Alberta Health Services

PROCEDURE

TITLE

TREATMENT OF HYPOGLYCEMIA - ADULT

SCOPE	DOCUMENT #
Provincial: Acute Care	HCS-206-01
APPROVAL AUTHORITY	INITIAL EFFECTIVE DATE
Clinical Operations Executive Committee	September 1, 2017
SPONSOR	REVISION EFFECTIVE DATE
Diabetes, Obesity and Nutrition Strategic Clinical Network	February 4, 2019
PARENT DOCUMENT TITLE, TYPE AND NUMBER	SCHEDULED REVIEW DATE
Provincial: Glycemic Management Policy (#HCS-206)	September 01, 2020

NOTE: The first appearance of terms in bold in the body of this document (except titles) are defined terms – please refer to the Definitions section.

If you have any questions or comments regarding the information in this document, please contact the Policy & Forms Department at policy@ahs.ca. The Policy & Forms website is the official source of current approved policies, procedures, directives, standards, protocols and guidelines.

OBJECTIVE

- To support assessment, early recognition, and prompt intervention for adult **patients** with diabetes experiencing a hypoglycemic event, presenting to or admitted to an Alberta Health Services (AHS) Acute Care setting.

APPLICABILITY

Compliance with this document is required by all Alberta Health Services employees, members of the medical and midwifery staffs, Students, Volunteers, and other persons acting on behalf of Alberta Health Services (including contracted service providers as necessary) working within Acute Care settings.

ELEMENTS

1. Points of Emphasis

1.1 For the purposes of this policy suite only, Acute Care setting(s) includes all AHS urban and rural hospitals (including the Emergency Department), psychiatric facilities, and Urgent Care facilities.

1.2 This procedure may be used in non-Acute Care settings. Site or unit managers are responsible for determining whether this procedure in whole or in part is appropriate for their patient care setting and communicating relevant information out to **AHS people**.

1.3 Treatment is for all patients with a blood glucose less than four (4.0) millimoles per litre (mmol/L), even those asymptomatic who meet the criteria below:

a) patients with diabetes or gestational diabetes, who are on at least one (1) of the following medications:

(i) insulin; or

(ii) insulin secretagogues (e.g., glyburide, gliclazide, glimepiride or repaglinide).

b) patients without diabetes who have symptomatic hypoglycemia due to insulin or insulin secretagogue overdose (glyburide, gliclazide, glimepiride or repaglinide), malnutrition, liver failure, or more rare conditions (e.g., insulinoma, late dumping syndrome, etc.).

1.4 This hypoglycemia procedure should not be applied to:

a) Patients with diabetes who are not taking insulin or insulin secretagogues (e.g., glyburide, gliclazide, glimepiride or repaglinide).

b) Asymptomatic patients who do not have diabetes (since healthy people who are fasting can have blood glucose levels below four [4.0] mmol/L).

1.5 An **order** is not required to implement this procedure, provided that a **health care professional** has determined that the patient meets the specific circumstances and implementation criteria outlined within the procedure.

Exception:

a) A patient-specific order from the **most responsible health practitioner (MRHP)** is required to administer dextrose 50 percent in water (D50W) via intravenous (IV), as this is a **schedule one (1) medication**; this should not delay treatment. In emergent situations where it is not possible to obtain an order prior to administering D50W; obtaining an order can happen at the same time as treating the patient with D50W via IV.

1.6 Blood glucose targets are five (5.0) – 10.0 mmol/L for the majority of non-critically ill adult patients, as long as these targets can be safely achieved. Please refer to the provincial AHS *Glycemic Management* Policy for details on caring for patients for whom these targets do not apply.

1.7 It is important to avoid overtreatment of hypoglycemia, since this can result in rebound hyperglycemia.

1.8 The patient should not be sent off the unit, especially for physical activity, until their blood glucose is greater than or equal to four (4.0) mmol/L after treatment; and they have had the opportunity to have a snack or meal containing carbohydrate and protein (or Parenteral Nutrition [PN] or tube feed re-established).

