

# M\_CDNPQ (600+ Questions) - Quiz Questions with Answers

1.

Mr. Clark is concerned about losing employment because of his inability to carry out all aspects of the job because of physical limitations. The best initial solution for the patient is likely to

apply for disability through Social Security.

ask for accommodations per the ADA.

look for other employment.

retrain for other types of employment.

***Explanation:***

*If a 40-year-old patient using hemodialysis is concerned about losing employment because of his inability to carry out all aspects of the job because of physical limitations, the best initial solution for the patient is likely to ask for accommodation per the ADA. It is better for patients to discuss their needs with employers to determine if the workload or procedures can be modified than to try to do work they are physically unable to do or to put themselves in a position to be fired.*

2.

Ms. Eggers has become increasingly withdrawn, answering in monosyllables and exhibiting a flat affect. The patient may benefit most from

change to hemodialysis.

**psychological counseling.**

social worker.

spiritual support.

***Explanation:***

*If an 18-year-old patient using APD (also known as CCPD) has become increasingly withdrawn, answering in monosyllables and exhibiting a flat affect, the patient may benefit most from psychological counseling, as these are indications of depression. Depression is common with dialysis patients, especially adolescents, because of the many physical, social, and emotional demands of maintaining the dialysis schedule and coping with complications. The primary concern as the patient becomes more withdrawn is nonadherence with the treatment regimen.*

3.

If Ms. Walker's PTH level is high, the most appropriate referral is likely to a(n)

internist.

nephrologist.

**endocrinologist.**

hematologist.

**Explanation:**

*If the patient's PTH level is high, the most appropriate referral is likely to an endocrinologist because it can be challenging to manage PTH levels and to accurately titrate medications, such as cinacalcet and vitamin D, in order to prevent further complications. If the patient has diabetes, the patient may already be under the care of an endocrinologist to manage the diabetes. Disease management for the patient with chronic kidney disease often requires a multidisciplinary effort.*

4.

**Patients with severe kidney disease, such as Ms. Walker, should avoid MRI with gadolinium contrast agent because it may result in**

anaphylaxis.

**nephrogenic systemic fibrosis.**

glomerulonephritis.

renal vascular stenosis.

**Explanation:**

*Patients with severe kidney disease should avoid MRI with gadolinium contrast agent because it may result in nephrogenic systemic fibrosis, which causes fibrosis of the skin as well as internal organs (similar to scleroderma) and for which there is no treatment. If a patient with kidney disease absolutely must have gadolinium contrast agent because of inability to tolerate other imaging procedures, then the lowest possible dose of gadolinium contrast should be used, and the patient may need to undergo temporary hemodialysis after the MRI to ensure rapid removal of the contrast agent.*

5.

Ms. Walker must be carefully observed for the MIA syndrome. The MIA syndrome commonly found in end-stage kidney disease refers to (1) malnutrition, (2) inflammation, and

anemia.

agranulocytosis.

angina.

**atherosclerosis.**

***Explanation:***

*The MIA syndrome commonly found in ESKD refers to (1) malnutrition, (2) inflammation, and (3) atherosclerosis. Malnutrition may result from inadequate diet (particularly protein), loss of appetite, GI bleeding, substance abuse, impaired metabolic processes, and factors associated with hemodialysis, such as inadequate Kt/V. Inflammation is related to increased oxidative stress, production of cytokines (interleukin 1 $\beta$ , interleukin 6, tumor necrosis factor), metabolic acidosis, and infection. Atherosclerosis is associated with a variety of factors, including hyperlipidemia and lipoprotein abnormalities.*

6.

Ms. Walker is at risk for which type of anemia because of decreased production of erythropoietin?

Microcytic, hypochromic.

Microcytic, normochromic.

**Normocytic, normochromic.**

Normocytic, hypochromic.

**Explanation:**

*Patients with chronic kidney disease often develop normocytic, normochromic anemia because production within the bone marrow is not impaired; however, as the erythropoietin level falls, it does not adequately stimulate production of red blood cells. Patients may also develop other types of anemia because of nutritional deficiencies, more rapid hemolysis of red blood cells, GI bleeding, blood sampling, and hemodialysis. Additionally, elevated parathyroid hormone levels may inhibit erythropoiesis and shorten survival of red blood cells.*

7.

Chronic kidney disease is staged according to the patient's

GFR.

serum creatinine.

BUN.

urine albumin.

**Explanation:**

*Chronic kidney disease is staged according to the patient's glomerular filtration rate (GFR). The GFR shows the quantity of glomerular filtrate produced each minute in the nephrons, based on clearance of specific substances. Different equations are used to estimate the GFR, but the NKF KDOQI guidelines recommend the Modification of Diet in Renal Disease (MDRD) Study equation, which is based on the serum creatinine and is normalized to a body surface area of  $1.73 \text{ m}^2$  so the equation does not require the patient's height and weight. The equation requires age and includes adjustments for females and for African Americans.*

8.

When teaching Ms. Walker about dietary restrictions, the patient should be advised to limit dietary phosphorus intake to

400 to 600 mg/d.

600 to 800 mg/d.

800 to 1000 mg/d.

1000 to 1200 mg/d.

***Explanation:***

*When teaching a patient with chronic kidney disease about dietary restrictions, the patient should be advised to limit dietary phosphorus intake to 800 to 1000 mg/d in order to maintain a normal phosphorus level of 2.5 to 4.5 mg/dL. Foods and fluids high in phosphorus include chocolate, dark colas, dairy products, organ meats, sardines, oysters, dried beans and peas, nuts, whole grains, bran, and seeds. Patients may be prescribed phosphate binders to absorb some of the phosphorus from foods.*

9.

According to KDOQI guidelines, patients such as Ms. Walker should restrict calcium intake to

1200 mg/d.

1500 mg/d.

1800 mg/d.

2000 mg/d.

**Explanation:**

*According to KDOQI guidelines, patients with chronic kidney disease should restrict calcium intake to 2000 mg/d, although some authorities recommend a lower limit of 1500 mg/d in order to keep the serum calcium level in the low to mid-normal range as a means of reducing the risk of vascular calcification. If the patient is taking calcium-based phosphorus binders, this calcium must be added to the dietary intake of calcium. Many foods high in calcium (such as dairy products) are also high in phosphorus and should be avoided.*

10.

**In a patient with chronic kidney disease, metabolic acidosis results in**

increased risk of cardiovascular disease.

**increased reabsorption of bone.**

increase risk of hemorrhage.

increased risk of vascular calcification.

**Explanation:**

*In a patient with chronic kidney disease, metabolic acidosis results in increased reabsorption of bone and may also increase the progression of kidney disease. The serum bicarbonate level should be maintained at 22 mmol/L or higher. Treatment to prevent metabolic acidosis is sodium bicarbonate at 0.5 to 1 mmol/kg per day in order to prevent reabsorption of bone. Metabolic acidosis becomes acute when the GFR decreases to about 20 mL/min because the kidneys can no longer filter acids adequately.*

11.

If all are available to a patient, the form of dialysis that provides the best control and the least inconvenience is generally

in-center conventional daytime hemodialysis.

home peritoneal dialysis.

home hemodialysis.

**in-center nocturnal hemodialysis.**

***Explanation:***

*If all are available to a patient, the form of dialysis that provides the best control and the least inconvenience is generally in-center nocturnal hemodialysis, which usually includes 3 nights of 7- to 9-hour treatments. This schedule increases the hours of dialysis and is done so at a time the patient is sleeping so it does not interfere with daily activities. While home hemodialysis may be equally effective, the patient and partner must be trained, and the home requires modifications to accommodate a safe water supply and the equipment needed for dialysis.*

12.

After a needle stick injury with exposure to hepatitis C–infected blood from a hemodialysis patient, post-exposure management includes

hepatitis C vaccination and ALT (alanine aminotransferase) test.

immunoglobulin antiviral agent.

immunomodulator.

**baseline testing for anti-hepatitis C virus and ALT test.**

***Explanation:***

*After a needle stick injury with exposure to hepatitis C–infected blood from a hemodialysis patient, post-exposure management should include baseline testing for anti-hepatitis C virus and ALT (alanine aminotransferase) test. ALT is a liver enzyme that increases with hepatitis C infection. Further testing may be done at 4 to 6 weeks and/or 4 to 6 months. There is no hepatitis C vaccination and no post-exposure prophylaxis, so those with exposure to hepatitis C should be monitored.*

13.

**If Ms. Eggers is using APD with a long day dwell, icodextrin could be used**

**as the “last bag option.”**

for the first nighttime cycle.

for all the nighttime cycles.

for no cycles because it is not appropriate for APD/CCPD.

***Explanation:***

*If a patient is using APD with long day dwell, icodextrin could be used as the “last bag option.” Many cyclers include the option to use a different dialysate for the last bag, which will be retained for an extended period of time. Icodextrin is only used for long dwells, so it is not appropriate for the nighttime cycles. Icodextrin induces ultrafiltration but is absorbed more*

slowly by the lymphatics than glucose solutions so there is no advantage to using it for short dwells.

14.

Weight gain between hemodialysis treatments should not exceed

1% of dry weight.

5% of dry weight.

8% of dry weight.

10% of dry weight.

**Explanation:**

Weight gain between hemodialysis treatments should not exceed 5% of dry weight. One kilogram (2.2 lb) of increased weight represents 1 L of fluid retention. Dry weight is the optimal post-dialysis weight after excess fluid has been removed. Because patients may gain weight because of the glucose in dialysate solutions or lose weight because of lost muscle mass or fat stores, it is important to reevaluate the patient's dry weight at least every 2 weeks to ensure adequate removal of excess fluids.

15.

If the usual dose of potassium in dialysate is 2 mM, what is the usual dose for a patient who is taking digitalis?

1 mM.

2 mM.

3 mM.

4 mM.

**Explanation:**

*The usual dose of potassium in dialysate is 2 mM. The dose may be increased to 3 mM if the patient experiences hypokalemia (<4.5 mM). Patients on digitalis also require a higher dose of 3 mM. If this results in higher potassium levels between dialysis treatments, then patients may require routine administration of sodium polystyrene sulfonate resin (Kayexalate). Using potassium doses of 1 mM routinely to control hypokalemia is contraindicated because of increased risk of cardiac arrest.*

16.

**Which of the following interventions may be indicated for a patient who routinely develops hypotension during hemodialysis?**

Increasing the ultrafiltration rate near the end of the session.

Administering hypotonic sodium solution IV.

**Utilizing sodium modeling.**

Administering midodrine (Orvaten).

**Explanation:**

*Sodium modeling may be indicated for a patient who routinely develops hypotension during hemodialysis. Sodium modeling usually involves a sodium level in the dialysate higher at the beginning of treatment than it is later in the treatment so that the patient's sodium level returns to normal at the end of treatment (although the levels may alternate or start low and end high). The higher the sodium content, the more fluid that is drawn from the tissues into the blood. However, sodium modeling makes some patients thirstier so that they drink more, and this in turn can result in increased blood pressure.*

17.

**If a patient on hemodialysis has a predialytic serum creatinine level that remains stable but a BUN level that is markedly increasing, the most likely cause is**

change in residual urinary function.

decreased dietary protein.

incorrect dialysate.

**increased dietary protein.**

***Explanation:***

*If a patient on hemodialysis has a predialytic serum creatinine level that remains stable but a BUN level that is markedly increasing, the most likely cause is increased dietary protein, so the nurse should review protein requirements with the patient and question the patient's diet. If both the serum creatinine and BUN level either increase or decrease similarly, then the nurse should suspect that a change has occurred in the patient's residual urine function or that the dialysis prescription needs modification.*

18.

**Patients are at increased risk of mortality when predialytic albumin levels fall to**

<2 g/dL.

<3 g/dL.

<4 g/dL.

<5 g/dL.

**Explanation:**

*Patients are at increased risk of mortality when predialytic albumin levels fall to less than 4 g/dL with increased risk of morbidity with levels less than 3 g/dL. Albumin levels should be monitored before dialysis sessions at least every 3 months because the albumin level is an indicator of a patient's overall nutritional status. If the level is below normal, the cause should be identified and corrected as soon as possible.*

19.

Approximately what percentage of the total blood volume circulates in the veins?

35% to 50%.

50% to 65%.

65% to 80%.

