the problem. An understanding of how individual insulin regimens work will demonstrate that the due dose is not the causative culprit of the prevailing problem. The previous dose may, however, be implicated if no other cause relating to food, activity or recovery from infection can be identified.

Given the combination of extra carbohydrate ingestion and counter-regulation, it may not be unusual to see blood glucose levels rise into the double figures in the hours following the hypoglycaemic episode, which could be exacerbated by inadequate circulating insulin levels. Giving extra insulin at this point to manage the 'hyperglycaemia' may lead to fluctuating blood glucose levels, taking longer to resolve and stabilise. This sequence of events may be considered to be an adverse event, as noted by James (2005).

Thus, giving the appropriate due dose can help to avoid excess fluctuation, and patients' fears can be alleviated by giving the dose closer to the meal.

Box 2. The glycaemic index (GI) values of foods that are commonly used to treat hypoglycaemia.

Food	GI value
Lucozade	95±10
Coca Cola	58±5
Orange juice	50±4
Honey	55±5
Milk chocolate	43±3
Mars bar	65±3
Full-fat milk	27±4
Multi-grain bread	43
Ryvita	74
Cornflakes	81±3
Digestive biscuits	59±2

Page points

1. Various methods can be utilised to get messages across to colleagues and some may be more effective than others.
2. Boyle et al (2007) suggest that professional caregivers, as well as patients, can be fearful of hypoglycaemia, so teaching and learning should encourage a level of understanding that will aid appropriate problem solving in the clinical setting.
3. Diabetes teams, and in particular inpatient nurse specialists can potentially influence colleagues by initiating and supporting such learning, using a variety of approaches.

Educating colleagues : Applying the Confucius principle

'I hear and I forget, I see and I remember, I do and I understand' (Confucius, c450BC).

Various methods can be utilised to get messages across to colleagues and some may be more effective than others. Confucius recognised that in order to effect change through learning, there needed to be a higher level of involvement than merely 'being told'. As with patients, cognitive learning theory suggests that practitioners are not just 'passive receptors' of information, but will process it into 'meaningful categories' which may be integrated with existing knowledge and lead to a change in attitudes and practice (Thomson, 1999). As with patients, the message needs to be consistent and come from a 'reliable and significant source' – that is, knowledgeable practitioners.

Boyle et al (2007) suggest that professional caregivers, as well as patients, can be fearful of hypoglycaemia, so teaching and learning should encourage a level of understanding that will aid appropriate problem solving in the clinical setting.

Diabetes teams, and in particular inpatient nurse specialists can potentially influence colleagues by initiating and supporting such learning, using a variety of approaches.

'Tell me' and 'show me' approaches

Instructions on charts

This can be easily incorporated if there are separate diabetes charts. On this chart there is a section for colleagues to complete if an insulin dose has been withheld, giving the reasons why. This not only allows for audit which can identify any specific learning needs relating to insulin management, but may move the individual towards 'involvement' through the thinking process required in giving a rationale for the action. Specialist teams may be able to use this as a basis for reflective discussion about the action that was taken.

Clinical guidelines

Sometimes in hard copy, but more usually cited on the hospital intranet, these may not always be easy to find in a hurry. While guidelines can aid decision making, they may not always include causal explanations to aid problem solving. For example, the action of insulin and the adjustment of doses may not always be well understood by colleagues for whom diabetes is not a specialty. Making

Page points

1. Use case histories or simulation through role play – plant a colleague who fakes a hypo, observe the response and then discuss.
2. There may be many ways in which people do not receive optimal care during an admission to hospital, but mismanagement of hypoglycaemia can be one of the most difficult in terms of both immediate and long-term well-being.

a presentation available to explain the action of insulin, principles of adjustment and common regimens may be useful as an adjunct to the guidelines.

Hypo boxes

Kept in a prominent place, these have been shown to encourage positive practice (Baker et al, 2007) although use of hypo boxes may not engender improved understanding about hypoglycaemia management (Adams et al, 2002). The box should contain everything needed to deal with mild or moderate hypoglycaemia, with written instructions clearly visible. These instructions may also briefly mention the action to take if the ‘hypo’ progresses. An example of a hypobox is shown in *Figure 1*. Some hypoboxes may contain glucose that can be administered via feeding tubes.

‘Involve me’ approaches:

Study days

Include some information about hypoglycaemia for every audience and on every occasion. Use case histories or simulation through role play – plant a colleague who fakes a hypo, observe the response and then discuss. The use of simulation allows feedback in a controlled situation (Thomson, 1999). Conn et al (2003) found the use of simulated case scenarios effective at improving junior doctors’ management of inpatient glycaemic control.

Ward ‘buzz’ sessions

Just 5 or 10 minutes with staff can be used to discuss the effects of a specific action. Use a case example (including examples of good practice),



Figure 1. The contents of a hypobox.

look at what was done and reflect on it.

Critical incident analysis

This requires more time and depth than the ‘buzz’ session and may involve formal reporting. They could take place in multidisciplinary team meetings or as part of personal clinical supervision, and can be a good opportunity for positive discussion about practice.

Conclusion

Standard 8 of the *National Service Framework for Diabetes: Standards* required the delivery of effective care for people with diabetes admitted to hospital (DoH, 2001). There may be many ways in which people do not receive optimal care during an admission to hospital, but mismanagement of hypoglycaemia can be one of the most difficult in terms of both immediate and long-term well-being.

Colleagues need to recognise the potential influence of their actions, not only on immediate clinical outcomes, but on the long-term self-care of people with diabetes. By optimising every opportunity for teaching and learning, diabetes specialist teams, and particularly DSNs, may help colleagues to increase their knowledge and understanding, apply appropriate patient care, reinforce self-management education and reduce risk. ■

Adams E et al (2005) An audit on the management of hypoglycaemia in hospital. *Diabetes Care* **22** (Suppl 2): 115
Baker H et al (2007) Managing hypoglycaemia in hospital. *Journal of Diabetes Nursing* **11**: 108–11
Boyle P, Zrebiec J (2007) Management of Diabetes-related Hypoglycemia. *Southern Medical Journal* **11**: 183–94
Conn JJ et al (2003) The transition from knowing to doing: teaching junior doctors how to use insulin in the management of diabetes mellitus. *Medical Education* **37**: 689–94
Cox DJ et al (1993) Perceived symptoms in the recognition of hypoglycaemia. *Diabetes Care* **16**: 519–27
Deary IJ (1999) Symptoms of hypoglycaemia and effects on mental health and performance. In Frier BM and Fisher BM eds. *Hypoglycaemia in Clinical Diabetes*. Wiley, Chichester
DoH (2001) *National Service Framework for Diabetes: Standards*. DoH, London
Festinger L (1957) *A theory of cognitive dissonance*. Stanford University Press, California
Foster-Powell K et al (2002) International table of glycemic index and glycemic load values: 2002. *American Journal of Clinical Nutrition* **76**: 5–56
James J (2005) Insulin-treated inpatients and prescribing errors. *Journal of Diabetes Nursing* **9**: 171–7
Marteau TM (1995) Health Beliefs and Attributions. In Broome A; Llewelyn S (Eds) *Health Psychology: Processes and Applications*. Chapman and Hall, London
Naidoo J, Wills J (2000) *Health Promotion: Foundations for Practice*. Balliere Tindall, London
Thomson (1999) The nature of teaching and learning. In Hinchliff S (Ed) *The Practitioner as Teacher*. Balliere Tindall, London
Watson J (2002) *The Influence of Health Education on the Reduction of Cardiovascular Risk in people with Diabetes*. Thesis (MPhil). Bournemouth University