1.9 Holding of insulin requires an order from the MRHP.

1.10 Holding basal or bolus insulin after a hypoglycemic event commonly results in significant hyperglycemia three (3) – four (4) hours later.

1.11 Treatment of hypoglycemia shall be initiated when a patient's blood glucose reading is below four (4.0) mmol/L. The patient may be symptomatic or asymptomatic. Refer to *Appendix A: Adult Hypoglycemia Treatment Algorithm*.

1.12 Timing of insulin administration should be coordinated with meals and blood glucose testing in the following order.

a) Blood glucose testing should be done within 30 minutes prior to meal; and

b) meal/bolus insulin should be administered based on this test no more than 30 minutes prior to meals in most instances.

(i) Short acting insulin should be given 30 minutes prior to a meal; and

(ii) rapid acting insulin should be given just before a meal.

(iii) Meal/bolus insulin may be given immediately after the meal/feed in certain situations (e.g., gastroparesis or concern that the patient may not be able to ingest or retain the full meal).

1.13 Capillary blood is not recommended for blood glucose testing for patients with severely impaired peripheral circulation (e.g., hypovolemia, shock).

1.14 Blood glucose testing may be repeated and/or verified by laboratory testing at the health care professional's discretion if the point of care testing (POCT) blood glucose reading is:

a) inconsistent with the patient's clinical status (i.e., the patient is not exhibiting signs and symptoms of hypoglycemia); or

b) suspected to be related to equipment failure.

Verification is not required for a patient who is known to have asymptomatic hypoglycemia or hypoglycemia unawareness and the blood glucose meter result is less than four (4.0) mmol/L.

2. Personnel

2.1 Care and management of hypoglycemic patients shall be provided by all health care professionals within their scope of practice.

2.2 Point of care testing (POCT) with glucose meters shall be performed by health care providers who have received appropriate glucose meter clinical education and training and have maintained the ongoing competency requirements.

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3. Identification of Hypoglycemia

3.1 Hypoglycemia is defined by blood glucose level of less than four (4.0) mmol/L. This is most often seen in patients treated with insulin or an insulin secretagogue (i.e., glyburide, gliclazide, glimepiride or repaglinide).

3.2 A hypoglycemic state may be asymptomatic or symptomatic.

3.3 Symptoms of hypoglycemia may include, but are not limited to:

a) Early/Non-severe symptoms: headache, mood changes, irritability, tremors, tiredness, tachycardia, excessive hunger, diaphoresis, pallor, paresthesia, and/or inability to concentrate.

b) Advanced/Severe symptoms may include all of the above as well as: being unable to recognize and treat hypoglycemia by self; disorientation, altered level of consciousness (including unconscious state), and/or seizure.

4. Treatment of Hypoglycemia in Conscious Patients that are Able to Swallow Including Those That Have a Tube Feed

4.1 Refer to *Appendix A: Adult Hypoglycemia Treatment Algorithm*.

For patients who are ordered nothing by mouth (NPO) follow the section on the algorithm for Altered Consciousness/Unable to Swallow.

4.2 Where the health care professional identifies a state of hypoglycemia, treatment shall be initiated, as per this procedure.

4.3 The MRHP shall be contacted and informed if the patient's condition changes to an advanced/severe state of hypoglycemia; and when otherwise specified in this procedure.

4.4 Provide 15 grams (g), or as close as possible, of a **quick acting carbohydrate**. Choose one (1) of the following:

a) four (4) dextrose tablets (16 g of carbohydrate); or

b) three-quarters (3/4) cup or 175 millilitres (mL) juice or regular pop; or

c) one and one-half (1 ½) individual packages of honey (or 15 mL providing 18 g of carbohydrate); or

d) four (4) packets of sugar dissolved in water.

