nxSTAGE®

nxSTEPS®

Simple Steps for Success at Home™

Nurse Guide









NxSTEPS® Simple Steps for Success at Home

Nurse Guide Introduction

NxStage Medical, Inc. is dedicated to continuously improving the experience of our customers and their patients, and to improving patient access to the clinical and quality of life benefits that have been reported with home and more frequent hemodialysis. This training curriculum represents an important next step for NxStage in further supporting the needs of our customers' home training teams. The curriculum includes materials that cover the proper use and operation of the System One™ as well as other key concepts in home training, including aseptic technique, cannulation, troubleshooting and responding to medical problems. Recognizing that all adults learn differently, the curriculum also incorporates guidance in the principles of adult learning as well as a variety of learning tools and methods to enhance the training experience for the training team, nurse, patient and care partner.

NxStage recognizes that patients and their care partners all have unique needs and that center policies vary from customer to customer. This curriculum is not intended to replace your existing training program and materials or to provide all of the materials you will need to train patients and their care partners. Instead, it is intended to supplement them, consistent with the needs of your individual program. The curriculum and related tools are also designed to allow for customization for the unique needs of your patients and their care partners. Importantly, these materials do not replace the need for your home training team, patients and care partners to read, use and thoroughly understand the information in our System One and PureFlow™ SL User guides or Cartridge Instructions for Use. Members of the training team, patients and their care partners must review and refer to the System One and PureFlow SL User guides and Cartridge Instructions for Use for all Instructions, Warnings, and Precautions. Finally, NxStage acknowledges that the practice of home hemodialysis is continuously evolving. Training of home patients and their care partners is ultimately the responsibility of the prescribing physician and the home training program. Therefore, all materials must be reviewed carefully by your center's Medical Director, prescribing physician and home training program before adaptation and incorporation into your program.

We hope these materials enhance your training program and your patients' and care partners' experiences with the System One.

how to use this nurse guide

The purpose of the Nurse Guide is to give you step-by-step instructions for guiding a patient and care partner through the NxSTEPS®, *Simple Steps for Success at Home,* training curriculum. Please keep in mind:

- This guide is not a script that you read verbatim; it provides a framework for the training sessions, the key points to cover for each topic, and guidance on executing the practice exercises.
- This guide is intended to be used with the flipbook, online modules, videos, and patient quick reference guides.
- You may want to add additional notes and reminders within the Nurse Guide.

The Nurse Guide is modular, allowing the flexibility to customize your training to the needs of each patient and care partner. How much material you cover each day, and in some cases the order in which you cover the material, will be dictated by the patient's training schedule.

Remember, you need to use the **Patient Schedule Customization Tool** to build a customized schedule for each patient and care partner you train.

nurse guide features

Organization

The Nurse Guide is organized by topic and subtopic, rather than training schedule. Each subtopic includes:

- Goals and learning objectives
- Supply list
- What to Do or Explain when teaching each subtopic.
- Reinforcement tips for patients and care partners that need help mastering a subtopic.
- Visual cues (icons) to remind you which tool from the patient toolkit to use for each lesson.

Listing of topics, subtopics and related content within this Nurse Guide.

Topics	Subtopics	Contents	Starting page #
 Get Ready for Training	Get Ready for Training	▪ Nurse Guide pages ▪ Quick Reference Guide: How do I get ready for home hemodialysis?	**10**
 Prepare for Treatment	Keep it Clean	▪ Nurse Guide pages ▪ Quick Reference Guides: How do I maintain aseptic technique? How do I recognize infection? How do I take precautions?	**14**
	Access Your Blood	▪ Nurse Guide pages ▪ Quick Reference Guide: How do I access my blood?	**20**
	Interpret Your Prescription	▪ Nurse Guide pages ▪ Quick Reference Guides: How do I determine my treatment dose? How do I enter my treatment information?	**48**
 Complete Your Treatment	Use the System One Cycler	▪ Nurse Guide pages ▪ Quick Reference Guides: How do I use the system one cycler?	**62**
	Create and Maintain PureFlow	▪ Nurse Guide pages ▪ Quick Reference Guides: How do I manage pureflow?	**110**
 Keep Calm and Carry On	Troubleshooting Alarms	▪ Nurse Guide pages ▪ Quick Reference Guides: How do I troubleshoot common alarms? How do I deal with the unusual?	**134**
	Manage Medical Complications	▪ Nurse Guide pages ▪ Quick Reference Guides: How do I recognize a problem? Are you Ready Planning Guidebook for Non-Medical Emergencies	**168**
 Plan for Success	Plan for Success	▪ Nurse Guide pages	**176**

introduction

Organization (continued)

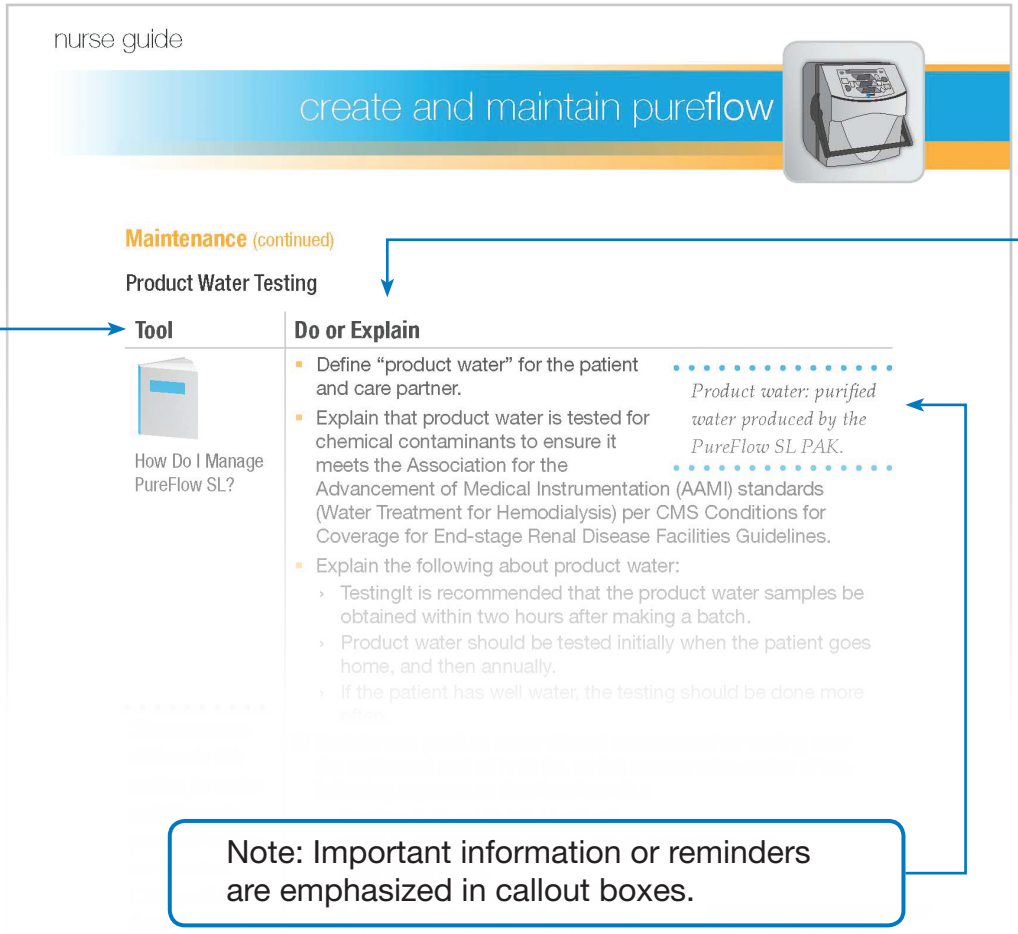
Each topic has a color and icon (shown on previous page). The color-coding for each topic is consistent across all curriculum materials (Nurse Guide, flipbook, online modules, and patient quick reference guides).

Layout

The Nurse Guide is formatted to provide you with easy visual cues and simple, direct instruction. Within each subtopic, you'll see two columns:

The **Tool** column lets you know what supporting resources you'll need to teach that subsection. (You'll see both an icon representing the resource and either the name of the resource or a list of supplies needed.)

The **Do** or **Explain** column guides you through the key learning points and activities.



Note: Important information or reminders are emphasized in callout boxes.

Supporting Materials

The Nurse Guide directs you to specific sections of several resources to support the learning. Within the resources, some key concepts are repeated using different media to facilitate learning.

	**Flipbook**	Bound book that you can place on a table or in your lap. One side contains supplemental visuals to support your demonstrations and explanations to the patient. The other side gives the nurse the main talking points.
	**Quick Reference Guide**	The patient and care partner's primary learning tool. These booklets will be used during and after training to support learning. The quick reference guides provide high-level, critical information; they do not replace the User guides, which are much more detailed.
	**Online Modules**	Computer-based, self-study training the patient and care partner complete at home or as part of the in-center training. Online modules introduce or reinforce key concepts like using aseptic technique and entering treatment information into the Cycler. **Helpful hint:** External speakers may be required to increase volume.
	**Videos**	Videos provide detailed descriptions of critical tasks like setting up and using the System One Cycler and PureFlow SL.
	**Props**	Any supplies needed to complete practice activities (for example, if you are teaching how to wash an access, the prop list will include soap, water, paper towels, and disinfecting agent).

online resources

To access the Patient Schedule Customization Tool and all the NxSTEPS online training modules:

- From the NxStage Medical, Inc. Web site (http://www.nxstage.com) click on NxSTEPS at the top of the page to display the NxSTEPS *Simple Steps for Success at Home* login.
- On the NxSTEPS login screen, enter your NxStage NxRx® or NxDx username and password, then click “Sign In”. Completion of the Nurse Registration is **not** required if you have a NxRx or NxDx username and password.
- If you do not have a NxStage NxRx or NxDx username and password, you need to complete the “Nurse Registration”. You will need to know your NxStage account number. Once you’ve completed the registration, you will be logged into the site automatically. Registration is only required once. After initial registration, complete the User Login using your established username and password. (Figure 1)
- The NxSTEPS online nurse resources are divided into 5 main topics and include all printed materials and online learning modules. Select a topic to view or download the related training material. (Figure 2)

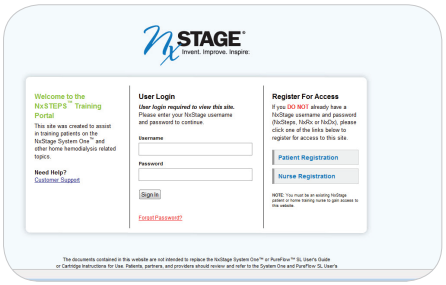


Figure 1



Figure 2

› The Patient Schedule Customization Tool is located on the main screen as well as within the Get Ready for Training topic.

› The NxSTEPS Patient Training Online resources include only the online modules and Quick Reference Guides.

› You may access the online resources from a center, personal, or public computer.

› Viewing the online modules requires a high speed internet connection for downloading and the most recent version of Adobe Flash Player.

› The online modules are not currently supported by the Apple iPad device due to incompatibility with Adobe Flash Player.

› The Quick Reference Guides printed from the NxSTEPS online resources are NOT customized.

preparing to train

Before you teach each subtopic:

1. Familiarize yourself with the content.
   - Review the Nurse Guide.
   - Review the supporting materials: flipbook, quick reference guide(s), online module(s), and/or video(s).
   - Make sure you are comfortable with all the content.

2. Some quick reference guides in this curriculum require customization. Be sure to customize in accordance with the dialysis center's policies and to meet the individual patient's and partner's needs and medical condition.

3. Review the supply list to ensure you have all the tools needed for that subtopic (e.g., props, computer to show the online module, etc.).

4. Set up the equipment and make sure everything in the area works properly.

5. Most of the training occurs during the patient's treatment. However, there are certain sections that may be taught before or after treatment (for example; proper hand washing technique or troubleshooting alarms if an extra Cycler is not available).

documenting training and comprehension

Use the *Patient and Care Partner Learning Checklist* included within each NxStage User's Quick Reference Guide binder or the Patient Schedule from the Customization Tool to record when the instruction was provided and learning objectives met.

- Retain this completed document with the patient's medical file.
- Do not leave blank lines; use N/A = not applicable, when appropriate for those sections not taught or required per the patient's customized schedule.
- Complete the follow-up action plan section(s) indicating when subsequent training will be provided for patients/care partners who were unable to achieve competency.

goals and objectives

Readiness and Expectations

Patients and/or care partners should be able to:

- Describe the elements of a successful patient training experience.
- Assess their readiness for training.
- Determine their appropriate training schedule.
- Set realistic expectations on weekly goals for training based on the defined schedule.
- Articulate what success will look like related to training and therapy.
- Identify training references and resources and explain how to use them:
  - Online modules
  - User guides
  - Quick reference guides
  - Patient portal
  - Learning checks

Roles and Responsibilities

Patients and/or care partners should be able to:

- Define the roles the patient, care partner, and nurse educator will play in the training experience.

