



Core Curriculum for the Dialysis Technician

A Comprehensive Review of Hemodialysis

PRECEPTOR MODULE



Preceptor Module

Introduction

Across the nation, dialysis technicians are assuming increasing responsibility for the safety and well-being of patients on dialysis. From dialyzer reprocessing to patient care, technician training and experience are a crucial link in providing safe and effective patient care.

The purpose of the *Core Curriculum for the Dialysis Technician* is to provide basic information on the varying duties dialysis technicians may have in a dialysis center. The modules cover both technical and clinical aspects of dialysis treatment. Combining these modules with your center-specific information and a thoughtful, well-planned preceptorship program will help improve dialysis technician training.

The Preceptor Method

WHAT IS A PRECEPTOR?

Each dialysis technician beginning work at a center brings a unique background, education, and set of skills to the workplace. Depending on state law, the trainee may have to meet certain requirements. A new employee may have a high school diploma, a four-year college degree, or anything in between.

To become a productive employee, the new technician will have to learn tasks associated with the job, as well as the routines and personalities that are unique to *your* center. Helping the new employee to adjust to a new role is the job of a preceptor.

A preceptor is a knowledgeable, experienced staff person who works one-on-one with new employees, overseeing and coordinating their learning process, until they are able to function independently. According to *Preceptorships in Nursing Staff Development*:

“The preceptor is responsible for microplanning: deciding which experiences best fit the novice’s needs, sequencing experiences so that they build on one another, seeking out learning experiences to meet the novice’s needs or goals, and generally planning on a minute-to-minute, hour-to-hour, and day-to-day basis.”¹

In many centers, a trainee will “shadow” his or her preceptor. The pair will be assigned to all the same shifts for a predetermined period of weeks or months, or until the learning objectives are met. The preceptor will choose patients to care for, to provide the trainee with a balanced learning experience.

There are many roles a preceptor may take. Following are descriptions of the most common ones.

Teacher

The teacher/preceptor is a guide who knows program content, demonstrates proper techniques, and presents new information to the trainee in an organized, stimulating way that improves understanding. As a teacher, the preceptor helps the student to integrate theory with practice.

An assessment of the student’s learning needs helps the teacher/preceptor plan an *individualized outline and learning plan*. The preceptor observes while the novice attempts new procedures, offering assistance when needed. Careful supervision,

Preceptor Module

on-the-spot feedback, and objective evaluation help the learner stay on track.

Support Person

The support person/preceptor is a facilitator who helps the student who may be overwhelmed by the sheer volume of new material to master. The preceptor can offer a realistic time frame for the trainee to become more comfortable with new job duties, and provide motivation to continue the learning process. In addition, the preceptor can introduce the new employee to co-workers, and include the novice in work-related social activities.

Role Model

The role model/preceptor presents an example of appropriate work habits, behavior, and attitudes toward patients and administration. The new employee will be seeking clues about how to best fit into the work place—are other employees conscientious or careless? Do they follow established procedures or take shortcuts? Are they respectful of patients at the work stations *and* in the break room? A caring preceptor can be a powerful, positive influence on a beginning technician.

Resource Person

The resource person/preceptor is an expert in the day-to-day functioning of the center, the issues facing dialysis patients and healthcare personnel, kidney disease and its effect on patients, and dialysis treatment. As a resource person, the preceptor is available to answer questions and explain policies. The preceptor/resource person does not need to know everything—only where to find the information. Part of the preceptor's duty as a

resource person is to familiarize the student with the reference materials and department manuals that are available.

Mentor

The mentor/preceptor is an established employee who guides the career development of a newer worker, either formally or informally. For example, a staff nurse or experienced dialysis technician might advise a new technician to think ahead to improve knowledge and credibility, and to consider becoming an active member in a professional organization.

WHY USE A PRECEPTOR MODEL?

The preceptor learning model makes sense in today's dialysis environment because it is a cost effective, practical way to enhance the professionalism of current staff members while boosting the competence of new employees.

Preceptorship makes good use of a staff person's experience to help fill the gap between a novice's current knowledge and what will be needed to do the job well. The technician-in-training is not considered to be a full-fledged employee until both the theoretical learning and clinical skills training have been completed. This novice role reduces new-job stress for the trainee, and clears the way for more thorough learning.

An additional advantage for experienced dialysis staff is the opportunity preceptorship offers for professional advancement while continuing to perform patient care duties. With few such opportunities available today, becoming a preceptor can be a welcome way to gain recognition for exceptional performance.

A preceptor program creates a challenging environment for future professional growth.

In fact, having a strong preceptorship program in place can help your center attract and retain quality personnel. The obvious value placed on professional competence and continued learning can make your center more attractive to prospective employees.

Finally, the atmosphere of professionalism and continued learning that surrounds a thriving preceptorship program is contagious to everyone who works in the center—and this can improve the quality of care for patients.

THE PRECEPTOR IN A DIALYSIS SETTING

Feasibility

Is a preceptorship program feasible for your center? In general, a preceptorship program is most cost effective when there will be an ongoing need to train technicians one at a time or in small groups.

There are certain considerations as you decide which training model to adopt. The following six are important areas to assess:

Leadership availability

Do you have a motivated leader available to pull the program together, present it to administration, and make it work?

Administrative support

Is your center's administration open-minded and willing to consider new ways to train employees?

Coordinator time

A coordinator for a preceptorship program is somewhat like a preceptor for preceptors.

Is there a willing coordinator who has time to troubleshoot, match up preceptors with trainees, and work out schedules?

Preceptor availability

For a preceptorship program to work, you will need a number of excellent practitioners who are willing to take on the additional responsibility for training and evaluating others. Do you have as many potential preceptors as you'll need?

Flexibility

Any new training program will require fine-tuning. Can your center adapt to changes and show the necessary sensitivity to new preceptors and trainees?

Economics

Is money available for program development, resource materials, administrative and clerical staff, trainee salaries, and preceptor financial incentives?

Developing Preceptors

If you answer "yes" to the above questions, you're ready to teach your qualified staff how to be preceptors. While a learn-as-you-go policy may eventually create good preceptors, taking an active approach will yield more consistent and positive results.

Workshops or classes in preceptorship are more formal ways of developing would-be preceptors. Such courses may be available through a hospital in-service department, private companies, colleges and universities, or could even be taught by current employees who have taken the time to research the topic.

Self-learning materials are another way to investigate preceptorship. Useful topics might

include background on preceptor and trainee roles, expectations, the adult learner, teaching and learning principles, communication skills, stress and time management, and performance evaluation.

Merging the Clinical and Theoretical

Unfortunately, some dialysis technicians receive only clinical training with no theoretical background. Without knowing the “why” behind the procedures, it is difficult for these technicians to know whether they are doing things properly. Troubleshooting becomes nearly impossible.

Lack of context for a task renders it boring and repetitive—which may make dangerous mistakes more likely. Also, technicians who are unable to answer basic questions do not tend to inspire patients’ confidence.

A working knowledge of dialysis history, human renal anatomy, physiology, principles of dialysis, devices, vascular access, procedures, reprocessing, and water treatment will improve the technician’s ability to care for and communicate with patients.

