

Chapter 03 - Toxic Effects of Drugs

1. A nurse is planning patient teaching about a newly prescribed drug. What is a priority teaching point included by the nurse to improve compliance and safety?
- A) List of pharmacies where the drug can be obtained
 - B) Measures to alleviate any discomfort associated with adverse effects
 - C) The cost of the brand name drug compared with the generic form
 - D) Statistics related to Phase III testing for the prescribed drug

Ans: B

Feedback:

If a patient is aware of certain adverse effects and how to alleviate or decrease the discomfort, he or she is more likely to continue taking the medication. A list of pharmacies can be useful information but will not improve safety or compliance. Knowing the cost of the brand name versus the generic form could also be helpful to the patient. However, a substitution may not be allowable and the cost of a drug does not improve patient safety. Most patients are not concerned with the statistics related to drug testing and it would not improve compliance or safety even if the patient was interested in the information.

2. A patient presents at the clinic complaining of vaginal itching and a clear discharge. The patient reports to the nurse that she has been taking an oral antibiotic for 10 days. The nurse is aware that the patient is experiencing what?
- A) An adverse reaction from the antibiotic
 - B) A drug toxicity effect of the antibiotic
 - C) An overdose of the drug that is damaging to more than one body system
 - D) A superinfection caused by the antibiotic, which has destroyed normal flora

Ans: D

Feedback:

Superinfections often occur with antibiotic use because the drug kills normal bacterial flora. This is not a result of toxic levels of the antibiotic, but rather an effect of the medication that has killed normal flora, which it is designed to do. Vaginal itching and a clear discharge are not considered adverse effects of an antibiotic. An overdose of a drug that damages more than one body systems is considered

drug poisoning.

3. A 42-year-old male patient is brought to the emergency department by ambulance. The patient is in distress. The nurse suspects an anaphylactic reaction resulting from taking oral penicillin. What assessment findings are important in making this diagnosis?

- A) Blood pressure (BP): 186/100, difficulty breathing
- B) Hematocrit (Hct): 32%, decreased urine output
- C) Temperature: 102°, swollen joints
- D) Profuse sweating, Blood Pressure: 92/58

Ans: A

Feedback:

An anaphylactic reaction is an immune reaction that causes a massive release of histamine, which results in edema and swelling that can lead to respiratory distress and increased blood pressure. A decreased hematocrit and decreased urine output suggests a cytotoxic reaction. An increased temperature and swollen joints could suggest serum sickness. Profuse sweating and decreased blood pressure may indicate cardiac-related issues.

4. A patient with seasonal allergies is taking an antihistamine to relieve itchy, watery eyes, and a runny nose. When planning teaching for this patient, the nurse would include what teaching point?

- A) Advise the patient to limit fluid intake to dry out mucous membranes.
- B) Advise the patient to avoid driving or operating machinery.
- C) Advise the patient to report strange dreams or nightmares.
- D) Advise the patient to decrease dietary fat.

Ans: B

Feedback:

An adverse effect of antihistamines is drowsiness, so that injury to the patient or others can occur if driving or operating machinery. An increase in fluids would be indicated to help keep nasal membranes moist. It is common for dreams to occur when taking medication and it is not necessary to report them. Dietary fat should not interfere with the drug metabolism of antihistamines.

5. A nurse is providing teaching to a group of patients who are beginning drug therapy for acquired immunodeficiency syndrome (AIDS). What should be included in her instructions to the group?

- A) Take your medications as directed. Poisoning occurs with overdosage causing damage to more than one body system.
- B) Renal injury results from first-pass effect when the drug is excreted from the system.
- C) A blood dyscrasia due to drug therapy can be serious. Call us if your skin looks yellowish or you experience itching.
- D) Most drugs are metabolized in the liver and the first indication of damage is dark red papules, which should be reported immediately.

Ans: A

Feedback:

Poisoning resulting from overdosage can lead to the potential for fatal reactions when more than one body system is affected. Liver, not kidney, injury can be caused by the first-pass effect and can cause the skin to have a yellow appearance. Most drugs are metabolized in the liver but liver damage causes jaundice, manifested as a yellow tinge to the skin and sclera. Dark red papules appearing on limbs are characteristic of Stevens-Johnson syndrome, a potentially fatal erythema multiforme exudativum, which should be reported but is not due to liver damage.