80% to 95%.

**Explanation:**

Approximately 65% to 80% of the total blood volume circulates in the veins; therefore, changes in venous capacity, such as changes that may occur in arterial resistance, can result in blood sequestering in the venous system as the veins distend. This can affect the volume of circulating blood and result in hypotension during hemodialysis. Exchange of gases and nutrients occurs only in the capillaries, which contain approximately 5% of the total blood volume.

20.

If a hemodialysis patient's temperature per tympanic membrane thermometer is 37 °C, in order to reduce incidence of intradialytic hypotension related to inadequate vasoconstriction, the temperature of the dialysate solution should ideally be set at

37.5 °C.

36.5 °C.

38 °C.

39 °C.

**Explanation:**

If a hemodialysis patient's temperature per tympanic membrane thermometer is 37 °C, in order to reduce incidence of intradialytic hypotension related to inadequate vasoconstriction, the temperature of the dialysate solution should ideally be set at 36.5 °C (0.5 °C below the patient's temperature). Dialysate that is too warm may result in vasodilation and reduced vascular resistance with resultant hypotension. Dialysate that is too cold may result in shivering and chills. In many centers, initial temperatures are set at 37 °C and then adjusted up or down, but this temperature may be too high for many patients.

21.

Patients should be advised to avoid eating during hemodialysis because ingestion of food may result in

hypotension.

hypertension.

nausea and vomiting.

shivering and chills.

**Explanation:**

*Patients should be advised to avoid eating during hemodialysis because ingestion of food may result in hypotension. Patients who tend to be hypotensive during hemodialysis should also avoid eating immediately before the treatment. Eating likely causes dilation of the splanchnic venous system and reduces the circulating volume of blood. This effect may continue for up to 2 hours after eating. Oral fluids should also be limited or avoided because it can take up to 10 hours for the fluids to be absorbed into the systemic circulation.*

22.

The physician has prescribed midodrine 10 mg for a patient to take 2 hours prior to hemodialysis. The most likely reason for this medication is to prevent intradialytic

hypotension.

hypertension.

muscle cramps.

nausea and vomiting.

**Explanation:**

*If a physician has prescribed midodrine 10 mg for a patient to take 2 hours prior to hemodialysis, the most likely reason for this medication is to prevent intradialytic hypotension resulting from inadequate vasoconstriction. Contraindications to this drug include supine hypertension and active cardiac ischemia (although the drug may be administered with coronary artery disease without ischemia). However, if a cooler dialysate solution is being used to prevent intradialytic hypotension, adding midodrine does not provide increased benefit.*

23.

Which of the following may result in muscle cramping during hemodialysis?

Hypervolemia.

**Hypovolemia.**

Low ultrafiltration rate.

High-sodium dialysis solution.

**Explanation:**

*Hypovolemia is a primary cause of muscle cramping during hemodialysis. Other common causes include hypotension, high ultrafiltration rate, and low-sodium dialysis solution. Muscle cramps occur when the muscles do not receive adequate perfusion because of vasoconstriction, so cramping frequently occurs with hypotension. Cramping is most likely to occur during the first month a patient receives hemodialysis. Both hypomagnesemia and hypocalcemia may precipitate muscle cramping.*

24.

Because Ms. Eggers has not been adhering to a healthy diet, the physician orders amino acid-based dialysate solution for nutritional supplementation. This solution should be used for

all dwells.

all nighttime dwells.

**one 4- to 6-hour dwell daily.**

one time only.

***Explanation:***

*If a patient has not been adhering to a healthy diet and the physician orders amino acid-based dialysate solution for nutritional supplementation, this solution should be used for one 4- to 6-hour dwell daily as the amino acids are absorbed during this period. If the amino acid dialysate solution (usually 1.1% essential and non-essential amino acids in a non-glucose solution) is used more than once daily, it may cause acidosis and increased serum urea.*

25.

Which of the following medications is contraindicated to prevent muscle cramps during hemodialysis?

Vitamin E.

Carnitine.

**Quinine.**

Oxazepam.

**Explanation:**

*Quinine, which was once used routinely for treatment of muscle cramps, is effective as a treatment to prevent muscle cramps during hemodialysis but no longer recommended because of multiple adverse effects, including thrombocytopenia, QT prolongation, and hypersensitivity reactions. Other medications that may help reduce cramping include carnitine supplements, oxazepam, and vitamin E. In some cases, increasing the sodium content of dialysate may reduce cramps, although care must be taken to avoid a sodium level so high it increases thirst.*

26.

**A patient on hemodialysis experiences persistent nausea during dialysis despite stable hemodynamics. The predialytic medication of choice to prevent nausea is**

prochlorperazine.

chlorpromazine.

**metoclopramide.**

ondansetron.

**Explanation:**

*If a patient on hemodialysis experiences persistent nausea during dialysis despite stable hemodynamics, the predialytic medication of choice to prevent nausea is metoclopramide. About 10% of patients on dialysis experience persistent nausea or vomiting, often related to hypotension or hypersensitivity reactions. If the nausea and vomiting are unrelated to hypotension, then metoclopramide 5 to 10 mg administered prior to dialysis may relieve symptoms. Some patients, especially those with diabetes, also develop gastroparesis, which may increase nausea and vomiting.*

27.

If a severely uremic patient is undergoing rapid hemodialysis and develops headache, restlessness, nausea, and vomiting, the initial response should be to

increase dialysate flow rate.

increase blood flow rate.

increase heparin dosage.

**decrease blood flow rate.**

***Explanation:***

*If a severely uremic patient is undergoing rapid hemodialysis and develops headache, restlessness, nausea, and vomiting, the initial response should be to decrease the blood flow rate, as these symptoms are indications of mild disequilibrium syndrome. Slowing the blood flow rate slows the removal of solutes and changes in pH. If symptoms worsen, or seizures or coma occurs, then dialysis should be stopped altogether. If patients are acutely uremic, overly aggressive dialysis should be avoided.*

28.

An elderly patient undergoing hemodialysis has expressed the wish to die but has never requested a DNR order. During treatment, the patient experiences a cardiac arrest. The correct initial response is to

allow the patient to die.

**carry out CPR and defibrillation.**

carry out CPR only.

call physician for guidance.

**Explanation:**

*If an elderly patient undergoing hemodialysis has expressed the wish to die but never requested a DNR order and experiences a cardiac arrest, the correct initial response is to carry out CPR and defibrillation. Patients often express the wish to die, and they have the right to refuse treatment and request no life-saving treatments. However, since the patient did not request a DNR order, nursing staff cannot assume that the patient would want no resuscitation efforts made.*

29.

**Marked eosinophilia in a patient undergoing hemodialysis puts the patient at increased risk of**

**type A (anaphylactic) dialyzer reaction.**

type B hypersensitivity dialyzer reaction.

hemolysis.

air embolism.

**Explanation:**

*Marked eosinophilia in a patient undergoing hemodialysis puts the patient at increased risk of type A (anaphylactic) dialyzer reaction. The reason for eosinophilia in patients with kidney disease is not clear, but there is some indication that eosinophilia is more associated with vascular disease, such as may occur with diabetes, than uremia. Studies have shown that*

*eosinophil counts drop during the first quarter hour of dialysis and then increase markedly at the end of the dialysis session.*

30.

If severe hemolysis occurs during hemodialysis, for which electrolyte imbalance is the patient most at risk?

Hyponatremia.

Hypernatremia.

Hypokalemia.

**Hyperkalemia.**

***Explanation:***

*If severe hemolysis occurs during hemodialysis, the patient is at risk for hyperkalemia because potassium is released when red blood cells are hemolyzed. Hyperkalemia can lead to cardiac abnormalities and cardiac arrest, so the blood pump should be stopped immediately so that blood with high levels of potassium is not reinfused into the patient. The patient may need treatment for both hyperkalemia as well as a drop in hematocrit because of the volume of blood that cannot be reinfused.*

31.

In order to reuse dialyzers, the dialysis center must follow standards developed by

FDA.

CMS.

**AAMI.**

OSHA.

***Explanation:***

*In order to reuse dialyzers, the dialysis center must follow standards developed by the Association for the Advancement of Medical Instrumentation (AAMI). CMS utilizes these standards as well under their conditions of coverage of ESRD facilities. Standards are set for both manual and automated reprocessing, but most reprocessing is done by companies that specialize in reprocessing because of the cost of equipment and the strict standards. All automated equipment must be approved by the FDA.*

32.

**Prior to using a reprocessed dialyzer, a recirculating rinse with normal saline should be completed with recirculating flow rate through the blood compartment and the dialysate compartment of at least**

200 mL/min for BFR and 200mL/min for DFR.

**200 mL/min for BFR and 500 mL/min for DFR.**

500 mL/min for BFR and 200 mL/min for DFR.

500 mL/min for BFR and 500mL/min for DFR.

***Explanation:***

Prior to using a reprocessed dialyzer, a recirculating rinse with normal saline should be completed with recirculating flow rate through the blood compartment (blood flow rate [BFR]) of 200 mL/min and recirculating flow rate of 500 mL/min through the dialysate compartment (dialysis flow rate [DFR]). The rinse is carried out for a period of 15 to 30 minutes, being careful to avoid introduction of air into the arterial circuit as air may interfere with the removal of germicide. Test strips are used to ensure all germicide is cleared from the dialyzer.

33.

The primary complication from recurrent pyelonephritis is

scarring.

sepsis.

pericarditis.

hypertension.

**Explanation:**

The primary complication from recurrent pyelonephritis is scarring, which can lead to reduced kidney function and chronic kidney failure. Recurrent pyelonephritis is more common in children than adults and is often associated with vesicoureteral reflux (VUR), which may be undetected before damage occurs. Females are more likely to contract pyelonephritis than males, and pregnancy may cause the kidney damage to progress. Hypertension also has a negative effect on the kidneys, causing further deterioration of function.

34.

When percussing Ms. Park's right kidney area using indirect fist percussion, the patient has pain when the nurse delivers a firm blow. This likely indicates

normal finding.

renal cell cancer.

congenital malformation of the kidney.

**infection or polycystic kidney disease.**

***Explanation:***

*If, when percussing the right kidney area of a patient using indirect fist percussion, the patient has pain when the nurse delivers a firm blow, this likely indicates kidney infection or polycystic kidney disease, as this procedure should not elicit pain. Since the patient did experience pain, then further tests, such as laboratory tests and imaging, are indicated to determine the cause. The nurse should also palpate the kidneys to determine if they are enlarged, although the left kidney is usually not palpable because of the position of the spleen.*

35.

Which of the following is a water-soluble vitamin that should be supplemented for a patient on peritoneal dialysis?

Vitamin D.

Vitamin A.

Vitamin K.

**Vitamin B9.**

**Explanation:**

*Because the patient loses water-soluble vitamins during dialysis, these vitamins should be replaced with supplementation. Folate is especially lost, so patients should take vitamin B9 (folic acid is the synthetic form) as well as other B vitamins, including vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B7 (biotin), vitamin B5 (pantothenic acid), and vitamin B12 (cobalamin). Vitamins A, D, and K are fat-soluble vitamins. Vitamins A and K supplementation should be avoided.*

36.

**When discussing disease progression with Mr. Chan, kidney transplantation should be initially considered**

if he has repeated access failure.

after a trial period of dialysis.

**at stage 4 of chronic kidney disease.**

at stage 5 of chronic kidney disease.

**Explanation:**

*When discussing disease progression with a patient with chronic kidney disease, kidney transplantation should be initially considered at stage 4 of chronic kidney disease because this is the time when the patient should be preparing for dialysis or transplantation and making decisions about the best option. Preemptive transplantation (done without beginning dialysis) offers superior outcomes to transplantation done later, although not all patients are candidates for transplantation, and kidneys may not always be readily available.*

37.

As Mr. Chan nears end-stage kidney disease, he decides that he wants to be put on the list for a kidney transplant. Mr. Chan is evaluated by a psychiatrist with the Mini-Mental State Examination to determine if he is a good candidate for transplantation. Which of the following scores is within normal range?

≥10.

≥15.

≥24.

≥40.