Planning a Training Program

HOW TO USE THE *CORE CURRICULUM*

How do you get your technician training program off the ground? While it would be convenient if this manual could just tell you to do A, B, C, and D, the reality is that your use of the *Core Curriculum* must be customized for

your specific center. How? The following steps are crucial to the success of a center’s preceptor training program.

Assessment

Taking stock of your center’s situation is an essential first step to a successful training program. How many new employees will need to be trained? How will you evaluate their skills and education during the hiring process? What resources and personnel are available to you? You must decide *what* you need before you can plan to meet those needs with a training program.

Prepare one or more questionnaires for current technicians, RNs, and administration to determine what knowledge gaps must be filled and what your priorities will be. Talk informally to patients. The next step is planning your program.

Planning

It is important to carefully set up the structure and personnel for your training program, and determine a realistic budget. If you have chosen a preceptor model, for example, a head nurse or coordinator will be responsible for matching a preceptor to a trainee. The preceptor will follow the novice’s entire training, and will evaluate clinical and technical skills.

The preceptor (or supervisor) should arrange to set aside a file cabinet or drawer or some other space to keep the materials. Each student should have a large folder with his or her name on it in this drawer.

Each preceptor can then arrange a pre-training meeting with the trainee. This meeting should cover the program’s purpose, your center’s philosophy, a realistic time framework, goals, and learning objectives.

Learning objectives must be measurable, achievable, written in concrete terms, and understandable by everyone involved (no jargon). Learning objectives may be designed for daily or weekly use. An example of a weekly learning objective might be: By the end of the first week, the trainee should be able to:

- Identify different parts of the machine and describe their functions.
- Define the basic principles of diffusion, osmosis, and filtration.
- Identify the parts of a human kidney on an unlabeled diagram.
- Compare normal kidney functions to those of the dialyzer and delivery system.

The preceptor or supervisor can customize the *Core Curriculum* for your center by including center-specific materials, procedures, instructions, and other essential information.

Each module of the *Core Curriculum* contains its own concrete learning objectives. (Posttests and posttest answer keys are at the end of this Preceptor Module.) The preceptor determines how appropriate each activity is for the student, and gathers resources ahead of time so that the chosen activities can take place.

Implementation

Now that your plan is in place, it can be put into action. Using the *Core Curriculum*, the preceptor can tailor the educational experience to the knowledge level of the trainee and to the job skills that will be required. Throughout the use of the *Core Curriculum*, the preceptor is available to answer questions, clarify concepts, and check the results of the posttests.

At the same time, the preceptor designs clinical learning activities to complement the lessons in the *Core Curriculum*. Constant assessment and feedback allow the novice to gradually function independently at a high level.

During the implementation phase of a technician training program, it is important to make sure that your preceptors or trainee supervisors have enough time for their new roles. If possible, an RN acting as a preceptor should not also be charge nurse. In addition to shadowing the preceptor's shift, the schedule ideally should allow time for the preceptor and novice to have weekly planning meetings and feedback sessions.

Periodically throughout each module and at the end of each module, the preceptor should record all appropriate information about the student's progress. The record should include feedback to and from the student. An even more thorough picture of the student's progress will emerge if the preceptor includes anecdotal observations along with the more formal learning assessments.

Evaluation

A training program can be evaluated on several levels. You will need ongoing feedback to know not only how your trainee is doing, but also how well the training program is functioning to bring the new employee up to speed.

According to M. Knowles in *The Adult Learner: A Neglected Species*, among the different types of evaluation are:²

- *Reaction evaluation* – a paper-and-pencil test of how well participants liked the program.
- *Learning evaluation* – posttests to determine how well the facts were learned.

- *Behavior evaluation* – observation of behavior or self-ratings can disclose whether the training is effective.
- *Results evaluation* – an institutional determination of the benefits to the organization, such as cost savings, improved quality of care, or better staff retention.
- *Re-diagnosis* – determining further areas of learning needs, and areas for potential growth. If a number of trainees are consistently unable to understand a certain portion of the theoretical background, for example, it may be necessary to rework the way that section is taught.

The evaluation component of your training program allows your center to undertake the type of continuous quality improvement that is the basis for the *Core Curriculum*. Fine-tuning and troubleshooting the program according to the feedback you receive encourages flexibility and continued professional growth.

OTHER TRAINING MODELS

If a full-fledged preceptor program is beyond the needs or resources of your center, other training models are available that may offer some of the same benefits—if they are handled conscientiously. Either of these models could potentially be molded into a classic preceptor program over time when your center's circumstances are more favorable.

Independent Study/ Clinical Orientation

Trainees may complete the *Core Curriculum* modules by themselves, and then “shadow” a clinically competent “buddy” who is responsible for teaching skills and procedures.

Staff time will be required to decide which modules are to be used and in what order, and to answer questions. Even so, the lack of formal structure inherent in a loosely-woven training program such as this can increase the stress felt by novices, potentially reducing their learning levels.

If this type of plan is used, it would be helpful if a supervisor could set up weekly planning meetings with the trainee to evaluate his or her progress and allow questions to be answered. The fewer staff people the trainee must answer to, the better—too many opinions about how to perform every procedure can be confusing.

The important training component which could be lost under this system is *progress evaluation* of the novice. An effort must be made by the head nurse or chief technician to follow the trainee's progress, and provide the feedback he or she needs to develop confidence in a new and demanding role.

Group Study/ Clinical Orientation

Theoretical and background information can be taught to small groups of trainees, using the *Core Curriculum* and additional center-specific materials.

This model has the advantage of a knowledgeable staff person available to answer questions and present materials.

However, the disadvantage of this model is the difficulty involved in tailoring a novice's training when all students must be given the same information at the same time. The inability to adjust for different levels of prior knowledge and different job descriptions in the center may lead to some trainees being bored, while others are left behind and don't understand the material.

Student evaluation in the classroom can be done quite easily, but it will be necessary to make arrangements to evaluate each novice's clinical skills. This could, perhaps, be done by the classroom instructor in conjunction with a clinical orientation "buddy."

CORE CURRICULUM MODULES

Eight core modules form the basis of the training series. Each module is a self-sufficient topic, containing objectives, suggested practice areas with relevant informational background, and evaluation material. In addition, there is a separate reference module, which includes a glossary of terms. The eight *Core Curriculum* training modules include:

Module 1: Today's Dialysis Environment: An Overview

Most beginning technicians lack an overall sense of the context of dialysis. Why is dialysis needed? By whom? How does it work? When did it begin? This introductory module covers many of the basic concepts of dialysis. Most important, the student learns that allowing patients with chronic kidney disease to lead lives as normal as possible is the goal of all dialysis treatment.

This module introduces the history of dialysis, history of the Medicare End-Stage Renal Disease program, and career options. Much of this information is covered in greater depth in additional modules.

Module 2: The Person with Chronic Kidney Disease

Although many of the aspects of dialysis treatment involve equipment and technical

devices, every student must learn that his or her actions directly affect the recipient of care—the patient. With an understanding of the patient's experience, the student will be better able to communicate with patients, and recognize symptoms and potential problems early.

This module of the *Core Curriculum* helps the student learn what happens to the patient who requires dialysis treatment. The module explains normal kidney function and the causes, signs, and symptoms of chronic kidney disease.