6. The pharmacology instructor is talking to the nursing students about potassium-sparing diuretics and how they can lead to hyperkalemia, indicated by what assessment finding?
- A) Urine output of 1,500 mL/24 hours
 - B) Blood pressure of 98/60
 - C) Potassium level of 5.9 mEq/L
 - D) Calcium level of 11.4 mg/dL

Ans: C

Feedback:

The normal range of serum potassium for an adult is 3.5 to 5.0 mEq/L. A level higher than 5.0 mEq/L can indicate hyperkalemia. Normal urinary output is between 1,500 and 2,000 cc per day. Urinary output below 1,000 mL per day would include oliguria and would indicate hyperkalemia. A decrease in blood pressure and pulse can indicate hypokalemia. Hyperkalemia refers to an elevated potassium level and not an elevated calcium level.

7. An 80-year-old patient presents at the clinic for a follow-up appointment. She is taking a macrolide antibiotic and is experiencing tinnitus. The nurse is talking with family members about home care for the patient. What should the nurse include in her instructions regarding home care?

- A) Keep the patient in a prone position when in bed.
- B) Eliminate salt from the patient's diet.
- C) Provide protective measures to prevent falling or injury.
- D) Monitor exposure to sunlight.

Ans: C

Feedback:

Macrolide antibiotics can cause severe auditory nerve damage, which can cause dizziness, ringing in the ears (tinnitus), and loss of balance and hearing. The patient would be at high risk for injury due to falls. Usually a person who is dizzy is unable to lie flat and needs to recline with the head elevated. Salt and sunlight are not a component of this patient's presenting complaint.

8. Oral antidiabetic drugs can cause alterations in glucose metabolism. Patients who are taking these drugs would need to be observed for what?
- A) Increased urination
 - B) Deep Kussmaul's respirations
 - C) Thirst and hot or flushed skin
 - D) Confusion and lack of coordination

Ans: D

Feedback:

Antidiabetic medications decrease blood glucose levels. If levels fall too low, symptoms of hypoglycemia would include confusion and lack of coordination. Elevated blood glucose levels can occur when the patient does not take the medications. With inadequate dosage, hyperglycemia can occur, resulting in increased urination in an attempt to eliminate serum glucose, deep Kussmaul's respirations to reduce blood pH by eliminating carbon dioxide, thirst, and hot or flushed skin.

9. A patient is taking chloroquine (Aralen) for rheumatoid arthritis. What problem reported by the patient would the nurse suspect may be an adverse reaction of the medication?
- A) I have to urinate all the time.
 - B) Sometimes I have blurred vision.

- C) I have tingling in my arms and legs.
- D) Sometimes I feel like I am off balance.

Ans: B

Feedback:

Chloroquine (Aralen) can cause ocular toxicity with blurring of vision, color vision changes, corneal damage, and blindness. Increased urination, tingling, and numbness are signs of hyperkalemia and hypokalemia. Loss of balance can be caused by auditory damage due to drug toxicity.

10. A 68-year-old patient who must take antihistamines for severe allergies is planning a vacation to Mexico. The nurse will encourage the patient to do what?

- A) Avoid sightseeing during the hottest part of the day.
- B) Discontinue the antihistamines if he becomes extremely restless.
- C) Decrease the dosage of the drugs if he experiences excessive thirst.
- D) Continue taking the antihistamines even if he begins to hallucinate.

Ans: A

Feedback:

Antihistamines can cause anticholinergic effects, which would result in decreased sweating and place the patient at high risk for heat stroke. Avoiding the hottest part of the day will help prevent dehydration and heat prostration. Extreme restlessness could indicate Parkinson-like syndrome not usually associated with antihistamines. Excessive thirst is characteristic of hyperglycemia. Hallucinations are associated with drugs that affect neurologic functioning. Further, nurses should never tell patients to decrease or discontinue a drug unless the prescriber has instructed them to do so.

11. A 77-year-old man is brought to the clinic by his daughter for a routine follow-up appointment. The daughter tells the nurse that her father is only taking half the prescribed dosage of several of his medications. What effect would the nurse explain could result from this behavior?