Challenges

Patients and/or care partners should be able to:

- Recognize common training challenges and ways to overcome them.
- Identify and plan for common lifestyle challenges and coping strategies.
- Acknowledge fears related to home therapy and recognize that those fears are common and manageable.

supply list

- Nurse Guide
- Patient quick reference guides:
  - *how do I get ready for home hemodialysis?*
- Online module:
  - *Getting the Most from Training*
- Customized Patient Training Schedule
- HHD Patient Self-Assessment Form

training checklist

Readiness and Expectations

Tool	Do or Explain
 HHD Patient Self-Assessment Form	▪ Using the *HHD Patient Self-Assessment Form*, have the patient and care partner complete the "Prior to starting NxStage HHD therapy" column. Tell them to use an average of the 3 months prior to starting therapy on NxStage HHD when entering the information. › This form may also be used with patients on HHD therapy for greater than one year. To do so, write in the existing patient assessment date on the second row.
 Getting the Most from Training	▪ Have the patient and care partner complete the *Getting the Most from Training* online module at the beginning of each week of training. ▪ Ask what questions the patient and care partner have about the schedule and tools described in the online module.
 Patient Schedule	▪ Give the patient and care partner their copy of the customized patient schedule. ▪ Explain that the schedule was created especially for them based on their needs. ▪ Review the patient schedule at a high level; reinforce that: › Skills are broken into smaller chunks to make them easier to learn. › There will be many opportunities to practice each skill until it has been mastered. › There may be things that cause the schedule to shorten or lengthen (such as challenges with cannulation) and that's OK.

get ready for training

Roles and Responsibilities

Tool



How Do I Get Ready for Home Hemodialysis?

Do or Explain

- Give the patient the *how do I get ready for home hemodialysis?* quick reference guide.
- Have the patient and care partner turn to the “Preparing the Home” section of the quick reference guide.
- Review the tasks that must be completed at the patient’s home prior to starting home hemodialysis.
- Set a date for the patient and care partner to have all of the “Preparing Your Home” tasks completed.
- Instruct the patient and care partner to review the “Assigning the Tasks” section of the quick reference guide.
- Explain that each task will be discussed during the training program and the patient and care partner will need to decide who performs certain tasks associated with hemodialysis. The checklist on the remaining pages of the quick reference guide will be finalized during future training sessions as those decisions are made.



keep it clean

goals and objectives

Dirty, Clean, Sterile

Patients and care partners should be able to:

- Explain the difference between dirty, clean, and sterile.
- Assess environment or equipment conditions as dirty, clean, or sterile.

Aseptic Techniques

Patients and care partners should be able to:

- Demonstrate proper aseptic techniques.
- Recognize signs and symptoms of infection.

Universal Precautions

Patients and care partners should be able to:

- Recognize when and how to use universal precautions to protect themselves.

supply list

- Online module
  - *Keep It Clean*
- Nurse Guide
- Flipbook
- Patient quick reference guides:
  - *how do I maintain aseptic technique?*
  - *how do I recognize infections?*
  - *how do I take precautions?*
- Solution to simulate germs (Glo Germ or GlitterBug used per manufacturer's directions)
- Black marker
- Soap (either non-antimicrobial or antimicrobial) and water
- Waterless alcohol-based antiseptic hand rub (with 60-90% alcohol content)
- Practice Cartridge
- Practice SAK
- Practice Vascular Access Line
- 1 liter bag of normal saline
- Thermometer
- Disposable gloves
- Sterile gloves

training checklist

Dirty, Clean, and Sterile

Tool	Do or Explain
 Keep it Clean	▪ Before beginning the discussion, have the patient and care partner take this online module. Patients will learn to: › Describe the steps of proper hand washing technique. › Explain the difference between dirty, clean, and sterile. › Recognize the components of the Cartridge and related equipment that must remain sterile. ▪ Ask the patient and care partner what questions they have from the video. ▪ Ask, “What are the differences between clean, dirty, and sterile?” Review the differences if necessary.
 Dirty, Clean, and Sterile  Bagged Dialysate, Fluid Warmer Disposables, vascular access needles	▪ Using the flipbook, have the patient identify: › Which items are dirty, clean, or sterile (page 1-1). Review the answers provided in the flipbook as needed. › Which connection points on the Cartridge are sterile (page 1-3). (Note: If the Cartridge you are using is different than the one shown in the flipbook, refer to the appropriate Cartridge and point out the sterile locations.) › Which connection points on the SAK are sterile (page 1-5). ▪ Using the patient’s supplies (for example the Bagged dialysate, Warmer Disposables and vascular access needles), have the patient and care partner identify other sterile connection points.

Supporting **Dirty, Clean, and Sterile** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Review the flipbook (page 1-2) and explain why the items and connection points are dirty, clean, or sterile.
- Using supplies available in the training area, have the patient identify whether an item is dirty, clean, or sterile.

keep it clean

Aseptic Technique

Tool	Do or Explain
 How Do I Maintain Aseptic Technique?	▪ Give the patient the *how do I maintain aseptic technique?* quick reference guide. ▪ Have the patient and care partner read the introduction on page 2. ▪ Explain what aseptic technique is and why it is important to use. Tell them it reduces the risk of germs entering the body. ▪ Ask, "When is it important to maintain aseptic technique during dialysis treatment?" It is important the entire treatment time. ▪ Refer to Action 1 in the quick reference guide, Wash Hands Properly. Explain that proper hand-washing is one of the actions to maintain aseptic technique.
 Aseptic Technique	▪ Using the flipbook (page 1-7), explain when hands should be washed. ▪ Describe when to wash with soap and water and when it is okay to use an antiseptic hand rub. › If hands are visibly soiled, they must be washed with soap and water. › If hands are not visibly soiled, they can be washed with a waterless alcohol-based antiseptic hand rub (with 60-90% alcohol content).
 How Do I Maintain Aseptic Technique?	▪ Refer to the proper hand-washing techniques in the quick reference guide (pages 2-3). ▪ Have the patient and care partner read the proper hand-washing techniques. ▪ Ask the patient, "How long is it recommended you wash your hands with soap and water?" Confirm that hands should be washed for at least 15 seconds.

Aseptic Technique (continued)

Tool	Do or Explain
 GlitterBug or Glo Germ	▪ Instruct the patient and care partner to apply a solution to simulate germs (for example, GlitterBug) to their hands. ▪ Have them practice proper hand-washing techniques as described in the *how do I maintain aseptic technique?* quick reference guide (pages 2-4), using both: › Soap (either non-antimicrobial or antimicrobial) and water. Waterless alcohol-based antiseptic hand rub (with 60-90% alcohol content). ▪ Show them whether they effectively removed all of the germs from their hands.
 How Do I Maintain Aseptic Technique?	▪ Using the quick reference guide, explain the other actions that maintain aseptic technique (actions 2-6 on pages 5-7).
 Practice Cartridge, SAK, and vascular access	▪ Using the practice Cartridge, SAK, and vascular access, have the patient and care partner practice maintaining aseptic technique when making the connections listed below without touching the connection points: › Remove the Cartridge Saline T (white clamp) cap. Disconnect the Saline Line (white clamp) from the Cartridge Dialysate Inlet line, and connect to the Saline T (white clamp). Keep the Cartridge Dialysate Inlet line sterile. › Remove a cap from one of the SAK Dialysate Outlets and connect the Dialysate Outlet to the Cartridge Dialysate Inlet line (green clamp). › Remove the cap from the end of a vascular access. Disconnect the Arterial Blood Line (red clamp) from the Priming Spike and connect it to the vascular access.

keep it clean

Aseptic Technique (continued)

Tool	Do or Explain
 How Do I Recognize Infection?	▪ Give the patient the *how do I recognize infections?* quick reference guide. ▪ Explain the possibility of developing a local or systemic infection if aseptic technique is not followed. ▪ Using the quick reference guide, explain: › When to contact the health care professional. › How to recognize signs/symptoms of local or systemic infection.
 Thermometer	▪ Have the patient check his/her temperature, correctly read the thermometer, and write his/her “normal” temperature on the *how do I recognize infections?* quick reference guide.

Supporting **Aseptic Technique** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Review the online module with the patient and point out important concepts.
- Reuse the GlitterBug lotion and let patients touch the equipment and their binder to demonstrate how germs can end up in unintended places.
- During subsequent treatments, when the patient is connecting their Arterial Blood Line to their vascular access, point out that by not touching the connection points, he/she is maintaining aseptic technique and preventing infection.

Universal Precautions

Tool	Do or Explain
 How Do I Take Precautions?	▪ Give the patient the *how do I take precautions?* quick reference guide. ▪ Using the quick reference guide, explain (pages 2-4): › What Universal Precautions are. › Why it is important to take precautions. › Who should follow the precautions. › What actions to take to follow universal precautions.
 Universal Precautions	▪ Use the flipbook (page 1-9) to reinforce: › Why it is important to take precautions. › When to take precautions. › How to take precautions.
 Gloves and Black Marker	▪ Have the patient and care partner practice removing and disposing of contaminated gloves: › Have the patient and care partner put on gloves. › Using a black magic marker, mark the outside of the gloves on the fngers or palms to simulate contamination. › Have the patient and care partner practice removing and disposing of the gloves without touching the contaminated marked area.
 Sterile Gloves	▪ Show the patient a pair of sterile gloves and explain that the gloves used for universal precautions are clean, not sterile. If the clean gloves come in contact with a sterile item, the sterile item is contaminated. Do not demonstrate how to use sterile gloves since patients will not use them.

Supporting **Universal Precautions** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Explain to the patient and care partner that using universal precautions is similar to putting on a raincoat. Just like a raincoat prevents the rain from getting your clothes wet, personal protective equipment (gloves, mask) prevent blood and body fluids fom contacting and transmitting germs to your hands and face.



access your blood

goals and objectives

Needle Use and Connections

Patients and care partners should be able to:

- Recognize and overcome perceived dangers or fears related to cannulating vascular access.
- Identify the vascular access type.
- Determine direction of flow, access maturation, and location of anastomosis.
- Use proper aseptic technique and universal precautions when accessing the patient's blood.
- Properly prepare access area and safely connect vascular access (fistula or graft) to the blood lines.
- Describe correct cannulation technique.
- Monitor and evaluate access during treatment.
- Explain access pressures and their relevance.

Care and Complications

Patients and care partners should be able to:

- Know how to take care of the access before, during, and after treatment.
- Recognize and assess potential access complications.

Central Venous Catheter Access (CVC)

Patients and care partners should be able to:

- Use proper aseptic technique and gloves and masks when accessing the catheter.
- Know and follow the dialysis center's instructions for catheter use and care.
- Assess, recognize and report any unusual appearance of the catheter before, during and after treatment.

supply list

- Nurse Guide
- Flipbook
- NxStage Medical, Inc. video, *Access Preservation and Needlestick Prevention*
- Patient quick reference guides:
  - *how do I access my blood?*
  - *how do I get ready for home hemodialysis?*
- Online module
  - *Not As Scary As You Think*
- Cannulation practice tools or props:
  - Access arm
  - Cannulation block
  - Tubing
  - Needles
  - Banana
- Cannulation supplies
  - Clean gloves
  - Two fistula or ButtonHole® needles
  - Two 10 mL syringes
  - Antibacterial soap
  - Paper towels
  - Medical tape (Micropore or plastic)
  - Tourniquet
  - SteriPick® scab remover or equivalent device
- Disinfecting agent of choice
- Anesthetic agent of choice
- Stethoscope

access your blood

training checklist

Needle Use and Connections

Preparing for Treatment

Note: The guidance provided here was developed according to commonly accepted best practices. Adjust based on the patient's needs or specific dialysis center policies as needed.

This column contains background information or additional tips for you, the nurse. This information may be too technical for the patient. Share information in this column with the patient as appropriate.

Tool	Do or Explain	Additional Nurse Information
 How Do I Get Ready For Home Hemodialysis?	▪ Give the patient the *how do I get ready for home hemodialysis?* Assign the Tasks section of the quick reference guide. ▪ Have patient and care partner decide who will be responsible for each vascular access task and record their decision.	▪ The KDOQI Work Group recommends that patients who are capable and whose access is suitably positioned should be encouraged to self-cannulate. ▪ For fistula access the buttonhole cannulation technique is preferred.
 Not As Scary As You Think	▪ Have the patient and care partner complete the *Not As Scary As You Think* online module. ▪ Review any concerns they may have, using the list of questions from the online module as a guide.	▪ True needle phobia (frequently inherited) is found in approximately 3-4% of the U.S. population, and is evidenced by a vasovagal reflex that could result in major complications, including tachycardia, followed by bradycardia, hypotension, vertigo, nausea, diaphoresis, and although rare, asystole and death.

Needle Use and Connections (continued)

Preparing for Treatment (continued)

Tool	Do or Explain	Additional Nurse Information
 How Do I Access My Blood?	▪ Discuss the need for local anesthetic. Options include: › EMLA Cream (lidocaine with prilocaine) › Intradermal lidocaine › 1% ethyl chloride spray ▪ Give the patient the *how do I access my blood?* quick reference guide. ▪ If the patient will be using an anesthetic, have him/her record the anesthetic of choice in the "Access My Blood: My Info" section at the back of the quick reference guide. ▪ Review the potential complications of using these anesthetics agents.	▪ Possible side effects: › **EMLA Cream:** May cause systemic effects if too much is absorbed. Application should be limited to the cannulation sites. › Intradermal lidocaine: Lidocaine injections put the cannulator at twice the risk of a needle accident and are thought to cause shrinkage and scarring of the surrounding tissue. › The cannulator will need to be taught how to administer intradermal lidocaine 1%.