Because there are important nutritional, psychological, and financial concerns for people with chronic kidney disease, a dietitian has contributed a section on diet, and a social worker has outlined available services. An overview of hemodialysis, peritoneal dialysis, and renal transplant is presented, including medications, potential complications, and expected goals of treatment.

Module 3: Principles of Dialysis

How does dialysis remove excess fluid and waste from the patient's body? The *Principles of Dialysis* module considers fluid and solute movement at the cellular level. A thorough grounding in the physiological principles that make dialysis possible will help the technician understand the reasons behind the orders given for the patient's dialysis treatment.

This module helps the student understand the basic principles behind dialysis and how dialysis replaces some functions of damaged kidneys. To understand some of the concepts of dialysis, it is helpful to understand how the human body works. This module compares

the functions of dialysis to the functions of the kidneys in the human body. This module also shows how the principles of dialysis relate to methods for achieving appropriate clearance.

Module 4: Hemodialysis Devices

Impressive technical advances over the past half century have combined to make dialysis an increasingly safe, effective, and efficient treatment for patients with renal failure. A dialyzer, dialysate, and a delivery system are the three key components of hemodialysis treatment.

Each component of the hemodialysis system raises complex safety and monitoring issues that are covered in this module. These issues include safe handling and mixing of dialysate, and the function of each alarm on the delivery system and extracorporeal circuit. The technician learns that the most important safety monitor is an alert, conscientious staff person.

This module provides information about dialysis devices, including different types of dialyzers, dialysate fluid, and delivery systems. By carefully following center procedures and learning from this module, the new technician will master the use of each device, and be able to assist in the safe delivery of the hemodialysis treatment.

Module 5: Vascular Access

Despite significant advances since the first reusable vascular access in 1959, this “patient life-line” remains the greatest challenge to the success of dialysis. Complications such as thrombosis, stenosis, and infection can lead to hospitalization, surgery, illness, and even death.

Without a good working access, patients do not receive adequate dialysis treatments, which affects their health, their work, and their family lives. The importance of good technician training and care for a vascular access cannot be underestimated.

This module provides information about each type of vascular access, and advantages and disadvantages for each type. Good management and care of the access are emphasized, as are patient teaching and complications. Knowledge and an appreciation for the value of a good vascular access are the best gifts a dialysis technician can bring to patient care.

Module 6: Hemodialysis Procedures and Complications

Every center has developed preferred methods for performing dialysis-related tasks. The specific techniques used at a given center for individual steps in a procedure should be passed on to the new technician by a preceptor or teacher who can demonstrate step-by-step processes.

The *Hemodialysis Procedures and Complications* module helps the student to understand the procedures he or she will need to learn. It breaks the numerous complex tasks that make up a dialysis treatment into manageable pieces. The module is organized to cover the process of dialysis, from set-up through clean-up.

Topics covered in the module include predialysis procedures, initiation of dialysis, monitoring during dialysis, heparinization, discontinuing the dialysis treatment, postdialysis procedures, and determining adequate dialysis.

The module also includes information about potential medical and technical complications during dialysis, general practice, infection control, laboratory tests, and documentation.

Module 7: Dialyzer Reprocessing

Economic savings and improved patient care converge in the reprocessing of dialyzers—at least for many patients. On the one hand, the biocompatibility of dialyzers is enhanced by reprocessing, making dialysis more comfortable and less symptomatic. On the other hand, residual bacteria, endotoxin, or germicide can be hazardous for patients.

In this module, the technician learns about the history, basic theory, procedures, and benefits-versus-risks to patients of reprocessed dialyzers. Risk management, and AAMI/CMS safety regulations are also covered. Practical guidelines for handling, labeling, reprocessing, inspecting, and storing dialyzers are provided, as well as quality assurance and quality control policies.

Module 8: Water Treatment

The large volume of water used in dialysis means that dialysis water quality is vitally important to patient safety. The student must understand why water quality must be maintained, and be able to monitor the variety of filters and other devices used to remove microorganisms, sediment, heavy metals, chemicals, and ions before drinking water can be used for dialysis.

This module of the *Core Curriculum* presents the dialysis technician with information about why and how water is treated before being

used for dialysis-related purposes. It covers the types of contaminants commonly found in water; how contaminants can affect patients; water treatment system components; and monitoring of the water treatment system.

INDIVIDUALIZING THE CURRICULUM

The preceptor can individualize technician training according to the center's priorities by varying the order of the *Curriculum* modules and the overall outline of the trainee's orientation program. Each module is a self-contained center that can be used alone or in sequence with the others.

Certain key concepts and illustrations are repeated in several modules to help the student understand how these concepts apply to different contexts.

RESOURCES

To make the best use of the *Core Curriculum* and related modules, each dialysis center should be prepared to provide trainees with the following library resources.

Reference Materials

Dialysis center references should include an English language and a medical dictionary, a medical terminology text, drug references, literature from equipment manufacturers, FDA manuals, and American Association of Medical Instrumentation (AAMI) materials.

Textbooks

Recent texts (published within the past five years) should be available covering all aspects of clinical and technical information on kidney disease and dialysis.

Medical Journals

Periodical literature helps practitioners keep up with new information in the field:

- *Advances in Chronic Kidney Disease*
- *American Journal of Kidney Diseases*
- *American Society for Artificial Internal Organs (ASAIO) Journal*
- *Clinical Journal of the American Society of Nephrology*
- *Dialysis and Transplantation*
- *Hemodialysis International*
- *Journal of the American Medical Association*
- *Journal of the American Society of Nephrology*
- *Kidney International*
- *Nephrology News & Issues*
- *Nephrology Nursing Journal*
- *New England Journal of Medicine*
- *Peritoneal Dialysis International*
- *Seminars in Dialysis*
- Professional and patient organization journals and newsletters:
 - American Association of Kidney Patients
 - American Society of Nephrology
 - Board of Nephrology Examiners – Nursing and Technology
 - National Association of Nephrology Technologists
 - National Kidney Foundation
 - National Renal Administrators' Association
 - Renal Physicians Association

Additional Materials

Films, videos, slide shows, and other non-printed information help round out the collection.

Obtaining Resource Materials

Given the budget constraints that all dialysis centers must work under, it may take creativity and time to build up a respectable library of educational materials. Merely making it known that you are seeking these resources may bring some of them to you. Here are several suggestions of ways to acquire materials:

- Center subscriptions to journals or periodicals
- Copies of journals or periodicals donated by staff members
- Journals obtained by staff members who join professional organizations
- Textbooks purchased with vendor or donor funds
- Free pamphlets, videos, slides, or tapes from vendors

The library you put together will be a valuable resource for existing staff members. The Internet is also an excellent resource.

PRECEPTING THE ADULT LEARNER

Most dialysis technician trainees will, as a rule, be interested in learning the material you are helping them to master. After all, their jobs will depend on it—and so will the safety of the patients cared for directly or indirectly by the trainee. As an adult, the technician trainee is *self-directed* and *self-motivated*, and the information you will be providing is immediately relevant to his or her life.

A *problem-centered* approach, staying on task, is most useful for the adult learner. Too much background information can be confusing and may even interfere with transmission of the main message.

Relevance is a powerful concept in adult education. Consider, for a moment, how information about home remodeling suddenly becomes interesting when you are planning a home improvement project, or how you look for travel information when vacation time is near. Adults actively seek out information that is relevant to their current life situation. To help a trainee learn, be sure the information you provide is what he or she needs to know.

