Hypoglycemia, Management in Adults

Quick Links to:

- Initial Management of Hypoglycemia
  - Print version: Initial Management with Signs and Symptoms (Appendix A)
- Follow up instructions once blood glucose above 4 mmol/L (3.3 mmol/L in pregnancy)
- Common Symptoms of Hypoglycemia
- Insulin Information: refer to the appropriate PDTM for your area or Lexicomp for further information regarding various insulin products.
- Hypoglycemia PPO (Vancouver Long Term Care only - PPO.552)

Site Applicability

All VCH and PHC sites

Practice Level

Profession	Basic Skill	Advanced Skill (requiring additional education)
RN, RPN	• Identification of hypoglycemia • Administration of oral/enteral treatment	**Nurse Independent Activity (NIA):** • Administration of dextrose 50% IV to treat hypoglycemia • Administration of glucagon subcutaneously to treat hypoglycemia • Initiation and maintenance of Peripheral Intravenous (PIV) access and administration of parenteral solutions
LPN	• Identification of hypoglycemia • Administration of oral/enteral treatment **Requires an Order:** • Administration of glucagon subcutaneously to treat hypoglycemia	

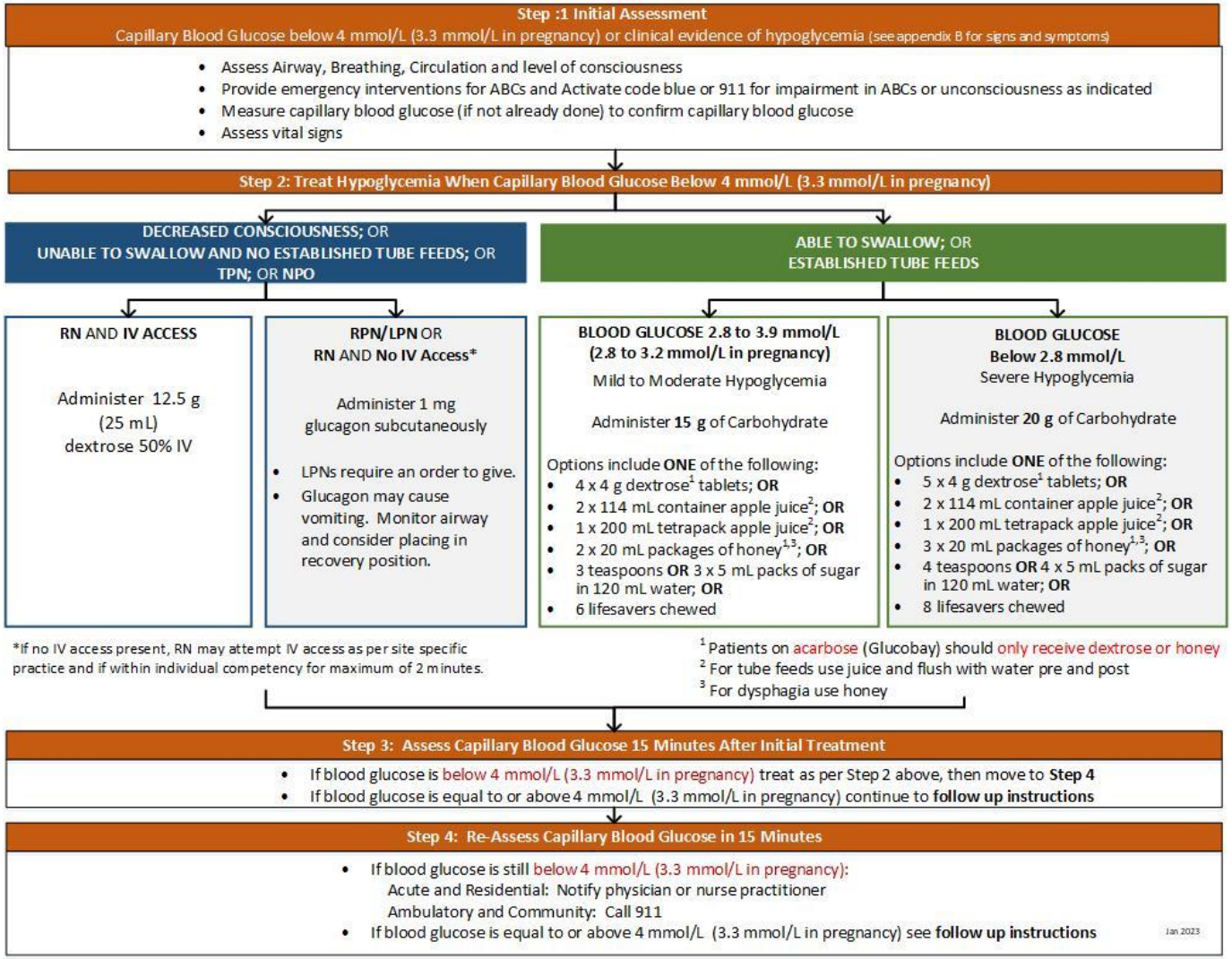
Education:

