



Certification Preparation Guide



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Nephrology Nursing
Certification Commission

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CDN Certification Preparation Guide

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About the Nephrology Nursing Certification Commission (NNCC)

Mission

The Nephrology Nursing Certification Commission (NNCC) exists to establish certification mechanisms to promote patient safety and to improve the quality of care provided to nephrology patients.

Philosophy

NNCC supports the philosophy that there should be a diversity of examinations that will effectively provide the opportunity for certification at various levels of education, experience, and areas of practice within nephrology nursing.

Commission

NNCC was established in 1987 to develop and implement certification examinations for nephrology nursing. NNCC is separately incorporated, and an independent organization that collaborates with the Center for Nursing Education and Testing (C-NET) in test development, test administration, and test evaluation. It is the goal of NNCC to promote the highest standards of nephrology nursing practice through the development, implementation, coordination, and evaluation of all aspects of the certification and recertification processes. NNCC is a charter member of the American Board of Nursing Specialties (ABNS). The ABNS is a membership organization that maintains a national peer review program for nursing specialty certifications.

Center for Nursing Education and Testing (C-NET)

NNCC collaborates with The Center for Nursing Education and Testing (C-NET) whose expertise in the areas of test development, administration, and evaluation is unequalled. C-NET works with the NNCC to ensure that all of the examinations offered are reliable, valid, and meet industry standards. C-NET provides a full range of test development and test administration services, including:

- Performing practice analysis surveys of specialty areas
- Developing test specifications (blueprint)
- Leading item-writing sessions
- Pilot testing of questions
- Statistical analysis of whole test and test questions
- Reporting results of testing to Board and test committees

Relationship to Professional Associations

A professional association is an organization of members for whom educational and professional offerings and events are provided. They promote professional growth, provide approved continuing education, promote, recognize, and endorse certification, but they do not administer certification examinations. Examples of professional associations are:

- American Nephrology Nurses Association (ANNA)
- National Kidney Foundation (NKF)
- National Association of Nephrology Technicians/Technologists (NANT)
- American Society of Nephrology (ASN)

The NNCC does *not* have members or provide educational programming. The NNCC promotes professional growth by developing and implementing certification examinations for nephrology nursing.

ABNS and ABSNC Accreditation

The American Board of Nursing Specialties (ABNS), established in 1991, is a not-for-profit, membership organization focused on consumer protection and improving patient outcomes by promoting specialty nursing certification. The Accreditation Board for Specialty Nursing Certification (ABSNC), formerly the ABNS Accreditation Council, is the only accrediting body specifically for nursing certification. ABSNC accreditation is a peer-review mechanism that allows nursing certification organizations to obtain accreditation by demonstrating compliance with the highest quality standards in the industry.

The NNCC is a charter member of the ABNS, and the Certified Nephrology Nurse (CNN) certification program was one of the first national certification programs to be recognized and accredited. ABSNC accreditation was initially granted for the CDN examination in January 2011. Currently, the CNN, CDN, and CCHT examinations are accredited by ABSNC.

Organizational Structure

The NNCC is composed of nine commissioners, including one public member. The commission is comprised of members of each examination board. Officers of the NNCC include the President, President-Elect, Secretary and Treasurer. The NNCC staff includes an Executive Director, Director of Certification Services, and Certification Specialists. The management firm is Anthony J. Jannetti, Inc. in Pitman, New Jersey.

Nursing Examination Board

The Nursing Examination Board is made up of representatives from both the CDN and CNN Testing Committees. The purpose of the Exam Board is to establish, review, and update eligibility criteria relevant to certification and recertification. The members develop knowledge and activity statements for practice analyses in collaboration with the testing agency (C-NET) and the commission (NNCC). In addition, the Exam Board participates in review of the practice analysis/role delineation survey tool and data analysis, updates the examination blueprint, and completes audits of certification and recertification applications for quality assurance.

Nursing Test Committee

Members of the CDN Test Committee meet licensure and education requirements, must be NNCC certified, and have nephrology nursing expertise. They are responsible for writing and reviewing questions relevant to the examination. Along with the testing agency representatives, members review current item statistics and develop and revise items as needed.

Examination Development

Valid and reliable tests do not arise spontaneously from item writers. They are carefully planned to ensure that they are legally defensible and psychometrically sound. A test has a specific blueprint, or test plan, which identifies what content needs to be included on the test. In addition, there is a list of the key content or activities performed by dialysis nurses. Both the blueprint and the key content/activities serve as tem-writing guides or "test specifications" for the item writers.

Where do these test specifications come from? The content of the CDN examination is based on a practice analysis survey of dialysis nurses that identifies the key tasks/activities performed by dialysis nurses. A national task force is brought together to plan the survey content. This task force includes dialysis nurses, as well as clinical educators and clinical managers of dialysis nurses. Following data collection, the task force reviews the survey results and makes recommendations for the CDN test specifications. The practice analysis also delineates and differentiates the roles of CDN and CNN. Most importantly, a practice analysis is performed every five years to be sure the test reflects current practice and is kept up to date.

The group that oversees CDN test development is the Nursing Examination Board, which is made up of nurses with expertise in dialysis and nephrology. There is also a CDN Test Committee that writes the actual test questions. Item writers, who are certified dialysis nurses from a variety of geographic and practice settings, write test questions to meet the CDN blueprint requirements. Members of both the Nursing Exam Board and the test committee are considered "content experts" concerning the knowledge and skills needed by dialysis nurses for safe practice.

Each question on the test can be linked directly to the tasks/activities in the practice analysis survey. The test committee meets in person twice a year to review, evaluate, and write test questions. To be certain that the test content is accurate, all questions are supported, using the most recent edition of the *ANNA Core Curriculum for Nephrology Nurses* and/or other references, including the regulations in the *CMS Conditions for Coverage for End-Stage Renal Disease Facilities*.