Exceptions:

(i) If the patient is taking acarbose (e.g., Glucobay) for glycemic control, use dextrose tablets or honey only, as acarbose delays the absorption of sucrose.

(ii) If the patient has a tube feed and unable to have nutritional intake by mouth, provide four (4) dextrose tablets crushed and dissolved in water via tube feed and flush with 30 mL water (pre and post treatment).

(iii) For patients requiring thickened fluids; provide thickened juice (see Section 4.4b) based on the thickness indicated in the patient's diet order.

4.5 Repeat blood glucose test in 15 minutes:

a) If the patient's blood glucose result is below four (4.0) mmol/L, repeat treatment with 15 g of quick acting carbohydrate.

(i) Retest in 15 minutes.

(ii) If blood glucose remains below four (4.0) mmol/L, contact the MRHP for further treatment.

- If the patient becomes unresponsive or has altered level of consciousness, proceed to Section 5 of this procedure.

b) If the patient's blood glucose result is greater than or equal to four (4.0) mmol/L and the next meal is more than one (1) hour away, provide a snack consisting of approximately 15 g of carbohydrate and a protein source. Choose one (1) of the following suggested snack options:

(i) Three (3) packages of soda crackers (two [2] crackers per package) with either:

- one (1) package of peanut butter (one [1] tablespoon or 15 g per package); or
- one (1) package of cheese (one [1] ounce or 30 g per package);

(ii) two (2) packages of arrowroot cookies (two [2] cookies per package) with either:

- one (1) package of peanut butter (one [1] tablespoon or 15 g per package); or

- one (1) package of cheese (one [1] ounce or 30 g per package);

(iii) one (1) slice of toast/bread with either:

- one (1) package of peanut butter (one [1] tablespoon or 15 g per package);
- one (1) package of cheese (one [1] ounce or 30 g per package);

(iv) one-half (1/2) of a meat or cheese sandwich (one [1] slice of bread and one [1] ounce or 30 g of meat or cheese); or

(v) one (1) container of smooth Greek yogurt (100 g).

Exceptions:

- For patients with dysphagia on dysphagia soft/minced/pureed diet(s) provide:
  - one (1) container of Ensure or Boost pudding (113 g/142 g); or
  - one (1) container smooth Greek yogurt (100 g).

  If neither is available; discuss appropriate snack options with dietitian or MRHP.

- For patients on tube feed:
  - If tube feed is continuous, continue regular feeding at established rate; or
  - If tube feed is intermittent, give 100 mL bolus of ordered formula and resume feeding at next scheduled time.

(vi) If none of the recommended options are appropriate for the patient, discuss the best snack options with dietitian or MRHP.

c) If the patient's blood glucose result is greater than or equal to four (4.0) mmol/L; and the meal is less than one (1) hour away, give the meal only and do not provide a snack.

4.6 Document patient's symptoms, treatment provided and response to treatment in the patient's **health record**.

4.7 Notify the MRHP, at the next contact, regarding the patient's hypoglycemic event.

4.8 Repeat blood glucose test one (1) hour after the hypoglycemic event.

4.9 Resume insulin schedule or other anti-hyperglycemic medications unless otherwise ordered. Contact the MRHP if unsure.

5. Treatment of Hypoglycemia in Patients with Altered Consciousness/Unable to Swallow (includes Patients who are NPO)

5.1 Refer to *Appendix A: Adult Hypoglycemia Treatment Algorithm*.

5.2 Where the health care professional identifies an advanced/severe state of hypoglycemia, the MRHP shall be contacted and informed of the patient's change in status.

a) A patient-specific order from the MRHP is required to administer D50W via IV, as this is a Schedule one (1) medication; however this should not delay treatment. In an emergent situation obtaining an order can happen at the same time as treating the patient with D50W via IV.