- Additional education is recommended: see LearningHub NIA Course.
- **RN and RPN:** Review of this document to independently administer dextrose 50% IV or glucagon subcutaneous to treat hypoglycemia.
- **RN:** Additional education to perform PIV insertion.

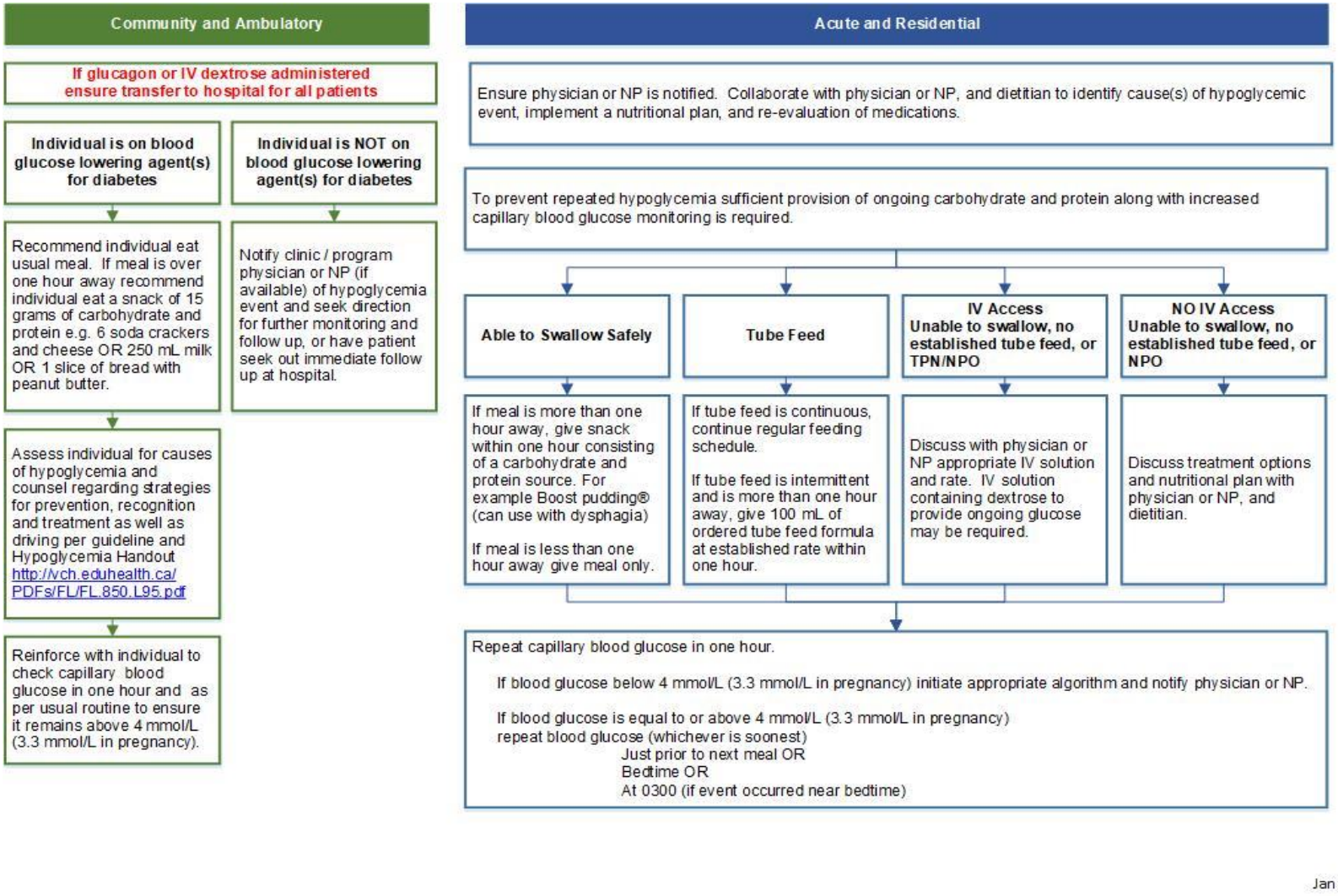
Requirements

- NIAs for RNs and RPNs is supported within VCH/PHC and is defined by Policy: Nurse Independent Activities (NIA) and Nurse-Initiated Protocols (NIP).
- Provider (Physician/NP) orders override the use of NIA

Initial Management of Hypoglycemia



Follow-Up Instructions once Blood Glucose 4 mmol/L or more (3.3 mmol/L or more in pregnancy)



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Need to Know

Hypoglycemia is blood glucose below 4 mmol/L (3.3 mmol/L in pregnancy) and is potentially life-threatening. Hypoglycemia, therefore, must be recognized and treated quickly by rapidly increasing blood glucose. The brain uses glucose for energy and cannot directly use other forms of energy, such as fat. Typically autonomic (autonomic nervous system response), neuroglycopenic (neurological symptoms caused by low blood sugar), or nocturnal symptoms are present with hypoglycemia (see table 1). Sufficient carbohydrate administration relieves these symptoms if caused by hypoglycemia.

Patients at risk for hypoglycemia episodes who are travelling off unit/service should carry a sufficient amount of an appropriate source of carbohydrate based on their swallowing ability, such as dextrose tablets, Life Savers®, or juice.

Table 1: Common Manifestations of Hypoglycemia

Mild Hypoglycemia	**Moderate** Hypoglycemia	**Severe** Hypoglycemia	**Nocturnal Symptoms** (experienced during sleep or upon waking)
Blood glucose 3.9 to 2.8 mmol/L		Blood glucose below 2.8 mmol/L	Variable, but can occur when blood glucose below 3.5 mmol/L