Patients should be assessed frequently to determine the need for continued use of local anesthetics.

Access Types

 Needle Use and Connections	▪ Using the flipbook (page 1-10), briefly explain the three different access types: › Arteriovenous fistula **(AVF)** › Arteriovenous graft **(AVG)** › Central venous catheter **(CVC)**	▪ AVF: A surgically created opening between an artery anastomosed to a nearby vein that allows the high pressure arterial blood to flow into the vein, causing engorgement, enlargement, and wall thickening. ▪ AVG: A synthetic or, less frequently, biologic conduit implanted subcutaneously and inserted between an artery and a vein. ▪ CVC: A synthetic, relatively large tube made of rigid material, placed into a high-flowing central vein.

If you have a patient with a catheter, skip to the Catheter Access section on page 1-18.

access your blood

Needle Use and Connections (continued)

Evaluating the Access (AVF or AVG)

Tool	Do or Explain	Additional Nurse Information
 NxStage Medical, Inc. video, *Access Preservation and Needlestick Prevention*	▪ Have patient and care partner watch the NxStage Medical, Inc. video *Introduction to Cannulation*.	▪ **How to determine maturation of AVF or the KDOQI Rule of 6's:** › An AVF should be expertly assessed within 6 weeks of creation. › Flow through the vessel should exceed 600 mL/min. › The vessel should be greater than 6 mm in diameter. › The vessel should be less than 6 mm from the surface of the skin. › Maturation of an AVF can take weeks to months. If an AVF fails to mature after 6 weeks, consult with the physician to develop a plan for obtaining a fistulogram. ▪ **Maturation of an AVG:** An AVG can typically be used two weeks after insertion and once swelling has subsided. Vessel maturation is not necessary.
 Needle Use and Connections	▪ Using the flipbook, (page 1-11) explain how to evaluate the access prior to each cannulation. Tell the patient to report any abnormalities to the dialysis center. **Look and Feel** ▪ Comparing to the opposite arm, evaluate the access arm for: › Swelling, color changes, or elevated temperature. › Numbness, movement limitations, or changes in function. ▪ Evaluate the access vessel area for: › Redness, bruising, or hematoma. › Rash, breaks in skin, bleeding, or drainage. › Tenderness or pain. › Aneurysm. ▪ Look at the location of last cannulation site and choose the next site using rope-ladder principles for site rotation.	

Needle Use and Connections (continued)

Assessing the Access (AVF or AVG)

Tool	Do or Explain
 Needle Use and Connections  Stethoscope	▪ Explain how to evaluate the access vessel: **Feel:** ▪ Show the patient and care partner how to feel for the pulse or thrill: › Locate the arterial anastomosis to feel the pulse. › Feel the pulse throughout the outflow vessel; it should be easy to compress. ▪ Explain the difference between what they should and shouldn't feel. **Listen:** ▪ Explain that when the patient is at the center, you will listen to the access for the bruit. ▪ Explain what you should and should not hear as you listen.
	▪ Have the patient and care partner practice evaluating the patient's access. Ask them to describe what they see, feel, and hear.

access your blood

Needle Use and Connections (continued)

Choose Insertion Site

Tool	Do or Explain	Additional Nurse Information
 Needle Use and Connections	▪ Show patient and care partner how to choose sites for needle placement. Using the flipbook (page 1-12), ask the patient and care partner to identify the incorrect cannulation pattern. › The rope-ladder technique may be used for either a non-buttonhole fistula or a graft. › The “One-site-itis” is not an appropriate cannulation pattern. › The buttonhole (constant site) technique may be used for a fistula. ▪ Identify the cannulation pattern (buttonhole or rope-ladder technique). Avoid recently used sites. ▪ Explain the following: › Stay approximately 1.5 inches away from anastomosis. › Space needle sites about 2-3 inches apart. › Choose the entry site and location of needle tips once fully inserted. › Look for a straight area that is at least the length of the fistula needle. Avoid curves, flat spots and aneurysms. › It may be necessary to try several sites to obtain the best location and the desired access pressures.	▪ The arterial needle can be placed either retrograde (against the flow) or antegrade (with the flow). ▪ Placing the arterial needle retrograde may help the care partner see better and obtain the correct insertion angle. ▪ The venous needle is always antegrade; that is, it points away from the arterial anastomosis and is downstream or closer to the heart. This prevents recirculation. Choose needle length according to vessel depth and length.

Needle Use and Connections (continued)

Choose the Site

Tool	Do or Explain
	▪ Instruct the patient to observe their access vessel area and practice locating and selecting sites for cannulation.
 How Do I Access My Blood?	▪ Have patient or care partner record the patient's average and maximum access pressures in the Access My Blood: My Info section of the *how do I access my blood?* quick reference guide.

Anesthetic Agent		Additional Nurse Information
 Anesthetic agent	▪ Show the cannulator how to administer selected anesthetic agent. Have the cannulator practice administration of anesthetic agent. *Avoid injecting lidocaine deeper than intradermal; doing so may puncture the vessel and cause a hematoma over the vessel.*	▪ Follow Manufacturer's instructions for use of EMLA cream (lidocaine 2.5%/ prilocaine 2.5%). This product requires absorption time for effectiveness. The patient will need to be reminded to apply at the appropriate time and then wash the access prior to needle insertion. ▪ If using intradermal lidocaine 1%, use one syringe with a 25-gauge needle for each site. Intradermal means that the needle is inserted just under the surface of the skin and lidocaine is injected to form a bleb about 5 mm in diameter.

access your blood

Needle Use and Connections (continued)

Needles 101

Tool	Do or Explain	Additional Nurse Information
 Needle Use and Connections  How Do I Access My Blood?	▪ Using the flipbook (page 1-13), identify and describe the parts of the fistula needle: › Needle › Needle cover › Bevel › Wings › Hub › Tubing › Cap › Clamp ▪ Using the flipbook (page 1-14), have the patient and care partner identify the parts of the needle. ▪ Have the patient record his/her needle type, gauge, and length in “My Blood: My Info” section of the *how do I access my blood?* quick reference guide.	▪ The gauge and length of the needle is determined by the dialysis center’s policy or, if the patient is coming from an in-center program, the size the patient is already using. ▪ Tubing length is important and depends upon the location of the access, the cannulator, and who is making the connections to the cartridge bloodline. Longer tubing may be needed if the patient is self-cannulating an upper arm. ▪ Various tubing lengths are available from NxStage Medical, Inc.

Needle Use and Connections (continued)

Practice Approaching the Access

Tool	Do or Explain	Additional Nurse Information
 Fistula or ButtonHole Needle	▪ Show patient or care partner how to hold the needle. Share the following tips: › Use aseptic technique when removing the needle cover. Pull the needle cover straight off. Bending the needle cover could bend the needle. › If the needle is dropped or touches an unclean surface, it may be contaminated and it must be discarded and replaced with a new one. › If needed, wear glasses so you can see clearly. › Ensure the room is well lit.	
 Fistula or ButtonHole Needle prop of your choice: Access Arm NxStage Medical, Inc. block Segment of tubing from an unused sterile bloodline set	▪ Using a Fistula or ButtonHole needle, simulate the cannulation process: › Show the cannulator how to approach the access. › Using the prop of your choice, show the cannulator how to insert the needle (use the "Tandem Hand" technique; have the cannulator place his/her thumb and forefinger just behind your thumb and forefinger nail). › Have the cannulator perform the process; ask him/her to explain what he/she feels as the needle goes into the prop. ▪ Have the cannulator practice the procedure until he/she is comfortable; provide guidance as needed. ▪ Tell the cannulator to practice at home to increase comfort level.	▪ Consider placement of the base of the hand; the cannulator should anchor the heel of the hand on the arm with the fingers cocked and the needle tip at the insertion site. The solid base provides control and helps maintain the same angle of insertion for each cannulation (vital for buttonhole).

access your blood

Needle Use and Connections (continued)

Supplies and Prep

Tool	Do or Explain
 How Do I Access My Blood?	▪ Tell patient to turn to the "Prepare the Access Site" section in the *How do I access my blood?* quick reference guide. ▪ List the cannulation supplies: › Clean gloves › Two fistula or ButtonHole needles › Two 10 mL syringes › Antibacterial soap › Paper towels › Disinfecting agent › Medical tape (Micropore or plastic) › Tourniquet (fistula only) › SteriPick (Buttonhole needle only) ▪ Describe which disinfecting product will be used for antimicrobial cleansing. Choose from these recommended options (follow manufacturer's instructions for use): › 2% chlorhexidine gluconate/70% isopropyl alcohol › 10% povidone iodine › 70% isopropyl alcohol ▪ If the patient will need additional supplies, have the patient or care partner record them in the "Access My Blood: My Info" section of the quick reference guide.

Additional Nurse Information

- 2% chlorhexidine gluconate/70% isopropyl alcohol antiseptic has a rapid **(30 seconds)** and persistent **(up to 48 hours)** antimicrobial activity on the skin. Apply solution using back and forth friction for 30 seconds. Allow area to dry. Do not blot the solution.
- Alcohol has a short bacteriostatic action time and should be applied in a rubbing motion for 1 minute immediately prior to needle insertion.
- Povidone iodine needs to be applied for **2-3 minutes** for its full bacteriostatic action to take effect and must be allowed to dry prior to needle insertion.

Needle Use and Connections (continued)

Supplies and Prep

Tool	Do or Explain
 How Do I Access My Blood?	▪ Using the *how do I access my blood?* quick reference guide, explain how to wash the access and disinfect sites: **Wash:** › Use antibacterial soap. › Wash the area for at least 15 seconds (hum the "Happy Birthday" song twice). › Dry well with paper towels. **Disinfect:** › Use an approved disinfecting agent. › Use a different swab or pad to disinfect each site. Follow manufactures instructions for use. › Allow site(s) to dry. ▪ Remind patient and care partner not to touch the access area once it has been cleansed. › Explain the risks of infection.

access your blood

Needle Use and Connections (continued)

Supplies and Prep

Tool	Do or Explain
 How Do I Access My Blood?	▪ Using the *how do I access my blood?* quick reference guide, for patients with a buttonhole fistula, explain how to remove scabs when preparing the access: › Stretch skin away from buttonhole; soak with antibacterial solution to loosen the scab. › Wash the buttonhole sites by gently scrubbing with a clean gauze pad or clean paper towel. › Disinfect the sites using a separate swab or pad for each site. › To remove the scab, lift the loosened scab gently with gauze or a SteriPick, or remove the scab using an approved scab removal device recommended by your dialysis center. › Disinfect the sites again. ▪ Share these tips with the patient: › Take care not to break up the scab or cause damage to the buttonhole or surrounding skin. › Avoid causing bleeding around the buttonhole site. › With daily or frequent dialysis, fewer scabs may form.
 Soap Water Paper towels Disinfecting agent	▪ Have patients and care partners that are not using a buttonhole fistula wash and disinfect access sites.

Needle Use and Connections (continued)

Cannulate the Access

Tool	Do or Explain	Additional Nurse Information
 How Do I Access My Blood?	▪ Have patient and care partner review the "Access Your Blood" section of the *how do I access my blood?* quick reference guide.	
	▪ Verbally review the Tandem Hand Technique with the cannulator. Explain that you will use this technique until the cannulator is comfortable and confident with cannulation.	▪ Follow this process for a minimum of three dialysis sessions. After that, reverse the positions so the patient or care partner handles the needle; you place your thumb and forefinger behind the thumb and forefinger of the cannulator.
	▪ If the patient is using intradermal lidocaine 1% or ethyl chloride spray, guide the cannulator in administering the chosen anesthetic following the manufacturer's instructions for use.	▪ Remember that EMLA cream achieves dermal analgesia when applied under an occlusive dressing for at least 1 hour. It reaches maximum analgesia in 2-3 hours and persists for 1-2 hours after removal.

access your blood

Needle Use and Connections (continued)

Cannulate the Access

Tool	Do or Explain
 How Do I Access My Blood?	Once the patient or care partner has demonstrated cannulation proficiency and confidence, Using the *how do I access my blood?* quick reference guide, show patient or care partner how to cannulate the access: ▪ Wash hands. ▪ Put on clean gloves. ▪ Verify needle size, type, and tubing length is correct. ▪ Apply a tourniquet (fistula only). ▪ Pull skin taut in the opposite direction the needle will be inserted. ▪ Insert the arterial needle at the proper angle. ▪ Pause and observe for flashback. ▪ Stabilize the vessel with thumb and index finger. ▪ Lower the angle of insertion. ▪ Advance the needle close to the hub using a smooth, continuous motion. ▪ Release the tourniquet (fistula only). ▪ Explain how to securely tape arterial needle following your dialysis center's instructions. Take care not to push or flatten the needle completely against the skin, which could change the angle of the needle. ▪ Insert the venous needle following the same procedure. ▪ Verify flow from arterial and venous access. ▪ Connect the access needle lines to the blood circuit's arterial and venous lines. ▪ Check vital signs, access flow pressures, and patient comfort before adjusting to the prescribed blood flow. Follow your dialysis center's policies and procedures for initiating blood flow.

There will be a learning curve. You will need to apply more pressure to the needle to get it into the vessel flap. You may need to manipulate the needle as it goes down the track.

If the patient is using a local anasthetic: Apply EMLA cream before applying tourniquet, or lidocaine spray/ injection before inserting the arterial needle.