Adult learners share other characteristics that can make your role as preceptor more clear-cut. With a lifetime of experiences to call upon, adults have a broad background of information that can serve as a framework for new information. When you present new material, help the student to see how it compares to other information he or she already knows.

Additional factors influence adult learning. They may include the following:

Self-concept

Adults are usually seen by society and each other as workers, not learners—but this view can be changed by the preceptor. A positive educational experience with a preceptor can build the student's self-confidence.

Environment

A comfortable physical setting encourages learning. It is difficult, for example, to concentrate on learning when the chair wobbles, the room is ice-cold, and there is

constant noise and activity. A comfortable psychological atmosphere also helps the learning process. An open, non-judgmental, non-authoritarian setting encourages adult learners to participate.

Age

An individual's life experience, maturation, and previous accomplishments influence his or her motivation to learn.

Motivation

Internal motivation arises from an interest of the learner, and is stronger than external motivation, which comes from outside the individual (for example, traffic school attendance mandated after a ticket). Asking a trainee about personal reasons for wanting to learn the information can help you understand exactly how important mastery of the material is to him or her.

Education and Learning Style

Previous educational attainments and reading levels influence a learner's comfort level with the whole idea of learning a new body of information. Learning style is an individual's general way of relating to new information—by relating it to previous knowledge, by observing, by theorizing, or by active experimentation and participation. A preceptor who is careful to observe the learning style of a trainee can present information in the best way to improve understanding.

ADULT LEARNING PRINCIPLES

The following learning principles from *Preceptorships in Nursing Staff Development* are

tried-and-true methods for increasing the acquisition of new information:¹

Reinforcement

Feedback following performance of a newly learned task can make the behavior more or less likely to recur. For example, if you try out a new recipe, you'd be more likely to repeat it if you hear good things about it (positive reinforcement) than if you hear unpleasant comments (negative reinforcement).

Goals and Feedback

Setting and meeting individually-set goals can contribute to the student's satisfaction and increase his or her internal motivation.

Discussing goals and learning objectives and how they will be measured at the beginning of a new section helps clarify what must be learned from the new materials.

Readiness

Individual maturity, time available for learning tasks, and previous experiences all contribute to a student's readiness to learn new material. For example, teaching must begin at a different level for a technician who is unfamiliar with the functions of a kidney versus one with a background in anatomy and physiology. The first student must begin at a basic level, while the student with a strong anatomy/physiology background may be ready to begin dialysis concepts after a brief refresher.

Assessment

Self-observation by the learner as well as external feedback from the preceptor help identify progress and learning needs. The student's self-assessment, direct observation by the preceptor, and objective

measurements (such as tests) should be combined to provide a complete picture of the trainee's performance. Assessment should be followed by identification of specific areas for improvement.

LEARNING CONTRACTS

Younger adults, perhaps just out of high school, may not be as self-motivated as you'd like. One way to increase a less-mature trainee's "ownership" of the responsibility to learn new material is to sit down with the trainee and complete a learning contract (see example on page 269).

According to M. Knowles in *The Adult Learner: A Neglected Species*, a learning contract specifies what is to be learned, how long it will take, what resources will be available, and how mastery of the information will be measured.² Both the trainee and the preceptor or supervisor sign the contract.

Use of a learning contract can also reassure the trainee that he or she is in fact there to learn, and not merely to relieve the regular staff of low-level, repetitive tasks.

For the learning contract to be effective, it is necessary to first have preset, concrete learning objectives for your training program. Before putting the contract to use, it would be helpful to have a number of staff members look it over to see if the objectives are clear, or if anything is missing.

Strategies for Effective Preceptorship

THE TEACHING PROCESS

A preceptor cannot force anyone to learn.

Instead, teaching is a process of facilitating learning by taking certain steps that encourage progress. Ongoing assessment, planning, and evaluation help you tailor the learning experience to meet the student's educational needs.

Being prepared can reduce your anxiety, and allow you to take advantage of spontaneous “teachable moments” that may arise throughout the course of a shift. Devoting some thought—however brief—to learning objectives and methods also improves lesson organization and use of time. Beware of overstructuring and planning every minute, however, or you may lose the interest of your student.

Lessons themselves—and any written handouts—should be brief and to the point. Formal presentations should be limited to no more than 20 minutes, and should actively involve the student in participation or discussion.

COMMUNICATING SKILLFULLY

As a health professional, you are clearly and accurately transmitting crucial information every day—misunderstanding a lab value or a prescription could be disastrous. The same care must be taken to be sure that you and your trainee understand each other. The following list of communication methods can help you think about your use of important learning tools.

Language

You speak English, your student speaks English...or *do you?* Many healthcare professionals quickly become unaware of the technical medical terms, abbreviations, and jargon they use each day... “Ms. Smith needs her meds QID, we need to record her I and O

and vitals before the end of the shift, and send a crit, BUN, and creat to the lab.” Do not assume that a trainee understands these terms; make an effort to explain them at every opportunity.

Observation and Perception

Communication is more than words. Eye contact and body language are additional forms; even the way individuals dress influences how they perceive, and are perceived by, others. Picking up on some of the nonverbal messages your trainee is sending can help bring issues out into the open that might not otherwise be dealt with.

Silence

Sometimes a preceptor's silence can help a trainee concentrate on a task, work through a solution, or just think about what was said. A trainee's silence could indicate that he or she is uncomfortable, quietly observing, bored, or does not understand the material. Skillful assessment by the preceptor can identify the reason for the trainee's silence—and deal with the issue.

Listening and Empathy

The ability to listen with focused attention and fully understand a message is a powerful tool. Called active listening, the technique involves reflecting, or restating the speaker's message in different words, paying careful attention to the emotional content.

Empathy is also important when dealing with students' fears or feelings of inadequacy. Let your students know that you, the preceptor, once had the same concerns they are feeling. Stress that with more experience and training, their confidence and knowledge will grow.

Preceptor Module

Strategies for Improving Communication

Table 1 lists several techniques you can use to make your communication with your trainee better.

ONE-ON-ONE: THE PRECEPTOR/TRAINEE RELATIONSHIP

A preceptor and trainee are subject to the same interpersonal differences as any other relationship. In theory, a head nurse or coordinator should choose a preceptor for a

trainee after careful consideration of the personalities involved. In practice, there may not be time or available, qualified personnel to make this possible. In general, however, an atmosphere of openness and mutual respect will go a long way toward easing the path of preceptorship for both partners.