Autonomic symptoms are typically present which include: • Trembling • Palpitations • Sweating • Anxiety • Hunger • Nausea abdominal pain • Tingling Patient may also exhibit: • Crying • Irritability	Autonomic symptoms are typically present plus **neuroglycopenic** symptoms which include: • Difficulty concentrating • Confusion • Erratic behavior • Weakness • Drowsiness • Vision changes • Difficulty speaking • Headache • Dizziness • Combativeness Patient may become non-compliant with instructions	Neuroglycopenic symptoms may be present. Patients may experience: • Decreased consciousness • Seizures • Unconsciousness • Inability to self treat hypoglycemia	• Nightmares • Night sweats • Vivid dreams • Fatigue • Irritability or confusion upon waking • Waking with headache Patients may not experience nocturnal symptoms of hypoglycemia. Capillary blood glucose should be checked at 0300 hr if hypoglycemia is a concern.

See Appendix B for further information on factors affecting hypoglycemia and signs and symptoms of hypoglycemia:

- Hypoglycemic unawareness
- Hypoglycemia in the elderly
- Factors pre-disposing individuals to hypoglycemia
- Predictors and risk factors for severe hypoglycemia
- Medications that may cause hypoglycemia

Equipment and Supplies

- VCH/PHC maintained blood glucose meter.
- Patients who wish to use their own meter routinely may do so with a Provider Order. Accuracy testing of the patient-owned meter is required. Refer to the Regional Laboratory Point of Care Testing Clinical Standard and Policy for glucometer accuracy requirements.
- In settings such as an individual's home where a VCH/PHC maintained blood glucose meter is not available the patient's own meter may be used in an emergent situation with the knowledge the accuracy of readings cannot be assured.
- Agents to increase blood sugar (see below).