5.3 If patient has an altered level of consciousness, place in the recovery position to maintain an open airway.

5.4 If patient does not have intravenous (IV) access, attempt to establish in a large vein (i.e. antecubital vein). Avoid using small peripheral veins for the administration of IV D50W, as this hyperosmolar solution can cause extravasation and consequential complications including tissue injury and loss of limb.

a) If unable to initiate IV within two (2) minutes, administer glucagon one (1) milligram (mg) subcutaneously or intramuscularly (SC or IM) and continue to attempt IV access. Administer glucagon while the MRHP is being contacted regarding the patient's condition. Do not delay treatment.

5.5 Once IV access is established in a large vein (i.e., antecubital vein) or central line, administer one (1) pre-filled 50 mL syringe of D50W (25 g of dextrose) via direct IV over one (1) – three (3) minutes, as per AHS *Parenteral Monograph*.

a) If the health care professional is unable to administer D50W via direct IV (i.e., IV "push"), add 50 mL of D50W (25 g of dextrose) to a 50 mL mini-bag of dextrose five (5) percent in water (D5W) or 0.9 percent normal saline (NS) and infuse over 15 to 20 minutes, as per AHS *Parenteral Monograph*.

b) If a smaller peripheral vein is the only IV access, infuse D50W (25 g of dextrose) in a 50 mL mini-bag of D5W or NS and infuse over 30 minutes, as per AHS *Parenteral Monograph*.

c) A patient-specific order from the MRHP is required to administer dextrose D50W via IV, as this is a Schedule one (1) medication; however this should not delay treatment. In an emergent situation, obtaining an order can happen at the same time as treating the patient with IV D50W.

5.6 Following administration of D50W, infuse IV with D5W at 30 millilitres per hour (mL/hr) to keep the vein open, or rate ordered by the MRHP.

5.7 Repeat blood glucose test in 15 minutes:

a) If blood glucose is greater than or equal to four (4.0) mmol/L and patient is conscious, proceed to Section 5.8 in this procedure.

b) If blood glucose is below four (4.0) mmol/L and patient is conscious and able to swallow:

(i) Provide 15 g (or as close as possible) of a quick acting carbohydrate. Choose one (1) of the following:

- four (4) dextrose tablets (16 g of carbohydrate); or
- three-quarter (3/4) cup or 175 mL of juice or regular pop; or
- one and one-half (1 ½) individual packages of honey (or 15 mL providing 18 g of carbohydrate); or
- four (4) packets of sugar, dissolved in water.

Exceptions:

- If the patient is taking acarbose (e.g,. Glucobay) for glycemic control, use dextrose tablets or honey only, as acarbose delays the absorption of sucrose.
- If the patient has a tube feed and unable to have nutritional intake by mouth, provide four (4) dextrose tablets crushed and dissolved in water via tube feed and flush with 30 mL water (pre and post treatment).
- For patients requiring thickened fluids; provide thickened juice (see element 4.4b) based on the thickness indicated in the patient's diet order.

(ii) Repeat blood glucose test in 15 minutes.

- If the patient's blood glucose result is less than four (4.0) mmol/L, repeat treatment with 15 g of quick acting carbohydrate.
- Retest in 15 minutes.
- If blood glucose remains below four (4.0) mmol/L, contact the MRHP for further treatment orders.

c) If blood glucose is below four (4.0) mmol/L, and patient continues to have altered level of consciousness, is unable to swallow or is NPO, and IV access is established, repeat administration of intravenous D50W (25 g of dextrose) followed by:

(i) repeat blood glucose test in 15 minutes; and

(ii) contact the MRHP for further treatment if blood glucose remains below four (4.0) mmol/L.

d) If blood glucose is below four (4.0) mmol/L, and patient continues to have altered level of consciousness, is unable to swallow or is NPO, and there is no IV access, repeat administration of glucagon one (1) mg SC or IM followed by:

(i) continued attempts to establish IV access;

(ii) repeat blood glucose test in 15 minutes; and

(iii) contact the MRHP for further treatment if blood glucose remains below four (4.0) mmol/L.