**Explanation:**

*The Mini-Mental State Examination is often used as a baseline evaluation of mental status for patients who are candidates for transplant as well as donor candidates. A score of 24 or higher is within normal limits. The Mini-Mental State Examination assesses orientation (time, date, place), registration (repeating names of common objects), attention (spelling "world" backward) and calculation, recall (report common objects named earlier), and language (repeating words, following directions), with maximum scores for each task ranging from 1 to 5.*

38.

Which of the following pretransplant screenings is recommended for adult recipients of a donor kidney?

Urinalysis.

Varicella-zoster antibody.

West Nile virus.

*Trypanosoma cruzi.*

**Explanation:**

*Pretransplant screening for varicella-zoster antibody is recommended for adult recipients of a donor kidney. All recipients should also be screened for a history of or exposure to tuberculosis. Patients should have their immunization history reviewed and receive recommended immunizations prior to transplantation if they are not up to date in order to prevent post-transplant infection. Recommended immunizations include influenza, hepatitis A and B, tetanus, polio, pneumonia, and meningitis.*

39.

**A casual acquaintance of Mr. Chan has volunteered to donate a kidney to him. When considering whether a potential unrelated kidney donor is acceptable, which of the following should raise concerns?**

**The potential donor has made repeated reports about donating on multiple social media sites.**

The potential donor asks many questions about what to expect in the postoperative period.

The potential donor is independently wealthy and is not employed.

The potential donor reports a transient episode of depression as an adolescent.

**Explanation:**

*When considering whether a potential unrelated kidney donor is acceptable, the fact that the potential donor has made repeated reports about donating on multiple social media sites should be cause for concern because people who want to donate to gain publicity may have unrealistic expectations of the recipient and others. While one early episode of depression may*

*not eliminate a person from consideration, serious or ongoing psychiatric problems may. Donors should have the cognitive ability to completely understand what is entailed in donation, and there should be no suggestion of coercion.*

40.

Mr. Chan undergoes kidney transplantation, but develops a small bladder leak in the immediate postoperative period. Initial treatment usually includes

surgical repair of leak.

**Foley catheter and decompression.**

cystectomy.

instillation of antibiotic solution.

***Explanation:***

*If following kidney transplantation a patient develops a small bladder leak, initial treatment usually includes insertion of a Foley catheter into the bladder and decompression to allow the lesion time to heal spontaneously. Large leaks or those that are located more proximal to the transplanted kidney may require surgical repair. Leaks may occur throughout the urinary tract after transplantation. The patient may have abdominal pain or exhibit edema of the perineal area as well as urinary leakage.*

41.

If Mr. Chan exhibits signs of depression post kidney transplantation, the medicine of choice is usually

**SSRI.**

MAO inhibitor.

tricyclic antidepressant.

St. John's wort.

**Explanation:**

*If a patient exhibits signs of depression post kidney transplantation, the medicine of choice is usually an SSRI. SSRIs are usually fairly well tolerated by kidney transplant patients and have fewer adverse effects compared with other choices, such as MAO inhibitors or TCAs. St. John's wort interacts with cyclosporine, an immunosuppressive drug usually administered after transplantation. Patients must be monitored very carefully. Some studies show that sertraline may affect cyclosporine concentration, although other SSRIs (such as citalopram, paroxetine, and fluoxetine) do not appear to affect cyclosporine.*

42.

**For the immediate postoperative period following kidney transplantation, Mr. Chan should be advised to have daily protein intake of**

0.8 g/kg/d.

0.8 to 1 g/kg/d.

1 to 1.2 g/kg/d.

1.3 to 1.5 g/kg/d.

**Explanation:**

*For the immediate postoperative period following kidney transplantation, patients should be advised to have a fairly high daily protein in order to promote healing, usually 1.3 to 1.5 g/kg per day. Some patients, such as those who develop infection or fever, may be advised to increase protein intake further, up to 2 g/kg. With increased protein, patients should have intake of 30 to 35 calories/kg to avoid a negative nitrogen balance.*

43.

The most common infection following kidney transplantation is

abdominal.

pulmonary (pneumonia).

**urinary tract.**

cardiovascular (endocarditis).

***Explanation:***

*The most common infection following kidney transplantation is urinary tract infections (45% to 47%), which impair the function of the donor kidney or lead to loss of the kidney, and, in some cases, death. Infection is especially dangerous if it occurs in the first 6 months after transplant. Bacteriuria and UTI may be asymptomatic because of immunosuppression. Administration of antibiotic prophylaxis and early removal of urethral catheters have helped to reduce infections, but rates remain high.*

44.

When OKT3 treatment is used for a severe acute kidney rejection episode, premedication usually begins with

cyclosporine.

azathioprine.

**methylprednisolone.**

fexofenadine.

***Explanation:***

*When OKT3 treatment is used for a severe acute kidney rejection episode, premedication usually begins with IV methylprednisolone (250 to 500 mg), which is administered about an hour before administration of OKT3 and again 30 minutes after. Diphenhydramine (50 mg IV) is also usually administered before the OKT3 each day, as well as acetaminophen (650 mg) 30 minutes before. Cyclosporine is discontinued but azathioprine may be continued (25 mg/d). OKT3 is generally administered at 5 mg/d for 2 weeks.*

45.

When assessing an 80-year-old patient for kidney function, the nurse expects age-related changes to result in

**decreased kidney size, decreased creatinine clearance, and increased BUN and serum creatinine.**

increased kidney size, increased creatinine clearance, and decreased BUN and serum creatinine.

decreased kidney size, decreased creatinine clearance, BUN, and serum creatinine.

decreased kidney size, increased creatinine clearance, and increased BUN and serum creatinine.

**Explanation:**

*When assessing an 80-year-old patient for kidney function, the nurse expects age-related changes to result in decreased kidney size, decreased creatinine clearance, and increased BUN and serum creatinine. The kidney becomes smaller in size and weight and up to half of the glomeruli no longer function. Because of fewer functioning nephrons and decreased function in the loop of Henle and tubules, the creatinine clearance decreases and the BUN and serum creatinine increase. Urine is less concentrated because of kidneys concentrate less efficiently.*

46.

If Ms. Eggers receives calcium carbonate as a phosphate binder, how much calcium is usually contained in the PD solution used for dialysis?

2 to 2.5 mEq/L.

3 mEq/L.

3.5 mEq/L.

4 mEq/L.

**Explanation:**

*If a patient on peritoneal dialysis receives calcium carbonate as a phosphate binder, 2 to 2.5 mEq/L of calcium is usually contained in the PD solution used for dialysis rather than 3.5 mEq/L, which was more commonly used with other phosphate binders. Lowering the concentration helps to prevent hypercalcemia that may result from oral intake of calcium and vitamin D. The lower calcium concentration may also help prevent adynamic bone disease but may result in higher levels of PTH.*

47.

Stage 3 chronic kidney disease is characterized by

eGFR 15 to 29 mL/min.

eGFR 30 to 59 mL/min.

eGFR 60 to 89 mL/min.

eGFR  $\geq$ 90 mL/min.

**Explanation:**

Stage 3 chronic kidney disease is characterized by an eGFR of 30 to 59 mL/min/1.73 m<sup>2</sup>. Stage 3 is common in older adults with other disorders, such as cardiovascular disease, and patients are at increased risk of cardiovascular events, such as myocardial infarction or stroke. At this stage, creatinine is usually within normal limits. Many patients will stabilize at stage 3, but some will progress to ESKD. Indications that kidney disease is progressing include decreasing eGFR, proteinuria, and hematuria.

48.

In elderly patients with kidney failure, the first signs of various types of infection may be

rash and somnolence.

fever and confusion.

fever and incontinence.

confusion and incontinence.

**Explanation:**

*In elderly patients with kidney failure, the first signs of various types of infection may be confusion and incontinence. Urinary infections, especially, are associated with sudden onset of confusion in older adults. Dehydration, which is also common in older adults with infection and fever, may also lead to confusion. The overall confusion associated with infection makes older adults more prone to incontinence, especially when the infection involves the urinary tract.*

49.

For elderly patients with chronic kidney disease but who do not exhibit marked fluid overload, the need for dialysis may be delayed up to 1 year with

protein restriction and ketoacids.

fluid and protein restrictions.

protein restrictions and loop diuretics.

fluid restriction and ketoacids.

**Explanation:**

*For elderly patients with chronic kidney disease but who do not exhibit marked fluid overload, the need for dialysis may be delayed up to 1 year with protein restriction (very low protein diet with 0.3 to 0.6 g/kg/d) and intake of ketoacids as well as essential amino acids to compensate for the low protein diet. Studies have shown that patients have no long-term adverse effects of this regimen. Patients must be monitored carefully to ensure adherence to the dietary restrictions.*

50.

With chronic kidney failure, specific gravity usually ranges from

1.007 to 1.01.

1.01 to 1.015.

1.015 to 1.02.

1.02 to 1.025.

***Explanation:***

*With chronic renal failure, specific gravity usually ranges from 1.007 to 1.01 with urine isotonic to plasma at all times (regardless of fluid intake or time of day) because the nephrons have hypertrophied in an effort to compensate for the kidney damage, but they are unable to adequately filter waste products. With normal kidney function, specific gravity is usually about 1.015 but may vary widely from 1.001 to 1.04, depending on intake of fluid and other substances, such as sodium and protein.*

51.

In a patient with chronic kidney failure and impaired cognition because of increased BUN and creatinine levels, the priority for patient education should be

dietary and fluid restrictions.

hygiene needs.

pathophysiology of disease.

exercise needs.

**Explanation:**

*In a patient with chronic kidney failure and impaired cognition because of increased BUN and creatinine levels, the priority for patient education should be dietary and fluid restrictions in order to help control BUN and creatinine levels. These needs take priority because they are related to the patient's physiological condition. Hygiene and exercise needs may also be addressed. Because the patient has mildly impaired cognition, detailed information about the pathophysiology of the disease may be difficult to comprehend.*

52.

**If a nondialytic patient with chronic kidney disease requires treatment for iron deficiency anemia, KDIGO recommends as initial therapy**

IV low-molecular-weight iron.

**oral iron supplements.**

IV high-molecular-weight iron

increased dietary iron.

**Explanation:**

*If a nondialytic patient with chronic kidney disease requires treatment for iron deficiency anemia, KDIGO recommends oral iron supplements as initial therapy. IV iron infusions may be necessary if response is not adequate after 1 to 3 months of oral supplements. If IV infusion is indicated, then low-molecular-weight iron (dextrans, ferrous gluconate, iron sucrose, or ferumoxytol) is recommended over high-molecular-weight iron, which has a higher risk of precipitating an anaphylactic reaction.*

53.

If the goal is to use a simple display of data to show patients and staff progress in decreasing infections in patients with kidney disease each month over the past year, the best display type is likely a

bar graph.

**line graph.**

pie graph.

histogram.

***Explanation:***

*If the goal is to utilize a simple display of data to show patients and staff progress in decreasing infections in patients with kidney disease each month over the past year, the best display type is likely a line graph. The line graph is uncluttered, easily understood by most people, and requires little or no understanding of statistical measures. It may be presented as a simple one line run chart or as a control chart, which includes goal or median lines showing upper and lower parameters.*

54.

If a patient with chronic kidney failure develops pyelonephritis, the antibiotic of choice is generally a(n)

cephalosporin.

aminoglycoside.

penicillin.

**fluoroquinolone.**

**Explanation:**

*If a patient with chronic kidney failure develops pyelonephritis, the antibiotic of choice is generally a fluoroquinolone, such as ciprofloxacin. Ciprofloxacin has good penetration of tissue so the concentration of antibiotic is adequate. Cephalosporins may be used as the second-line drug. Aminoglycosides increase risk of nephrotoxicity and are generally avoided. Patients with chronic kidney failure are at increased risk of adverse effects from penicillins.*

55.

**With the renin-angiotensin-aldosterone system (RAAS), in response to decreased renal blood flow and decreased pressure in the glomerulus,**

renin is decreased.

**renin is released.**

aldosterone is released.

Na reabsorption decreases.

**Explanation:**

*With the renin-angiotensin-aldosterone system (RAAS), in response to decreased renal blood flow and decreased pressure in the glomerulus, renin is released and enters general circulation where it is converted to angiotensin I and then angiotensin II, which caused vasoconstriction and increased vascular resistance, which in turn decreases renin again. Angiotensin II also causes aldosterone release, which increases sodium and fluid reabsorption, increasing renal*

blood flow and blood volume, increasing pressure in the glomerulus. This then also decreases renin.