Preceptorships in Nursing Staff Development has valuable insights into the preceptor/trainee relationship and its potential pitfalls.¹ Some aspects of this relationship have been found to be quite predictable across a variety of situations, including:

Table 1: Strategies for Improving Communication¹

Technique	Effect
Ask direct questions	Gives preceptor more information.
Ask open-ended questions	Questions that cannot be answered “yes” or “no” encourage free exchange and an atmosphere of willing communication.
Make small talk	A moment or two reduces anxiety and tension and paves the way for more in-depth talk. (Overuse could be seen as avoidance.)
Confront	To be effective, confrontation must be followed by cooperative problem solving. (What can we do to help you?)
Clarify	Summarizing what you think was said, or asking, “did you mean...” can improve understanding on both sides.
Compare	Drawing comparisons between situations can help relate past knowledge to current situations, and allows trainees to find solutions on their own.
Reflect/paraphrase	Restating trainees’ phrases in your own words helps them feel they are in a supportive environment where they can speak freely. It also encourages further thought.
Acknowledge feelings	Promotes further communication.
Express doubt	Carefully worded expressions of doubt, like “is that the way you believe it works?” can advocate critical thinking without criticizing the thinker, and encourage an atmosphere of tolerance.
Verbalize the implied	Clarifying motives and hidden messages can bring feelings out into the open where they can be dealt with.
Encourage	Positive feedback and encouragement help motivate the learner. Statements like, “yes, go on,” indicate that the learning environment will be supportive.
Be specific	Concentrating on specific examples and areas for improvement minimizes confusion.

Reality Shock

Many new employees find that the day-to-day situations they encounter on the job fail to meet their expectations. At first, a trainee tends to experience a “honeymoon” phase—patients, co-workers, and the job itself are all better than expected. This is followed by a period of depression—the real world doesn’t match up to the ideal goals set in training. Employees who make it past this phase enter a “recovery” stage, regaining their sense of balance. Finally, “resolution” is an integration of ideal and real-world values into a workable solution.

Trust

For optimal training to occur, the trainee and preceptor must be able to trust each other. Being honest, consistent, dependable, and respecting privacy and confidentiality help trust to grow.

Acceptance

The preceptor and trainee must be willing to accept each other as individuals, regardless of the differences between their personal values. Openness, tolerance, and acceptance contribute to a quality learning environment.

Preceptor Pitfalls

Helping a trainee to be fully functional in the workplace is not always an easy task. At times the student’s own agenda or other issues may interfere with the educational goals you have worked out together.

Anxiety

New employee anxiety can be contagious—to you—adding to your concerns about your own performance and leading you to second-guess

your methods. Try to keep your own feelings separate from those of your student, who is understandably nervous about the new job responsibilities.

Avoidance

Students may try to divert attention from subject matter that intimidates them. A sudden surplus of off-the-topic questions or non-essential tasks that “must” be performed are cues to redirect attention to the original task, or seek the reasons for the avoidance behavior.

One-way thinking

One-way thinking can limit problem-solving ability for both preceptor and student. If a student devises a different way to perform a task, think carefully before immediately assuming that your own way is better. Many problems can be solved in a variety of ways, and a trainee with a fresh perspective may indeed have something to offer.

Indecisiveness

This problem is common among new employees, who may feel reluctant to apply the new information they are learning. Instead of making decisions for the trainees, ask for their recommendations and the reasons for them. Ask questions to direct the line of thought carefully. It is better for a student to attempt to act now, under your supervision, than to rely on your decisions and be unable to function alone later.

Letting Go: the Fledgling Trainee

You’ve accomplished your goal. The raw trainee you worked with has become a responsible

addition to your center, able to perform his or her assigned duties independently and seek out information when needed. The preceptor/student relationship is over, and the preceptor becomes a consultant instead.

Like many preceptors, you may find it surprisingly difficult to let go of a trainee when the time comes. Loss of the student's constant companionship and the continuing appreciation for your vast knowledge and experience can make a shift seem flat and empty.

You may find yourself disagreeing that the trainees know enough to be on their own—after all, you've been evaluating their progress and you know exactly how much more they need to learn.

At some level you may even be concerned that your student's job performance will be a reflection on you as a preceptor—if the trainee fails, do you fail, too?

No one can tell you that you have to accept the end of a preceptor relationship, but if you are aware that it can be an uncertain time, you can reward yourself and take other steps to help you cope.

Most importantly, when you are part of a successful preceptor relationship leading to a

conscientious, alert technician, you are helping your center and your patients.

EVALUATING YOUR TRAINING PROGRAM

How do you know whether your technician training is effective? Certainly one way to tell is the caliber of technicians you are turning out. Another way to fine-tune your program and demonstrate its progress is to do periodic evaluations.

Generally, most evaluations are done to answer two questions:

1. How well is the program doing?
2. How can it be improved?

To tell how your program is performing, it must be compared against a set of measurable criteria that you develop. These outcome criteria should be understandable by everyone, achievable, and consistent with the resources and philosophy of your center. Your review of the results can help you recommend improvements in the preceptorship program, making it a solid contributor to continually-improving patient care.

Sample Learning Contract

Learner's Name: _____

Center: _____ Dates of orientation: _____

Type of orientation: _____

This learning contract is a method by which the learner and the preceptor mutually identify a plan for orientation. By signing this contract, both document commitment to actively participate in this program.

Learner: I have read the program format and objectives of the *Core Curriculum for the Dialysis Technician*.

1. I agree to complete _____ selected learning modules.
2. I agree to actively participate in _____ days of clinical orientation.
3. I understand that I will be expected to verbalize and/or demonstrate the required knowledge and skills for _____ to show competence in the curriculum materials.
4. I understand my training period will cover _____ weeks and will be evaluated by a preceptor and testing.

Learner

Date

Preceptor: I am familiar with the format and objectives of the *Core Curriculum for the Dialysis Technician*.

1. I agree to provide resources necessary to facilitate the learner's attainment of required knowledge and skills.
2. I agree to provide _____ days of clinical orientation.
3. I will observe and verify the knowledge and skills required of the learner.
4. I will reverify skills annually.

Preceptor

Date

Sample Student Evaluation

DIALYSIS TECHNICIAN EDUCATION PROGRAM

Please take a few minutes to complete the attached evaluations of your dialysis center and your preceptor. The results will be used to help improve the quality of clinical training instruction. All information will be kept strictly confidential.

Evaluation of the Dialysis Center

Dialysis Center: _____

Dates: From _____ to _____

1. Evaluate the dialysis center in terms of meeting your training needs.

- Excellent.* Opportunities to practice needed skills were always available.
- Above average.* Opportunities to practice needed skills were usually available.
- Average.* Opportunities to practice needed skills were sometimes available.
- Below average.* Opportunities to practice needed skills were seldom available.
- Poor.* Opportunities to practice needed skills were never available.

Comments:

2. Evaluate the availability of staff for instruction and supervision:

- Excellent*
- Above average*
- Average*
- Below average*
- Poor*

Comments:

3. Evaluate the overall quality of the instruction by the staff:

- Excellent*
- Above average*
- Average*
- Below average*
- Poor*

Comments:

4. How much direct physician contact did you have during this rotation:

Very much

Much

Some

Little

None

Comments:

5. Evaluate the dialysis center in terms of providing teaching activities that helped you learn:

Excellent. Rich and varied opportunities were available.

Above average. Several opportunities were available.

Average. Occasional opportunities were available.

Below average. Few opportunities were available.

Poor. No opportunities for enrichment were available.