The test consists of 150 questions that match the test blueprint. About 25 of the questions are new experimental or "pilot" questions that are not scored. Pilot testing of new questions allows for the evaluation of questions to determine if they are valid before they become scored questions.

The passing score of the test is determined by a panel of dialysis nurses who serve as subject matter experts (SMEs). Both experienced and newly certified nurses serve on this panel. This group performs a standard setting procedure (Angoff) in which each test question is reviewed to determine its level of difficulty. Finally, the passing score is determined. It is based on the SME panel's estimation of the level of difficulty required to identify individuals who have an acceptable level of knowledge and skill. Therefore, each candidate's test score is measured against a predetermined standard, not against the performance of other test takers. A score of about 73% correct is required to pass the CDN examination.

Frequently Asked Questions

What is certification?

Certification is the formal recognition of specialized knowledge, skills, and experience. It is demonstrated by the achievement of standards identified by a nursing specialty to promote optimal health outcomes. Certification validates advanced knowledge and competence in a specialty. Licensure validates the entry level competence of basic nursing knowledge and skill and provides the legal authority to practice nursing. Certification indicates a higher degree of professional competence than the minimal requirement for licensure. It must be designed to protect the public from unsafe and incompetent caregivers, and it allows consumers of health care to easily identify competent caregivers.

Why should I get certified?

The number one reason to become certified is to help ensure patient safety. Additional reasons include professional recognition, validation of skills, self-confidence in decision-making, and enhanced credibility. Certified nurses have an up-to-date knowledge base, in part due to required ongoing professional education. Certification has been linked to patient safety, optimal patient outcomes, decreased errors, improved patient satisfaction, increased staff retention, and job satisfaction. In an ideal world, employers would recognize, support, and reward certification.

What is the difference between the CDN and CNN exams?

The CDN exam is tailored specifically for RNs specializing in dialysis and the care of individuals with CKD stage 5. The CNN exam is for RNs practicing in multiple areas of nephrology and caring for individuals with CKD stages 3-5.

Am I ready to earn the CDN?

To be eligible to sit for the CDN Exam, candidates from the **United States (& US territories)** must:

- Hold a current, full, and unrestricted license as a registered nurse in the United States, or its territories.
- Have a minimum of 2,000 hours experience as a registered nurse in nephrology nursing caring for patients who require or may require dialysis or educating/supervising staff who care for patients who require or may require dialysis within the two (2) years prior to submitting this application.
- Have completed twenty (20) contact hours of continuing education in nephrology nursing from approved providers within the two (2) years prior to submitting the exam application.

International Candidates must meet the eligibility requirements listed above. In addition, applicants educated and/or licensed outside the United States must hold a current, full, and unrestricted license as a first-level general nurse and meet the eligibility requirements of the Commission on Graduates of Foreign Nursing Schools (CGFNS). The CGFNS requirements are:

- Successfully completed a secondary school education that was separate from your nursing education.
- Graduated from a government-approved, general nursing program that was at least two (2) years in length.
- Received theory and clinical education in each of the following areas: nursing care of the adult (which includes medical and surgical nursing), maternal/infant nursing, nursing care of children, and psychiatric/mental health nursing.

(Please refer to the Certification Application booklet for additional information.)

How do I apply for the CDN exam?

1. Download and complete all sections of the application from the NNCC website, www.nncc-exam.org. Be sure to include the last four (4) digits of your social security number as well as all required signatures.
2. Attach clear copies of contact hour certificates to total twenty (20) contact hours specific to nephrology.
3. Attach a copy or verification of your current RN license, with the expiration date clearly visible, or a letter or printout from your state board of nursing verifying licensure with license number and date of expiration.
4. Mail the application form, a copy or verification of your current RN license, with the appropriate payment, to the NNCC.
5. If you need special accommodations for the examination, contact C-NET at 1-800-463-0786.

How will I know my application was received?

Within a four (4) week processing period, you will receive an examination permit containing instructions for scheduling your exam or an incomplete application letter, requesting further information or documentation. (Note: incomplete applications are subject to an incomplete application fee.)

What study resources are available?

- The test blueprint and practice questions included in this booklet
- The most recent editions of the following references. *
 - ANNA Core Curriculum for Nephrology Nursing.
 - Daugirdas' Handbook of Dialysis.
 - Kallenbach's Review of Hemodialysis for Nurses and Dialysis Personnel.
 - NKF's Primer on Kidney Diseases
 - The regulations in the CMS Conditions for Coverage for End-Stage Renal Disease Facilities.
- The **Online Practice Test** (found on www.nncc-exam.org)
 - 50 multiple-choice questions available in two modes:
 - **Practice Mode:** provides the correct answer and rationale after each question
 - **Test Mode:** holds the results until the end of the test
 - Results display percentage correct by blueprint area
 - 90-day access to the test
 - Several scrambled versions of the same 50 questions are offered for retesting

*Please see page 14 and www.nncc-exam.org for the complete list.

Are there secrets or tricks to help me pass the exam?

Caution: Test preparation websites offering alternative and/or shortcuts to test preparation should be avoided. Exam content is confidential and is not shared with any individuals involved in test preparation activities. "Tricks" of testing and "shortcut" methods for test preparation are specifically avoided when creating this exam. We test candidates on content and not on their "test taking skills."

If you have any questions about the best methods to prepare, please call NNCC toll free at (888) 884-6622. Our goal is that exam candidates will best use their time and money to reach the end result of demonstrating their excellence in nephrology nursing care through certification.

What should I expect the day of the test?

You should arrive at the testing center 30 minutes before your test is scheduled to begin. Bring your valid government-issued photo ID and examination permit. The name on your ID must match the name on your exam permit. Directions to the testing center can be found in the email confirming you have successfully scheduled your test. Be sure to know the best route to the testing center and pay attention to traffic reports.