56.

Nephrotic syndrome is characterized by

marked proteinuria.

hematuria.

hypertension.

dehydration.

**Explanation:**

*Nephrotic syndrome is characterized by marked proteinuria (greater than 3.5 g/day) because of increased glomerulus permeability. The proteinuria is mirrored by resultant hypoalbuminemia, and the albumin is filtered out of the blood and excreted. Other characteristics include diffuse pitting edema (about the eyes and in dependent areas) and hyperlipidemia. Treatment usually includes diuretics, ACE inhibitors, and lipid-lowering agents.*

57.

Ms. Eggers tests positive for nasal *Staphylococcus aureus*. Which of the following may be indicated to prevent exit-site infections for patients who are colonized with *Staphylococcus aureus* while undergoing peritoneal dialysis?

Application of hydrogen peroxide to exit site.

Application of transparent dressing over exit site.

**Application of mupirocin cream to exit site.**

Application of clindamycin gel to exit site.

***Explanation:***

*Application of mupirocin cream or ointment to the exit site may be indicated to prevent exit-site infections for patients who are colonized with Staphylococcus aureus while undergoing peritoneal dialysis. However, it is important to ensure that mupirocin is compatible with the catheter material before application, and resistance can occur with prolonged use. Exit-site care should be carried out daily, including cleansing the site with an antiseptic, such as 1% chlorhexidine gluconate.*

58.

If 200 patients are exposed to an airborne virus carried by a staff member over a 1-week period and 40 patients are infected, the attack rate is

5%.

10%.

**20%.**

40%.

***Explanation:***

*If 200 patients are exposed to an airborne virus carried by a staff member over a 1-week period and 40 patients are infected, the attack rate is 20%. The attack rate shows the proportion of at-risk patients who are exposed and become infected. Attack rates are always calculated as a percentage based on the number of cases per 100. Since there are 20 patients per 100, the calculation is  $20/100 \times 100 = 20\%$ .*

59.

**If an infection involves a propagating source, the nurse would expect the infection to spread**

from a common source, such as the water supply.

**from person to person.**

through airborne means only.

through contact only.

***Explanation:***

*If an infection involves a propagating source, the nurse would expect the infection to spread from person to person, either through airborne means or through direct contact. With a propagating source, there may be waves of infections as the first infected group infects a subsequent group, so the infection keeps spreading. With a common source, there is one source of infection, such as a water supply, that can directly infect multiple persons. A common source of infection is easier to contain than a propagating source.*

60.

**If 4 patients in a community of 2000 people are infected with the MRSA, this would be classified as a(n)**

epidemic.

pandemic.

outbreak.

cluster.

***Explanation:***

*If 4 patients in a community of 2000 people were infected with MRSA, this would be classified as a cluster because of the small number. If the number grows beyond what is expected for the population, then it would be classified as an outbreak or epidemic, with the terms often used interchangeably, but the term epidemic sometimes refers to a larger spread of the disease. A pandemic occurs when the epidemic spreads very widely, sometimes to multiple countries.*

61.

The risk of disease occurring in a population (such as the number of people with kidney disease who develop a urinary tract infection) over a specified period of time (such as 1 year) is the

incidence rate.

prevalence rate.

incidence density.

attack rate.

**Explanation:**

The risk of disease occurring in a population (such as the number of people with kidney failure who develop a urinary tract infection) over a specified period of time (such as 1 year) is the incidence rate. For example, if there are 500 patients with kidney failure and 42 develop urinary tract infections over the course of 1 year, the numerator is the number of infections and the denominator the total number of patients:

$$42/500 = 0.084 \times 100 = 8.4\% \text{ incidence rate.}$$

62.

Which of the following factors may produce a false-negative finding in a urine dipstick for protein?

Specific gravity of <1.01.

Specific gravity of >1.03.

Alkaline urine.

Presence of blood.

**Explanation:**

A specific gravity of less than 1.01 may produce a false-negative finding in a urine dipstick for protein because the urine is dilute. Other factors that may result in a false negative are urine that has a high sodium content or is acidic, and the presence of non-albumin proteinuria because the dipsticks detect albumin. Other factors may result in a false positive. These include the presence of blood or semen in the sample, urine that is alkaline, contamination of the sample with detergents, disinfectants, or radiocontrast agents, as well as a specific gravity of greater than 1.03.

63.

Which of the following may result in ischemic injury to the kidneys rather than nephrotoxic injury?

Radiopaque contrast dye.

Amphetamines.

**Anaphylaxis.**

Tumor lysis syndrome.

***Explanation:***

*Anaphylaxis may result in ischemic injury to the kidneys. With ischemia, the inadequate perfusion results in impaired tubular endothelial function and damage to tubular cells as well as cast formation. Other causes of ischemic injury include hemorrhage, volume depletion, prolonged hypotension, shock (cardiogenic, hypovolemic, and septic), and sepsis. Nephrotoxic causes of kidney injury include endogenous toxins from rhabdomyolysis and tumor lysis syndrome, antimicrobials, immunosuppressants, chemotherapeutics, illicit drugs (heroin, PCP, and amphetamines), and NSAIDs.*

64.

Following treatment for leukemia, a patient develops tumor lysis syndrome. Which of the following responses to cell lysis may result in urinary obstruction and decreased glomerular filtration rates, leading to renal insufficiency and acute kidney failure?

Hyperkalemia.

Hypophosphatemia.

**Hyperuricemia.**

Hypercalcemia.

**Explanation:**

*If, following treatment for leukemia, a patient develops tumor lysis syndrome, cell lysis results in hyperuricemia, which in turn causes urinary obstruction because the increased levels of uric acid result in metabolic acidosis and crystallization of the uric acid in the kidneys. The kidneys are unable to adequately filter the crystals and the GFR decreases, resulting in renal insufficiency and acute kidney failure. Calcium and phosphorus ions bind and create calcium phosphate salts, which then precipitate in the renal tubules, increasing renal insufficiency.*

65.

Which electrolyte imbalances are likely to occur with tumor lysis syndrome?

Hyperkalemia, hyperphosphatemia, and hypocalcemia.

Hypokalemia, hypophosphatemia, and hypercalcemia.

Hyperkalemia, hypophosphatemia, and hypocalcemia.

Hyperkalemia, hyperphosphatemia, and hypercalcemia.

**Explanation:**

*The electrolyte imbalances that are likely to occur with tumor lysis syndrome are:*

*Hyperkalemia: intracellular K is rapidly expelled into the systemic circulation, resulting in muscular and cardiac abnormalities.*

*Hyperphosphatemia: intracellular  $PO_4$  is released, resulting in muscle cramping tetany, cardiac dysrhythmias, and seizures.*

*Hypocalcemia: calcium levels fall as calcium and phosphorus bind, forming calcium phosphate, resulting in muscle cramping, tetany, cardiac dysrhythmias, and renal failure from acute nephrocalcinosis.*

66.

According to the Renal Physicians Association's clinical practice guidelines to determine if dialysis should be avoided or stopped in patients with end-stage kidney disease, one requirement is

family consensus.

malignant disease.

life expectancy <1 year.

**shared decision-making.**

***Explanation:***

*According to the Renal Physicians Association's clinical practice guidelines to determine if dialysis should be avoided or stopped in patients with end-stage kidney disease, one requirement is shared decision making. Patients (and family) should be fully informed about the disease and should have advance planning. Forgoing dialysis may be considered for patients with poor prognosis or with marked risk factors. A process should be in place for conflict resolution in case of disagreement, and palliative services should be available.*

67.

Which of the following is an example of a post-renal cause of acute kidney injury?

Rhabdomyolysis.

Prostatic hypertrophy.

Acute glomerulonephritis.

Aepsis.

***Explanation:***

*Prostatic hypertrophy is an example of a post-renal cause of acute kidney injury, which is an obstruction in the urinary tract below the kidney, such as in the ureter or the bladder neck, making the urine back up into the kidney. Prerenal causes of acute kidney injury are those conditions that decrease perfusion of the kidney before the arterial blood reaches the kidney. Intrarenal causes are those that produce injury through ischemia or toxins inside the kidney at the nephrons.*

68.

Ms. Johnson has severe muscle pain and stiffness. Medications include calcitriol 0.25 mg daily, atorvastatin 20 mg daily, insulin glargine 26 units twice daily, regular insulin per sliding scale as needed before meals and at bedtimes, and ferrous sulfate 325 mg twice daily. Which of these medications is most likely the cause of the muscle pain?

Atorvastatin.

Calcitriol.

Ferrous sulfate.

Insulin glargine.

***Explanation:***

*If a patient on hemodialysis has severe muscle pain and stiffness, the cause is most likely atorvastatin, as statins are associated with myopathy. The extent of myopathy may vary widely and symptoms usually recede within 2 months of stopping the medication; some patients may develop rhabdomyolysis and chronic persistent muscle damage. The patient may tolerate a different statin, or non-statin agents may be used.*

69.

A patient with chronic kidney disease says she has anorexia but is steadily increasing weight. The patient's potassium is 6.4 mEq/L, BUN 43 mg/dL, creatinine 3.6 mg/dL, hemoglobin 6.4 g/dL, and hematocrit 18.8%. Which of these laboratory findings has priority for intervention?

Potassium.

Creatinine.

Hemoglobin.

BUN.

**Explanation:**

*Although the patient's laboratory results show multiple abnormalities, the priority for intervention is the elevated potassium because hyperkalemia puts the patient at risk of cardiac dysrhythmias and cardiac arrest, and the patient is nearing the critical value. Potassium values:*

*Normal values: 3.5 to 5.5 mEq/L.*

*Hypokalemia: <3.5 mEq/L. Critical value: <2.5 mEq/L.*

*Hyperkalemia: >5.5 mEq/L. Critical value: >6.5 mEq/L.*

70.

A 40-year-old patient with chronic kidney disease and renal failure states he is concerned that the illness will affect his marriage and relationship with his spouse. What initial topic should the nurse likely discuss with the patient?

Depression.

**Sexual dysfunction.**

Marriage counseling.

Family issues.

***Explanation:***

*Because sexual dysfunction is a common occurrence with chronic kidney disease and renal failure, the nurse should likely initially discuss this issue if the patient expresses concern about the effect that his disease will have on his marriage and relationship with his spouse. Patients may be embarrassed to ask about sexual dysfunction directly but can benefit from a frank discussion, including information about resources available to the patient and his spouse. If possible, the patient's spouse should be included in the discussion.*

71.

The cardiac abnormality that is most prevalent in patients with chronic kidney disease and renal failure is

right atrial hypertrophy.

left atrial hypertrophy.

**left ventricular hypertrophy.**

right ventricular hypertrophy.

**Explanation:**

*The cardiac abnormality that is most prevalent in patients with chronic kidney disease and renal failure is left ventricular hypertrophy, with the prevalence increasing in direct proportion to the stage of renal failure. Even patients in the beginning stages often exhibit LVH with 50% to 80% exhibiting LVH at the time that dialysis is initiated. Patients are at increased risk of mortality associated with cardiovascular disease, which accounts for at least half of the deaths of patients with chronic kidney disease.*

72.

**If a 24-hour urine quantitative protein test shows persistent proteinuria, this usually indicates**

congenital abnormality.

kidney infection.

renal tumor.

**glomerular renal disease.**

**Explanation:**

*If a 24-hour urine quantitative protein test shows persistent proteinuria, this usually indicates glomerular renal disease. Protein found in the urine is usually albumin. A 24-hour test should result in fewer than 150 mg of protein. Glomerular renal disease interferes with the kidneys' ability to filter toxins so that some toxins that should be excreted are retained in the blood and proteins and blood cells, which should be retained are excreted in the urine.*

73.

A 44-year-old man with a history of diabetes mellitus and hypertension is admitted to the hospital with increasing peripheral edema (2<sup>+</sup> pitting), nausea and vomiting, lethargy, and generalized itching. The patient's BP is 190/120 mm Hg, pulse 86 bpm, respiration 26 breaths per minute. The patient's potassium (6.1 mmol/L) and phosphorus (10.2 mg/dL) were elevated and BUN was 150 mg/dL and serum creatinine 14 mg/dL. Parathyroid hormone level was 885 pg/mL. Hemoglobin was 8.4 g/dL and hematocrit 27.2%. Glucose is 106 mg/dL. Based on these findings, the patient is most likely experiencing

liver failure.

heart failure.

rhabdomyolysis.

uremia.