Comments:

6. How could the educational opportunities be improved?

Evaluation of the Preceptor

Instructor's Name: _____

Dates of rotation: From _____ to _____

1. Rate the preceptor's ability to teach technical skills for dialysis:

Excellent

Above average

Average

Below average

Poor

Comments:

2. Rate the preceptor's ability to integrate materials into dialysis practice:

Excellent

Above average

Average

Below average

Poor

Comments:

Preceptor Module

3. Rate the preceptor's ability to teach problem solving skills:

- Excellent*
- Above average*
- Average*
- Below average*
- Poor*

Comments:

4. Rate the availability of the preceptor for skills practice and testing:

- Excellent*
- Above average*
- Average*
- Below average*
- Poor*

Comments:

5. Rate the objectivity of the preceptor during skills testing:

- Very fair*
- Fair*
- Unfair*
- Very unfair*

Comments:

6. Evaluate the preceptor's creativity and motivation as a clinical teacher:

- Excellent*
- Above average*
- Average*
- Below average*
- Poor*

Comments:

7. How could the preceptor improve as a clinical educator?

Adapted with permission from Madison Area Technical College, Respiratory Therapy Program, Madison, WI.

Module 1 Posttest

1. What are the two main types of dialysis:
 - a. Continuous renal replacement therapy and peritoneal dialysis
 - b. Hemodialysis and peritoneal dialysis
 - c. Hemofiltration and peritoneal dialysis
 - d. Hemodialysis and continuous renal replacement therapy
2. Which of these developments in dialysis history came first:
 - a. Dr. Kolff's rotating drum device
 - b. Shunt
 - c. Dr. Kolff's coil dialyzer
 - d. Arteriovenous fistula
3. How are clinics paid by Medicare for dialysis treatment:
 - a. Separate billing
 - b. Contract pricing
 - c. Composite rate
 - d. Fee-for-service
4. Which of the following is covered by the standards of the Association for the Advancement of Medical Instrumentation (AAMI):
 - a. Dialyzer reprocessing
 - b. Clinical performance measures
 - c. Hemodialysis machine maintenance
 - d. Safety of hemodialysis machines
5. Which of the following is a step of the CQI process:
 - a. Implement the PDCA cycle.
 - b. Write a long article about the problem.
 - c. Develop a hypothesis.
 - d. Consult an expert.
6. Which of the following actions shows that you have a conscientious manner:
 - a. Running through the dialysis clinic
 - b. Getting to work on time
 - c. Talking about patients in front of other patients
 - d. Talking about your personal problems in front of patients
7. Which of the following is an example of a boundary that should be kept between you and your patients:
 - a. It is okay to ask a patient for a date.
 - b. You may take gifts, money, or tips from patients.
 - c. You can borrow money from patients.
 - d. You should not invite patients to your home.
8. What is the minimum number of months of experience you need to take a certification exam:
 - a. 3
 - b. 6
 - c. 9
 - d. 12

Module 2 Posttest

1. The functional unit of the kidney, or the structure in the kidney that does the work, is the:
 - a. Medulla
 - b. Cortex
 - c. Calyx
 - d. Nephron
2. A nephron is made up of:
 - a. A glomerulus and a tubule
 - b. The nephrons and a capsule
 - c. The loop of Henle and the capillary ball
 - d. The bladder and the ureter
3. The leading cause of chronic kidney disease for adults in the United States is:
 - a. Hypertension
 - b. Glomerulonephritis
 - c. Diabetes
 - d. Urinary obstruction
4. The endocrine functions of the kidney include:
 - a. Regulating growth hormone and making thyroid hormone
 - b. Making erythropoietin and the active form of vitamin D
 - c. Making estrogen and testosterone
 - d. Regulating body temperature and sleep rhythms
5. The primary cause of the anemia of ESRD is:
 - a. Erythropoietin deficiency
 - b. Calcium deficiency
 - c. Iron deficiency
 - d. Cholecalciferol deficiency
6. Which of the following are hemodialysis treatment options:
 - a. CAPD, nocturnal, short daily
 - b. CCPD and transplantation
 - c. In-center, nocturnal, short daily
 - d. Short daily, CAPD
7. Which is the best definition for *dry weight*:
 - a. Postdialysis weight at which all or most excess fluid has been removed
 - b. Weight gained between treatments
 - c. Predialysis weight
 - d. Amount of weight to be removed during treatment
8. What is the Health Insurance Portability and Accountability Act (HIPAA)?
 - a. A law about how to treat patients
 - b. A law that created rules about how to document dialysis treatments
 - c. A law that created national rules about the security and privacy of health data
 - d. Standards on how to manage healthcare information

9. Mrs. M., a 72-year-old widow, asks to have her treatment shortened by 20 minutes today so she can get home and watch her favorite soap opera. You explain that:
- This will be okay because a few minutes here and there don't make any difference
 - Center policy does not permit patients to discontinue treatment early
 - It is very important to get the prescribed time, every dialysis treatment, to avoid medical complications
 - She can leave, but she must sign a release
10. Which of the following medical problems may occur due to chronic kidney disease (choose all that apply):
- Anemia
 - Indigestion
 - Sleeping problems
 - Pericarditis
11. Kidney failure is a chronic illness that causes many changes for the person with the disease and his or her family and friends. The dialysis team member with special training in helping people adjust to these changes is the:
- Nurse
 - Physician
 - Social worker
 - Technician

Module 3 Posttest

1. A solution is a mixture of:
 - a. Water and blood
 - b. Dialysate
 - c. A solvent and a solute
 - d. Water and sodium
2. A semipermeable membrane is a filter that:
 - a. Allows only certain sized particles to cross
 - b. Prevents fungal contamination
 - c. Can distinguish between particles
 - d. Is biocompatible, non toxic, and hypoallergenic
3. Diffusion is movement of particles:
 - a. By filtration through a biocompatible membrane
 - b. From an area of higher concentration to an area of lower concentration
 - c. Into a vacuum created when fluids are forced through a membrane
 - d. Into a space made by solutions moving in countercurrent flow
4. Negative pressure is pressure created when:
 - a. Larger amounts of filtration exist in a closed space
 - b. Fluids separated by a membrane flow in the same direction
 - c. Larger molecules drag smaller molecules across a membrane
 - d. Fluid is pulled through a restriction
5. During dialysis, ultrafiltration occurs when:
 - a. Water is removed from blood because there is a pressure gradient across a membrane.
 - b. Phosphorus is removed from blood because dialysate is low on phosphorus.
 - c. A higher concentration of sodium causes water to move from body compartments into the dialysate.
 - d. A suction device is applied to the venous trap and a Harvard Clamp is applied to the arterial side of the blood set.
6. Which of the following best describes the “intravascular” fluid compartment?
 - a. Fluid inside the cells
 - b. Blood inside the blood vessels
 - c. Fluid between cells
 - d. Fluids inside and between cells
7. During dialysis, levels of waste in the blood should:
 - a. Remain the same
 - b. Decrease
 - c. Increase
 - d. Fluctuate
8. Which of the following factors affects the rate of diffusion:
 - a. Pressure gradient
 - b. Flow rate
 - c. Hydraulic pressure
 - d. Surface area of the membrane