- A) Increased risk of primary actions
- B) Dermatologic reaction
- C) Superinfection
- D) Reduced therapeutic effect

Ans: D

Feedback:

Taking too little of the medication would mean that therapeutic levels are not being reached and the drugs will be less effective at lower dosages. Primary actions are the result of overdose, which is not the case in this patient who is taking too little of the drug. Dermatologic reactions are not likely if the patient is taking too little of the drug unless the drug is treating a dermatologic problem, which is not indicated by the question. Superinfection would only result if the patient was taking an antibiotic, which is not indicated by the question.

12. A patient with Parkinson's disease is taking an anticholinergic drug to decrease the tremors and drooling caused by the disease process. The patient complains that he is having trouble voiding. The nurse would explain that this is what?

- A) A hypersensitive action of the drug
- B) A primary action of the drug
- C) An allergic action of the drug
- D) A secondary action of the drug

Ans: D

Feedback:

Sometimes the drug dosage can be adjusted so that the desired effect is achieved without producing undesired secondary reactions. But sometimes this is not possible, and the adverse effects are almost inevitable. In such cases, the patient needs to be informed that these effects may occur and counseled about ways to cope with the undesired effects. The situation described is not a hypersensitivity reaction that would indicate an allergic reaction, a primary reaction that would be excessive therapeutic response, or an allergic reaction to the drug.

13. The nurse is assessing a patient new to the clinic. The patient says she is allergic to penicillin. What would be the nurse's appropriate next action?

- A) Ascertain the exact nature of the patient's response to the drug.
- B) Document the patient is allergic to penicillin.
- C) Mark the patient's chart in red that she has a penicillin allergy.
- D) Continue to assess the patient for other allergies.

Ans: A

Feedback:

Ask additional questions of patients who state that they have a drug allergy to ascertain the exact nature of the response and whether it is a true drug allergy. Patients may confuse secondary actions of the drug with an allergy. Only after it was determined the action was truly an allergy would the nurse document the allergy, mark the patient's chart, and continue to assess for other allergies.

14. The pharmacology instructor is discussing the adrenergic drug ephedrine with the nursing students and lists an adverse reaction of this drug as what?
- A) Bronchoconstriction
 - B) Hyperglycemia
 - C) Cardiac arrhythmias
 - D) Severe constipation

Ans: B

Feedback:

Ephedrine (generic), a drug used as a bronchodilator to treat asthma and relieve nasal congestion, can break down stored glycogen and cause an elevation of blood glucose by its effects on the sympathetic nervous system. Ephedrine does not cause bronchoconstriction, cardiac arrhythmias, or severe constipation.

15. The nurse needs to consider teratogenic effects of medications when caring for what population of patients?
- A) Older adults
 - B) Patients with a history of cancer
 - C) Children
 - D) Young adult women

Ans: D

Feedback:

A teratogen is a drug that can harm the fetus or embryo so the nurse would consider the teratogenic

properties of medications when caring for woman of child-bearing age including adolescents and young adult women. Teratogens have no impact on older adults or children. Carcinogens are chemicals that cause cancer.

16. The nurse is caring for a patient receiving an antineoplastic medication who reports fever, chills, sore throat, weakness, and back pain. What type of adverse effect does the nurse suspect this patient is experiencing?
- A) Dermatologic reaction
 - B) Blood dyscrasia
 - C) Electrolyte imbalance
 - D) Superinfection

Ans: B

Feedback:

Symptoms of blood dyscrasias include fever, chills, sore throat, weakness, back pain, dark urine, decreased hematocrit (anemia), low platelet count (thrombocytopenia), low white blood cell count (leukopenia), and a reduction of all cellular elements of the complete blood count (pancytopenia). Dermatologic reactions would be reflected in skin alterations, electrolyte imbalances would result in differing symptoms depending on the electrolyte involved but would not cause chills and fever, and a superinfection could cause a fever but would not cause a sore throat, weakness, or back pain unless the infection involved those body parts.

17. The pharmacology instructor explains to students that adverse effects can be extensions of what?
- A) Primary action of a drug
 - B) Anaphylaxis
 - C) Secondary action of a drug
 - D) Anticholinergic responses to the drug

Ans: A

Feedback:

Primary action adverse effects are extensions of the therapeutic action and are usually the result of overdosage, essentially too much of the therapeutic effect. Anaphylaxis is not an extension of the therapeutic action of the drug but a histamine reaction to an allergen. Secondary actions of a drug are negative effects of the drug that occur even when the drug is in the therapeutic range. Anticholinergic responses occur in response to drugs that block the parasympathetic nervous system.