The next three pages contain background information for you, the nurse, to aid in the teaching process.

Review these tips:

- Never probe blindly into a poorly defined vessel.
- Never force the needle against resistance.
- It is not necessary to advance the needle hub completely to the skin. Advance as far as necessary to ensure that the bevel is completely inserted without pushing the bevel too tightly against the skin. Erosion of the skin may cause complications.
- Always keep your access visible.

Needle Use and Connections (continued)

Cannulate the Access

Additional Nurse Information

AVG

- The angle of insertion is 45 degrees.
  - A less steep angle increases the risk of dragging the tip along the surface of the graft material.
  - A steeper angle increases the risk of perforating the underside (back wall of graft).
- First cannulation of AVG can occur two weeks post-operative with most grafts. Swelling and echymosis must have subsided so that the course of the graft can be palpated.
- The composite polyurethane (PU) graft should not be cannulated for at least 24 hours post-operative and not until swelling has subsided.
  - Insert standard size arterial and venous needles.
  - Assure that heparin is stopped one hour prior to the end of treatment to prevent prolonged bleeding.

AVF

- The angle of insertion is 20-25 degrees.
- Always use a tourniquet (tight enough to engorge vessel but not occlude flow). This enlarges and stabilizes the vessel for easier penetration.
- Use the rope-ladder or buttonhole technique.
- If the patient has established buttonhole sites but the cannulator does not feel confident performing the buttonhole cannulation, the cannulator may rotate sites being careful to stay at least ¾ inch from buttonhole to avoid damaging the tunnel wall.
- If a patient has a functioning catheter in place, the first cannulation of a newly-matured AVF should use one 17-gauge needle for the arterial access with return to the venous circulation through the catheter. This is referred to as the “one and one” method.
  - Pay attention to the use of heparin; give a lesser dose for the loading bolus.
  - It is generally accepted that one needle should be used for three consecutive treatments before progressing to two needles, judgement should be used to determine when to progress based on the individual patient need.
  - Use pre-pump arterial monitoring to ensure that the blood pump speed does not exceed the needle capacity. Arterial pressure should not exceed -250 mm Hg.
  - In general, lower blood flow rates should be used initially for first cannulations.



access your blood

Needle Use and Connections (continued)

Cannulate the Access

Additional Nurse Information

Buttonhole

- The buttonhole should be created by an expert cannulator who has assessed and chosen the most superficial, straight, and problem-free sites on the outflow vein.
- It takes at least six and as many as twelve sharp entries to establish each buttonhole.
- Once the buttonhole has been established, the cannulator must switch to dull or blunt needles for all future cannulations.
  - Do not use sharp needles once the track is established. Switch to blunt or dull needles when the buttonhole site is clearly visible after scab removal and when the needle moves down the track effortlessly. The tunnel track should be palpable once established.
  - Long-term use of sharp needles will continue to cut adjacent tissue, enlarge the insertion site, and cause bleeding along the track. This will change the existing scar tissue along the track and distort the path of the tunnel.
- Holding the needle behind the wings, and using a rolling, or twirling motion between the forefinger and thumb, advance the needle towards the vessel flap and allow the needle to slide in.
- Hold the needle behind the wings to better visualize the flashback while inserting.

Needle Use and Connections (continued)

Post-dialysis: Remove Needles

Tool	Do or Explain
 Needle Use and Connections	Using the flipbook (page 1-15), demonstrate how to safely remove needles after dialysis: 1. Put on clean gloves and use aseptic technique. 2. Place gauze over the access sites. 3. Pull needles out one at a time following angle of insertion. 4. Use two fingers to hold pressure on the access sites. 5. When the bleeding stops (approx 10 minutes), cover the sites with adhesive bandages or gauze and tape. 6. Dispose of needles in an approved sharps container. Share these tips with the patient and care partner: ▪ Remember that the skin and vessel are staggered; use two fingers to apply pressure to both areas. ▪ Do not apply pressure over the needle sites until the needle is completely out of the access. ▪ Apply enough pressure to stem blood flow but not so much that it occludes the vessel. ▪ Pressure dressing should be removed a few hours later; remove adhesive bandages the next day.

Demonstrate removing needles for the first several dialysis sessions. Then allow the patient or care partner to remove the needles on their own with your guidance.

access your blood

Needle Use and Connections (continued)

Supporting **Needle Use and Connections** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- For patients that have needle anxiety or fear of blood, first have them watch another patient being cannulated, then have the patient and care partner watch the patient being cannulated. Each time, have them try to extend the time watching until the patient becomes comfortable with the sight of their own or another person's blood.
- If a practice arm is available, have the cannulator practice preparing, cannulating, taping and removing needles. If no practice arm is available, use a 12-inch length of plastic tubing (from an unused practice Cartridge for cannulating practice).
- Review the NxStage Medical, Inc. video, *Access Preservation and Needlestick Prevention* again.
- Allow the cannulator to become confident inserting the arterial needle before moving on to inserting both needles.

Reinforce that the patient should always protect the access; it is the "lifeline."

Care and Complications: Fistula or Graft

Tool	Do or Explain
 Care and Complications	▪ Using the flipbook (page 1-16), share these guidelines for proper access care: › Avoid wearing anything tight on the access arm, such as watches, bracelets, or tight sleeves. › Avoid sleeping on the access arm. › Never allow a blood pressure cuff to be placed on the access arm. › Do not allow an inexperienced person to draw blood from an access.

Care and Complications: Fistula or Graft (continued)

Vascular Access Complications

Tool	Do or Explain	Additional Nurse Information
 How Do I Access My Blood?  Care and Complications	▪ Using the *how do I access my blood?* "Managing Complication" section of the quick reference guide, first explain arterial and venous access pressures and the relationship to blood flow, then discuss needle or flow problems. ▪ Using the flipbook (page 1-17), discuss how to handle complications. ▪ If you see infiltration: › Stop treatment. Do not rinseback blood. › Do not recannulate until swelling subsides. › Apply ice intermittently for the first 24 hours, then apply heat. › Discuss with physician the use of a short-term central venous catheter to continue subsequent treatments. ▪ If you have Alarms 11 or 24 and/or suspect poor arterial blood flow: › Check blood pressure; treat hypotension if present. › Decrease the blood flow rate. › Stop treatment and adjust the needle. › Consider recannulation. ▪ Explain your dialysis center's recommendations regarding repeated alarms (how often alarms can go unresolved before the patient must end treatment and rinseback blood). ▪ If you observe bleeding or oozing, infection, prolonged bleeding after treatment, skin breaks, or shiny aneurysms, or if you detect no pulse or thrill: › Contact your dialysis center.	▪ It is important for nurses to recognize signs, symptoms, and causes of thrombosis. Predominant signs in AVF and AVG are absence of thrill and bruit along the vessel. Do not cannulate to confirm. This will complicate or prevent lytic administration. ▪ The following are complications that require invasive procedures or surgical interventions. Any signs and symptoms should be reported to the Nephrologist and Vascular Access Team (VAT). ▪ AVF Complications: › Non-maturing outflow vein and early failure. › Disturbances in flow dynamics, usually caused by venous stenosis. › Accessory veins. › High output cardiac failure. ▪ AVG Complications: › Extremity edema. › Steal syndrome. › Graft degenerations and pseudoaneurysms.

A quick response to needle infiltration helps minimize damage to the access. Proper needle taping and correct needle removal technique decreases the potential for infiltration.



access your blood

Care and Complications: Fistula or Graft (continued)

Supporting **Care and Complications: Fistula or Graft** Concepts

If you have a patient or care partner who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Have the patient and care partner watch the NxStage Medical, Inc. video, *Access Preservation and Needlestick Prevention.*

Accessing the Blood with Central Venous Catheters

Evaluating the Catheter

Tool	Do or Explain	Additional Nurse Information
 Catheter Access Nurse	▪ Using the flipbook (page 1-18), explain how to evaluate the access. **Look for:** ▪ Intact catheter (without holes or cracks). ▪ Securely taped, clean, and dry dressing. ▪ Present and secured caps. ▪ Closed clamps. ▪ A well-healed exit site, with the absence of signs and symptoms of infection and other possible complications that may include: › Redness. › Swelling. › Discoloration or bruising. › Drainage. › Bleeding. › Evidence of catheter migration (visible cuff). **Feel for:** ▪ Catheter is not sore to the touch.	Determine if the patient has an internal jugular (IJ) vein, CVC, or a subclavian CVC. ▪ Determine by inspection: › Is the exit site above or below the clavicle? › Does the tunneled catheter cross the clavicle? ▪ Determine by palpatation: › With a gloved hand, feel the skin above the exit site for a tunnel. › Trace the tunnel until you can no longer feel the catheter. If it crosses the clavicle, it's IJ; if not, it's probably subclavian. ▪ Knowing the type of catheter a patient has can assist with positional changes to improve blood flow if needed. If it is an IJ catheter, the head and neck position may compromise flow; if it is a subclavian catheter, the torso position may compromise flow.
	▪ Have patient and care partner practice evaluating the patient's catheter access.	

access your blood

Accessing the Blood with Central Venous Catheters (continued)

Supplies and Prep

Tool	Do or Explain
	▪ Instruct the patient and care partner how to prepare for dialysis: › Wash hands using proper aseptic technique. › Gather supplies according to your dialysis center's instructions.
 Catheter Access	▪ Using the flipbook (page 1-19), explain the proper aseptic technique to use whenever the catheter ports are opened and/or the catheter dressing is changed. › Wear gloves and masks. › For every catheter-related procedure, every person in the room must wear a mask.

Catheter Access

Tool	Do or Explain
 How Do I Access My Blood?	▪ Have the patient turn to the catheter access section of the *how do I access my blood?* quick reference guide. ▪ Demonstrate how to access the patient's catheter for the dialysis treatment: › Cleanse the exit site. This can be done before, during, or after the treatment; follow your dialysis center's instructions. – Use strict aseptic technique, with patient, care partner, and nurse wearing masks. – Clean the exit site with approved disinfecting agent and follow manufacturer's instructions for application and drying time, as they may differ. – Clean twice, starting at the exit site and working outward in a circle, diameter of 10 cm (4 inches). – Allow to dry before applying sterile dressing (which can be either gauze and tape or a transparent, breathable, plastic dressing). › Apply a new sterile dressing over the exit site.

Remind the patient and care partner to maintain visibility of the access and connections at all times.

Accessing the Blood with Central Venous Catheters (continued)

Catheter Access (continued)

Tool	Do or Explain
 How Do I Access My Blood?	› Catheter Accession — Prepare to connect to bloodlines, following your dialysis center instructions. The recommended practices are listed for you: – Clean the catheter hub or connection with approved disinfecting agent. Clean the connection with one swab directing away from the hub connection for 10 cm (4 inches). Discard swab. With a new swab, clean the cap and hub vigorously. Follow manufacturer's instructions for use with regard to drying time and use with specific catheter material. – Using strict aseptic technique, open catheter. Minimize the time the catheter lumens are open to air. (There are now catheter caps that can be cleaned and accessed without removal. They are changed weekly, reducing that exposure time significantly.) – Withdraw locking solution, discard, and flush lumens with saline assessing for ease of flow. › Securely connect to bloodlines. Following your dialysis center instructions: – Ensure connection is secure to prevent accidental disconnection, but do not overtighten. Overtightening may result in damage to the catheter port during disconnection. – Initiate blood flow at 200 mL/min. – Check vital signs, flow pressures and patient comfort prior to setting prescribed flow. › Maintain visibility of access and connections at all times.

access your blood

Accessing the Blood with Central Venous Catheters (continued)

Catheter Access (continued)

Tool	Do or Explain	Additional Nurse Information
 How Do I Access My Blood?	Have patient and care partner continue to follow along in the *how do I access my blood?* quick reference guide as you show them how to disconnect the blood lines following the dialysis center's instructions. ▪ Use strict aseptic technique. ▪ Clean the connections. ▪ Flush both lumens with saline. ▪ Instill anticoagulant lock; follow your dialysis center's instructions for the procedure and the amount of heparin to be instilled according to the type of catheter you have (based on manufacturer's instructions for use). ▪ Verify that both catheter limb clamps are securely closed and caps tightly connected. ▪ Secure the catheter limbs to the patient's skin as directed.	▪ Firmly infuse anticoagulant lock (to the volume of the lumen, per the manufacturer's instructions), displacing the saline. Quickly reclamp lumen to prevent negative pressure in catheter from pulling blood into the side holes. *Remind the patient and care partner to report any problems with blood flow or alarms to the dialysis center.*

Accessing the Blood with Central Venous Catheters (continued)

Catheter Care and Complications

Tool	Do or Explain	Additional Nurse Information
 Catheter Access	Using the flipbook (page 1-20), explain the possible complications of catheter use: ▪ Infection (report it to the dialysis center). ▪ Poor blood flow may be indicated by alarms 11 and 24 and may be improved by: › Lowering blood flow rate. › Changing body position. › Ending treatment and rinsing back blood if experiencing multiple alarms. ▪ Explain your dialysis center's recommendations regarding repeated alarms (how often alarms can go unresolved before the patient must end treatment and rinseback blood). *Emphasize to the patient and care partner that proper aseptic technique lowers the risk of infection.*	Algorithm for catheter dysfunction located in Core Curriculum, 5th ed., and NKF KDOQI 2006, CGP7 (see Figure 12-11). **Causes of complications:** ▪ Infection (local and systemic): › Not using aseptic technique. › Inadequate skin cleansing with dressing changes. ▪ Catheter dysfunction (blood flow < 300 mL/min): › Mechanical, line, or catheter kinking. › Patient position. › Partial or complete occlusion due to intraluminal thrombosis or fibrin sheath. ▪ Superior vena cava syndrome: › Long-term catheter placement causes endothelial injury, inflammations, stenosis, and occlusion of any vein. › Can have slow or rapid onset.



access your blood

Accessing the Blood with Central Venous Catheters (continued)

Supporting **Accessing the Blood with Central Venous Catheters** Concepts

If you have a patient or care partner who needs reinforcement or additional help with the concepts, follow these tips and actions:

- To practice use of a catheter, have available a demo catheter to perform all tasks. Repeat skills until patient and care partner have a good understanding of the principles of catheter care and use.



interpret your prescription

goals and objectives

Dialysis Prescriptions and Cycler

Patients and care partners should be able to:

- Describe the main therapy prescription components.
- Describe the importance of evaluating dry weight.
- Determine the appropriate ultrafiltration (UF) volume and rate at each treatment.
- Input dialysis prescription data into Cycler.