Source of Carbohydrate Outlined in Treatment Protocol Each item represents an option for a single dose of carbohydrate	**Diabetes Kits** Some VCH and Providence sites have pre-made kits as a ready source of carbohydrate	**Medications to increase Blood Sugar** Options if enteral carbohydrate cannot be administered	**Alternative Sources of Carbohydrates**
• 4 to 5 dextrose tablets • 175 to 250 mL apple juice* • 20 to 30 mL honey • 15 to 20 mL sugar dissolved in 120 mL of water • 6 to 8 Lifesavers® (1 lifesaver = 2.5g carbohydrate)	• 4 × 114 mL of apple juice OR 2 × 200 mL of apple juice • 6 × 5 mL of honey • 1 Boost® pudding (for snack after initial treatment of hypoglycemia) • 1 plastic spoon	• Glucagon for subcutaneous administration • Dextrose 50% Prefilled syringe for IV administration if available	• 175 mL to 250 mL of regular juice or soft drink (not diet)* If possible orange juice should be avoided in patients with renal dysfunction as it can increase serum potassium

*Making exact measurements of juice or soft drinks can be impractical. Patients should receive at least 175 mL of juice or regular soft drink (not diet) as a source of carbohydrate to treat hypoglycemia. To ensure adequate carbohydrate replacement, areas with access to 114 mL juice containers should provide two full containers for a total of 228 mL, while areas with access to 200 mL tetrapacks should provide one full tetrapack as a carbohydrate replacement option.

Enteral treatment of hypoglycemia for patients taking acarbose (Glucobay®) must consist of a monosaccharide such as dextrose tablets, glucose gel, honey or milk. Acarbose blocks the breakdown of complex sugars. The use of complex sugars such as table sugar, fruit juice, pop, or starches will not reverse hypoglycemia in patients taking acarbose.

Nurses who are likely to encounter hypoglycemia should ensure they have access to an appropriate means to treat hypoglycemia.

Protocol

1) Initial Management Algorithm

   Print version: Initial Management with Signs and Symptoms (Appendix A)

2) Follow-Up Instructions Algorithm

Expected Patient/Client/Resident Outcomes

- Hypoglycemia is promptly recognized and treated appropriately in a timely manner.
- Further episodes of hypoglycemia are prevented.
- Patients receive appropriate education about hypoglycemia.

Patient/Client/Resident Education

An episode of hypoglycemia in individuals who are not on blood glucose lowering agents for diabetes warrants follow-up with the individual's health care provider.

Individuals on medications which can cause hypoglycemia, including insulin and oral medications should be aware of symptoms and treatment of hypoglycemia, and strategies to prevent hypoglycemia.

Individuals with diabetes should:

- Carry a source of fast-acting glucose at all times.
- Carry their blood glucose monitoring equipment.
- Carry or wear identification, such as a wallet card or MedicAlert® bracelet stating they are a diabetic.
- Have a family member or support person who can administer glucagon if the individual is at risk for severe hypoglycemia.

Individuals with diabetes who drive should be aware:

- Of the BC requirements for drivers.
- **For individuals with class 1 to 4 licenses**: not to begin driving or stop driving if blood glucose is below 6 mmol/L and not to resume driving until blood glucose has risen above 6 mmol/L after eating food.
- **For individuals with class 5 to 8 licenses**: not to drive when blood glucose level is below 4 mmol/L, and not to begin driving when blood glucose level is between 4 and 5 mmol/L unless prophylactic carbohydrate treatment has been taken first. Diabetes Canada recommends not to begin driving until blood glucose is 5 mmol/L or above.
- To stop driving immediately and treat themselves if hypoglycemia is identified or suspected.
- Not to drive for at least 45 minutes after effective treatment for hypoglycemia.

- That episodes of severe hypoglycemia or hypoglycemia unawareness must be reported to RoadSafetyBC and the individual's physician.
- Diabetes Canada recommends that persons with diabetes treated with insulin secretagogues should measure their blood glucose immediately before driving and at least every 4 hours.

Documentation

- Document assessment, nursing diagnosis of the condition, interventions including NIAs, patient response, and follow-up actions in the health record.
- Document the NIA in the client health record as per NIA/NIP Policy (BCD-11-11-40001).
- Patient teaching.