- Nothing is permitted in the testing room, so you are encouraged to leave personal items at home or locked in your car. Lockers are available in some, but not all, testing centers to secure personal valuables, such as purses or wallets.
- Cell phones and all other electronic devices are not permitted.
- Upon arrival you will give the proctor your photo ID. You will then have your photo taken, and sign a roster and other regulation sheets. The proctor will read the testing site rules upon registering you for the test.
- Once seated at your computer, you will take a short tutorial explaining the test setup and keyboard key functions just before your test begins.
- You will have three (3) hours to complete the exam.
- Your photo ID will be returned upon completion of the exam.

When will I get my results and how do I interpret them?

Your score report will be available to you at the end of your examination. If you pass the exam, the report will reflect your score as well as notify you of when to expect your certificate in the mail and when your name will appear in the online NNCC Certified Directory. If you were unsuccessful on the exam, the report will reflect your score and a breakdown of the test subareas – the Content Areas on the CDN Test Blueprint – with the percent of questions you answered correct in each. This breakdown of subarea scores will help you determine the blueprint areas in which you are weak and need further study.

What if I need to retest?

If you are unsuccessful on the exam, you have one opportunity within one year to retake the examination at a reduced rate. C-NET will mail a re-examination application to those applicants who do not pass.

Preparing to take the Examination

Physical and Emotional Preparation

- Think positively.
- Study and prepare for the examination so that you feel confident.
- Moderate anxiety is normal and may be helpful - you may be more mentally and physically alert.
- Even though some test takers may finish the exam early, use as much of the allotted time as you need to think through and answer the questions.
- Get a good night's sleep.
- Eat a good meal with protein before the examination.
- Gather all the materials you need to take the test the night before the exam.
- Allow plenty of time and arrive early.
- If you are distracted by other candidates, ask for a seat where you will be less likely to notice the other candidates.
- Reference books, notes, or other study materials may not be brought into the examination room.

Tips on Answering Examination Questions

- Read the questions carefully and focus on key words in the question such as "first," "most likely," "most," "important," "best."
- As you read the question, anticipate the correct answer.
- Read each of the four choices carefully. Even if the first option sounds correct, read all options before choosing the answer.
- Do not "read into" the question. Answer the question based only on the information presented, even if you think the answer is too obvious or too easy.
- Do not spend too much time on any one question. Make a note of the questions of which you are uncertain and return to them later if you have time.
- There is no penalty for guessing, so you should make an educated guess if you are not sure of an answer.

Resources

NNCC:

www.nncc-exam.org
(888) 884-6622
Like us on Facebook
Follow us on Twitter and LinkedIn

CNET:

www.cnetnurse.com
(800) 463-0786

NNCC Policies

Statement of Nondiscrimination

It is the policy of NNCC that no individual shall be excluded from the opportunity to participate in the NNCC certification programs on the basis of race, ethnicity, national origin, religion, marital status, sexual orientation, gender identity, age, or disability.

Denial, Suspension, or Revocation of Certification/Recertification

The occurrence of any of the following actions will result in the denial, suspension, or revocation of the certification:

- Failure to meet all eligibility criteria for certification/recertification
- Falsification of the NNCC application
- Falsification of any materials or information requested by the NNCC
- Any restrictions such as revocation, suspension, probation, or other sanctions by a nursing or other regulatory authority
- Misrepresentation of certification status
- Cheating on the examination
- Applicable state and/or federal sanctions
- Failure to meet continuing education criteria
- Failure to meet work experience requirements

Falsifying any materials, including continuing education requirements for certification or recertification (number of contact hours or dates), may lead to denial or permanent loss of NNCC certification.

The NNCC reserves the right to investigate all suspected/ reported violations and, if appropriate, notify the certificant's employer/State Board of Nursing or other regulatory authority. The certificant will be notified in writing of NNCC's decision(s)/action(s).

Appeal Process

An applicant who has been denied certification, failed an examination, or had certification revoked has the right of appeal. This appeal must be submitted in writing to the President of the NNCC within thirty (30) days of notification. The appeal shall state specific reasons why the applicant feels entitled to certification. At the applicant's request, the President shall appoint a committee of three (3) NNCC Commissioners who will meet with the applicant and make recommendations to the NNCC. The committee will meet in conjunction with a regularly scheduled NNCC meeting. The applicant will be responsible for his/her own expenses. The final decision of the NNCC will be communicated in writing to the applicant within thirty (30) days following the NNCC meeting. Failure of the applicant to request an appeal or appear before the committee shall constitute a waiver of the applicant's right of appeal.

Content of the CDN Examination

The CDN examination is designed to test the knowledge needed to provide safe care to patients who are receiving dialysis treatments. There are two dimensions in the test blueprint, Content and Objectives. Content includes four sections: (A) Concepts of Kidney Disease, (B) Hemodialysis, (C) Peritoneal Dialysis, and (D) Transplant and Acute Therapies. The Exam also includes nine Objective areas: (1) Pathophysiology/Complications, (2) Interventions, (3) Physical/Technical Principles, (4) Teaching, (5) Medications, (6) Interdisciplinary Team, (7) Psychosocial, (8) Infection Control, and (9) Professional Practice. Specific nursing activities are tested in each of these areas.

Each question on the test fits into one Content area and one Objective area. This is shown on the blueprint grid (see page 7). In the boxes next to Concepts of Kidney Disease, there are 8-9 questions under the Pathophysiology/Complications label. The entire test is mapped out in this manner to guide the item writers when they are developing the test.