Module 4 Posttest

- Which of the following is *not* a dialyzer characteristic:
 - Capacity
 - Clearance
 - Biocompatibility
 - Molecular weight cutoff
- Which of the following is a way to remove solutes:
 - Convection
 - Suction
 - Surface area
 - Irradiation
- Name the two compartments of the dialyzer:
 - Conventional and high flux
 - Convection and adsorption
 - Blood and dialysate
 - Hollow fiber and flat plate
- Dialysate is the fluid that helps remove waste products from the body. It contains a number of substances. Choose the group below that might be prescribed for a dialysate solution:
 - Bicarbonate, sodium, potassium
 - Magnesium, creatinine, calcium
 - Chloride, glucose, urea
 - Beta-2-microglobulin, calcium, sodium
- What is the purpose of a proportioning system?
 - Monitors the dialysate flow rate
 - Monitors for blood leaks
 - Checks the conductivity of the dialysate
 - Make dialysate by mixing fresh concentrate with fixed amounts of treated water
- Dialysate conductivity measures:
 - The total electrical charge of a solution
 - The total number of thermistors in a solution
 - The total number of mL per solution
 - The total number of gradients in a solution
- What condition occurs due to dialysate that is too hot:
 - Hypersensitivity reaction
 - Hemolysis
 - Pyrogenic reaction
 - Septicemia
- What are the two types of ultrafiltration systems:
 - Volumetric UF control and flow control
 - Flow rate and UFR
 - TMP and UFR
 - Proportioning system and flow control

Module 4 Posttest (continued)

9. Which of the following is *not* a component of the extracorporeal circuit:
 - a. Blood leak detector
 - b. Blood pump
 - c. Heparin infusion line
 - d. Drip chamber

10. Which of the following best describes the transducer protector:
 - a. Pump that moves blood through the extracorporeal circuit
 - b. Device inside the machine that converts air pressure into an electronic signal
 - c. Tubing that carries blood from the patient's access to the dialyzer and back to the access
 - d. System that removes water from the blood

11. Although dialysate delivery systems have back-up monitoring systems, it is critical that:
 - a. The monitoring systems be checked and calibrated on a schedule recommended by the manufacturer
 - b. Conductivity and pH be verified by independent meters before each dialysis treatment and whenever the dialysate is changed
 - c. All alarm systems be tested prior to each dialysis treatment
 - d. All of the above

12. Choose the group below that contains the dialysate delivery system monitors:
 - a. Temperature, venous pressure, flow rate
 - b. Blood and dialysate flow rates
 - c. Conductivity, pH, flow rate
 - d. Blood leak, pH, arterial pressure

13. Which of the following is a negative pressure:
 - a. Venous
 - b. Venous and arterial
 - c. Arterial
 - d. Predialyzer pressure

Module 5 Posttest

1. Mrs. Phyllis R. is a 40-year-old woman whose kidneys are failing due to hypertension. She does not have diabetes or cardiac problems. If her blood vessels are in good condition, what type of access is preferable?
 - a. A femoral catheter
 - b. A forearm loop graft
 - c. An arteriovenous fistula
 - d. A cuffed, tunneled catheter
2. When assessing a fistula or graft, which of the following needs to be listened for prior to starting dialysis:
 - a. Bruit
 - b. Stenosis
 - c. Thrill
 - d. Steal syndrome
3. Which of the following are possible complications of “flipping” the needle in AVF cannulation (choose as many as apply):
 - a. Stenosis
 - b. Infiltration
 - c. Steal syndrome
 - d. Stretching the needle hole
 - e. Tearing the lining of the vessel
4. Which direction should the venous needle be placed:
 - a. Antegrade
 - b. Next to the anastomosis
 - c. Retrograde
 - d. Into the flow of blood
5. Which of the following is the reason for rotating needle sites on a fistula:
 - a. Prevent infiltration
 - b. Prevent stenosis
 - c. Prevent steal syndrome
 - d. Prevent aneurysms
6. Infiltration refers to which of the following definitions:
 - a. A pocket of blood inside the blood vessel
 - b. A needle tip that punctures a vessel and goes out the other side, so blood escapes into the tissues
 - c. The colonization of bacteria in a graft anastomosis
 - d. Mixing of already dialyzed blood with arterial blood in the patient’s access
7. Which of the following is a long-term complication of fistulae:
 - a. Infiltration
 - b. Thrombosis
 - c. Bruit
 - d. Recirculation
8. When assessing a fistula or graft, which of the following need to be felt prior to starting dialysis:
 - a. Pulse and deep access
 - b. Bruit and deep access
 - c. Bruit and pulse
 - d. Pulse and thrill

Module 5 Posttest (*continued*)

9. Which of the following is the complication that can happen to grafts if the needle sites are not rotated:
 - a. Stenosis
 - b. Pseudoaneurysm
 - c. Steal syndrome
 - d. Infiltration

10. Which of the following will help prevent infection in catheters:
 - a. Wash hands and change gloves prior to touching the catheter
 - b. Palpate the skin along the catheter from the blood vessel down to the exit site looking for drainage at the exit site
 - c. Change the catheter dressing
 - d. Assess the catheter blood flow

11. Which of the following is a step in the port/catheter predialysis assessment:
 - a. Cleansing the catheter site
 - b. Connecting the catheter to the bloodlines
 - c. Assessing the blood flow rate through the catheter
 - d. Assessing the ease of heparin removal and saline flushing before connecting the bloodlines

Module 6 Posttest

- The instrument used for measuring blood pressure is called a:
 - Sphygmomanometer
 - Spirometer
 - Bronchoscope
 - Tachometer
- A rapid pulse of 104 beats/min would indicate that the patient has:
 - Bradycardia
 - Tachycardia
 - An arrhythmia
 - Atrial flutter
- The normal range of resting respirations in an adult is:
 - 12 to 20 breaths/min
 - 20 to 40 breaths/min
 - 30 to 50 breaths/min
 - 30 to 50 breaths/min
- For which of the following situations would you use the stand-and-pivot technique to transfer a patient:
 - Patient is brought into the dialysis clinic on a stretcher
 - Patient can bear weight once standing, but has trouble getting up from the dialysis chair
 - Patient can get out the dialysis chair without any problems
 - Patient is complaining of dizziness and nausea
- Which of the following methods kills bacteria, but will not destroy all of them completely?
 - Asepsis
 - Disinfection
 - Exposure to chemical sterilants
 - Open-flame irradiation
- What is the most important activity that you can perform to prevent the spread of infectious disease in the dialysis clinic:
 - Wearing a mask
 - Wearing gloves
 - Wearing protective equipment
 - Handwashing
- Which of the following should be done to prevent needle sticks (choose all that apply)?
 - Recapping needles
 - Throwing used needles into puncture-resistant, color-coded containers
 - Break or bend the needle
 - Leaving needles on the medicine carts
- The purpose of priming the extracorporeal circuit with saline during setup is:
 - To remove air and germicide before initiating treatment
 - To be certain fibers are thoroughly filled with germicide before initiating dialysis
 - To assess ultrafiltration capacity of the dialyzers and check for leaks
 - To maintain fiber noncompliance until the dialysis begins

Module 6 Posttest (continued)