Therapy-Related and Other Medications

Patients and care partners should be able to:

- Describe prescribed therapy-related medications and their function and role in successful home hemodialysis.
- Identify the appropriate dose for each prescribed medication.
- Administer heparin appropriately.

Changes to Cycler Settings

Patients and care partners should be able to:

- Update Cycler system settings appropriately due to prescription and/or system changes.

supply list

- Nurse Guide
- Flipbook
- NxStage *System One User guide*
- NxStage Nx2me® User guide (if used)
- NxStage Nx2me® Clinical Portal User guide (if used, for home training nurse only)
- Online module
  - *Entering My Treatment Information*
- Heparin vial
- Syringe with needle
- Alcohol wipes
- Blood pressure cuff
- Patient quick reference guides:
  - *how do I determine my treatment dose?*
  - *how do I enter my treatment information?*
- Gloves
- Fistula needle or Central Venous Catheter (CVC) port
- Cycler, set up for treatment
- Calibrated digital scale (medical grade preferred)
- Nx2me app (if used)
- Nx2me Clinical Portal (if used, for home training nurse only)

interpret your prescription

training checklist

Dialysis Prescriptions and Cycler

Tool	Do or Explain
 Nx2me Clinician Portal	▪ Note to Educator: If using Nx2me Clinician Portal, from the Clinical Portal set up the patient's Nx2me app with the: › Patient's password › Therapy prescription › Type of pre and post-assessment › Treatment and alert parameters ▪ Prior to this lesson, record the patient's therapy prescription within the patient's *how do I determine my treatment dose?* quick reference guide. ▪ Give the patient the *how do I determine my treatment dose?* quick reference guide. ▪ Using the flipbook (page 1-21), review the components of the patient's hemodialysis prescription: 1. Flow fraction (FF) 2. Blood flow rate (BFR) 3. Dialysate volume 4. Dialysate composition 5. Dry weight 6. Heparin dose 7. Frequency 8. Fluid removal (ultrafiltration)
 How Do I Determine My Treatment Dose?	
 Prescriptions and Cycler	

Dialysis Prescriptions and Cycler (continued)

Tool	Do or Explain
 How Do I Determine My Treatment Dose?	▪ Teach the patient how to do a pretreatment assessment. This should include vital signs and weights. › Using the how *do I determine my treatment dose?* quick reference guide, have the patient fill in the vital signs, ranges and dry weight parameters in the blank spaces provided. › Discuss when the patient should call the dialysis center for guidance. › Explain how the patient's dry weight is determined. › Explain that the physician and the nurse initially determine the patient's dry weight, monitor it throughout the patient's training, and adjust as needed. › Emphasize that inaccurate estimation of dry weight may lead to taking off too little or too much fluid, resulting in significant consequences. ▪ Explain that several factors affect dry weight, including: › Fluid management: – Thirst and sodium intake. – Fluid allowance. – Ideal fluid weight gain allowance should be approximately a gain of 1 Kg between treatments; 1.5 - 2.0 Kg for an additional day off is acceptable. › Diet and Exercise: – Actual dry weight, not fluid weight, may increase over time. This typically occurs as diet, appetite, improved sense of well-being and physical exercise increase. › Changing residual renal function. ▪ Teach the patient and care partner how to evaluate the patient's dry weight. › Teach the patient and care partner how to evaluate for peripheral edema. › Teach the patient and care partner how to evaluate BP. ▪ Answer any questions the patient or care partner has about the patient's prescription.

See the Additional Nurse information on page 52 for a list of the factors to consider when assessing dry weight.



interpret your prescription

Dialysis Prescriptions and Cycler (continued)

Additional Nurse Information

- It is important to accurately determine dry weight to ensure excess fluid is removed during daily dialysis. This way the patient will achieve a normotensive and normovolemic state.
- True dry weight is subject to change based on whether the patient experiences a condition that causes a loss or gain of non-fluid body tissue, such as increased appetite or exercise.
- Physician and nurse assessment of dry weight should include evaluation of:
  - Weight pre and postdialysis.
  - BP sitting and standing; compare to previous treatments.
  - Pulse, respiratory rate, temperature.
  - Heart and breath sounds.
  - Dependent and peripheral edema.
  - Fluid and sodium intake.
  - Medication management.
  - Residual renal function (assess every 2 months if urinary output is > 100 mL/day).
  - Assessment of intradialytic complaints or symptoms.
  - Assessment of patient adherence to fluid, weight gains and sodium intake.
  - Recent hospitalizations.

Dialysis Prescriptions and Cycler (continued)

Determine the Ultrafiltration (UF) Volume and Rate

Tool	Do or Explain
 How Do I Determine My Treatment Dose?	▪ Explain that ultrafiltration volume should be safely removed during the treatment without causing symptoms during dialysis or damage to vital organs. ▪ Explain how to determine the ultrafiltration volume to be removed for each treatment: › Subtract the patient's dry weight from the patient's predialysis weight. Remind the patient and care partner that: – Accurate weights must be used. – The UF volume may change with each treatment depending on the patient's weight gain/loss. – After the predialysis weight has been determined, the patient should add fluid consumed and any planned fluid bolus to the ultrafiltration volume. › Explain what pre and postdialysis weight means. – Predialysis weight is used to determine the ultrafiltration volume (excess fluid to be removed). – Postdialysis weight is the best indication of how much ultrafiltration has occurred during treatment. Postdialysis weight could be affected by food and fluid intake during treatment. – If postdialysis weight does not reflect intended UF, it may influence the UF volume for the next treatment. ▪ Explain how to obtain an accurate pre and postdialysis weight: › Weigh in just before and right after each treatment. › Use a calibrated digital scale (medical grade preferred). › Place the scale on a firm, flat surface (bare floor, not on carpet). › Weigh with similar weight clothing each day. › Measure weight three individual times. Weights should be within 0.1 Kg of each other. Disregard any weight out of this range, then average the remaining weights.

interpret your prescription

Dialysis Prescriptions and Cycler (continued)

Determine the Ultrafiltration (UF) Volume and Rate

Tool	Do or Explain
 How Do I Determine My Treatment Dose?	▪ Using the *how do I determine my treatment dose?* quick reference guide, in the blank spaces provided write in the patient's maximum ultrafiltration volume per treatment, and other center-specific instructions. › If the UF volume exceeds this maximum, the patient must call the dialysis center prior to treatment for instructions. › Explain how to determine the UF rate for each treatment. UF rate may change with each treatment depending on UF volume. › It is recommended to remove the ultrafiltration fluid volume evenly throughout the entire treatment. Note: Clinical evidence suggest the UF rate should not exceed 10 mg/Kg/Hr. – To remove the UF volume over the entire treatment, simply divide the UF volume by the treatment time (in hours) – If appropriate for the patient, a simple way to determine the ultrafiltration rate is to remove the ultrafiltration volume in 2 hours. This allows the UF to be removed before the end of the treatment time and before all of the prescribed dialysate volume has been delivered To do this, divide the total UF to be removed by 2. ▪ Note: If the patient's ultrafiltration rate is less than or equal to 0.5 Liters/ hour and System Setting #38 is set to "1", then the treatment time will be longer than anticipated to remove the rinseback volume. ▪ Using the quick reference guide, in the blank spaces provided write in the patient's maximum Ultrafiltration Rate per treatment, and other center-specific instructions: › If the patient's UF rate exceeds this maximum, the patient must call the dialysis center prior to treatment for instructions.

Dialysis Prescriptions and Cycler (continued)

Additional Nurse Information

- Removing the total UF in the first two hours of treatment ensures that these important things happen:
  - It allows time for the patient to physiologically re-equilibrate their extracellular fluid which may prevent hypotension from occurring as a result of fluid removal.
  - It reduces patient error in determining the ultrafiltration rate, because it is easy to calculate the UF rate.

Enter Treatment Information in Cycler

Tool	Do or Explain
 How Do I Enter My Treatment Information?	▪ Give the patient the *how do I enter my treatment information?* quick reference guide. ▪ Explain that this quick reference guide provides the basic steps to enter treatment information into the Cycler. › At Step #5 when verifying or entering the blood flow rate, explain to the patient and care partner that the blood flow rate is preset to 200 mL/min. After treatment is started, the blood flow rate will be increased to the prescribed rate when monitoring arterial and venous pressure.
 Prescriptions and Cycler	▪ Using the flipbook (page 1-22), explain how to enter the patient's prescription in the System One Cycler. As you demonstrate, share these tips: › The Rate screen is the default (or home) screen. › Press the **TOGGLE** button to view the volume screen. You know you're on the volume screen when it says VOL in the red status window. › On the Volume screen, work from top to bottom (green, then yellow). › On the Rate screen, work from bottom to top (red, then yellow, then green). › The Volume screen reverts back to Rate screen after 10 seconds of inactivity or for Cycler software versions 4.10 or higher per the System Setting #77 (Volume Display Timeout); the patient or care partner may need to toggle back to the Volume screen again to finish entering total weight to remove. › The Green Status Window in the upper left corner shows flow fraction and total treatment time after all required data is entered on the Rate and Volume screens. If the patient sees an incorrect flow fraction and a treatment time of 99:59, he/she has not correctly entered all required data.

interpret your prescription

Dialysis Prescriptions and Cycler (continued)

Enter Treatment Information in Cycler

Tool	Do or Explain
 Entering my treatment information	▪ Tell the patient and care partner to complete the online module *Entering My Treatment Information.* › Explain that the blood flow and dialysate rates shown reflects the starting rates and not the prescribed blood flow and dialysate rates. Discuss any questions the patient or care partner have after completing the online module.
 How Do I Determine my Treatment Dose?	▪ Using the "Your Treatment Prescription Consist of:" section of the quick reference guide, have the patient practice entering his/her treatment settings into the Cycler. › Refer to the patient's specific values on the "Your Treatment Prescription consists of:" section related to Dialysate Volume, Blood Flow, and Ultrafiltration Rates.

Supporting **Dialysis Prescriptions and Cycler** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Tell the patient to take the *Entering My Treatment Information* online module again.
- Input various ultrafiltration and dialysate volumes to demonstrate change in treatment times.

Dialysis Prescriptions and Cycler (continued)

Practice Heparin Dosage

Tool	Do or Explain
 Heparin vial, alcohol wipes, and syringe	▪ Using a heparin vial, alcohol wipes, and syringe, show the patient and care partner how to draw up a heparin dose. ▪ As you demonstrate, share these tips: › Use proper aseptic technique. › Always clean top of vial with an alcohol wipe. › Date the vial upon opening and follow the clinic's instructions for expiration. › Avoid using a damaged or cloudy vial. ▪ Have the patient and care partner practice drawing up the patient's correct heparin dose. Note: Follow your dialysis center instructions for the proper use and storage of heparin.
 Sample fistula needle or CVC port	▪ Demonstrate the proper procedure for delivering a heparin dose into the venous fistula needle or CVC port. ▪ Using a sample fistula needle or CVC port, have the patient and care partner practice delivering a mock heparin dose.
	▪ Discuss the side effects of heparin and appropriate action. ▪ Explain there will be more detailed training on managing complications in the upcoming weeks.

interpret your prescription

Therapy-Related and Other Medications

Practice Heparin Dosage

Tool	Do or Explain
 How Do I Determine My Treatment Dose?	▪ Tell patients to turn to the "My Medication" section of the *how do I determine my treatment dose?* quick reference guide. Have them list all of their current medications on the table provided in the guide. ▪ Review each prescribed medication with the patient. After consultation with precribing physician, discuss the purpose and potential side effects of each medication. Medications may include: › ESAs (erythropoetin stimulating agents) › Vitamin D analogues › Antihypertensives › Vitamins and iron › Heparin ▪ Using the table in the quick reference guide, discuss at what times the patient should be taking each medication. › Have the patient indicate on the table when he/she takes each medication. › Remind the patient and care partner that some medications may be removed through the dialyzer, so it is important to follow the prescribed medication schedule. ▪ Discuss the signs and symptoms of hypotension with patient. *Carefully watch the patient's blood pressure and medications in the first week of training. Consult with their physician to determine if any change in prescription is needed. Many patients require adjustments to their blood pressure medications within the first week of daily treatment.*

Supporting **Dialysis Prescriptions and Cycler** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Have patient write out medications, what each is for, and when each is taken.
- Discuss with them the consequences of taking medications incorrectly.
- Ask the patient daily if he or she has been able to keep their medication schedule. Discuss any challenges.