18. A student nurse asks her study group how to define a drug allergy. What would be the peer group's best response?
- A) A second effect of the body to a specific drug
 - B) The formation of antibodies to a drug protein causing an immune response when the person is next exposed to that drug.
 - C) A serum sickness caused by a reaction to a drug
 - D) Immediate systemic reaction to the drug when exposed to the drug the first time.

Ans: B

Feedback:

A drug allergy is the formation of antibodies to a drug or drug protein; causes an immune response when the person is next exposed to that drug. A drug allergy does not occur at the first exposure to a drug. A second action of a specific drug is an adverse response that the drug causes in addition to the therapeutic effect. Serum sickness is one type of allergic reaction but does not define allergic reaction. An immediate systemic reaction to a drug, usually not on first exposure, is an anaphylactic reaction.

19. The home health nurse is caring for an elderly patient with benign prostatic hypertrophy. An anticholinergic drug has been prescribed. What would be the nurse's priority teaching point for this patient?
- A) Urinary incontinence may develop.
 - B) Bladder hypertonia may develop.
 - C) An increased dosage may be required.
 - D) Empty the bladder before taking the drug.

Ans: D

Feedback:

A patient with an enlarged prostate who takes an anticholinergic drug may develop urinary retention or even bladder paralysis when the drug's effects block the urinary sphincters, so anticholinergic drugs are avoided whenever possible. However, if the medication is needed, the patient must be taught to empty the bladder before taking the drug. A reduced dosage also may be required to avoid potentially serious effects on the urinary system but this would not be a teaching point for the patient because the provider will make that decision. Hypotonia, not hypertonia, is more likely to occur. Urinary incontinence is not a likely effect in this case.

20. The Kardex record of a male patient who is prescribed antihistamines for treating an allergy reads as follows:

Age: 32; Profession: Carpenter; Lifestyle & diet: Lives alone, average smoker, nonalcoholic, no food preferences, practices yoga; Medical history: Suffers from hay fever, recent urinary tract infection that has been treated successfully. What information from the Kardex is likely to have the greatest implication in educating the patient about antihistamine administration?

- A) The patient's age
- B) The patient's smoking habit
- C) The patient's profession
- D) The patient's medical history

Ans: C

Feedback:

Most antihistamines cause drowsiness, so the nurse should advise the patient not to operate machinery or perform tasks that require alertness when taking antihistamines (e.g., climbing ladders, working on rooftops, standing on iron supports at the top of a building). Because the patient is not an older adult, his age has no implications on the therapy. Although encouraging the patient to make better lifestyle choices is an important part of the patient's plan of care, this information is not related to administration of antihistamines. There is nothing in the documented medical history that is significant to antihistamine use.

21. The nurse is caring for a patient who experienced a severe headache. When the prescribed number of over-the-counter pain relievers did not work the patient said she took double the dosage an hour later. The nurse recognizes this patient is at greatest risk for what?

- A) An allergic reaction
- B) Anaphylactic reaction
- C) Poisoning
- D) Sedative effects

Ans: C

Feedback:

This patient has taken an overdosage of the medication. Poisoning occurs when an overdose of a drug damages multiple body systems, leading to the potential for fatal reactions. Allergic and anaphylactic reactions can occur with any drug administration but this is not the patient's greatest risk. More

information about the exact type of medication would be needed to determine whether sedative effects are likely.

22. What classification of drug allergy would be described as an immune system reaction to injected proteins used to treat immune conditions?

- A) A cytotoxic reaction
- B) Serum sickness
- C) A delayed reaction
- D) An anaphylactic reaction

Ans: B

Feedback:

Serum sickness is an immune system reaction to certain medications, injected proteins used to treat immune conditions, or antiserum, the liquid part of blood that contains antibodies that help protect against infectious or poisonous substances. An allergic reaction can occur with any drug, not just those containing protein. Anaphylaxis is an acute, systemic, life-threatening allergic reaction. A cytotoxic reaction is one in which antibodies circulate and attack antigens on cell sites, causing death of that cell.