5.8 Once blood glucose is greater than or equal to four (4.0) mmol/L:

a) If the patient is conscious, able to swallow and the meal is less than one (1) hour away, give the meal only and do not provide a snack.

b) If the patient is conscious, able to swallow, and the next meal is more than one (1) hour away, provide a snack consisting of approximately 15 g of carbohydrate and a protein source. Choose one (1) of the following suggested snack options:

(i) three (3) packages of soda crackers (two [2] crackers per package) with either:

- one (1) package of peanut butter (one [1] tablespoon or 15 g per package); or
- one (1) package of cheese (one [1] ounce or 30 g per package); or

(ii) two (2) packages of arrowroot cookies (two [2] cookies per package) with either:

- one (1) package of peanut butter (one [1] tablespoon or 15 g per package); or
- one (1) package of cheese (one [1] ounce or 30 g per package); or

(iii) one (1) slice of toast/bread with either:

- one (1) package of peanut butter (one [1] tablespoon or 15 g per package); or
- one (1) package of cheese (one [1] ounce or 30 g per package).

(iv) one-half (1/2) of a meat or cheese sandwich (one [1] slice of bread and 1 ounce or 30 g of meat or cheese); or

(v) one (1) container of smooth Greek yogurt (100 g).

Exceptions:

- For patients with dysphagia on a dysphagia soft/minced/pureed diet(s) provide:
  - one (1) container of Ensure or Boost pudding (113 g/ 142 g); or
  - one (1) container smooth Greek yogurt (100 g).
- For patients on tube feed:
  - if tube feed is continuous, continue regular feeding at established rate; or
  - if tube feed is intermittent, give 100 mL bolus of ordered formula and resume feeding at next scheduled time.

(vi) If none of the recommended options are appropriate for the patient, discuss the best snack options with dietitian or MRHP.

c) If the patient is receiving Parenteral Nutrition (PN) – continue PN, infuse IV with D5W at 30 mL/hr to keep the vein open (or rate ordered), and notify MRHP. If PN is not running then infuse 150 mL bolus of D10W over one (1) hour and contact the MRHP for ongoing orders.

d) If the patient is NPO or unable to swallow and has IV access infuse 150 mL bolus of D10W over one (1) hour; and contact the MRHP for ongoing orders.

e) If the patient is NPO or unable to swallow and does not have IV access discuss treatment options and nutrition plan with the MRHP and/or dietitian.

5.9 Document patient’s symptoms, treatment provided and response to treatment in health record.

5.10 Repeat blood glucose test one (1) hour after blood glucose of four (4.0) mmol/L or greater has been established.

5.11 Resume insulin schedule or other anti-hyperglycemic medications unless otherwise ordered. Ask the MRHP to review medication orders.

6. Ongoing Patient Monitoring and Education

6.1 Once the patient's glycemic status has stabilized, recommence routine blood glucose monitoring and/or increase monitoring as ordered.

6.2 Discontinue intravenous when no longer required, as per the MRHP order.

6.3 Review the recent hypoglycemic event and look at efforts to prevent a recurrence.

6.4 Review patient understanding of their situation and provide education/training as required.

6.5 It is not recommended that basal insulin and/or other anti-hyperglycemic medication be withheld however, adjustments to insulin regime or other anti-hyperglycemics may be required.

6.6 Referral to a Certified Diabetes Educator (CDE) or diabetes specialist (when available), if required.

7. Documentation

7.1 The following information shall be documented in the patient's health record:

a) All blood glucose test results;

b) Associated patient symptoms observed/reported;

c) Any treatment provided, including interventions and medications administered to control or manage the patient’s hypoglycemic event;

d) Notification of members of the health care team;

e) Possible contributing factors and other observations; and

f) Patient and family teaching provided.