Changes to Cycler Setting

Tool	Do or Explain
 Changes to Cycler Settings	▪ Explain that the Cycler comes with most of the Cycler System Settings preprogrammed as listed in appendix A "System Settings Default Value" and does not need adjustment, however there are a few system settings that are customized for each patient. ▪ Explain that patients may need to change the settings in their Cycler if their prescription changes or their machine is replaced. Appendix A of the *System One User guide* has complete directions for changing system settings. ▪ Remind the patient to follow the dialysis center's instructions and physician's prescription when changing system settings. ▪ Using the flipbook (pages 1-23 and 1-24), walk the patient and care partner through the process of changing system settings. ▪ Show the patient and care partner how to change system settings in the Cycler. Refer to the user guide as needed. Use the following examples: › Setting 1 = maximum flow fraction (FF) › Setting 5 = dialysate volume › Setting 47 = arterial (access) pressure decreasing limit ▪ Remind patient and care partner that: › System settings cannot be changed during treatment. All settings must be set before priming. › After changing system settings, they must turn the Cycler **OFF** to save the settings. ▪ Have patient and care partner practice changing Cycler settings (allow them to refer to the user guide for reference).
 How Do I Enter My Treatment Information? Your System Settings	▪ Help patient or care partner complete the "Your System Settings" section on the back page of the *how do I enter my treatment information?* quick reference guide. › To enable the System One S Cycler for dialysate flow rates greater than 12 L/hr, set the System Setting parameter #0 (Cartridge Type) to 8, and parameter #1 (Maximum Flow Fraction) to either >/= 200% or per the Dosing Calculator for the therapy option selected.



interpret your prescription

Changes to Cycler Setting (continued)

Additional Nurse Information

- Cycler System Settings are parameters which configure the Cycler for operation. To keep the Cycler use as simple as possible, NxStage sends the Cycler to the center/patient with system settings preset for typical use when using the Cycler with the CAR-170. Certain system settings may be changed by the center/patient, if required, to optimize use of the Cycler for each patient; such as initial flow rates for blood, therapy, ultrafiltration, dialysate volumes and weight to remove. Always follow the patients' prescription and dialysis center's instructions when changing system settings. Once the System Settings are changed, they are remembered as initial values each time the Cycler is powered on.
- #38 System Setting default is equal to "1" enabling the rinseback volume to be automatically calculated and removed.
  - › If System Setting #38 is set to "0", remember to include the rinseback volume (300 mL if using the CAR-170 or CAR-172) in the ultrafiltration goal.
- You have the option of setting a predetermined UF rate based on the average UF rate of the patient and their hemodynamic response to fluid removal.
  - › System Setting #3 is defaulted to "0".
  - › This System Setting can be set to the patients' average UF rate.
- The steps explaining how to enter treatment information into the Cycler described in the NxSTEPS resources are appropriate for use with the Cycler software version 4.10 or higher.
- If the patient is using Cycler System One S with software version 4.10 or higher, there is another option for entering treatment information into the Cycler by using system settings #80 and #81 to set a maximum ultrafiltration and dialysate rate for the patient's treatments.
  - › System setting #80 (Maximum Ultrafiltration Rate) is adjustable between 0.01 to 2.4 L/hr. The default is set to 2.4 L/hr.
    - – Literature suggests that ultrafiltration rates </= 10 mL/kg/hr improves mortality.
    - – The patient pushes the ultrafiltration up adjustment arrows until the maximum flow rate is met. A "3" is displayed in the Yellow Caution window when the maximum rate is met.

› System setting #81 (Maximum Fluid (Dialysate) Rate) is adjustable between 0.1 to either 12 or 18 L/hr per the Cycler model System One or System One S respectively.
  – Adjust the System Setting #1 (Flow Fraction) to >/= 200% so the Flow Fraction does not constrain the dialysate flow rate.
  – To deliver 18 L/hr when using the System One S the system setting #0 (Cartridge Type) must be set to:

System Setting #0 Value	Cartridge Type
8	170/172
9	171

  – On the rate screen, the patient pushes the dialysate up adjustment arrows until the maximum flow rate is met. A “3” is displayed in the Yellow Caution window when the maximum rate is met.

Supporting **Changes to Cycler Settings** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Review system settings in the user guide (Appendix A).
- Have patient continue to practice changing a few system settings on their Cycler.



goals and objectives

Cycler and Associated Components

Patients and care partners should be able to:

- Identify associated components and major controls of the Cycler and HomeView (if used).
- Describe the direction and flow of blood and dialysate through the Cartridge.
- Describe the type of Warmer they will use, if applicable, including its purpose and how it functions.
- Describe the function of the Cycler Base and Fluid Detection Sensor (if used).

Prepare for Treatment

Patients and care partners should be able to:

- Safely install, set up Cycler, and initiate PRIME.
- Safely install, set up the Warmer and Warmer Disposable Set.
- Safely set up and use Nx2me app (if used).
- Acknowledge and respond to alarm tests.
- Remove air from the Cartridge.
- Make non-patient Cartridge connections.
- Correctly connect Waste Line Extension.

Treatment Process

Patients and care partners should be able to:

- Enter treatment parameters.
- Make Cartridge connections to patient.
- Initiate, monitor, and document treatment.
- Return blood and properly dispose of disposables.
- Confirm and send electronic flowsheet (if using Nx2me app).

goals and objectives

Treatment Wrap-up

Patients and care partners should be able to:

- Clean and disinfect equipment.

Common Procedures

Patients and care partners should be able to:

- Perform a Manual Fluid Bolus.
- Adjust the dialysate temperature settings on the Warmer (ComfortMate™ or Express Fluid Warmer).
- Reprime the Cartridge.
- Administer medications using the CAR–172 needleless access ports.
- Flush the Prime out of the Cartridge.
- Obtain a blood sample.
- Check chloramines/chlorine



use the system one cycler

supply list

- Online module
  - *Using the System One Cycler*
- Nurse Guide
- Flipbook
- *how do I use the system one cycler?* quick reference guide
- System One Treatment Checklist Using CAR-170/172
- User guides:
  - *NxStage System One*
  - *Express Fluid Warmer*
  - *NxStage ComfortMate Fluid Warmer*
  - *NxStage Cycler Base and Fluid Detection Sensor*
  - *NxStage Jewel Box and ConNxBox™ Computer Removal and Installation Instructions*
  - *NxStage Nx2me app (if used)*
- Removable labels (from User's Quick Reference Guide)
- Black marker
- Dialysis center's patient treatment record
- Cleaning and disinfecting supplies:
  - Gloves
  - Soft dry brush
  - Mild detergent
  - Paper towels
  - 1:100 bleach solution
  - Low-lint cloths
  - > 70% Isoprophyl Alcohol (if using Nx2me app)
- Blood sampling supplies
  - Vacutainer
  - Blood collection tubes
  - Labels
- Disposables:
  - CAR-170
  - Warmer Disposable Set
  - Waste Line Extension
  - Prescribed Dialysate Bags
  - Dialysate SAK
  - One bag of saline (or 3 if using CAR-124)
- Chloramines/chlorine test strip (dialysis center recommendation).
- Cup (to collect product water for chloramines/chlorine testing)
- Equipment:
  - Cycler (with Jewel Box or ConNxBox computer)
  - Warmer (Express Fluid or ComfortMate)
  - Cycler Base and Fluid Detection Sensor (if used)
  - Nx2me app (if used)
- Heparin Vial
- 2-10 mL luer lock syringe
- 1-20 mL luer lock syringe
- If CAR-172 is used:
  - Practice CAR-172
  - CAR-172 (used during treatment)
  - CAR-172 *Instructions for Use* (IFU)
  - Medication
  - Syringe
  - Alcohol swab
- If CAR-124 is used:
  - CAR-124
  - Dialyzer
  - CAR-124 IFU
  - *how do I use the system one cycler with the CAR-124* quick reference guide

Cycler and Associated Components

Tool	Do or Explain
 Using the System One Cycler	▪ Instruct the patient and care partner to review the *Using the System One Cycler* online module for an overview of how the Cycler and associated components work together. ▪ Explain that the patient will have the opportunity to review this module again, before conducting his/her treatment.
	▪ Explain that this section of the training focuses on equipment components, starting with the Cycler components. ▪ Explain that the Cycler pumps the blood, controls the therapy, and monitors all safety systems. ▪ Note to Educator: The NxStage System One Cycler is available with two different maximum Dialysate flow rates. The System One Cycler delivers Dialysate up to 12 L/hr (200 mL/min); the System One S Cycler delivers Dialysate up to 18 L/hr (300 mL/min). When using a warmer, the Dialysate rate must never exceed 12 L/hr. The NxStage PureFlow SL is required to supply Dialysate at flow rates greater than 12 L/hr. ▪ Higher Dialysate flow rate capabilities allow physicians expanded possibilities to adjust the patient's prescription.
 Patient's Cycler and Removable Labels  Cycler	▪ Using the flipbook (pages 2-1 through 2-4), the patient's Cycler, and the removable labels from the User's Quick Reference Guide for the Cycler, identify and describe the Cycler components listed below as you place the labels on the Cycler. › **Note:** you do not have labels for all of the components listed. **Cycler Components:** › **Filter Holder:** Holds the Dialyzer during treatment › **Lift/carry handle**: Used to lift or carry the Cycler › **Cycler door handle:** Used only to open or close the Cycler door › **Access Pressure Pod connection point:** Location of the connection to the Cartridge Access Pressure Pod Monitoring Line › **Control Panel:** Controls and monitors therapy › **Serial number label:** Lists the equipment serial number



use the system one cycler

Cycler and Associated Components (continued)

Tool	Do or Explain
 Patient's Cycler and Removable Labels	**Cycler Components (back view): (Cycler NX1000-1 is shown)** › **Serial number label:** Lists the equipment serial number › **Cooling fan:** Cools the Cycler › **Jewel Box or ConNxBox™ Computer:** Contains log files (data) that are communicated to NxStage › **Power input:** Plug for the power cord › **Power switch:** Turns the Cycler on and off › **Auxillary Power Outlet:** Where PureFlow and the warmer are ▪ Remind the patient and care partner that if they need to call Technical Support, they should have the equipment serial number available. **Cycler Computer - Jewel Box or ConNxBox Connections (underside of the computer):** › **USB ports:** Connection point used to retrieve log files using a USB flash drive or to connect the PureFlow SL to the Cycler › **Jewel Box internet connection and phone connection:** Connection points to send log files › **ConNxBox internet connection:** Connection point to send log files › **Reset button:** Restarts/resets the computer › **Heart Beat (HB) light:** Color indicates if the ConNxBox was able to connect to your Wi-Fi home network. Solid or flashing yellow or green indicates the ConNxBox is connected. **Cycler Control Panel:** › **ADD FLUID key:** – During PRIME, starts the PRIME and Alarm Test. – During RINSEBACK, returns blood. › **TREATMENT key:** Begins or restarts therapy and all Cycler pumps. › **MUTE key:** Temporarily silences beep (caution or alarm condition) and clears some caution conditions. › **STOP key:** – When pressed once during TREATMENT, it stops all pumps. – When pressed once during an alarm, it initiates alarm recovery. – When the **STOP** key is pressed and held for 2 seconds, it ends TREATMENT or RINSEBACK.
 Cycler	

Cycler and Associated Components (continued)

Tool	Do or Explain
 Patient's Cycler and Removable Labels  Cycler	**Cycler Control Panel (continued):** › **VOLUME TOGGLE:** When pressed, shifts the display from rate to volume for 10 seconds or for software versions 4.10 and higher, 60 seconds or per System Setting #77 (Volume Display Timeout). › **Rate/Volume Adjustment Arrows:** Used to adjust the dialysate, ultrafiltration, and blood flow rates, and the dialysate and ultrafiltration volume. ▪ Explain that the Cycler Control Panel is used to control and monitor the therapy. The Control Panel keys are only active when lit and pressed. ▪ Explain that for ease of use, NxStage made the colors of the Adjustment Arrows match the Cartridge clamp colors: › The dialysate Adjustment Arrow is green and the Cartridge dialysate fluid pathway clamps are green. › The ultrafiltration Adjustment Arrows are yellow and the Cartridge Waste Line clamps are yellow. › The blood flow Adjustment Arrows are red and the Arterial Blood Line clamps are red. ▪ Point out that the icons next to the up Adjustment Arrows are just pictures. Explain that these are sometimes confused with buttons, but they don't do anything if pressed.
 Cycler  Patient's Cycler and Removable Labels	▪ Using the flipbook (page 2-5), identify and describe the Control Panel Status windows and what each window means as listed in the table below. ▪ Label the status window on the Cycler. **Status windows:** › **Status windows:** Shows operating, caution, or alarm condition. **Green Operating window:** – During TREATMENT, displays the scrolling therapy parameters. This indicates "safe" operating condition when no cautions or alarms are displayed. – **V:** Venous pressure – **E:** Effluent pressure – **A:** Arterial pressure – **FF:** Flow fraction – **hr:min remaining:** Time remaining – During PRIME, it displays the time left in PRIME.



use the system one cycler

Cycler and Associated Components (continued)

Tool	Do or Explain
 Cycler	› **Yellow Caution window:** Displays a caution condition. Action may be required. › **Red Alarm window:** – Displays an alarm condition. Action is required. – Displays “000” to signify the end of a mode (PRIME, TREATMENT, RINSEBACK).
 Cycler and Removable Labels	▪ Remove all the labels you have placed on the Cycler. ▪ Instruct the patient and care partner to place the labels on the appropriate Cycler components and explain the function of the component to each other. Provide assistance as needed.
 Patient Cycler	▪ Explain that the same windows on the Cycler are used to enter both rate and volume information. ▪ Explain that the Rate screen is the default (home screen). ▪ Show the patient how to toggle to the Volume screen by pressing the **TOGGLE** button.
 Cycler Rate Screen Then Volume	▪ Using the flipbook (page 2-6) identify and describe the Cycler Rate windows listed below. **Rate Windows:** › **Dialysate rate:** How fast the prescribed dialysate is flowing in liters per hour. – During RINSEBACK, the rinseback volume in mL. › **Ultrafiltration rate:** How fast excess fluid or weight is being removed in liters per hour. › **Blood flow rate:** How fast blood is flowing through the Cartridge in milliliters per minute. ▪ Explain that during TREATMENT, a red dot will be seen in the lower, right-hand corner of the windows when the Rate screen is displayed and the pumps are on. During RINSEBACK, the red dot is visible in the dialysate and blood flow rate windows when the blood pump is on.