Related Documents

- Policy: Nurse Independent Activities (NIA) and Nurse-Initiated Protocols (NIP) **(**BCD-11-11-40001**)**
- BCCNM Scope of Practice for Registered Nurses: Standards, Limits and Conditions
- BCCNM Scope of Practice for Licensed Practical Nurses: Standards, Limits and Conditions
- BCCNM Scope of Practice for Registered Psychiatric Nurses: Standards, Limits and Conditions
- Tube Feeding Guideline:
  - VCH: Tube Feeding: Care and Management
- Hypoglycemia PPO (Vancouver Residential Care only - PPO.552)
- Capillary Blood Glucose Monitoring using the Accu-Chek blood glucose meter (Inform II or Performa (BD-00-12-40009)

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Appendices

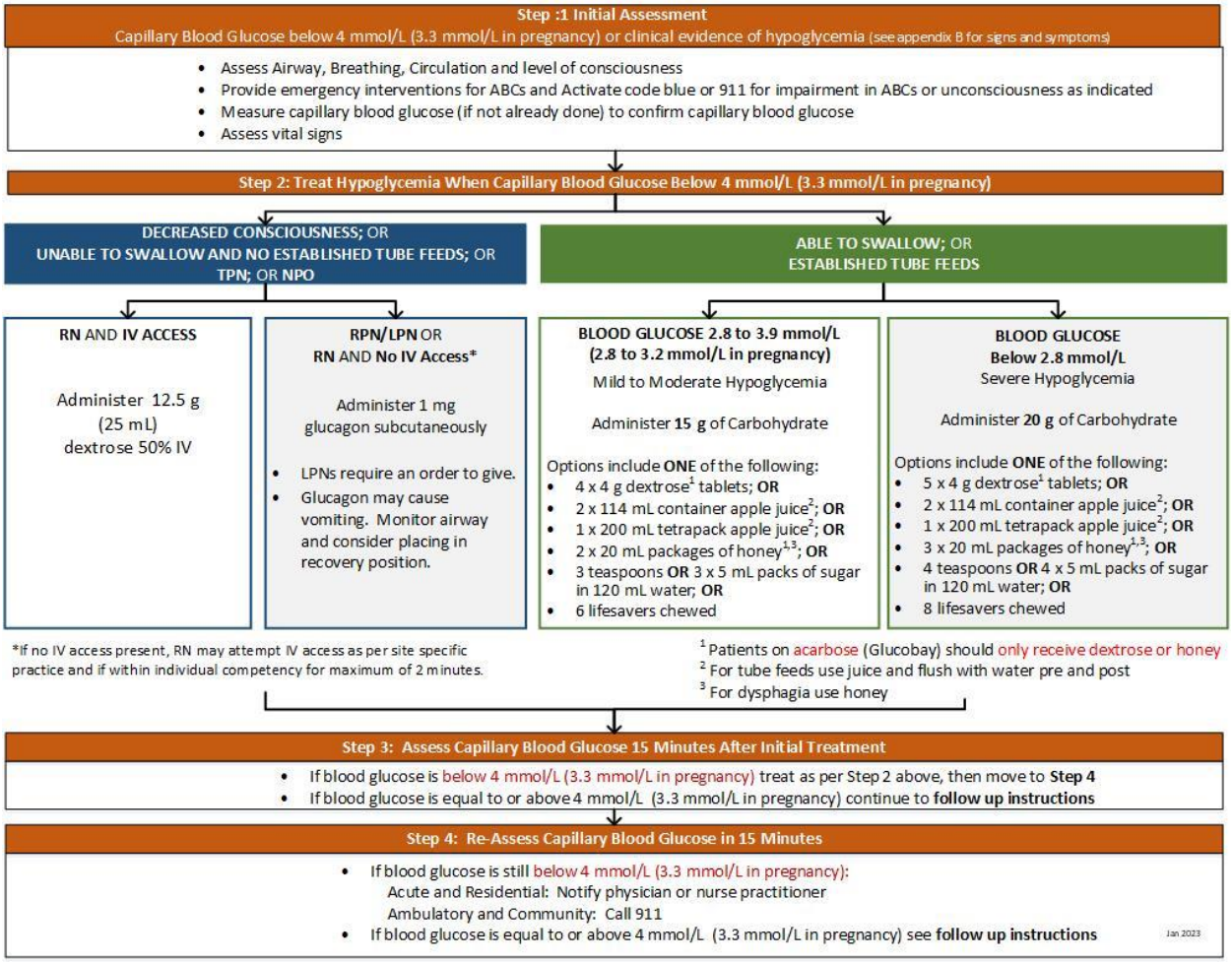
Appendix A: Initial Management of Hypoglycemia Algorithm with Signs and Symptoms