**Explanation:**

*The patient exhibits a number of signs and symptoms of uremia. Both diabetes and hypertension are risk factors, and increasing edema, nausea and vomiting, lethargy, and itching are common findings associated with uremia. The patient's blood pressure is uncontrolled on admission. The patient's laboratory results show signs of kidney failure, including hyperkalemia and hyperphosphatemia, as well as elevated BUN, serum creatinine, and parathyroid hormone. Additionally, the patient is anemic with a low hemoglobin and hematocrit.*

74.

If a patient requires treatment for hyperuricemia, which of the following medications may be used to prevent uric acid crystallization?

Loop diuretic.

Thiazide diuretic.

**Alkalinizing agent.**

Uricosuric agent.

***Explanation:***

*If a patient requires treatment for hyperuricemia to prevent uric acid crystallization, an alkalinizing agent is administered. Commonly used medications include allopurinol, acetazolamide (Diamox), and sodium bicarbonate. Acetazolamide increases urinary pH by decreasing reabsorption of bicarbonate in the proximal tubules. Sodium bicarbonate alkalinizes the urine (target is 7) to increase the solubility of uric acid. Use of sodium bicarbonate must include careful monitoring of urinary pH.*

75.

The nurse is concerned that Ms. Davis may not be a good candidate for CAPD. Which of the following is often a contraindication for peritoneal dialysis?

**Obesity.**

Young adulthood.

Residual urinary function.

Cardiovascular disease.

***Explanation:***

*Obesity is often a contraindication for peritoneal dialysis. Other contraindications include older adulthood and lack of social support, such as family members who can assist. Patients with ostomies or ventriculoperitoneal shunts are also usually advised against peritoneal dialysis. Indications for peritoneal dialysis include cardiovascular disease, younger age, adherence to treatment regimen, and adequate social support. The choice of peritoneal dialysis as opposed to hemodialysis should be made on an individual basis, considering many factors.*

76.

How long prior to Ms. Davis beginning peritoneal dialysis should the catheter be implanted?

1 week.

2 weeks.

6 weeks.

2 months.

**Explanation:**

*A catheter should be implanted about 2 weeks prior to a patient's beginning peritoneal dialysis. At one time, even if a patient elected peritoneal dialysis, a backup AV fistula was created in case the PD was not effective or the patient decided to switch to hemodialysis, but this is no longer recommended. Sometimes a peritoneal catheter is placed temporarily when a patient is going to have hemodialysis if the need for dialysis is urgent.*

77.

When teaching Ms. Davis to carry out CAPD, the nurse is concerned that the patient may lack manual dexterity needed to manage the procedure. The best professional to assess this is

occupational therapist.

rehabilitation specialist.

home health nurse.

physical therapist.

***Explanation:***

*If, when teaching a patient to manage CAPD, the nurse is concerned that the patient may lack manual dexterity needed to manage the procedure, the best professional to assess this is an occupational therapist. The occupational therapist can assess the patient's ability to carry out needed tasks and can determine if modifications or assistive devices are appropriate to help the patient to remain independent in carrying out treatment. The occupational therapist can customize interventions to meet the patient's needs.*

78.

When teaching Ms. Davis about peritoneal dialysis, the nurse should advise the patient that one advantage of peritoneal dialysis over hemodialysis is

fewer restrictions in fluids and sodium.

fewer treatments needed.

less potential for complications.

lower restriction on phosphorus intake.

**Explanation:**

*When teaching a patient about peritoneal dialysis, the nurse should advise the patient that one advantage to peritoneal dialysis over hemodialysis is fewer restrictions in fluids and sodium. Fluid restriction is less stringent because of the more frequent dialysis, which removes excess fluid. Also, water passes through the peritoneal membrane more readily than through dialyzer membranes, increasing fluid loss. While hemodialysis patients must generally limit sodium intake to 2 to 3 g daily, patients on peritoneal dialysis usually can have intake of 2 to 4 g daily.*

79.

**A patient on hemodialysis should be taught to monitor bowel function and to avoid constipation because constipation increases risk of**

hypercalcemia.

hypokalemia.

**hyperkalemia.**

hyperphosphatemia.

**Explanation:**

*A patient on hemodialysis should be taught to monitor bowel function and to avoid constipation because constipation increases risk of hyperkalemia. With normal kidney function, only about 5% to 10% of the potassium load is excreted through the intestines because the kidneys excrete the rest, but with impaired kidney function, the intestines increase excretion up to 25%. Thus, constipation directly impacts potassium excretion, although hyperkalemia usually involves constipation coupled with excessive potassium intake.*

80.

**Following a percutaneous kidney biopsy for diagnostic purposes, the most common complication is**

severe pain.

arteriovenous fistula.

**hematuria.**

hematoma.

***Explanation:***

*Following a percutaneous kidney biopsy, the most common complication is hematuria. While bleeding is usually not severe and clears within a few days, in some cases hemorrhage may occur, so patients should be advised to monitor urinary output and report excessive bleeding or bright red blood. Pain is usually mild. If the biopsy needle is inadvertently inserted into an adjacent artery and vein, an AV fistula may form, but it usually closes without intervention. Hematomas rarely occur but may become infected.*

81.

Following a renal biopsy, a compression bandage should be applied to the needle insertion site and the patient positioned

supine and at bedrest for 24 hours.

**on biopsy side for up to 60 minutes and bedrest for 24 hours.**

with no positional restrictions.

on biopsy side for 4 hours and bedrest for 24 hours.

**Explanation:**

*Following a renal biopsy, a compression bandage should be applied to the needle insertion site and the patient should be positioned on biopsy side for up to 60 minutes and bedrest for 24 hours. The biopsy is usually done in the lower lobe of the kidney percutaneously and may be done with CT or ultrasound guidance. Following the biopsy, the patient should be assessed for hypotension, flank pain, increasing temperature, chills, dysuria, and bleeding.*

82.

**If Ms. Walters has itching and stuffy nose that usually occurs only during hemodialysis, the most likely cause is**

hypersensitivity reaction.

hepatitis.

scabies.

anxiety.

**Explanation:**

*If a patient has itching and stuffy nose that usually occurs only during hemodialysis, the most likely cause is hypersensitivity reaction, usually to dialyzer or blood circuit components. Reactions to dialyzers are most common with new dialyzers ("first-use syndrome") and may range from mild allergic response to anaphylaxis. Although reusable dialyzers are carefully processed and rinsed before reuse, some sterilants, which may cause allergic responses, may remain.*

83.

**If Ms. Walters' itching persists and her Kt/V is 1.1, the first dialysis adjustment should be to**

decrease Kt/V to <1.

increase Kt/V to >1.1.

**increase Kt/V to >1.2.**

increase Kt/V to >1.5.

***Explanation:***

*If a hemodialysis patient's itching persists and the patient's Kt/V is 1.1, the dialysis adjustment should be to increase the Kt/V to greater than 1.2. The usual target is 1.4 to ensure that the patient's level does not fall below 1.2. Improving the quality of dialysis may, in some patients, relieve itching to some degree, although the evidence is not clear. Elevated calcium, phosphorus, and parathyroid hormone levels may also cause itching in some patients.*

84.

If adjusting Ms. Walters' Kt/V and changing dialyzers do not relieve itching, the intervention most indicated is

gabapentin.

**moisturizers/oil bath.**

tacrolimus ointment.

UVB phototherapy.

**Explanation:**

*If adjusting a patient's Kt/V and changing dialyzers do not relieve itching, the intervention most indicated should be moisturizers and oil bath as dry skin is generally the most common cause of itching. High levels of phosphorus, especially, may cause itching. If emollients do not control itching, then antihistamines, such as diphenhydramine, or other treatments, such as ultraviolet lights or gabapentin, may be considered. Naltrexone or tacrolimus ointment may relieve severe, persistent itching.*

85.

**If Ms. Walters wants to try herbal or complementary medicine to control chronic itching, the therapy that may be most beneficial is**

acupuncture.

aromatherapy.

St. John's wort.

therapeutic touch.

**Explanation:**

*If a hemodialysis patient wants to try herbal or complementary medicine to control chronic itching, the therapy that may be most beneficial is acupuncture, the use of which is supported by studies showing that acupuncture provided some relief of symptoms. Both acupuncture and electroacupuncture may provide some relief in the intensity of itching but may not eliminate it. St. John's wort may react with a variety of different drugs, and its safety for patients on dialysis is not clear.*

86.

If a patient is undergoing hemodialysis and the nurse notes that a bloodline has separated and blood has pooled beneath the access site, the first intervention should be to

clamp both sides of separated line.

**stop the blood pump.**

reconnect the separated line.

apply pressure at the outflow vein.

***Explanation:***

*If a patient is undergoing hemodialysis and the nurse notes that a bloodline has separated and blood has pooled beneath the access site, the first intervention should be to stop the blood pump and then to clamp both sides of the separated line to prevent further loss of blood. Both sides of the separated line are considered contaminated, so the line should not be reconnected, and the blood remaining in the line must be discarded.*

87.

The permeability of a dialyzer membrane to water is indicated by its

transmembrane pressure.

osmotic ultrafiltration

diffusion pressure.

**ultrafiltration coefficient.**

***Explanation:***

*The permeability of a dialyzer membrane to water is indicated by its ultrafiltration coefficient ( $K_{UF}$ ). The ultrafiltration coefficient listed for a dialyzer indicates the amount of water that will pass through a membrane at a given pressure in a specified unit of time (generally 1 hour). For example, if the  $K_{UF}$  is 10, then 10 mL of water will pass through the membrane for each mL of mercury (mm Hg) of transmembrane pressure. So if the transmembrane pressure were 100, then the patient would lose 1000 mL ( $10 \times 100$ ) of water each hour.*

88.

The nurse has calculated the target weight loss for Mr. Clark's hemodialysis session, but he insists that the nurse has made an error and that the target is 1 kg too high. The nurse should

**recalculate the target weight loss.**

ignore the patient.

reassure the patient that the target is correct.

advise the patient that 1 kg is inconsequential.

***Explanation:***

*If the nurse has calculated the target weight loss for a patient's hemodialysis session, but the patient insists that the nurse has made an error and that the target is 1 kg too high, the nurse should recalculate the target weight loss with the patient to determine which target is correct. Patients should be taught to monitor their own care because anyone can make mistakes, and patients often are very knowledgeable about their conditions and needs.*

89.

If a patient on hemodialysis has a blood flow rate of 400 and the serum urea nitrogen is 100 at inflow and 35 at outflow, the urea reduction ratio (URR) expressed in percentage is

35%.

70%.

50%.

**65%.**

***Explanation:***

*If a patient on hemodialysis has a blood flow rate of 400 and the serum urea nitrogen is 100 at inflow and 35 at outflow, the urea reduction ratio (URR) expressed in percentages is 65%. The formula for URR is:*

$$(inflow - outflow/100) \times 100.$$

$$(100 - 35/100) \times 100 = 65\%.$$

*The URR is used to estimate the amount of urea nitrogen that is removed from the blood by dialysis. The goal is usually about a 65% reduction.*

90.

Which of the following treatments is indicated specifically for hemodialysis patients with epoetin-resistant anemia?

Iron infusion.

**L-carnitine.**

RBC transfusion.

Oral ferrous sulfate.

**Explanation:**

*L-carnitine, a naturally produced amino acid, is indicated specifically for hemodialysis patients with epoetin-resistant anemia. Patients on hemodialysis frequently are deficient in L-carnitine because of both poor nutritional intake and loss during dialysis. Patients with low levels of carnitine are more likely to suffer severe anemia that requires treatment with erythropoietin and more likely to have epoetin-resistant anemia, so supplementation with L-carnitine may be effective for some patients.*

91.

**If a dialyzer is to be reprocessed in 3 hours, the dialyzer must be**

heated to body temperature (37 °C).

frozen.

maintained at room temperature.

**refrigerated.**

**Explanation:**

*Dialyzers should be processed within 2 hours. If a dialyzer is to be reprocessed after 2 hours (such as in 3 hours), the dialyzer must be refrigerated because the cold helps to retard the growth of bacteria. The dialyzer must be refrigerated during any transportation to another*

*facility for reprocessing. However, the dialyzer should not be frozen. The exact temperature is usually set by the manufacturer and/or the hemodialysis center.*

92.