Content Areas:

A. Concepts of Kidney Disease (28%)

Questions in the Concepts of Kidney Disease area deal with the nurse's ability to recognize normal kidney function along with pathologic processes and complications that occur in kidney disease. The Concepts of Kidney Disease area is the second largest part of the test, making up 28% of the test content. Examples of the kinds of CDN activities tested in the Concepts of Kidney Disease area include:

1. Using clean or aseptic technique, as appropriate, to initiate and terminate treatments or procedures.
2. Maintaining a safe patient and staff work environment.
3. Teaching patient and significant others about multisystem effects of kidney disease.
4. Participating in interdisciplinary rounds and care plan development.
5. Evaluating patient's and significant others' adaptation to illness and its treatment.

B. Hemodialysis (52%)

Questions in this area deal with physiologic and technical principles of hemodialysis and require the nurse to select appropriate actions while caring for patients being treated with this modality. The nurse is required to apply concepts of infection control and water treatment, safely administer medications and provide monitoring and surveillance for vascular access. The Hemodialysis area is the largest part of the test, making up 52% of the test content. Examples of the kinds of CDN activities tested in the Hemodialysis area include:

1. Preparing, initiating, monitoring, and discontinuing hemodialysis treatment.
2. Identifying and troubleshooting variations of blood flow through the extracorporeal circuit, e.g., arterial pressure, venous pressure, blood flow rate.
3. Administering medications.
4. Following protocol when intervening for dialysis-related problems/symptoms, e.g., hypotension, access malfunction.
5. Teaching patient and significant others the importance of adherence to dialysis prescription.

C. Peritoneal Dialysis (16%)

The questions under Peritoneal Dialysis include the nurse's ability to teach, perform, and manage the therapy and its related complications. The Peritoneal Dialysis area makes up 16% of the test content. Examples of the kinds of nursing activities tested in the Peritoneal Dialysis area include:

1. Performing and teaching peritoneal dialysis procedures.
2. Assessing for signs and symptoms of complications of peritoneal dialysis and implementing treatment per protocol/algorithm.
3. Performing and evaluating peritoneal equilibration or function tests.
4. Identifying causes of peritoneal catheter malfunction.
5. Teaching patient and significant others about complications related to peritoneal dialysis.

D. Transplant and Acute Therapies (4%)

The questions about transplant and acute therapies are very general. Transplant questions are restricted to patients on dialysis who are on the transplant list, or patients whose transplants have failed and have returned to dialysis. The Transplant and Acute Therapies area makes up 4% of the test content. Examples of the kinds of nursing activities tested in the Transplant area include:

1. Coordinating activities and procedures prior to kidney transplant.
2. Assessing patient for complications during acute therapies.
3. Collaborating with interdisciplinary team to evaluate suitability of potential transplant donors and/or recipients.
4. Performing hemodialysis on the transplant recipient with delayed graft function, focusing on judicious fluid removal, avoidance of hypotension, and monitoring possible return of kidney function.
5. Facilitating patient's transition to dialysis after a failed kidney transplant.

The complete list of activities can be found on the NNCC website in the CDN section. Click on "The Exam," then on "Exam Specifications."

Test Specifications (Blueprint) for the CDN Examination

Objectives:

1. Recognize pathologic processes and complications that occur with kidney disease and/or treatment modalities. **(18%)**
2. Select interventions appropriate to the pathologic processes and complications that occur with kidney disease and/or treatment modalities. **(19%)**
3. Apply physiologic and technical principles of kidney replacement therapies. **(18%)**
4. Select appropriate teaching/learning strategies to educate patient, family, other health professionals, and the public. **(10%)**
5. Select appropriate actions in administering medication(s) to the patient being treated for kidney disease. **(12%)**
6. Recognize the importance of an interdisciplinary approach to promote optimum functioning across the continuum of care. **(6%)**
7. Select interventions appropriate to the psychological and sociocultural effects of kidney disease. **(3%)**
8. Apply principles of infection control. **(12%)**
9. Recognize the importance of professional nursing practice in promoting patient outcomes (e.g., consultation, staff development, quality improvement, and research). **(2%)**

Distribution of 150 Question in the CDN Exam
(Accepted 4/2018, Effective 1/2019)

Objective Content Area	1. Path/ Comp	2. Interven- tions	3. Phys/ Tech	4. Teach	5. Meds	6. Interdis- ciplinary	7. Psycho- social	8. Infection Control	9. Profes- sional	Total
A. Concepts of Kidney Disease	7-8	8-9	7-8	4-5	5-6	2-3	1-2	5-6	0-1	41-43 (28%)
B. Hemodialysis	14-15	15-16	14-15	7-8	9-10	4-5	2-3	9-10	1-2	77-79 (52%)
C. Peritoneal Dialysis	4-5	4-5	4-5	2-3	2-3	1-2	0-1	2-3	0-1	23-25 (16%)
D. Transplant & Acute Therapies	1-2	1-2	1-2	0-1	0-1	0-1	0-1	0-1	0-1	5-8 (4%)
Total	26-28 (18%)	28-30 (19%)	26-28 (18%)	14-16 (10%)	17-19 (12%)	9-11 (6%)	4-6 (3%)	17-19 (12%)	2-4 (2%)	150

Types of Questions on the CDN Examination

Several different types of questions appear on the CDN examination. Some questions require a basic recall of knowledge, while others test the nurse's ability to comprehend a concept. However, most of the questions ask the nurse to apply knowledge in a clinical situation. Examples of each of these types of questions appear below with the correct answer marked with a checkmark (✓).

A. Recall of Knowledge

Test questions at the knowledge level ask the nurse to remember specific facts, common terms, basic concepts, and principles. Definitions of terms are examples of recall items.

1. Intradialytic hypotension is defined as a
 1. rise in blood pressure between hemodialysis treatments.
 2. rise in blood pressure during the hemodialysis treatment.
 3. fall in blood pressure between hemodialysis treatments.
 4. fall in blood pressure during the hemodialysis treatment. ✓

B. Comprehension

Test questions at the comprehension level go beyond basic recall to determine the nurse's deeper understanding of a concept. Examples of words used to describe comprehension might include interpret, compare, contrast, explain, estimate, and translate.