23. Why does the nurse need to be alert for any indication of an allergic reaction in patients?

- A) To obtain early warning of noncompliance in drug therapy
- B) To increase the effectiveness of a specific medication
- C) To maintain the patient's safety during drug therapy
- D) To reduce the risk of adverse effects during drug therapy

Ans: C

Feedback:

Being alert to adverse effects what to assess and how to intervene appropriately can increase the effectiveness of a drug regimen, provide for patient safety, and improve patient compliance. Indications of allergic reactions would not indicate noncompliance or improve effectiveness of a specific medication. Indications of allergic reaction would indicate an adverse effect and would not reduce the risk.

24. The nurse administers erythromycin, a drug that is known to irritate mucosa in the stomach lining. When the patient reports abdominal discomfort after taking the medication, the nurse would classify

this discomfort as what type of adverse effect?

- A) Primary action
- B) Secondary action
- C) Hypersensitivity reaction
- D) Allergic reaction

Ans: D

Feedback:

Secondary actions are those actions that occur as a result of taking a medication but do not fall under the category of therapeutic action and are often negative. This patient is experiencing a secondary action of erythromycin. Primary actions would be extensions of therapeutic action. Hypersensitivity reaction would be an excessive response to either the primary or secondary effects of a drug. An allergic reaction would be an immune response to the drug.

25. The nurse administers antipsychotic medications to the patient who has taken these same drugs for many years. What signs and symptoms would the nurse attribute to secondary actions of the drug? (Select all that apply.)

- A) Muscular tremors
- B) Drooling
- C) Changes in gait
- D) Yellow discoloration of skin and sclera
- E) Fine red rash on the trunk

Ans: A, B, D

Feedback:

Drugs that affect the dopamine levels in the brain (e.g., antipsychotic drugs), cause a syndrome that resembles Parkinson's disease including lack of activity, akinesia, muscular tremors, drooling, changes in gait, rigidity, extreme restlessness or jitters (akathisia), or spasms (dyskinesia). Yellow discoloration of the skin and sclera indicate jaundice and would suggest liver damage. A fine red rash on the trunk would be a dermatologic reaction unrelated to an antipsychotic agent's secondary effects.

26. The nurse is acting as the triage nurse in the emergency department when a 16-year-old boy is brought in by his friends. The patient is in respiratory distress, he is vomiting, and blood is noted in the vomitus.

He is somnolent and his electrocardiogram shows an arrhythmia. The boy's friends tell you he was taking a bunch of little green pills he got from the cupboard at his grandparent's house. The nurse suspects what?

- A) Overdose of sleeping pills
- B) Poisoning
- C) Anaphylactic shock
- D) Allergic reaction to Dyazide

Ans: B

Feedback:

Poisoning occurs when an overdose of a drug damages multiple body systems, leading to the potential for fatal reactions. The situation described does not indicate what was contained in the little green pills so it is not possible to say whether the drugs were sedatives or triamterene and hydrochlorothiazide (Dyazide). The symptoms do not indicate an anaphylactic reaction, which would not normally include bloody vomitus.

27. The patient with diabetes is also taking ephedrine to treat asthma that causes her blood sugar to increase. The patient asks the nurse, Why does this medication make my blood sugar go up? What is the nurse's best response?

- A) The active ingredient in ephedrine is mixed with sugar.
- B) Ephedrine is a placebo containing only sugar.
- C) Stored glycogen is broken down by ephedrine, which is causing higher blood sugar levels.
- D) Insulin is inactivated by ephedrine so it cannot work to control sugar levels.

Ans: C

Feedback:

Ephedrine breaks down stored glycogen, which then enters the bloodstream as glucose and causes an increase in serum blood glucose, or blood sugar, levels. Ephedrine is not mixed with sugar and is not a placebo. Ephedrine has no effect on insulin.

28. The nurse is writing a plan of care for a patient who is exhibiting Parkinson-like syndrome. What would be an appropriate intervention if, on assessing the patient, the nurse finds the patient is having difficulty swallowing?

- A) Thicken all liquids.
- B) Keep the patient NPO (not taking anything orally).
- C) Give only soft or pureed foods.
- D) Provide small, frequent meals.

Ans: D

Feedback:

Provide small, frequent meals if swallowing becomes difficult. Keeping the patient NPO would be inappropriate because these effects often result from medications that will be taken throughout the patient's life. Soft or pureed foods are often more difficult to swallow than more rigid foods. Thickening liquids would only be necessary if the dysphagia, or difficulty swallowing, continued to progress.