(i) Administration of IV D50W push prior to obtaining an order, in an emergent situation, is endorsed by the *CARNA Medication Guidelines*; guideline 10. It is also endorsed by the *CPLNA Medication Guidelines*, medication orders, and protocols. Obtaining an order can happen at the same time as treating the patient.

DEFINITIONS

AHS People means Alberta Health Services employees, members of the medical and midwifery staffs, Students, Residents, Volunteers, and other persons acting on behalf of AHS (including contracted service providers as necessary).

Health care professional means an individual who is a member of a regulated health discipline, as defined by the *Health Disciplines Act* or the *Health Professions Act*, and who practises within scope and role.

Health record means the Alberta Health Services legal record of the patient's diagnostic, treatment and care information.

Most responsible health practitioner (MRHP) means the health practitioner who has responsibility and accountability for the specific treatment/procedure(s) provided to a patient and who is authorized by Alberta Health Services to perform the duties required to fulfill the delivery of such a treatment/procedure(s), within the scope of their practice.

Order means a direction given by an authorized prescriber to carry out specific activity (-ies) as part of the diagnostic and/or therapeutic care and treatment, to the benefit of a patient. An order may be written (including handwritten and or electronic), verbal, by telephone or facsimile.

Patient means an adult or child who receives or has requested health care or services from Alberta Health Services and its health care providers or individuals authorized to act on behalf of Alberta Health Services. This term is inclusive of residents, clients and outpatients.

Schedule one (1) medication means the medications that are defined by the National Association of Pharmacy Regulatory Authorities and provincial legislation as requiring a prescription or order from an authorized prescriber.

REFERENCES

- Appendix A*: Adult Hypoglycemia Treatment Algorithm*
- Alberta Health Services Governance Documents:
  - *Glycemic Management - Adult* Policy (#HCS-206)
  - *Point of Care Testing (POCT)* Policy (#PS-90)
- Non-Alberta Health Services Documents:
  - *Diabetes Canada 2018 Clinical Practice Guidelines*
  - *CARNA Medication Guidelines 2015*
  - *CLPNA Medication Guidelines 2018*

VERSION HISTORY

Date	Action Taken
October 27, 2017	Revised
February 4, 2019	Revised (Posted February 15, 2019)
February 19, 2019	Non-substantive change