Cycler and Associated Components (continued)

Tool	Do or Explain
 Cycler Rate Screen then Volume	▪ Using the flipbook (page 2-6), identify and describe the Cycler Volume windows listed below. **Volume Windows:** › **Dialysate volume:** – During TREATMENT, the volume of prescribed dialysate left to exchange in L. › **Ultrafiltration volume:** Excess fluid left to remove in liters. ▪ Explain that as TREATMENT progresses, the dialysate and ultrafiltration volumes will count down on the Volume windows. TREATMENT is complete when the volumes go to zero. *Note the "VOL" in the bottom window when the Volume screen is accessed.*
 Patient Cycler	▪ Open the Cycler door on the patient's Cycler and point out the locations of the: › Pressure sensors › Air detectors › Dialysate, effluent, ultrafiltration, and blood pumps › Depressed location for the Cartridge Fluid Balance Chambers › Blood leak detector and mirror



use the system one cycler

Cycler and Associated Components (continued)

Tool	Do or Explain
 Cartridge Fluid Flow Pathways	▪ Using the flipbook (page 2-7), explain the Cartridge blood pathway and fluid pathways. › **Cartridge blood pathway:** Within the blood circuit, the Cycler blood pump pulls blood from the arterial access (creating negative pressure) and pushes it through the dialyzer fibers (creating positive pressure), and then back to the venous access. › **Cartridge fluid pathway:** Within the fluid circuit, the Cycler dialysate fluid pump pulls dialysate from the Dialysate Bags or the PureFlow SL SAK and pushes the dialysate through the Fluid Balance Chambers to the Dialyzer. The ultrafiltration and effluent pumps pull the effluent (spent dialysate or waste) from the Dialyzer and pushes it through the Fluid Balance Chambers, and then sends the fluid to the drain. ▪ Explain that the dialysate pump and the effluent pump move as a single unit. This is to balance the fluids entering and exiting the Dialyzer (what goes in, must come out). ▪ Explain the function of the Fluid Balance Chambers: › Fluid Balance Chambers ensures that the amounts of dialysate delivered and effluent (spent dialysate or waste) removed are equal. › The Cycler automatically checks the function of the Fluid Balance System 15 minutes after the start of TREATMENT and then every 30 minutes during TREATMENT. ▪ Explain that the ultrafiltration pump removes the ultrafiltration at the programmed rate.

Cycler and Associated Components (continued)

Tool	Do or Explain
 Dialyzer	▪ Using the flipbook (page 2-8), explain that as blood flows through the Dialyzer fibers, the dialysate surrounds or "bathes" the fibers, which allows the diffusion of toxins.
 Patient's Cartridge and Removable Labels  CAR-170 (CAR-172, if required)	▪ Using the flipbook (pages 2-9 and 2-10), the patient's Cartridge, and removable labels, identify the Cartridge components as you place the labels on the Cartridge. › **Note:** you do not have labels for all of the components listed. ▪ Explain that the Cartridge is a single-use disposable tubing set that contains all the fluid and blood pathways. Explain that the pictures in the flipbook display the patient's CAR-170 Cartridge in the PRIME configuration. › Point out that clamp colors on the Cartridge lines match the colors of the rate and volume Adjustment Arrows on the Cycler Control Panel (for example, the red clamp on the Arterial Blood Line corresponds to the red blood flow rate Adjustment Arrow). › The patient's CAR-170 includes a pre-attached Dialyzer and is the most common Cartridge used in the home setting. › NxStage also offers the following Cartridge configurations: – Without a pre-attached dialyzer (CAR–124). – With medication administration ports (needleless access ports) (CAR-172).
 Patient's Cartridge and Removable Labels	▪ Remove the labels from the Cartridge. ▪ Instruct the patient and care partner to place the labels on the appropriate Cartridge components. Provide assistance as needed.
 CAR-172 (if required)	▪ If the patient will be using the CAR-172, use the flipbook (page 2-11) to point out that the CAR-172 is similar to the CAR-170, except that the CAR-172 has additional Venous and Saline needleless access ports for administering medication.



use the system one cycler

Cycler and Associated Components (continued)

Tool	Do or Explain
 Patient's CAR-124, Dialyzer, and CAR-124 IFU	▪ If the patient will be using the CAR-124, review the Cartridge components using the patient's CAR-124, the Dialyzer, and the CAR-124 IFU.
 Patient's Cycler Base and Fluid Detection Sensor  Cycler Base and Fluid Detection Sensor	▪ If the patient will be using the Cycler Base and Fluid Detection Sensor, using the flipbook (page 2-12) and the patient's Cycler Base and Fluid Detection Sensor, explain the components of the Cycler Base and Fluid Detection Sensor and the function of each. ▪ Explain that the Cycler Base and Fluid Detection Sensor is an optional product designed to alert the patient of potential Cartridge leaks. When fluid comes into contact with the Fluid Detection Sensor's stainless steel bars, it sounds an alert. ▪ Describe how the Cycler Base fits under the Table Top Stand or the Express Fluid Warmer bottom mount (if used). ▪ Explain that the Cycler Base and Fluid Detection Sensor may not detect dialyzer or other leaks. The patient or care partner should periodically check all connections and the system for possible leaks. ▪ Explain that the Fluid Detection Sensor battery must be correctly installed and replaced as needed. The Sensor must be tested before EVERY treatment to be sure it is working properly.

Cycler and Associated Components (continued)

Tool	Do or Explain
 Patient's ComfortMate Warmer	▪ If the patient will be using bagged dialysate and the ComfortMate™ Warmer, explain that the Warmer and the Warmer Disposable Set warms dialysate to the programmed comfort setting, monitors the dialysate output temperature, monitors the Warmer plate temperature, and accumulates air for operator venting. › In less than 10 minutes, fluids at an initial temperature of 15 degrees Centigrade (59 degrees F) can be brought to a desired comfort setting. ▪ Using the flipbook (page 2-13 and 2-14), the patient's equipment, identify and describe the Warmer components listed below. **ComfortMate Warmer (front view):** › **Alarm indicator:** Displays and sounds an alarm if the temperature has been exceeded or the self-test fails during start-up. › **Temperature light:** Light blinks while warming and is steady once the temperature setting is reached. › **Power on light:** Green light is steady when the power is ON. The symbol ~ indicates alternating current voltage. › **Control knob:** Used to increase or decrease the temperature, or to put the Warmer in STANDBY mode. › **Mounting posts:** Used to mount the Fluid Warmer to the Table Top Stand. › **Door latch:** Used to open the door in order to install or remove a Warmer Disposable Set.
 ComfortMate Warmer	



use the system one cycler

Cycler and Associated Components (continued)

Tool	Do or Explain
 Patient's ComfortMate Warmer	**ComfortMate Warmer (back view):** › **On-Off switch:** Powers the Warmer **ON** or **OFF.** › **Power input receptacle:** Plug for the interconnect cord to supply power to the Warmer.
 ComfortMate Warmer	**ComfortMate Warmer Disposable Set:** › **Air vent:** Used to remove air from the system. › **Air trap:** Collects air created during warming. › **Smiley face:** Indicates the top of the disposable during loading. › **Warmer Disposable outlet line:** Connects to the Cartridge Dialysate fluid inlet line. › **Therapy Multi-Line Adapter:** Connects to the Dialysate Bags using spike or luer connections. ▪ **Waste Line Extension** › Routes waste fluid to drain.

Cycler and Associated Components (continued)

Tool	Do or Explain
 Patient's Express-Fluid Warmer	▪ If the patient will be using bagged dialysate and the Express Fluid Warmer, explain that this Warmer and the Warmer Disposable Set safely warms dialysate to the programmed comfort setting, monitors the dialysate output temperature, monitors the Express Fluid Warmer plate temperature, and traps air in the warmed Dialysate bag. › Within 30-60 minutes, dialysate at an initial temperature of 15 degrees Centigrade (59 degrees F) can be heated to a desired comfort level up to 38 degrees (100 degrees F) Centigrade. ▪ Using the flipbook (pages 2-15 and 2-16), and the patient's equipment, identify and describe the Warmer's components and Warmer disposable set listed in the tables below.
 Express Fluid Warmer	

Express Fluid Warmer Components

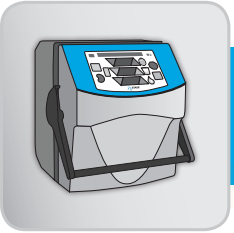
- **Bottom and top mounting brackets:** Secures the IV pole.
- **Collapsible IV pole:** Holds the Dialysate and saline bags.
- **Warming plate:** Warms the dialysate.
- **Power interconnect cord:** Connects the warmer to the cycler.
- **Dialysate cover:** Secures the Warmer Dialysate bag.
- **Hot surface indicator**
- **Standby indicator**
- **Comfort setting status lights**
- **Up adjustment arrow**

Express Fluid Warmer Disposable Components:

- **Multi-Line Adapter (MLA):** Connects to the Dialysate bags using luer connections.
- **Single lumen spike:** Connects MLA to the Dialysate bag on the Warmer.
- **Dialysate Outlet Line:** Connects Dialysate to the Cartridge Dialysate Fluid Inlet.

Waste Line Extension

- Routes waste fluid to drain.



use the system one cycler

Cycler and Associated Components (continued)

Tool	Do or Explain
 Dialysate Bag or SAK	▪ Using the patient's dialysate box, bag, or SAK, explain what to look for on the dialysate box, bag, or SAK to ensure the dialysate the patient uses matches his/her prescription. ▪ Locate and explain how to verify: › SAK, bag, or box catalogue number › Correct composition (potassium, lactate, chloride, calcium) › Lot number › Expiration date

Supporting Cycler and Associated Components

If you have a patient who needs reinforcement or additional help with the Cycler and Associated Components, follow these tips and actions:

- Review the flipbook pages, and then instruct the patient to relabel the equipment components.

Prepare for Treatment

Install the Equipment

Tool	Do or Explain
 Patient's Equipment and Related User guides: - NxStage Jewel Box and ConNxBox Computer - Express Fluid Warmer - NxStage ComfortMate Fluid Warmer - NxStage System One - NxStage System One Cycler Base and Fluid Detection Sensor	▪ Tell the patient and care partner that they will now learn how to install and set-up the equipment for treatment. ▪ Demonstrate how to install and set-up the equipment using the instructions in the appropriate user guides*:* › NxStage Jewel Box and ConNxBox Computer Installation Instructions › Express Fluid Warmer – Section 2: Installing your NxStage Express Fluid Warmer › NxStage ComfortMate Fluid Warmer – Chapter 3: Installing and Testing the ComfortMate Fluid Warmer. › NxStage System One – Chapter 3: Preparing for Use – Remind the patient and care partner that two people are required to lift the Cycler and that the Cycler door handle is used for opening or closing, not lifting. › NxStage System One Cycler Base and Fluid Detection Sensor: Unpacking the Fluid Detection Sensor and Base Accessory Kit and Installing the Base and Fluid Detection Sensor ▪ Conduct and monitor the initial self-test.

Installation of the PureFlow SL and LINX® is covered in the Create and Maintain PureFlow module.

Connect the Computer to the Cycler first. Then attach the Express Fluid Warmer mounting brackets or ComfortMate Tabletop stand on the Cycler before placing the Cycler on top of the Cycler Base (if used).



