

HYPOGLYCAEMIA ON THE KETOGENIC DIET - SCH

PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- The ketogenic diet is a medical diet for the management of refractory epilepsy and Glut-1 Transporter deficiency syndrome.
- This document details the procedure for monitoring and management of hypoglycaemia in patients on the ketogenic diet.
- In the ketogenic diet – the aim is to induce ketosis.
- Low blood glucose levels are common during the initiation stage of the ketogenic diet – (hypoglycaemia risk is 4%⁵).
- Patients on the ketogenic diet are also at high risk of hypoglycaemia when fasting (hypoglycaemia risk is as high as 33%⁵) for any reason (procedures, anaesthetic, intercurrent illness).
- The management of hypoglycaemia in the ketogenic diet is different to the management of hypoglycaemia in diabetes as the minimum blood glucose levels tolerated in non-diabetic epilepsy patients are somewhat lower than those tolerated in infants and children with diabetes where ketosis is avoided.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1 st December 2019	Review Period: 3 years
Team Leader:	Dietician	Area/Dept: Nutrition and Dietetics

CHANGE SUMMARY

- Poly-Joule solution recipe has been changed
- Percutaneous Enterostomy Tube changed to feeding tube

READ ACKNOWLEDGEMENT

- The following staff need to read and acknowledge they understand the contents of this document:
 - SCH nursing staff – SSSU, C2S and other ward nursing staff where ketogenic diet is used, ED, recovery, CICU nursing staff
 - Paediatric Dietitians
 - AUM and Educational CNC of C2S (Neurology and Neurosurgery ward)
 - Paediatric Junior Medical Staff on neurology rotations who look after children on the ketogenic diet
 - Paediatricians and Paediatric Neurologists who look after children on the ketogenic diet.
- The following staff need to be aware of the document:
 - Paediatric Neurologists
 - Anaesthetics and CICU staff
 - Paediatric Junior Medical Staff
 - Nursing staff involved in the care of children with epilepsy and intractable seizures
 - Pharmacist

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

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TABLE OF CONTENTS

Introduction	4
Purpose/Scope.....	4
Expected results.....	4
Responsibilities	4
Abbreviations	4
Related Documents.....	4
Equipment and supplies	4
Procedure	5
Management of Hypoglycaemia on the Ketogenic Diet.....	5
Flowchart: Management of Hypoglycemia on Ketogenic Diet	6
<i>Monitoring and Management</i>	6
References	7

Introduction

Purpose/Scope

This procedure should be followed for management of patients at the commencement of the ketogenic diet including those starting the Classical Ketogenic Diet, Medium Chain Triglyceride Diet, Modified Atkins Diet and Low Glycaemic Index Diet. It should also be used for patients who are already established on the ketogenic diet, who are fasting for a procedure, or anaesthetic, or during management of an inter-current illness. This should allow the early identification and treatment of hypoglycaemia in this cohort of patients.

Expected results

Safe management and treatment of hypoglycaemic events in ketogenic diet patients admitted to Sydney Children's Hospital Randwick.

Responsibilities

Nurses caring for patients on the ketogenic diet must ensure that blood sugar levels (BSL) are monitored as per the procedure, and that they have access to the appropriate equipment and supplies. Medical staff must appropriately chart glucose or Glucagon or Poly-Joule Solution as necessary.

Abbreviations

BSL	Blood sugar level
LOC	Loss of consciousness
IVC	Intravenous cannula
IMI	intramuscular injection
Subcut	Sub-cutaneous injection
IV	intra-venous

Related Documents

- NSW MoH Policy Directive PD2013_049: [Recognition and Management of patients who are clinically deteriorating](#)
- [Between the Flags – Clinical Emergency Response System Procedure](#)

Equipment and supplies

- Glucometer
- Orange or apple juice
- Poly-Joule solution 50% w/v (Provided by formula room. Recipe is 50 g of Poly-Joule made up to 100 mL with water. Contains 48 g carbohydrate in 100 mL solution).⁸
- 10% Glucose
- Glucagon

Procedure

Management of Hypoglycaemia on the Ketogenic Diet

1. On admission, identify patient on ketogenic diet.
2. Staff should be familiar with clinical signs of hypoglycaemia. Symptomatic episodes are uncommon, particularly in younger children who may not show signs. Symptoms include: paleness, shakiness, headache, sweating, feeling hungry, dizziness, irritability, lack of concentration, confusion, crying, weakness and rapid pulse.
3. If commencing ketogenic diet or if patient is fasting for a procedure or unwell with an inter-current illness then commence 4 hourly check of BSLs.
 - i. If >3.5 mmol/L, recheck in four hours
 - ii. If $2.6 - 3.5$ mmol/L, recheck in two hours
 - iii. If <2.6 mmol/L
 - a) If infant/child is conscious and safe to swallow:

Children > 12 months: give 30 mL of juice orally (Or via feeding tube if the patient is enterally fed.)

Infants under 12 months: 1 mL/kg of 50% Poly-Joule solution. Re-check in 30 minutes.

Initiate Clinical Review call.
 - b) If child has altered level of consciousness or hypoglycaemic seizures.

Initiate Rapid Response call.

If intravenous cannula in situ give bolus of 2 mL/kg of 10% glucose.

If no IVC in situ give Glucagon intramuscularly:

If > 25 kg use 1 mg glucagon IM,

if < 25 kg: use 0.5 mg glucagon IM

See [Flowchart](#) below.