9. Mrs. Smith's dry weight is 62 kg. Her pretreatment weight when she came in for treatment on Monday was 67 kg. For her treatment the priming saline amount is 240 mL, the rinseback amount is 200 mL, fluid from medications is 100 mL, and she is not allowed any fluids during treatment. What is the total amount of fluid weight to be removed during her treatment?
 - a. 5,000 mL
 - b. 5,230 mL
 - c. 5,540 mL
 - d. 5,820 mL
10. Based on Mrs. Smith's total amount of fluid to be removed, what is the ultrafiltration rate per hour (mL/hr) for her 4-hour treatment?
 - a. 1,220 mL/hr
 - b. 1,385 mL/hr
 - c. 1,440 mL/hr
 - d. 1,500 mL/hr
11. A medication used to prevent blood from clotting in the extracorporeal circuit is:
 - a. Mannitol
 - b. Heparin
 - c. Hypertonic saline
 - d. Lidocaine
12. Which of the following is used to prevent air in the bloodlines:
 - a. Maintain prescribed blood flow rates
 - b. Tighten all connections
 - c. Monitor patient's blood pressure
 - d. Allow the normal saline bag to empty
13. Which of the following is a cause of hypotension during and after dialysis treatments?
 - a. Uremia
 - b. Patient forgetting to take their blood pressure pills
 - c. Fluid overload
 - d. Removing too much fluid

Module 7 Posttest

- Dialyzers are reprocessed mainly because:
 - Reprocessing reduces the cost of dialysis treatments
 - Reprocessing shortens the dialysis treatment
 - Reprocessing is safer for staff
 - Reprocessing reduces the amount of plastic in landfills
- Which organization sets the standards and recommendations for dialyzer reprocessing:
 - FDA
 - CDC
 - AAMI
 - CMS
- Which of the following tests must be performed on new dialyzers:
 - Hgb (hemoglobin)
 - TIBC (total iron binding capacity)
 - CBC (complete blood count)
 - TCV (total cell volume)
- What are the steps for dialyzer reprocessing after a dialysis treatment:
 - Pre-cleaning, performance tests, dialyzer rejection, disinfection
 - Labeling, TCV, performance tests, disinfection
 - Pre-cleaning, TCV, dialyzer rejection, disinfection
 - Preprocessing, TCV, performance tests, disinfection
- Which of the following is a germicide used for dialyzer reprocessing:
 - Alcohol
 - Hydrogen peroxide
 - Peracetic acid
 - Acetone
- Which of the following is the definition of “contact time”:
 - Amount of time the germicide is rinsed through the dialyzer
 - Amount of time between dialyzer uses
 - Amount of time the germicide remains in the dialyzer
 - Time it takes to reprocess the dialyzer
- AAMI standards recommend quality control activities before a reprocessed dialyzer is used on a patient. Who must check the dialyzer to verify quality control information:
 - The patient, only as long as he or she is sighted
 - Two people, one of whom should be the patient
 - The medical director and the charge nurse
 - Two registered nurses and a patient care technician
- Which of the following is a problem in dialyzer reprocessing that may cause bacteria or endotoxin contamination of the dialyzer:
 - Use of proper storage conditions
 - Correct contact time used
 - Use of heat and citric acid
 - Improperly prepared germicide

Module 7 Posttest (continued)

9. Which of the following best describes the Dialyzer Reprocessing Manual:
 - a. Record of the dates and results of all quality assurance and quality control evaluations for the center
 - b. Summary of all reuse specifications, policies, procedures, training materials, manuals and methods, and samples of forms and labels
 - c. Log of the dates of preventive maintenance, repairs, and results of scheduled testing on all hemodialysis equipment
 - d. Record of testing required by regulatory agencies on any germicides or cleaning agents used in dialyzer reuse
10. Which of the following are two criteria for rejecting a reprocessed dialyzer:
 - a. Less than 80% of original fiber bundle volume, aesthetic appearance
 - b. Label incomplete, dialyzer not heparinized
 - c. Patient preference, access is recirculating
 - d. HIV status, hyperkalemia present

Module 8 Posttest

- Water used for dialysate must be treated because dialysis patients:
 - Have strict fluid restrictions and drink only pure water
 - Drink large amounts of water despite their restrictions
 - Are exposed to large volumes of water during dialysis
 - Are able to excrete contaminants in dialysate during dialysis
- Choose the substance which may be added to municipal drinking water supplies to make the water clearer:
 - Bleach
 - Zinc
 - Potassium
 - Alum
- The water softener performs the following activity:
 - Removes calcium and magnesium from water
 - Removes chlorine and chloramines from water
 - Adds calcium and magnesium water
 - Kills bacteria in the water
- Which of the following is a limitation of a reverse osmosis (RO) system?
 - Removes bacteria and endotoxin
 - Removes solutes from the water
 - Thin film composite membranes break down when exposed to chlorine and chloramines
 - Produces purified water
- Which is the most common way that water treatment systems are disinfected:
 - Heat
 - Ozone
 - Chemical
 - Minerals
- Contamination of water by bacteria/endotoxins may cause one of these reactions:
 - Blurred vision
 - Bone disease
 - Pyrogenic
 - Double vision
- How often should the RO operating parameters be checked:
 - Weekly
 - Hourly
 - Monthly
 - Daily
- Which of the following is an acceptable level of post softener hardness:
 - 0.8 grain per gallon
 - 1.1 grain per gallon
 - 1.5 grain per gallon
 - 2.0 grain per gallon

Module 8 Posttest (continued)

9. According to AAMI standards, bacteriologic testing for water and dialysate should take place:
 - a. Daily
 - b. Weekly
 - c. Monthly
 - d. Yearly
10. According to the AAMI standards, the total microbial count of dialysate shall not exceed:
 - a. 200 CFU/mL
 - b. 400 CFU/mL
 - c. 800 CFU/mL
 - d. 1,000 CFU/mL
11. According to AAMI standards, the total endotoxin count of dialysate shall not exceed:
 - a. 1 EU/mL
 - b. 2 EU/mL
 - c. 3 EU/mL
 - d. 4 EU/mL
12. How frequently should the carbon tanks be checked for chlorine and chloramines:
 - a. Each shift
 - b. Weekly
 - c. Monthly
 - d. Annually
13. Large amounts of aluminum in water used for dialysate could cause:
 - a. Fever/chills
 - b. Liver problems
 - c. Bone disease
 - d. Diarrhea

Posttest Answer Key

Module 1

- 1. b
- 2. a
- 3. c
- 4. a
- 5. a
- 6. b
- 7. d
- 8. b

Module 2

- 1. d
- 2. a
- 3. c
- 4. b
- 5. a
- 6. c
- 7. a
- 8. c
- 9. c
- 10. a, c, d
- 11. c

Module 3

- 1. c
- 2. a
- 3. b
- 4. d
- 5. a
- 6. b
- 7. b
- 8. d

Module 4

- 1. a
- 2. a

- 3. c
- 4. a
- 5. d
- 6. a
- 7. b
- 8. a
- 9. a
- 10. b
- 11. d
- 12. c
- 13. c

Module 5

- 1. c
- 2. a
- 3. b, d, e
- 4. a
- 5. d
- 6. b
- 7. b
- 8. d
- 9. b
- 10. a
- 11. d

Module 6

- 1. a
- 2. b
- 3. a
- 4. b
- 5. b
- 6. d
- 7. b
- 8. a
- 9. c

Preceptor Module

- 10. b
- 11. b
- 12. b
- 13. d

Module 7

- 1. a
- 2. c
- 3. d
- 4. a
- 5. c
- 6. c
- 7. b
- 8. d
- 9. b
- 10. a

Module 8

- 1. c
- 2. d
- 3. a
- 4. c
- 5. c
- 6. c
- 7. d
- 8. a
- 9. c
- 10. a
- 11. b
- 12. a
- 13. c

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