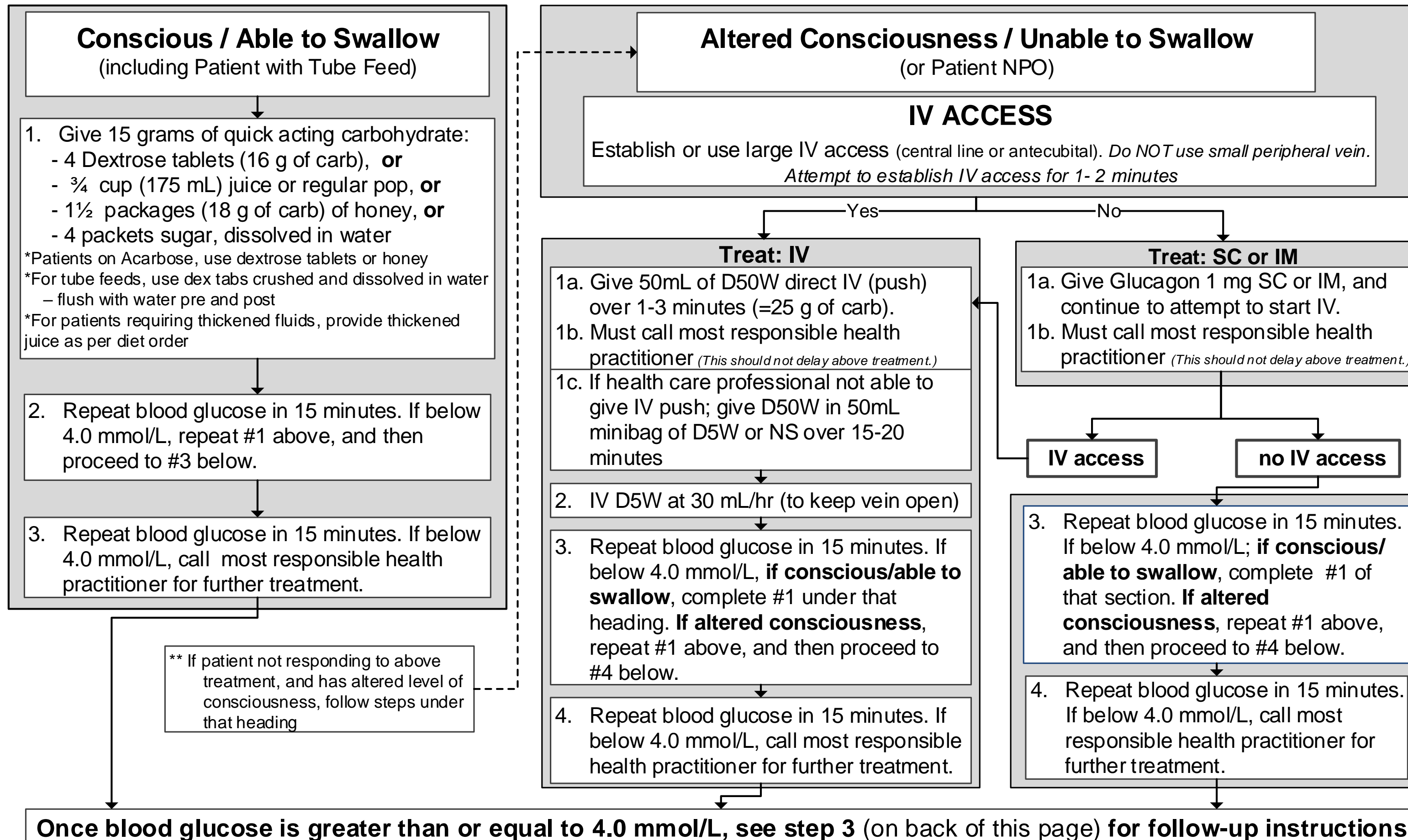
Appendix A: Adult Hypoglycemia Treatment Algorithm

Step 1 - Recognize

Blood Glucose is below 4.0 mmol/L

and on one of the following meds: insulin or insulin secretagogues (glyburide, gliclazide, glimepiride or repaglinide) or patients without diabetes with rare conditions and symptomatic hypoglycemia (see element 1.3b in procedure)