4. If Glucagon or IV glucose is given, close clinical and blood glucose observation is essential because vomiting is common and recurrent hypoglycaemia may occur. Regular glucose monitoring maybe required every 15 minutes to hourly as the patient becomes stable. Should recurrent hypoglycaemia occur, the child will require additional oral carbohydrate and / or IV infusion of glucose (e.g.: 10% glucose 2 – 5mg/kg/min) or as directed by medical officer.

Flowchart: Management of Hypoglycemia on Ketogenic Diet

Low blood glucose levels are common during the initiation stages of the ketogenic diet, if unwell or if fasting for procedures. Children may have low blood glucose levels without displaying symptoms.

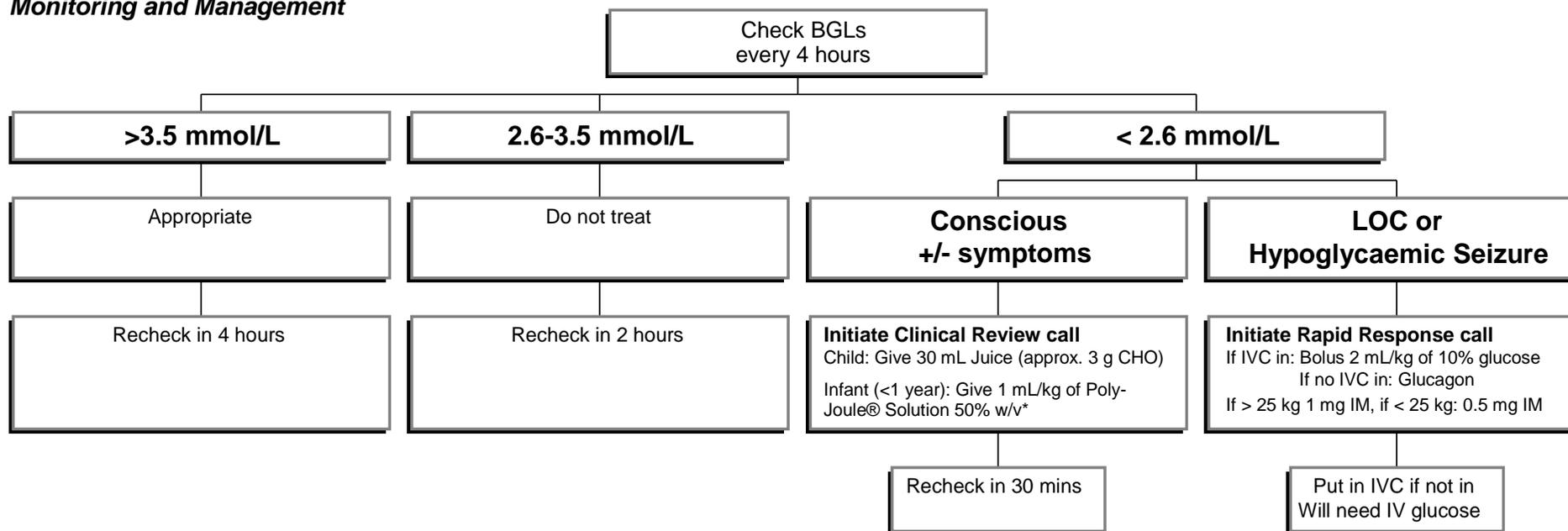
A **Symptomatic** episode of hypoglycaemia is uncommon, especially in younger children who may not show signs. This can cause:

- Paleness
- Shakiness
- Headache
- Sweating
- Feeling hungry
- Dizziness
- Irritability
- Lack of concentration
- Confusion
- Crying
- Weakness
- Rapid pulse

A **Severe** episode of hypoglycaemia is **extremely rare**. This is defined by:

- Loss of Consciousness (LOC)
- Hypoglycaemic Seizure

Monitoring and Management



*Recipe for Poly-Joule solution 50% w/v is 50g of Poly-Joule made up to 100mL with water

References

1. Aynsley-Green, A. Glucose; A fuel for thought! J. Paediatr.Child.Health. 1991: 27;21-30
2. Clarke, W. Jones, T. Rewers A, Dunger, D. Klingensmith, G J. ISPAD Clinical Practice Consensus Guidelines 2009 Compendium. Assessment and Management of Hypoglycemia in Children and Adolescents with Diabetes. Paediatric Diabetes. 2009: 10 (Suppl. 12) ; 134-145
3. NSW MoH Policy Directive PD2013_049: Recognition and Management of patients who are clinically deteriorating: https://www1.health.nsw.gov.au/pds/pages/doc.aspx?dn=PD2013_049 . 2013 (accessed 25/11/2019)
4. Between the Flags – Clinical Emergency Response System Procedure: <http://webapps.schn.health.nsw.gov.au/epolicy/policy/3183> (accessed 25/11/2019)
5. Bergqvist, A.G.C., Schall, J.I., et al. Fasting versus Gradual initiation of the ketogenic Diet: A prospective Randomized Clinical Trial of Efficacy Epilepsia. 2005; 46:1810-1819.
6. Sunehag, A., Haymond, M.W. Approach to hypoglycaemia in infants and children. UpToDate: <http://www.uptodate.com/contents/approach-to-hypoglycemia-in-infants-and-children> (accessed 1/7/2014)
7. Wibisono, C, Rowe, N, Beavis, E et al. Ten year single centre experience of the ketogenic diet: factors influencing efficacy, tolerability and compliance. The Journal of Paediatrics. 2015;166:1030-1036
8. Poly- Joule Factsheet: <https://nutriciamedical.com.au/products/poly-joule/> (accessed 27/11/2019)

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