2. A patient's pre-dialysis blood pressure was 156/86 mm Hg. Two hours into the treatment, the patient's blood pressure is 102/60 mm Hg. The nurse should understand that the change in blood pressure is **most** likely the result of
 1. increased central circulation contraction.
 2. decreased plasma refilling rate. ✓
 3. increased biventricular output.
 4. decreased parasympathetic outflow.

C. Application of Knowledge

Test questions at the application level ask the nurse to apply previously learned facts and concepts to new situations and to solve problems. These questions present a clinical situation and ask what problem is occurring or what action to take in the situation.

3. The nurse would anticipate which of the following orders to treat a patient's intradialytic hypotension?
 1. Instruct the patient to eat a carbohydrate-rich meal one hour prior to the hemodialysis treatment.
 2. Set the patient's treatment for the prescribed hemodialysis time followed by one hour of isolated ultrafiltration.
 3. Administer levocarnitine (Carnitor) 750 mg IV 30 minutes before to the end of the hemodialysis treatment.
 4. Have the patient take midodrine (Proamatine) 5 mg by mouth 30 minutes prior to hemodialysis. ✓

CDN Certification Preparation Test

This Preparation Test has been developed to give you experience with the type of questions that are on the CDN examination. None of these questions will appear on the actual exam. On page 14, the correct answers and rationales for each of the questions are given. Compare your answers with the correct answers.

- Fluid is removed in hemodialysis **primarily** by which of these pressures?
 - Convective.
 - Oncotic.
 - Hydrostatic.
 - Diffusive.
- Signs and symptoms of an air embolism include
 - dyspnea.
 - abdominal pain.
 - Kussmaul respirations.
 - headache.
- A patient who receives chronic hemodialysis treatments is brought to the emergency department on the weekend. Laboratory tests reveal a serum potassium of 7.0 mEq/L. Which of these treatments would effectively lower the patient's total body potassium?
 - Spironolactone (Aldactone).
 - Calcium gluconate (Kalcinate).
 - Sodium phosphate (Fleet) enema.
 - Sodium polystyrene sulfonate (Kayexalate).
- Auscultation is a routine part of the predialysis assessment of the arteriovenous (AV) access prior to cannulation. The rationale for auscultation is to
 - document the access patency.
 - listen for a thrill.
 - differentiate between an AV fistula and synthetic graft.
 - determine the appropriate needle gauge.
- When a patient has a loop graft, which of these needle placements would be appropriate?
 - Venous needle placed 1.5-2 inches from the arterial anastomosis.
 - Arterial needle placed 1.5-2 inches from the venous anastomosis.
 - Arterial needle placed retrograde to graft flow (in the opposite direction of flow).
 - Both arterial and venous needles placed retrograde to graft flow (in the opposite direction of flow).
- According to current (2015) CDC recommendations, which of these methods for **initial** skin preparation is appropriate prior to cannulation of an arteriovenous access?
 - Wash the site with hexachlorophene.
 - Wash the site with soap and water.
 - Clean the site with ethyl alcohol.
 - Clean the site with hand sanitizer.
- During a patient's hemodialysis treatment, the nurse observes tiny air bubbles in the venous bloodline. The **most** likely source of these air bubbles is a loose connection
 - before the blood pump.
 - after the blood pump.
 - in the affluent dialysate line.
 - in the effluent dialysate line.
- Long-term exposure to low levels of endotoxin in water used for dialysis may result in patients becoming resistant to
 - antibiotics.
 - parenteral calcimimetic therapy.
 - phosphate binders.
 - erythropoiesis-stimulating agents.

Larry Miller, a 68-year-old patient with chronic kidney disease (CKD), has been referred to a nephrology practice.

9. When instructing Mr. Miller about taking his calcium carbonate (Tums®) as a phosphate binder, the nurse should be sure he understands that the Tums should be taken
1. with meals.
 2. between meals.
 3. anytime, but spread throughout the day.
 4. with vitamins to aid absorption.
10. As Mr. Miller's residual kidney function declines, his potassium starts to increase. A single serving of which of the following foods is **highest** in potassium?
1. Frozen peaches.
 2. Fresh peaches.
 3. Dried peaches.
 4. Canned peaches.

Mr. Miller has an access placed and begins hemodialysis treatments.

11. When encouraging Mr. Miller to adhere to his plan of care, the nurse informs him about patient outcome findings from the Dialysis Outcome Practice and Pattern Study (DOPPS). By using the DOPPS data to educate Mr. Miller, the nurse is demonstrating
1. research utilization.
 2. regulatory adherence.
 3. observational analysis.
 4. quality control.
12. Mr. Miller has had hypotensive episodes several times during the last hour of his hemodialysis treatments. The **most** appropriate nursing action is to
1. determine if the blood flow rate is appropriate.
 2. check the function of the vascular access.
 3. assess for signs of congestive heart failure.
 4. re-evaluate his target weight.

After three years of outpatient dialysis, Mr. Miller's nurse informs him that his dialysis adequacy results do not meet the target value.

13. Which of the following could contribute to lower dialysis adequacy?
1. Increased urea reduction ratio.
 2. Increased salt and water intake.
 3. Decreased protein intake.
 4. Decreased access blood flow.

Theresa Ruiz, 45 years old, has CKD Stage 5 secondary to glomerulonephritis. She began dialysis emergently two months ago and has a cuffed, tunneled, central venous catheter, which is being used while her permanent access matures.

14. According to the Centers for Disease Control and Prevention (CDC), which of these nursing actions is **most** important in preventing hemodialysis catheter-related infection in patients like Ms. Ruiz?

1. Routine exit site care with povidone iodine (Betadine).
2. Using aseptic technique when starting/ending dialysis.
3. Locking each port with heparin post dialysis.
4. Routine monitoring of blood and dialysate flow rates.