According to KDOQI guidelines, when administering hemodialysis to a patient, a facemask should be worn

for all access connections.

if the nurse has a cough.

if the patient has a cough.

to discontinue the hemodialysis.

***Explanation:***

*According to KDOQI guidelines, when administering hemodialysis to a patient, a facemask should be worn for all access connections. If patients are doing their own cannulations, they should be advised to also don facemasks. Strict aseptic technique and proper hand hygiene with soap and water and/or alcohol-based hand rub are also critical elements in preventing infections. Patients should be advised to monitor staff members for compliance and to insist staff wear masks and use appropriate techniques.*

93.

What color is arterial blood tubing for hemodialysis most often color-coded?

Red.

Blue.

Green.

Yellow.

***Explanation:***

*Blood tubing for hemodialysis is generally color-coded to help decrease the chance of errors with arterial tubing color-coded red and venous tubing color-coded blue. Some types of equipment may require custom tubing sets for individual patients. Blood tubing includes patient connectors that connect the blood tubing segments to the patient's needles/catheter ports, dialyzer connectors that allow connection to the dialyzer, and drip chamber or bubble trap to check the arterial or venous pressure. The heparin line and saline infusion line are usually placed on the arterial tubing segment.*

94.

During hemodialysis, how much blood is usually outside of a patient's body at one time?

50 to 100 mL.

100 to 250 mL.

250 to 400 mL.

400 to 500 mL.

***Explanation:***

*During hemodialysis, usually 100 to 250 mL of blood is outside of the patient's body at one time. However, if a separation of a bloodline occurs, much more blood may be lost in a small amount of time because the blood flow rate is usually set to pump between 300 and 500 mL/minute. This continuous flow, if undetected, could result in exsanguination. For this reason, it is imperative that the access site be open to view at all times and that the patient be carefully monitored during treatment.*

95.

If a pseudoaneurysm occurs in a fistula, the most likely cause is

infection.

**improper rotation of needle sites.**

inadequate anastomosis.

incorrect needle size.

***Explanation:***

*If a pseudoaneurysm occurs in a fistula, the most likely cause is improper rotation of needle sites. A pseudoaneurysm occurs when the graft widens because of weakness of the wall. This may result from a defect related to too numerous punctures of the same site. Signs include swelling at the site, shiny stretched skin, discoloration of the skin, and pain. Because the pseudoaneurysm poses a risk of rupture and exsanguination, the nurse should never insert a needle into a pseudoaneurysm.*

96.

The hemodialysis center has instituted a "zero lift" policy. The primary purpose of such a policy is to

promote patient independence.

**prevent injuries.**

reduce liability.

reduce staffing.

***Explanation:***

*The purpose of a “zero lift” program is to prevent injuries, most commonly musculoskeletal disorders involving damage to muscles, nerves, and tendons. While staff can still assist patients to move and ambulate, staff members should avoid manual lifting as much as possible. It is important when instituting a “zero lift” program that staff members are trained in alternate methods, such as the use of assistive devices, and that the necessary equipment is readily available.*

97.

A patient receiving hemodialysis has weakness, and the nurse notes increasing muscle atrophy of the legs, decreased range of motion, and difficulty walking. The nurse should

advise the patient to be more active.

advise the patient to use a walker to prevent falls.

ask the patient to keep a record of activities.

**ask the physician to refer the patient for physical therapy.**

**Explanation:**

*If a patient receiving hemodialysis has weakness, and the nurse notes increasing muscle atrophy of the legs, decreased range of motion, and difficulty walking, the nurse should ask the physician to refer the patient for physical therapy. While general fatigue and weakness may prevent some patients from participating in physical therapy, this patient may benefit from strengthening exercises and a walking or cycling program. The physical therapist can evaluate the patient's physical abilities and determine an appropriate program.*

98.

**When an increase in infections occurs in a hemodialysis unit, besides notifying the administration, which hospital unit should also be notified?**

**Microbiology laboratory.**

Admissions.

Pharmacy.

Radiology.

**Explanation:**

*When an increase in infections occurs in a hemodialysis unit, besides notifying the administration (which can in turn notify risk management and public affairs), the hospital unit that should also be notified is the microbiology laboratory so that it can be on alert for further indications of infection. The laboratory should save any isolates that may be part of the outbreak to help with tracing the origins of the outbreak. The laboratory should be in direct communication with infection prevention professionals.*

99.

Mr. Clark often experiences intradialytic hypotension. Which of the following preventive measures is usually the best approach for patients who routinely experience intradialytic hypotension because of volume-related problems associated with large intradialytic weight gain?

Increasing the patient's dry weight.

Extending weekly dialysis time.

Increasing restriction of fluid intake.

Increasing restriction of sodium intake.

***Explanation:***

*The preventive measure that is usually the best approach for patients who routinely experience intradialytic hypotension because of volume-related problems associated with large intradialytic weight gain is to increase restriction of sodium intake. Patients who experience intradialytic hypotension are at increased risk of poor outcomes. Blood pressure should generally be maintained at a systolic pressure of at least 90 mm Hg. Low predialytic blood pressure is often an indicator for intradialytic hypotension.*

100.

If there is an outbreak of *Aspergillus* infections in patients treated in a hemodialysis center, an outbreak investigation should include review of

housekeeping procedures.

handwashing procedures.

the water system.

construction projects.

**Explanation:**

*If there is an outbreak of Aspergillus infections in a hemodialysis center, an outbreak investigation should include review of construction projects in or near patient areas. Aspergillus spores are typically inhaled. Aspergillus infections are often associated with construction projects, which release the spores. These projects may even be outside of the facility, such as in an adjacent property, especially if windows are open or air filters become contaminated. Air-conditioning systems may also become contaminated, especially those placed in windows.*

101.

If 4 patients in a hemodialysis center develop infections with *Clostridium difficile* in 1 week, this would be classified as a(n)

outbreak.

cluster.

epidemic.

pandemic.

**Explanation:**

*If 4 patients in a hemodialysis center develop infections with Clostridium difficile in 1 week, this would be classified as an outbreak. Epidemic has essentially the same meaning—an increase in infections over the number predicted—but the term epidemic is usually used to denote a more widespread outbreak with many cases in a wider area. Outbreaks are common in hospitals and often are associated with breaks in protocol, such as with inadequate handwashing.*

102.

When setting up a surveillance program for a hemodialysis center to monitor bloodstream infections (BSIs), once this event has been chosen for monitoring, what should be determined next?

Methods of data collection.

Methods of data analysis.

Data elements for collection.

Time period for observation.

***Explanation:***

*When setting up a surveillance program for a hemodialysis center to monitor bloodstream infections (BSIs), once this event has been chosen for monitoring, the next step is to determine the time period for observation, such as a month, quarter, or year. If BSIs are rare, then a longer time period is indicated in order to ensure measurement validity. Then surveillance criteria and data elements to be collected must be determined followed by outlining the method for data analysis and methods for data collection.*

103.

A patient who has had severe recurrent episodes of gout has recently started hemodialysis. What effect should the patient expect related to episodes of gout?

Episodes of gout will be less responsive to medication therapy.

Episodes of gout will likely increase in frequency.

Hemodialysis should have no effect on gout.

**Episodes of gout should decrease.**

***Explanation:***

*If a patient who has had severe recurrent episodes of gout has recently started on hemodialysis, the patient should expect that the episodes of gout would decrease. Uric acid is a small molecule so it is filtered from the blood during hemodialysis. However, if overproduction of uric acid continues, the patient may still experience some symptoms of gout because the production may still exceed the removal. Patients may need to continue with a low-purine diet.*

104.

**When considering the chain of infection, the 3 most common reservoirs of interest include humans, environment, and**

vectors.

water.

air.

**animals.**

***Explanation:***

*When considering the chain of infection, the 3 most common reservoirs of interest include humans, environment, and animals. Humans are the most common reservoir associated with healthcare-associated infections. The human reservoir may have an acute or subacute infection or may be a carrier with no personal sign of infection. A nasal carrier, for example, may spread *Staphylococcus aureus* to other patients without any sign of infection. In the prodromal stage of*

*some infections, the human reservoir may show no signs of infection. With some infections, the human reservoir may have recovered but is still shedding bacteria.*

105.

**A diabetic patient with chronic kidney disease is rapidly deteriorating and is starting hemodialysis. The patient has taken high doses of insulin for many years. What effect are end-stage kidney disease and dialysis likely to have on insulin dosage?**

The insulin dosage will likely remain the same.

The insulin dosage will likely need to be increased.

**The insulin dosage will likely need to be decreased.**

The insulin dosage may vary widely from one day to another.

***Explanation:***

*If a diabetic patient with chronic kidney disease is rapidly deteriorating and is starting hemodialysis and has taken high doses of insulin for many years, the insulin dosage will likely need to be decreased. Insulin is dependent on the kidneys for excretion, so with kidney failure, the insulin remains active in the body for longer periods. However, some patients who had been insulin-dependent are able to stop taking insulin with dialysis. Glucose levels should be carefully monitored and insulin dosage individualized.*

106.

**Which of the following is a contraindication for hemodialysis?**

**Hemodynamic instability.**

Metabolic acidosis.

Changes in mentation.

Hyperkalemia.

***Explanation:***

*There are few contraindications to hemodialysis because it is used in life-threatening circumstances. However, hemodialysis is contraindicated if the patient exhibits hemodynamic instability, has an inability to coagulate blood, or there is lack of access to systemic circulation. Metabolic acidosis, changes in mentation, and hyperkalemia are all indications for hemodialysis. Other indications include fluid overload, elevated BUN (>90 mg/dL), elevated serum creatinine ( $\geq 9$  mg/dL), drug toxicity, and signs of uremia. Hemodialysis is also indicated if there are contraindications to other forms of dialysis.*

107.

In hemodialysis, *ultrafiltration* refers to

extraction of electrolytes.

extraction of proteins.

**extraction of fluid.**

extraction of wastes/toxins.

***Explanation:***

*In hemodialysis, ultrafiltration refers to extraction of fluid from the vascular space. For ultrafiltration, the blood has a positive hydrostatic pressure and the dialysate solution has a negative hydrostatic pressure. This difference in pressure pushes the fluid through a semipermeable membrane because fluid moves from an area of higher pressure to one of lower pressure. The difference between the positive and negative hydrostatic pressure represents the transmembrane pressure (expressed in mm Hg).*

108.

**When using the “Got Chart” method of contacting a physician by telephone regarding a hemodialysis patient, the first step is to ensure**

there are no standing orders that pertain to the situation.

the nurse has checked physician preferences regarding contact.

the nurse has read the most recent progress notes.

**the nurse is contacting the correct physician.**

***Explanation:***

*Because of the interdisciplinary care needed by most hemodialysis patients, the first step when utilizing the “Got Chart” method of contacting a physician by telephone is to ensure the nurse is contacting the correct physician (primary care physician, nephrologist, consultant). Before completing the call, the nurse should check recent progress notes, standing orders, and physician preferences regarding how, when, and where to call. Additionally, the nurse should determine if the physician needs to be consulted about any other patient to avoid extra calls. The telephoning nurse should personally assess the patient before calling.*

109.

**A patient undergoing hemodialysis has been anemic for the last few months. When the patient comes to the hemodialysis center for treatment, the nurse reviews the patient’s laboratory report**

and finds that the patient's hemoglobin has dropped to 6.2 and hematocrit to 19.1. The nurse is unable to reach the nephrologist. The best action is to

continue with the dialysis treatment.

advise the patient to skip the dialysis treatment and make an appointment with the physician.

**hold the dialysis treatment until the physician responds.**

telephone an alternate physician, such as the patient's internist.

***Explanation:***

*Because the patient's hemoglobin (6.2) and hematocrit (19.1) are dangerously low, the nurse should hold the dialysis treatment until the physician responds. Continuing with the dialysis when the patient's blood cell counts are so low puts the patient at risk of cardiac arrest. The patient may require transfusions in order to increase the blood cell counts, and may need more aggressive management of anemia with EPO and iron. The patient should be assessed for signs of bleeding.*

110.