29. The post-anesthesia care unit nurse is serving a patient after a right knee arthroscopy. As the patient begins to wake up from anesthesia, the nurse assesses rigidity, involuntary movements, hyperthermia, and tachycardia. What would the nurse suspect is causing these effects?
- A) Neuroleptic malignant syndrome
 - B) Parkinson-like syndrome
 - C) Malignant tachycardia
 - D) Anaphylactic shock

Ans: A

Feedback:

Neuroleptic malignant syndrome is a generalized syndrome that includes extrapyramidal symptoms such as slowed reflexes, rigidity, involuntary movements; hyperthermia; autonomic disturbances (e.g., hypertension, fast heart rate); fever may be noted as well. This is most often seen after administering general anesthesia or drugs with central nervous system (CNS) effects. This syndrome was once known as malignant hyperthermia. These symptoms are not consistent with Parkinson-like syndrome or anaphylactic shock. Malignant tachycardia is a distracter.

30. A patient is admitted to the intensive care unit with hyperkalemia. The nurse caring for the patient knows that the most severe adverse effect of hyperkalemia is what?
- A) Renal failure

- B) Cardiac emergency
- C) Liver failure
- D) Respiratory distress

Ans: B

Feedback:

Monitor for cardiac irregularities because potassium is an important electrolyte in the action potential, needed for cell membrane stability. When potassium levels are too high, the cells of the heart become very irritable and rhythm disturbances can occur. Be prepared for a possible cardiac emergency. Hyperkalemia is often found in the patient with renal failure. Liver failure and respiratory distress are not generally caused by hyperkalemia.

31. The nurse administers an anticholinergic medication to the patient. When assessing this patient, what finding will the nurse consider a secondary effect of the drug?

- A) Nasal congestion
- B) Tachycardia
- C) Hyperthermia
- D) Profuse sweating

Ans: A

Feedback:

Anticholinergic secondary effects include dry mouth, altered taste perception, dysphagia, heartburn, constipation, bloating, paralytic ileus, urinary hesitancy and retention, impotence, blurred vision, cycloplegia, photophobia, headache, mental confusion, nasal congestion, palpitations, decreased sweating, and dry skin. Tachycardia, hyperthermia, and profuse sweating would not be expected findings or consistent with anticholinergic effects and would require further assessment.

32. Before administering a macrolide antibiotic the nurse would question the order for what patient?

- A) An 82-year-old woman with hypertension
- B) A 12-year-old boy with hearing loss
- C) A 30-year-old pregnant patient

D) A 51-year-old man after myocardial infarction

Ans: B

Feedback:

Macrolide antibiotics can cause severe auditory nerve damage so the nurse would question administration of this drug to the child with hearing loss because another antibiotic may be indicated to preserve remaining hearing. This drug is not contraindicated in older adults, although a lower dosage may be indicated. It may safely be given in pregnancy and after myocardial infarction.

33. What cardiac effect would the nurse be prepared to see in the patient with an extremely high potassium level?

A) Arrhythmia

B) Tachycardia

C) Sudden death

D) Bradycardia

Ans: A

Feedback:

Elevated potassium levels irritate cardiac cells and increase the likelihood of a cardiac arrhythmia. Tachycardia, sudden death, and bradycardia would be the result of an arrhythmia if they were to occur.

34. The nurse administers a loop diuretic to the patient. In addition to sodium and water, what other electrolyte would the nurse expect to be excreted in significant amounts?

A) Calcium

B) Magnesium

C) Potassium

D) Zinc

Ans: C

Feedback:

Loop diuretics increase excretion of sodium, water, and potassium most significantly. Although other electrolytes may be excreted, loss of magnesium, calcium, and zinc are usually not significant.

35. The nurse administers a medication to the patient that induces the secondary action of hypoglycemia. What organ will be most acutely impacted by inadequate circulating glucose?

- A) Brain
- B) Heart
- C) Lungs
- D) Skin

Ans: A

Feedback:

While all cells require glucose to function, the brain uses the greatest amount. As a result, hypoglycemia has the greatest impact on the brain, which explains why hypoglycemia has so many neurological signs and symptoms including fatigue, drowsiness, anxiety, headache, shaking, lack of coordination, numbness and tingling of the mouth, tongue, and /or lips; confusion, and in severe cases, seizures or coma may occur because the brain cannot function without adequate supplies of glucose.