15. Ms. Ruiz consistently has above-normal serum phosphorus levels. The nurse consults the dietitian who emphasizes that foods **highest** in phosphorus content include

1. fats and oils.
2. fruits and vegetables.
3. processed meats and fish.
4. enriched white bread and pastas.

16. The laboratory test results indicate that Ms. Ruiz is positive for hepatitis B surface antigen (HBsAg). Based on this finding, the nurse should realize that Ms. Ruiz

1. requires immunization.
2. has been successfully immunized.
3. previously had a hepatitis B infection.
4. currently has a hepatitis B infection.

Laura Beck, 77 years old, has CKD Stage 5 secondary to diabetic nephropathy. She has selected peritoneal dialysis for kidney replacement therapy.

17. A month after completing home peritoneal dialysis training, Mrs. Beck calls the nurse and reports white strands in the dialysate drain bag. The nurse should recognize this finding as

1. fibrin formation.
2. early peritonitis.
3. subclinical bleeding.
4. peritoneal sclerosis.

18. At Mrs. Beck's next routine clinic visit, an exit site assessment is done. Which of the following findings is characteristic of a healthy exit site?

1. Serous drainage.
2. Large crust.
3. Light pink coloration.
4. External granulation tissue.

19. It is noted that Mrs. Beck's hemoglobin A1C level is elevated. Which of these actions should the nurse take **initially**?

1. Recommend that she use only 1.5% dextrose dialysis solutions.
2. Consider changing her insulin to a long-acting form.
3. Change her to continuous cyclical peritoneal dialysis (CCPD) for blood glucose control.
4. Try to determine the underlying cause of her poor glucose control.

Robert Cooper, a 65-year-old male, was referred for peritoneal dialysis home training.

20. Mr. Cooper's home training is almost complete. A nurse who has not been involved in his training is asked to assess his mastery of the continuous ambulatory peritoneal dialysis (CAPD) exchange technique. An **essential** part of assessing this psychomotor skill is to

1. ask him to list the steps of the procedure.
2. ask him to demonstrate the procedure.
3. give him a paper-and-pencil test.
4. give him an oral quiz.

21. Which of the following classifications of drugs is nephrotoxic and should be used with caution in patients like Mr. Cooper to preserve residual kidney function?

1. Aminoglycosides.
2. Fluoroquinolones.
3. Neuromuscular blockers.
4. Calcium channel blockers.

Karen Perri, 28 years old, received a kidney transplant nine years ago. During the past several months she has shown signs of progressive loss of kidney function and has been diagnosed with chronic allograft nephropathy.

22. Ms. Perri says to the nurse, "I'm so depressed. I did so well for so long. Now I'm losing everything." Which of these **initial** responses of the nurse would be **best**?

1. "Feelings of loss are common among people in your situation."
2. "Losing the kidney doesn't mean you're losing everything."
3. "Tell me more about what you feel you're losing."
4. "Let's talk about the ways loss of the kidney can be treated."

23. Which of these medications, if taken by Ms. Perri, is likely to contribute to her altered mood?

1. Mycophenolate mofetil (CellCept).
2. Prednisone (Deltasone).
3. Azathioprine (Imuran).
4. Diltiazem (Cardizem).

The next two questions are individual items.

24. Which of the following factors affects the diffusion or removal of toxins during hemodialysis?

1. The lower the temperature, the greater the solute removal.
2. The smaller the molecular weight, the lower the solute removal.
3. The lower the concentration gradient, the higher the removal of solutes.
4. The more permeable the membrane, the greater the removal of solutes.

25. The nurse notices a patient's dialysis adequacy has decreased over the past few months. The development of which of the following access complications could explain this finding?

1. Steal syndrome.
2. Venous stenosis.
3. Pseudoaneurysm.
4. Superficialization.

Glenda Rowe, a 48-year-old female, has been on chronic hemodialysis for 3 months and has expressed an interest in performing in-center self-care hemodialysis. The nephrology team evaluates Ms. Rowe and decides that she is an excellent candidate for the self-care program. A certified dialysis nurse is assigned to the patient to provide her with the necessary knowledge and skills to perform self-care.

26. When providing education to Ms. Rowe, the nurse should remember that
1. adults have a significant decline in learning abilities after the age of 40.
 2. selective perception prevents incorporation of new information.
 3. organized information is more easily perceived and processed.
 4. abstract concepts are more easily learned than technical information.
27. Ms. Rowe watched a video about how dialysis works and is taking a self-assessment quiz. Learning would have occurred if she correctly identifies the process that moves solutes from an area of higher concentration to an area of lower concentration as
1. osmosis.
 2. sieving.
 3. modeling.
 4. diffusion.

Questions 28-30 are individual items.

28. In a normal glomerulus, the **initial** step in the formation of urine is via which of these processes?
1. Filtration.
 2. Secretion.
 3. Excretion.
 4. Absorption.
29. A 76-year-old male patient who has type 2 diabetes mellitus is being sent for a coronary angiogram. Because of his age and diabetes mellitus, the patient is at risk for
1. an allergic reaction.
 2. acute kidney injury.
 3. microangiopathic disease.
 4. a vasovagal response.
30. A 42-year-old female who was admitted to the ICU with sepsis syndrome develops acute kidney injury. Continuous renal replacement therapy (CRRT) is initiated. When planning the patient's care, the dialysis nurse should collaborate with the
1. nutritionist to calculate appendicular lean mass.
 2. ICU staff to maintain system patency.
 3. ethicist to determine eligibility for CRRT therapy.
 4. social worker for chronic dialysis placement.