When instructing Mr. Clark about weight gain, he should be advised that the usual goal for interdialytic weight gain is

<2.5 kg/d.

**<1 kg/d.**

<1.5 kg/d.

<2 kg/d.

**Explanation:**

*When instructing a patient on hemodialysis about weight gain, the patient should be advised that the usual goal for interdialytic weight gain is less than 1 kg per day, although it is common for patients to gain more than this amount. If weight gain is excessive, then patients should be cautioned about limiting sodium intake, as this restriction is usually more important than fluid restriction, as increased sodium increases thirst.*

111.

A 70-year-old patient has developed dialysis-associated pericarditis with pericardial effusion, but the effusion has remained stable at about 75 mL in size. The patient has frequent echocardiograms, and the latest shows that the pericardial effusion has almost doubled in size. At what volume is surgical drainage usually considered?

>150 mL.

>200 mL.

>250 mL.

>350 mL.

**Explanation:**

*Because pericardial effusions may suddenly enlarge and result in cardiac tamponade, surgical drainage is usually considered when the effusion volume exceeds 250 mL. The most common procedure is a subxiphoid pericardiostomy done under local anesthesia. If the effusion is less than 250 mL, increasing the frequency of dialysis to 5 to 7 times per week may resolve about half of the pericardial infusions. Medications such as NSAIDs and steroids have not proven to be helpful.*

112.

If post-dialysis blood values for BUN, sodium, and calcium are ordered, how soon after dialysis is discontinued should the blood be drawn?

20 seconds to 2 minutes after discontinuation.

2 to 5 minutes after discontinuation.

5 to 10 minutes after discontinuation.

15 to 30 minutes after discontinuation.

***Explanation:***

*If post-dialysis blood values for BUN, sodium, and calcium are ordered, blood should be drawn within 20 seconds to 2 minutes after discontinuation of dialysis to obtain accurate results. Blood should not be drawn from fistulae or grafts and should be drawn from the opposite side as access in order to avoid trauma to the access site. Plasma levels of BUN increase up to 20% within 30 minutes, so timing of the blood draw is critical.*

113.

A patient has developed a small aneurysm and asks the nurse to cannulate the aneurysm for the hemodialysis treatment because another patient told him that it would be less painful than cannulation of the fistula. The best response is

agree to cannulate the aneurysm.

tell the patient that there is no reduced pain if cannulating the aneurysm.

advise the patient that cannulating an aneurysm may result in rupture.

tell the patient that the other patient was wrong.

**Explanation:**

*If the patient has developed a small aneurysm and asks the nurse to cannulate the aneurysm for the hemodialysis treatment because another patient told him that it would be less painful than cannulation of the fistula, the best response is to advise him that cannulating an aneurysm may result in rupture. An aneurysm is a weak ballooning area of the vessel, and if it ruptures the patient could rapidly exsanguinate.*

114.

During hemodialysis, Mr. Wiley, who is lying in supine position, has chest pain, begins coughing, and shows evidence of cyanosis of distal extremities and lips. The nurse should suspect that the patient has

anaphylaxis.

myocardial infarction.

disequilibrium symptom.

**air embolism.**

**Explanation:**

*During hemodialysis, if a patient who is lying in supine position has chest pain, begins coughing, and shows evidence of cyanosis of distal extremities and lips, the nurse should suspect that the patient has air embolism. In supine recumbent position, the air often enters the heart (as opposed to the brain if the patient is sitting upright), generating foam in the right ventricle and*

into the lungs. If air returns from the lungs to the left atrium and ventricle, it can enter the arterial system and cause severe cardiac and neurological impairment.

115.

To prevent further complications, the nurse should immediately

clamp the venous line and stop the blood pump.

provide nasal oxygen at 4 L/min.

increase blood flow rate and dialysate flow rate.

administer a saline bolus to the patient.

**Explanation:**

*To prevent further complications, the nurse should immediately clamp the venous line and stop the blood pump to avoid the introduction of more air. Air emboli are usually venous, although arterial emboli can occur. Hypovolemia and sitting upright during dialysis are risk factors because they reduce venous pressure. Air emboli may result from leaks in the circuit or air in dialysate solution. Air can also be introduced during insertion or removal of CVCs.*

116.

In response to these symptoms, the patient should be positioned

upright at 90°.

semi-Fowler's position.

**Trendelenburg on left side or flat supine.**

Trendelenburg on right side.

***Explanation:***

*In response to these symptoms, the patient should be positioned in the Trendelenburg position on the left side or flat supine (depending on center protocol). Treatment is symptomatic and may include oxygen ( $FiO_2$  at 100%), intubation and ventilation, and cardiac catheterization or percutaneous needle insertion for aspiration of air from the atrium or ventricle. In some cases, treatment in a hyperbaric oxygen chamber may be used to prevent cerebral edema.*

117.

**The patient is to undergo a 24-hour creatinine clearance test. When instructing a patient about collecting urine for a 24-hour creatinine clearance test, the patient should be advised to**

begin saving urine with the first urination in the morning, and mark this as the beginning saving period.

**discard the first urination in the morning and mark this as the beginning saving period.**

begin saving urine with the first urination in the morning, but discard the first morning urination on the second day and end collection.

begin saving urine with the second urination in the morning and count that time as the beginning of the saving period.

***Explanation:***

*When instructing a patient about collecting urine for a 24-hour creatinine clearance test, the patient should be advised to discard the first urination in the morning and mark this as the beginning saving period. The 24-hour collection period should end after collecting the first*

urination in the morning of the second day. Normal values for creatinine clearance vary but are about  $95 \pm 20$  mL/min for females and  $125 \pm 25$  mL/min for males.

118.

If a patient is diagnosed with chronic kidney disease, the initial imaging is usually a(n)

CT scan.

MRI.

x-ray.

**ultrasound.**

***Explanation:***

*If a patient is diagnosed with chronic kidney disease, the initial imaging is usually an ultrasound because it uses sound waves to create images, and it is noninvasive, relatively inexpensive, and can show the size and position of the kidneys as well as any structural abnormalities and other abnormal findings, such as tumors or stones. X-rays may not show enough detail. Sometimes, the ultrasound is followed by a CT with contrast if indicated (such as when a tumor is found) or with an MRI.*

119.

Which medication or medications are recommended to control hypertension and slow the rate of chronic kidney disease in patients with diabetes mellitus?

Beta-blocker.

Calcium channel blocker.

Loop diuretic.

**ACE inhibitor and ARB.**

***Explanation:***

*The medications that are recommended to control hypertension and slow the rate of chronic kidney disease in patients with diabetes mellitus are ACE inhibitors and ARBs. This medication combination has been effective in slowing progression of kidney disease in diabetic patients and in nondiabetic patients with proteinuria ( $\geq 200$  mg/g). Both KDIGO and KDOQI recommend that the target blood pressure be less than 130/80 mm Hg for all patients with kidney disease but the JNC 8 recommends less than 140/90 mm Hg for patients younger than 60 years with kidney disease and diabetes.*

120.

The KDIGO lipid guidelines recommend treatment with a statin or statin/ezetimibe combination for

all patients with chronic kidney disease.

all patient  $\leq 50$  years of age at stage 1 or 2 of chronic kidney disease.

**all patients  $\geq 50$  years of age with eGFR  $< 60$  mL/min/1.73 m<sup>2</sup> and not on dialysis.**

all patients at stage 5 kidney failure on dialysis.

***Explanation:***

*The KDIGO lipid guidelines recommend treatment with a statin or statin/ezetimibe combination for all patients 50 years and younger with eGFR <60 mL/min/1.73 m<sup>2</sup> and not on dialysis. Those who are 50 years and older at stage 1 or 2 of chronic kidney disease and eGFR ≥60 mL/min/1.73 m<sup>2</sup> should be treated with a statin only but not the combination drugs. Those who are younger than 50 years and not on dialysis should be treated with a statin if they have a risk of cardiovascular disease greater than 10% (such as those with diabetes or coronary artery disease).*

121.

When removing the needle from a buttonhole access, a large volume of venous blood sprays into the nurse's mouth and eyes. Because Mr. Clark is HIV positive, class 2, postexposure prophylaxis (PEP) should include

basic 2-drug PEP.

**expanded 3-drug PEP.**

optional basic 2-drug PEP.

observation and follow-up testing only.

***Explanation:***

*If a nurse's mucous membranes are exposed to a large volume of blood from a patient with positive HIV, class 2, postexposure prophylaxis (PEP) should include the expanded 3-drug PEP because of increased risk of infection. If the volume were small, then the basic 2-drug PEP is recommended. Class 2 HIV infection is a symptomatic HIV infection, AIDS, or high viral load. Nurses should be taught to use a 2-finger hold for removal of the needle from a buttonhole access because of the potential for blood spray.*

122.

Before therapy with an erythropoiesis-stimulating agent (ESA) is initiated with chronic kidney disease, which of the following should be assessed?

GFR.

BUN.

Serum creatinine.

**Iron status.**

***Explanation:***

*Before therapy with an erythropoiesis-stimulating agent (ESA) is initiated with chronic kidney disease, iron status should be assessed. Both iron storage and iron bioavailability should be evaluated. About 40% of nondialytic patients with chronic kidney disease exhibit iron deficiency anemia, which is believed to be a precipitating factor in ESA resistance, so correcting iron status is important before beginning ESA treatment. If ESA resistance occurs (no increase in hemoglobin after 1 month of ESA treatment), the cause of resistance must be identified.*

123.

Which of the following tests assesses the bioavailability of iron?

**Transferrin saturation = (serum iron level X 100)/total iron binding capacity.**

Serum ferritin.

Serum zinc protoporphyrin.

Serum albumin.

**Explanation:**

*The transferrin saturation test is transferrin saturation (%) = (serum iron level X 100)/total iron binding capacity. It assesses the bioavailability of iron. If the level falls below 20%, then the bioavailability is insufficient, and this may result in decreased effectiveness of ESA therapy. Serum ferritin, also commonly monitored, provides information about how much iron is stored, but the result may be affected by chronic inflammation. Low levels of albumin are also associated with hyporesponsiveness of ESA therapy, and concentration of albumin correlates with hemoglobin so that when albumin levels increase, hemoglobin tends to increase as well.*

124.

For patients on oral iron, in order to increase absorption, patients should be advised to

take the supplement with dairy products, such as milk.

take enteric-coated preparations of the supplement.

**take the supplement on an empty stomach.**

take the supplement with phosphate binders.

**Explanation:**

*In order to increase absorption of iron for patients with chronic kidney disease on an oral iron supplement, patients should be advised to take the supplement on an empty stomach because taking it with food may decrease absorption. Additionally, patients should avoid enteric-coated preparations and should not take the supplement with phosphate binders. Patients are usually prescribed 325 mg of ferrous sulfate 3 times daily as this is equivalent to 200 mg of elemental iron daily.*

125.

According to KDOQI guidelines, the recommended first AV fistula should be which type?

Femoro-saphenous.

Ulnobasilic.

Brachiocephalic.

**Radiocephalic.**

***Explanation:***

*According to KDOQI guidelines, the recommended first AV fistula should be radiocephalic (above the wrist) because the fistula should be as distal as possible to allow replacement of the fistula should it fail. Vessels below a failed AV fistula are usually not suitable for access. The most common placement in the upper arm is brachiocephalic. Vessels need to be in good condition, and veins should be straight and able to accept a large-gauge needle.*

126.

When assessing veins and arteries prior to creation of a fistula, the minimum vein lumen generally needed for a successful fistula is

1.5 mm.

2 mm.

**2.5 mm.**

3 mm.

**Explanation:**

*When assessing veins and arteries prior to creation of a fistula, the minimum vein lumen generally needed for a successful fistula is 2.5 mm, although smaller vessels down to 1.5 mm have been used successfully by skilled surgeons. The minimum size generally needed for the arterial diameter is 2 mm. However, size is only one important element as the ability to dilate is also essential. Veins, for example, should demonstrate at least an internal diameter increase of 50% with the vein dilation test.*

127.

**When evaluating Ms. Kim in preparation for creation of a fistula, the blood pressure difference between the arms should be less than**

5 mm Hg.

10 mm Hg.

15 mm Hg.

20 mm Hg.