Hypoglycemia Symptoms Include

Mild Hypoglycemia
- Trembling
- Palpitations
- Sweating
- Anxiety
- Hunger
- Nausea/abdominal pain
- Tingling

Moderate Hypoglycemia
Mild symptoms plus:
- Difficulty concentrating
- Confusion
- Erratic behaviour
- Weakness
- Drowsiness
- Vision changes
- Difficulty speaking
- Headache
- Dizziness
- Combativeness

Severe Hypoglycemia
Moderate symptoms plus:
- Decreased consciousness
- Unconsciousness
- Seizures
- Inability to self treat hypoglycemia



Appendix B: Factors affecting Hypoglycemia and the Signs and Symptoms of Hypoglycemia

Hypoglycemic unawareness is poor symptom warning during hypoglycemia episode. Patients may present with neuroglycopenic symptoms (confusion) first or unconsciousness. Hypoglycemic unawareness occurs more commonly with patients who have a long duration of diabetes and occurs in 25% of all diabetics. Avoidance of hypoglycemia for several weeks may improve hypoglycemic unawareness.

Medications that alter symptoms of hypoglycemia

Beta blockers, such as propranolol, metoprolol and atenolol, block the effects of epinephrine that is produced during hypoglycemia. The neurogenic symptoms of hypoglycemia such as trembling, palpitations, sweating and anxiety may therefore be reduced in patients taking beta blockers and hypoglycemia may not be apparent until the emergence of neuroglycopenic symptoms.

Hypoglycemia in the Elderly

Hypoglycemia in the elderly population can often go unrecognized. The elderly may present with fewer observable clinical symptoms of hypoglycemia due to an aging associated decrease in glucagon and epinephrine release in response to hypoglycemia. Also, the elderly may not be able to communicate hypoglycemic symptoms due to underlying communication challenges or cognitive impairment.

Hepatic activity also decreases with age and may interfere with the metabolism of sulfonylurea agents, such as glyburide or insulin, which can result in an accumulation of this medication, increasing the likelihood of hypoglycemic episodes.

Hypoglycemia, therefore, can be more severe and prolonged in the elderly and can precipitate a cardiovascular event, cardiac dysrhythmias and stroke.

Elderly patients should have their blood glucose monitored closely and interventions should be initiated as required. Elderly patients should also be monitored for confusion, dizziness, and weakness that may be the only early manifestations of hypoglycemia. In residential care or when other underlying conditions and frailty increase the risk of developing hypoglycemia a medication review and review blood glucose parameters is recommended. Goals of care should be taken into consideration when determining level of monitoring and parameters for glycemic control.

Factors pre-disposing individuals to hypoglycemia:

- missed or delayed meals
- reduced food intake
- missed or delayed tube feeding
- exercise or change in activity level without insufficient carbohydrate intake or a reduction in anti-hyperglycemic medications
- recent medication adjustment

- increased age
- impaired kidney or liver function
- adrenal insufficiency
- gastrointestinal disease or illness
- alcohol consumption without sufficient carbohydrate intake (symptoms may persist 8 to 12 hours after the last drink)
- medications: (see section below 'Medications that may cause hypoglycemia')
- incorrect timing of insulin given

Predictors and risk factors for severe hypoglycemia are:

- medication/insulin changes
- alteration in activity level
- advanced age
- recent hospitalization with co-morbidities
- poly-pharmacy (5 or more medications)
- history of severe hypoglycemia
- low A1C
- hypoglycemia unawareness
- prior history of hypoglycemia

Medications that may cause hypoglycemia:

Any medication that stimulates insulin production or replaces endogenous insulin may cause hypoglycemia. Examples of medications that can cause hypoglycemia include but are not limited to:

- Insulins (ex. Rapid acting, Humulin N or NPH, glargine/Lantus®)
- Glyburide (Diabeta®)
- Gliclazide (Diamicron®, Diamicron MR®)
- Glimepiride (Amaryl®)
- Repaglinide (Gluconorm®)
- Nateglinide (Starlix®)
- Chlorpropamide
- Tolbutamide

(Double sided print version)

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