CDN Certification Preparation Test Answers

Below, you will find the correct answer to each of the Preparation Test questions, as well as a rationale explaining the correct answer. Also indicated is the blueprint area that each question falls under, and a reference where the correct answer can be found. The references used are:

- Bodin, S.M. (Ed.) (2017). *Contemporary Nephrology Nursing*, 3th ed. Pitman, NJ: ANNA.
- Counts, C.S. (Ed.) (2015). *Core Curriculum for Nephrology Nursing*, 6th ed. Pitman, NJ: ANNA.
- Daugirdas, J.T., Blake, P.G., & Ing, T.S. (2015). *Handbook of Dialysis*, 5th ed. Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins.
- Fox, K, Leibrecht, C & Shields, K.M. (2019). *Pearson Nurse's Drug Guide 2019*. Hoboken, NJ: Pearson Education, Inc.
- Gilbert, S.J., et al. (2018). *NKF's Primer on Kidney Diseases*, 7th ed. Philadelphia: Elsevier and National Kidney Foundation.
- Gomez, N.J. (Ed.). (2017). *Nephrology Nursing Scope and Standards of Practice*, 8th ed. Pitman, NJ: ANNA.
- Kallenbach, J. Z. (2016). *Review of Hemodialysis for Nurses and Dialysis Personnel*, 9th ed. St. Louis, MO: Elsevier Mosby.
- Centers for Medicare & Medicaid Services. Conditions for Coverage. www.cms.gov
- Centers for Disease Control and Prevention. www.cdc.gov
- National Kidney Foundation. KDOQI Clinical Practice Guidelines. www.kidney.org.

1. **Answer:** 3

Blueprint Area: Hemodialysis - Physiologic/Technical

The hydrostatic or hydraulic pressure has the most influence on fluid removal during hemodialysis. This is the pressure that a liquid exerts against the wall of its container. In ultrafiltration, the blood circuit exerts positive pressure against the membrane while negative pressure is exerted from the dialysate side.

Core Curriculum, Module 3, p. 79; *Review of Hemodialysis*, p. 86

2. **Answer:** 1

Blueprint Area: Hemodialysis - Pathology/Complications

The classic symptoms of an air embolism include chest pain or tightness or shortness of breath, as well as cough.

Core Curriculum, Module 3, p. 139; *Review of Hemodialysis*, p. 172

3. **Answer:** 4

Blueprint Area: Hemodialysis - Medications

Sodium polystyrene sulfonate (Kayexalate) is used for the treatment of hyperkalemia. It removes potassium from the body by exchanging sodium for potassium, primarily in the large intestine. Calcium gluconate protects the heart from the effects of potassium but does not lower total body potassium.

Review of Hemodialysis, p. 227; *NKF's Primer on Kidney Diseases*, p. 105; *Pearson Nurse's Drug Guide*, p. 1504

4. **Answer:** 1

Blueprint Area: Hemodialysis - Physiologic/Technical

Nursing assessment of an arteriovenous fistula should include auscultation for a bruit. Changes in pitch and amplitude might be early signs of stenosis. Assessment is done predialysis to prevent cannulation of a clotted access.

Core Curriculum, Module 3, p. 181; *Review of Hemodialysis*, p. 151; *Handbook of Dialysis*, p. 114

5. **Answer:** 3

Blueprint Area: Hemodialysis - Physiologic/Technical

Fistula needles must be placed 1.5 or more inches from the anastomosis site. The arterial needle can be placed either antegrade or retrograde to blood flow. The venous needle must be placed antegrade (in the direction of flow).

Review of Hemodialysis, p. 152

6. **Answer:** 2

Blueprint Area: Hemodialysis - Infection Control

According to the current CDC checklist, skin preparation techniques for subcutaneous AV accesses include:

- Soap and water should be used to wash the access.
- Apply skin antiseptic per manufacturer's instructions for use.

Core Curriculum, Module 3, p. 203; CDC Arteriovenous Fistula and Graft Cannulation Checklist (updated January 2015)

7. **Answer:** 1
Blueprint Area: Hemodialysis - Physiologic/Technical
An air embolism may be caused by a leak or loose connection in the extracorporeal circuit before the blood pump. A loose connection pre blood pump would result in air being drawn into the system (negative pressure), whereas a loose connection post blood pump would result in blood being forced out of the system (positive pressure).
Core Curriculum, Module 3, pp. 91-92; Review of Hemodialysis, p. 172
8. **Answer:** 4
Blueprint Area: Hemodialysis - Pathology/Complications
Long term exposure to low levels of endotoxins that emanate from gram negative bacteria may cause chronic inflammatory disease in patients. Signs may include resistance to ESAs.
Core Curriculum, Module 3, p. 102
9. **Answer:** 1
Blueprint Area: Concepts of Kidney Disease - Medications
The active substance in a phosphoric binder attaches to phosphorus when present. Phosphorus binders are most effective when given with meals when the phosphorus in the food is physically available.
Review of Hemodialysis, p. 229
10. **Answer:** 3
Blueprint Area: Concepts of Kidney Disease - Interventions
Food preparation affects the potassium level. The potassium concentrates in dried fruit as the water is removed, leaving very high levels of potassium in a single serving of fruit.
Core Curriculum, Module 6, p. 177, Table 5.9
11. **Answer:** 1
Blueprint Area: Concepts of Kidney Disease - Professional
Research utilization is applying knowledge gained from research to a clinical situation.
Core Curriculum, Module 1, pp. 65-66, 75-76
12. **Answer:** 4
Blueprint Area: Hemodialysis - Interventions
If the patient's target or "dry" weight does not reflect the patient's euvolemic state, the patient will likely become hypotensive as the intravascular volume falls and can no longer support the blood pressure.
Core Curriculum, Module 3, p. 146-148; Review of Hemodialysis, p. 168-169; Handbook of Dialysis, p. 217
13. **Answer:** 4
Blueprint Area: Hemodialysis - Pathology/Complications
The National Kidney Foundation identifies a number of factors as instrumental in adversely affecting the prescribed dose of dialysis. These include compromised urea clearance from a variety of causes--including inadequate blood flow from the vascular access.
Core Curriculum, Module 3, pp. 182-183; Review of Hemodialysis, p. 203
14. **Answer:** 2
Blueprint Area: Hemodialysis - Infection Control
To minimize the risk of infection, aseptic technique should be used when initiating or terminating dialysis. While exit site care is also important, it is done less frequently.
Core Curriculum, Module 3, p. 210; CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011.
15. **Answer:** 3
Blueprint Area: Hemodialysis - Interdisciplinary
Patients can best control their phosphorus levels by following a reduced phosphorus diet. Foods higher in phosphorus include dairy products, meat, processed foods, nuts, peanuts and other legumes, chocolate, and colas.
Core Curriculum, Module 2, p. 135; Handbook of Dialysis, p. 668 (table)
16. **Answer:** 4
Blueprint Area: Hemodialysis - Infection Control
A positive HBsAg is indicative of ongoing hepatitis B infection.
Core Curriculum, Module 2, p. 349, Table 6.2; Review of Hemodialysis, p. 121, Table 10-2