**Explanation:**

*When evaluating a patient in preparation for creation of a fistula, the blood pressure difference between the arms should be less than 10 mm Hg. This is a normal finding. If the difference is 10 to 20 mm Hg, this is a borderline finding, but a difference of more than 20 mm Hg is cause for concern. All upper extremity pulses should be assessed as well as pulse oximetry. The Allen test should be carried out to assess circulation of the radial and ulnar arteries.*

128.

When conducting the Allen test to assess circulation of the radial and ulnar arteries, arterial insufficiency is indicated when the blanching persists for

≥2 seconds.

≥3 seconds.

≥4 seconds.

≥5 seconds.

***Explanation:***

*When conducting the Allen test to assess circulation of the radial and ulnar arteries, arterial insufficiency is indicated when the blanching persists for ≥5 seconds. For the test, the patient should extend the arm and hand, palm upward. The nurse compresses both the radial and ulnar arteries at the wrist while the patient pumps the hand repeatedly to help the hand to blanch. Once the hand is blanched, the ulnar artery is released and duration of blanching of the palm noted. Then, all compression is released and the procedure is repeated for the radial artery.*

129.

For preoperative assessment of vessels, Doppler ultrasonography is often done under regional anesthesia of the arm because

it is a painful procedure.

anesthesia causes the veins to dilate.

anesthesia causes the veins to constrict.

the patient must hold completely still.

**Explanation:**

*For preoperative assessment of vessels, Doppler ultrasonography is often done under regional anesthesia of the arm because anesthesia causes the veins to dilate, making them easier to visualize and assess. Doppler ultrasonography is used to measure the inner diameters of the arteries and veins as well as the flow velocity. However, central veins cannot be adequately visualized with Doppler ultrasonography. The vein dilation and arterial dilation tests are done during Doppler ultrasonography as well as vein mapping.*

130.

Following a period of maturation, what diameter of the AV fistula is considered necessary before the fistula can be used for hemodialysis?

3 mm.

6 mm.

1 cm.

1.5 cm.

**Explanation:**

*Following a period of maturation, an AV fistula should have a diameter of at least 6 mm before it is used for hemodialysis. According to the "rule of 6s," the diameter should be at least 6 mm and the depth below the skin less than 6 mm. Additionally, a straight segment of at least 6 cm should be present and the AV fistula should accommodate a flow rate of at least 600 mL/min.*

*This degree of maturation usually takes about 6 weeks but may extend up to 4 months in some patients.*

131.

When auscultating Ms. Kim's AV fistula to listen for the bruit, if the nurse notes the bruit is very high pitched, this may indicate

normal functioning.

collateral circulation.

**stenosis.**

inadequate anastomosis.

***Explanation:***

*When auscultating an AV fistula to listen for the bruit, if the nurse notes the bruit is very high pitched, this may indicate stenosis. The thrill should be low pitched and constant. The other indications of stenosis include a pounding ("water-hammer") pulse, decreased thrill, intermittent bruit, edema of access limb, increased venous pressure during treatment, recirculation, clotting of the extracorporeal system during treatment, excessive bleeding after removal of needles at completion of hemodialysis, "black blood syndrome," and decreased Kt/V and URR. Common sites for stenosis are inflow (juxta-anastomotic stenosis), outflow, and central vein.*

132.

If Mr. Clark's predialytic serum total cholesterol level falls to <150 mg/dL, this probably represents

optimal cholesterol level.

excessive statin dosage.

incorrect dialysate.

**poor nutritional status.**

***Explanation:***

*If a patient's predialytic serum total cholesterol level falls to <150 mg/dL, this probably represents poor nutritional status, usually associated with a low serum albumin level. Both poor nutrition and inflammation may result in lowered cholesterol levels. A serum cholesterol level between 200 and 250 mg/dL is associated with a lower risk of mortality in dialysis patients, and levels of less than 150 mg/dL are associated with increased risk. There is some debate about the use of statins because of this, but patients on dialysis are also at high risk of cardiovascular disease.*

133.

Ms. Kim is to have a trial cannulation of the newly matured AV fistula. The best time to carry out a trial cannulation is

**on a non-dialysis day.**

on the first dialysis day of the week.

on the mid-week dialysis day.

on the last dialysis day of the week.

***Explanation:***

*If a patient is to have a trial cannulation of a newly matured AV fistula, the best time to carry out a trial cannulation is on a non-dialysis day to avoid complications. If this is not possible, then the trial cannulation should be done at the mid-week dialysis day rather than the first day after a weekend without treatment because there is less danger of fluid overload and electrolyte abnormalities. The selected needle size should be equal to or smaller than the vein without a tourniquet in place, usually size 17-gauge.*

134.

**The best way to determine if Ms. Kim needs glasses to adequately see the access site prior to beginning self-cannulation is to**

refer the patient to an ophthalmologist for a comprehensive visual examination.

ask the patient if he or she routinely uses reading glasses for fine print.

observe the patient carefully during early cannulation attempts.

**place a dot with ink on the patient's skin and ask the patient to touch it with a needle tip.**

***Explanation:***

*The best way to determine if a patient needs glasses to adequately see an access site before a patient begins self-cannulation is to place a dot with ink on the patient's skin and ask the patient to touch the tip of a needle to the dot. If the patient cannot do this accurately and without squinting, the patient may require reading glasses. A patient who wears bifocals may be able to see the site but may need to hold the head at an awkward angle to do so. In this case, the patient should obtain separate glasses to use during cannulation.*

135.

**Ms. Kim asks about using the buttonhole technique for cannulation. When using the buttonhole technique for vascular access for hemodialysis, the needles are placed**

in the same sites in a graft.

in rotating sites in a graft.

in rotating sites in a fistula.

**in the same sites in a fistula.**

***Explanation:***

*When using the buttonhole technique for vascular access for hemodialysis, the needles are placed in the same sites in a fistula with one site for the arterial needle and one for the venous needle. KDOQI guidelines recommend teaching the patient to self-cannulate. The buttonhole technique cannot be utilized with a graft because the grafts lack muscle fibers to close the hole after the needle is removed. Using the same holes with a graft could result in a permanent opening and exsanguination.*

136.

When inserting a needle for hemodialysis, which of the following increases the risk of infiltration?

**Rotating the needle 180 degree.**

Flushing the needle with normal saline after insertion.

Leveling the needle to the surface of the skin to advance.

Using a wet needle for insertion.

**Explanation:**

*When inserting a needle for hemodialysis, rotating the needle to any degree increases the risk of infiltration, and even one incidence of infiltration may damage an access. The nurse should be very gentle and proceed slowly when cannulating and should level the needle to the surface of the skin before advancing it. Using a wet needle reduces the risk of infection and makes observing for flashback easier. The needle should be gently flushed with NS after insertion to ensure it is placed properly.*

137.

The most important reason for placing hemodialysis needles in antegrade position is because

it is easier to place the needles.

it is less painful for the patients.

**it causes less scarring.**

it decreases the chance of infection.

**Explanation:**

*The most important reason for placing hemodialysis needles in antegrade position is because it causes less scarring than the retrograde position. When a needle is placed in antegrade position, the blood flows in the direction of the needle so that the blood flow will hold the small flap created by the needle closed. If the needle is in retrograde position, the needle points in the opposite direction of the blood flow, so when the needle is removed, the blood flow keeps the flap open.*

138.

Following formation of an AV fistula and beginning of hemodialysis, the nurse notes that Ms. Kim's nail bed and skin on the hand below the fistula are cyanotic during hemodialysis, and she has pain in

the hand. This is likely an indication of

steal syndrome.

stenosis.

aneurysm.

infection.

**Explanation:**

*If, following formation of an AV fistula, the nurse notes that the patient's nail bed and skin on the hand below the fistula are cyanotic during hemodialysis and the patient has pain in the hand, this is likely an indication of steal syndrome (also known as dialysis access-associated hand ischemia). The hand may feel noticeably cooler than the opposite hand. Steal syndrome may occur in up to 20% of accesses. Upper arm access increases risk of steal syndrome as does diabetes and peripheral arterial disease. Patients may have pain, paresthesia, and coldness of the hand during dialysis.*

139.

Which of the following statements by Ms. Batten indicates the need for referral to a nutritionist?

"I should have 30 to 40 g of fiber daily."

"I can have all of the salt and salty foods I want in my diet."

"I should choose soft cheese over hard."

"I drink ginger ale instead of cola."

**Explanation:**

*The statement by a patient undergoing peritoneal dialysis indicating the need for referral to a nutritionist is, "I can have all of the salt I want in my diet." While there has been some debate about the value of sodium restriction to prevent cardiovascular disease, and increasing the glucose hypertonicity of dialysate can help to remove excess fluids, doing so can lead to increased serum glucose, damage to the peritoneal membrane, weight gain, and hyperlipidemia, so patients need to limit sodium intake, ideally to about 1.5 g per day.*

140.

The nurse is concerned about Ms. Batten's caloric intake. For most patients on CAPD, glucose present in the dialysate adds about how many calories each day?

200.

300.

500.

700.

**Explanation:**

*For most patients on CAPD, glucose present in dialysate adds about 500 calories each day, so patients are at risk for increased weight gain. Patients should monitor their diets carefully, and dry weight should be routinely reassessed to determine if patients' weight gain is from fluid retention or increased fat stores. Because of the calories absorbed from dialysate, patients on peritoneal dialysis generally require a lower calorie/kg (30 to 35) intake than patients on HD.*

141.

The nurse reviews Mr. Rodriguez's medications. Which of the following medications may result in cloudy peritoneal fluid for patients on peritoneal dialysis?

Calcium carbonate.

Beta-blockers.

ACE inhibitor.

Calcium channel blockers.

***Explanation:***

*Calcium channel blockers may result in cloudy peritoneal fluid for patients on peritoneal dialysis, possibly because the calcium channel blockers result in increased concentration of triglycerides in the solution. While cloudy peritoneal solution is often indicative of infection (cell counts >50 to 100/mcL), it can also indicate increased levels of monocytes or eosinophils without peritonitis. Peritoneal solution may also become cloudy in the presence of malignancy, blood, or fibrin, and may appear cloudy after an extended dwell period.*

142.

Which of the following places a patient with peritoneal dialysis, such as Mr. Rodriguez, at high risk for peritonitis?

Spiking of dialysis bags.

"Flush before fill" procedure.

Double-cuffed catheter.

Downward directed skin exit site.

**Explanation:**

*Spiking of dialysis bags places the patient with peritoneal dialysis at high risk of peritonitis because the system can easily be contaminated if aseptic technique is broken. For this reason, closed systems are preferable. The "flush before fill" procedure helps to reduce risk of contamination. Other risk factors include single-cuff catheters and upward directed exit sites (these should be directed downward or laterally). Hypokalemia also places patient at increased risk of enteric peritonitis.*

143.

**If Mr. Clark has persistent headaches during dialysis, the medication usually given to manage headaches is**

ASA (aspirin).

NSAID.

hydrocodone.

**acetaminophen**

**Explanation:**

*If a patient has persistent headaches during dialysis, the medication usually given to manage headaches is acetaminophen. Up to 70% of patients on dialysis have headaches, and dialysis may exacerbate migraines. Headaches may result from hypomagnesemia, although magnesium supplementation must be used with caution in patients with kidney failure. NSAIDs should be*

avoided because of their nephrotoxic affects, and ASA should be avoided with heparin used during dialysis.

144.

Mr. Rodriguez is diagnosed with fungal peritonitis and is receiving intraperitoneal fluconazole. Mr. Rodriguez begins to experience hallucinations and exhibit paranoid behavior. The nurse should suspect a(n)

psychotic break.

overdose.

allergic response.

adverse effect.

***Explanation:***

*If a patient with peritoneal dialysis is receiving intraperitoneal fluconazole for fungal peritonitis and begins to experience hallucinations and exhibit paranoid behavior, the nurse should suspect an overdose of the medication. Fungal peritonitis is often related to improper techniques for peritoneal dialysis, but fungal peritonitis can also occur secondary to antibiotic therapy. Most fungal peritonitis is caused by *Candida spp.* If fungi are found along with a bacterial infection, prognosis is poor because response to therapy is decreased.*

145.

Following treatment for fungal peritonitis, Mr. Rodriguez's peritoneal catheter cultures positive for fungal organisms, indicating that the tube is colonized. The most likely intervention is

antifungal instillations.