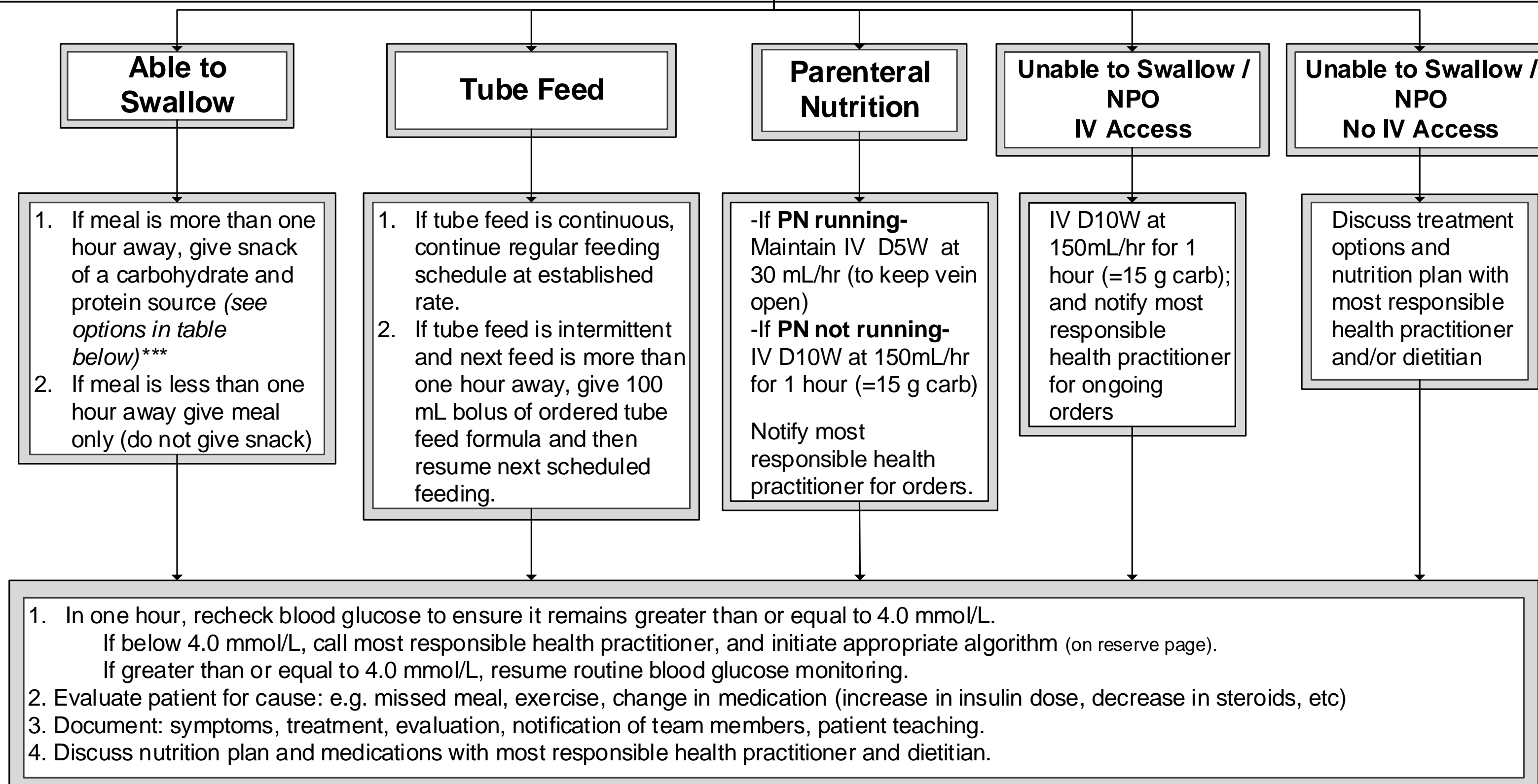
Step 2 - Treat



2019-01-17

****Do not send patient off unit until blood glucose greater than or equal to 4.0mmol/L****

Step 3 – Follow-Up



*** **SUGGESTED SNACK OPTIONS OF APPROXIMATELY 15 grams OF CARBOHYDRATE AND A PROTEIN SOURCE**: Choose only 1 of the following:

- 3 packages of soda crackers (2 crackers per package) with 1 package of peanut butter (1 Tbsp or 15 g) or 1 package of cheese (1 oz or 30 g)
- 2 packages of arrowroot cookies (2 cookies per package) with 1 package of peanut butter (1 Tbsp or 15 g) or 1 package of cheese (1 oz or 30 g)
- 1 slice of toast/bread with 1 package of peanut butter (1 Tbsp or 15 g) or 1 package of cheese (1 oz or 30 g)
- Half a meat or cheese sandwich (1 slice of bread and 1oz [30g] of meat or cheese) –*may not be available at all locations*
- 1 container of smooth Greek yogurt (100g)

***For patients with dysphagia on a dysphagia soft/ minced /pureed diet(s) provide if available: 1 container Ensure/Boost pudding (113g/142g) or 1 container of smooth Greek yogurt (100 g). If not available; discuss appropriate snack options with dietitian and/or food service.

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