17. **Answer:** 1
Blueprint Area: Peritoneal Dialysis - Pathology/Complications
Fibrin in the effluent can lead to haziness and to observations of fibrin strands or clumps in drainage bags, either immediately or after the bag is left sitting out for a period of time.
Review of Hemodialysis, p. 260, 266 (Table 19.5); *Handbook of Dialysis*, p. 441
18. **Answer:** 3
Blueprint Area: Peritoneal Dialysis - Interventions
A healthy exit site color is natural, pale pink, or somewhat darker than natural skin tone.
Core Curriculum, Module 3, p. 239; *Review of Hemodialysis*, p. 262
19. **Answer:** 4
Blueprint Area: Concepts of Kidney Disease - Interventions
While the dextrose content of the peritoneal dialysis solution can contribute to elevated glucose levels and, in turn, elevate A1C, many other factors might also be involved. Assessment of the patient's unique situation is essential prior to any nursing intervention.
KDOQI Clinical Practice Guidelines for Diabetes (2012), p. 867 (found in *AJKD* 2012 Vol. 60[5])
20. **Answer:** 2
Blueprint Area: Peritoneal Dialysis - Teaching/Learning
In this situation, directly observing the behavior being taught is the most accurate and appropriate method to evaluate psychomotor skills. All of the other answers refer to indirect measurements of successful learning and are not as effective.
Core Curriculum, Module 3, p. 291; *Review of Hemodialysis*, p. 269
21. **Answer:** 1
Blueprint Area: Peritoneal Dialysis - Medications
Aminoglycosides can cause acute kidney injury through direct tubular injury.
Core Curriculum, Module 6, p. 28; *NKF Primer on Kidney Diseases*, pp. 340-341; *Contemporary Nephrology Nursing*, p. 706
22. **Answer:** 3
Blueprint Area: Transplant and Acute Therapies - Psychosocial
Patients with progressive chronic kidney disease and a failing transplant are in need of emotional support and grief counseling. Only option 3 allows the patient to express her feelings about her loss.
Review of Hemodialysis, p. 309
23. **Answer:** 2
Blueprint Area: Transplant and Acute Therapies - Medications
Mood changes, such as emotional lability, euphoria, or depression, are aggravated by prednisone.
Pearson Nurse's Drug Guide 2019, p. 1346; *Contemporary Nephrology Nursing*, pp. 772-773
24. **Answer:** 4
Blueprint Area: Hemodialysis - Physiologic/Technical
Diffusion in hemodialysis occurs across the semipermeable membrane that separates the blood compartment from the dialysate compartment. A semipermeable membrane allows passage of some molecules while restricting or preventing the transit of others. Therefore, the more permeable the membrane, the greater the removal of solutes.
Core Curriculum, Module 3, pp. 76-77; *Review of Hemodialysis*, p. 81
25. **Answer:** 2
Blueprint Area: Hemodialysis - Pathology/Complications
Venous stenosis can lead to recirculation and inadequate dialysis.
Core Curriculum, Module 3, p. 182; *Handbook of Dialysis*, p. 139; *Review of Hemodialysis*, p. 203
26. **Answer:** 3
Blueprint Area: Concepts of Kidney Disease - Teaching/Learning
By presenting information in an organized fashion, learning is facilitated.
Core Curriculum, Module 2, p. 213; *Review of Hemodialysis*, p. 322, Box 24-1

27. **Answer:** 4

Blueprint Area: Concepts of Kidney Disease - Physiologic/Technical

Diffusion is the movement of a molecule from an area of high solute concentration to an area of lower solute concentration. *Core Curriculum*, Module 3, p. 74, Figures 2.1 & 2.2; *Review of Hemodialysis*, p. 22; *NKF's Primer on Kidney Diseases*, p. 528.

28. **Answer:** 1

Blueprint Area: Concepts of Kidney Disease - Pathology/Complications

The process of forming urine begins with the passive process of filtration of water and other small molecules from the plasma into Bowman's capsule.

Core Curriculum, Module 2, p. 34, Figure 1.30; *Review of Hemodialysis*, p. 33

29. **Answer:** 2

Blueprint Area: Concepts of Kidney Disease - Pathology/Complications

A higher incidence of intrarenal acute kidney injury (AKI) is seen in persons with diabetes with pre-existing chronic kidney disease. This patient's age also places him in a higher risk category, as does exposure to a nephrotoxic radiocontrast agent.

Core Curriculum, Module 4, p. 28

30. **Answer:** 2

Blueprint Area: Hemodialysis - Interdisciplinary

Collaboration between the nephrology and ICU disciplines leads to the best opportunities, care, and outcomes for the acutely ill patient. Ongoing communication between the nephrology and ICU nurses is a critical element to effective and safe CRRT.

Core Curriculum, Module 4, pp. 179-180



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