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Prepare for Treatment (continued)

Install the Equipment (continued)

Tool	Do or Explain
 Patient's Cycler and System One User guide: Appendix A	▪ Using Appendix A: System Settings in the *NxStage System One User guide*, the patient's Cycler, and the patient's Cycler system settings recorded in the *how do I enter my treatment information?* quick reference guide, tell the patient to verify that the system settings displayed on the Cycler match the default system setting values and the patient's system setting prescription. › The process for adjusting the Cycler system settings is covered in the *Interpret Your Prescription* module. However, it is important at this time, to ensure the Cycler the patient is using has the correct settings. › Remind the patient and care partner to verify or change (if required) the Cycler system settings if a new Cycler is received (for example, if the Cycler has been sent to NxStage for preventive maintenance or repair). ▪ If the patient is using CAR-124, note and change the Cycler system settings so they are consistent with the IFU.
 How Do I Enter My Treatment Information	

Understand Operating Instructions

 User guides: - NxStage System One - Express Fluid Warmer - NxStage ComfortMate Fluid Warmer - NxStage Cycler Base and Fluid Detection Sensor	▪ Explain that the user guides are the complete reference for equipment use. They contain all the equipment warnings and precautions for use. ▪ Using the patient's user guides, instruct the patient and care partner to locate and read the "Using or Operating" sections in each user guide for the equipment the patient is using. › *NxStage System One*, Chapter 4: Hemodialysis › *Express Fluid Warmer*, Section 3: Using Your Express Fluid Warmer › *NxStage ComfortMate Fluid Warmer*, Chapter 4: Operating the ComfortMate Fluid Warmer › *NxStage System One Cycler Base and Fluid Detection Sensor*: Using the Cycler Base and Fluid Detection Sensor with the NxStage System One

Prepare for Treatment (continued)

Install the Equipment (continued)

Tool	Do or Explain
	▪ Note to educator: › If your patient plans to use the NxStage System One S Cycler with dialysate flow rates greater than 12 L/hr, confirm that the patient's system meets the following requirements, the: – System One S Cycler part number is CYC-D2E (NX1000-3) or higher. – System Setting parameter #0 (CAR Type) is set to 8. (for CAR-170/172) – System Setting parameter #1 (Flow Fraction) is set to either >/= 200% or per the Dosing Calculator for the therapy option selected. – PureFlow SL is used as a dialysate source and the Control Unit has version 1.15 or higher. – SAK 40x series is used and the correct SAK type is selected in the User Maintenance > Settings menu of the PureFlow SL Control Unit. › Use of CAR-170 is explained within this Nurse Guide. › Use of the PureFlow SL is covered in the *Create and Maintain PureFlow* online module. › Use of the CAR-124 is covered in the CAR-124 Instructions for Use and *how do I use the system one cycler with the CAR-124* quick reference guide. › Use of the CAR-172 is the same as use of the CAR-170, except for the use of the additional saline and venous needleless access ports. Refer to CAR-172 Instructions for Use for information on using needleless access ports.
 Using the System One Cycler	▪ Instruct the patient and care partner to watch the *Using the System One Cycler* video. › Answer any questions the patient or care partner have on the video. › Remind the patient and care partner that they are not expected to memorize the procedural steps. Instead, once they are at home, they can reference printed resources, including the User guides and quick reference guides, and they will receive approximately three to four weeks of supervised practice during training. › Remind the patient and care partner that they can watch the video at any time during training and also from home.



use the system one cycler

Prepare for Treatment (continued)

Pre-TREATMENT Documentation and Important Reminders

Tool	Do or Explain
 Dialysis Center Specific Patient Treatment Record  How do I use the System One Cycler?	▪ Using your dialysis center's patient treatment record, HomeView Pre-Treatment section (if used), and the *how do I use the system one cycler?* quick reference guide, explain how to complete and document the pre-treatment assessment. Explain that the patient and care partner should call the dialysis center before treatment if any abnormal pre-treatment conditions, signs, or symptoms exist, such as: › Excessive weight gain › Abnormal vital signs or symptoms › Access issues › Write in any "other" patient or dialysis center specific issues for which the patient should call the dialysis center on the blank lines in the Prepare for Treatment section of the quick reference guide.

Prepare for Treatment

 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base  How do I use the System One Cycler?	▪ Using the patient's equipment and the *how do I use the system one cycler?* quick reference guide, explain and demonstrate how to set-up the equipment for TREATMENT. › Remind the patient and care partner that if a disposable is contaminated, is past expiration date, or has missing components, it cannot be used. ▪ Explain that when setting up their equipment, the patient and care partner should verify that all equipment automatic self-tests are displayed prior to use. If the self-tests don't complete successfully, don't use the equipment and call NxStage Technical Support. › To customize use of this quick reference guide, cross out any equipment not used.

Prepare for Treatment (continued)

Prepare for Treatment (continued)

Tool	Do or Explain
 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base	▪ Describe the self-tests: › **Cycler:** When PRIME is complete, you see all 8's in the status window and Rate/Volume windows and hear an alarm. After **MUTE** is pressed, you'll see the display test and hear an alarm. The following numbers and letters will appear: – In the Status window: 1234, AbCd, EFgH. – In the three Rate/Volume windows: 987, 654, and 321. › **ComfortMate Fluid Warmer:** Upon power up, the control panels should flash, an audible alarm sound should be heard, and the Power On green light remains lit. › **Express Fluid Warmer:** When the interconnect power cord is connected to both the Cycler (Cycler is connected to power), and the Express Fluid Warmer, the lights on the front of the Express Fluid Warmer will flash red, yellow, and then green. The STANDBY and Hot Surface indicator lights will turn on and then turn off. An alarm will sound and then all the lights will go out, except for the Standby light. ▪ Demonstrate how to position the Cartridge correctly within the Cycler to ensure that the safety and control systems function properly. › Note the Cartridge "smiley face" faces the front of the Cycler door. › To help the patient and care partner remember where to push the Cartridge in (where the air detectors are located), tell them to remember the phrase, "air is square." ▪ Explain that when hanging Dialysate bags on the Express Fluid Warmer IV pole, it holds a total of 21 liters of dialysate and that a 5 liter bag of Dialysate is positioned directly on the Warmer plate. › Use additional IV poles if more fluid is required. › The Dialysate Bag is placed on the Express Fluid Warmer prior to priming the Cartridge because it will take approximately 30-60 minutes of preheating to reach the desired comfort setting depending on the room temperature.
 How do I use the System One Cycler?	



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Prepare for Treatment (continued)

Prepare for Treatment (continued)

Tool	Do or Explain
 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base	▪ Have the patient and care partner practice setting up for TREATMENT. Provide assistance as needed.
 How Do I Use the System One Cycler?	

Supporting **Prepare for Treatment** Concepts

If you have a patient who needs reinforcement or additional help with Preparing for Treatment, follow these tips and actions:

- Monitor the patient and care partner as they perform subsequent set-up procedures.
- Have the patient or care partner write out the key steps to help them understand the procedure.

Treatment Process

TREATMENT Documentation and Important Reminders

Tool	Do or Explain
 Dialysis Center's Patient Treatment Record	▪ Using your dialysis center's patient treatment record and HomeView (if used), explain when and how to record the treatment information. Explain that it is important that the patient or care partner call the dialysis center during TREATMENT for abnormal signs, symptoms, or conditions which may include: › Excessive alarms › Blood circuit or dialyzer clotting › Abnormal bleeding from access › Abnormal vital signs › Arterial and venous pressures outside the patient's expected range

Perform TREATMENT

Tool	Do or Explain
 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base	▪ Using the patient's equipment and the *how do I use the system one cycler?* quick reference guide, demonstrate how to perform and end TREATMENT. Instruct the patient and care partner to follow along in the quick reference guide. ▪ Before your demonstration, ensure that the patient and care partner have successfully completed the online module *Entering Treatment Parameters* and know how to enter the patient's treatment settings.
 How Do I Use the System One Cycler?	

Changing the rate or volume using the Cycler adjustment arrows intentionally requires firm pressure on the keys to prevent inadvertent adjustments.

The Cycler automatically calculates the dialysate rate based on the flow fraction (FF) system setting. The FF is based on the dialysate rate plus the ultrafiltration rate divided by the blood flow rate.



use the system one cycler

Treatment Process (continued)

Perform TREATMENT (continued)

Tool	Do or Explain
 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base	▪ Using the *how do I use the system one cycler* quick reference guide, prior to your demonstration, fill in the patient's treatment information and the patient's maximum ultrafiltration volume and rate on the blank lines provided (step 17). Instruct the patient and care partner to call the dialysis center prior to treatment if the determined volume and/or rate exceeds these numbers. Then fill in the patient's heparin dose (step 18) and the arterial and venous pressure ranges (step 22). › Typical arterial pressures are between -50 and -200 mmHg. Remind the patient that the Cycler displays the arterial access pressure without the negative sign, therefore when the arterial pressure becomes lower (more negative), the arterial pressure displayed on the Cycler becomes a higher number, indicating a more restricted blood flow. › Typical venous pressures are between 20–300 mmHg ▪ Verify that the initial dialysate volume displayed on the Cycler Control Panel is correct. The dialysate volume displayed is determined by Cycler system setting **#5,** which was already programmed for this patient. › The Cycler system setting **#5** should be changed if the patient's prescription changes.
 How Do I Use the System One Cycler?	

Treatment Process (continued)

Perform TREATMENT (continued)

Tool	Do or Explain
	▪ Explain that once treatment been initiated, it is normal for certain informational Cautions to appear in the Yellow Caution window, for example a Caution #7 followed by a Caution #8 is displayed as the Cycler system stabilizes following a change in commanded flow rates. A Caution #2 occurs as the Cycler is conducting a normal automated fluid balance system check. ▪ Share the following reminders with the patient and care partner: › Always follow your prescription. The dialysate volume displayed must match your dialysate volume prescription. › Use an accurate dry weight to determine the ultrafiltration volume to be removed. Do not exceed your maximum ultrafiltration volume. › Do not exceed your maximum ultrafiltration rate. › The ultrafiltration rate should remove fluid evenly throughout the entire treatment, or the first couple of hours, whichever is most appropriate for the patient. › Remember that the starting blood flow rate will be slower than your prescription. It is recommended that the start-up blood flow be programmed at 200 mL/min (system setting #4). › If the arterial access cannot deliver the programmed blood flow rate, the arterial pressure may become more negative (a larger number), which can damage the red blood cells or cause air to be pulled from the blood causing an **Alarm 11: Check for Arterial Air During TREATMENT** or **Alarm 24: Check Arterial Access: Access Pressure at Low Limit.** › When the prescribed blood flow rate is met, the arterial and venous pressures should remain within a consistent range during treatment. ▪ Explain that placing and filling syringes on the Priming Spike red and blue ports after the Patient Lines are disconnected maintains sterility of the ports for use with Temporary Disconnection Procedures and ensures a saline flush is available, if required.



use the system one cycler

Treatment Process (continued)

Control and Monitor TREATMENT

Tool	Do or Explain
 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base  How Do I Use the System One Cycler?	▪ Explain the steps outlined in step 23 in the *how do I use the system one cycler?* quick reference guide. Facilitate safe treatment and can help prevent unnecessary alarms and problems.
 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base  How do I use the System One Cycler?	▪ Explain that TREATMENT automatically ends when the prescribed volume of dialysate has been delivered, the prescribed ultrafiltration volume has been removed, and all alarm conditions have been cleared. ▪ Explain that when TREATMENT has ended: › 000 is displayed in the Yellow Caution window. › The dialysate and ultrafiltration rates will read "0.00". › The blood pump will continue to run. ▪ Explain that the patient can terminate TREATMENT before volume targets are met, if required, by pressing and holding **STOP** for two seconds. › Make sure the patient and care partner understand that it is not recommended to terminate treatment early. However, this procedure, when necessary, assures a quick transition to rinseback without requiring the use of emergency rinseback.

Treatment Process (continued)

End TREATMENT

Tool	Do or Explain
(continued)  Patient's Equipment: Cycler, Computer, Warmer, Cycler Base  How do I use the System One Cycler?	(continued) ▪ Explain that when the **ADD FLUID** key is pressed, the rinseback volume is displayed in the dialysate Rate window. The rinseback volume is based on the Cycler System Settings #12 and #13. › Evaluate the patient lines following RINSEBACK. They should be clear of blood or slightly pink. If they are not, press **ADD FLUID** to repeat a complete or partial rinseback. › Modifying the patient's Cycler system setting #13 (Rinseback Factor) may be required to increase the rinseback volume if the patient lines are not clear after RINSEBACK. › If the ultrafiltration goal was met and additional fluid is administered through rinseback, the ultrafiltration window will count up as this amount is extra fluid given to the patient.
 System One Treatment Checklist using CAR-170/172	▪ Review the *System One Treatment Checklist Using CAR-170/172* with the patient and care partner. Inform them that this tool is intended to help them remember the major steps when using the System One during PRIME, TREATMENT and RINSEBACK. › Explain, to use this tool effectively, they should check off each step once completed. The checklist is intended to be wiped clean and then reused for subsequent treatments. › Remind the patient and care partner, that the checklist does not include all the detailed instruction and information listed in the user guides and the quick reference guides. › It is the training nurse's responsibility to assess the patient and care partner's competency using the NxStage System One to determine if this checklist is appropriate for use by the patient and care partner.



use the system one cycler

Treatment Process (continued)

Post-TREATMENT Documentation and Important Reminders

Tool	Do or Explain
 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base	▪ If not using Nx2me app, following RINSEBACK and before turning off the Cycler power, instruct the patient to press the **VOLUME TOGGLE** and record the following treatment information on the dialysis center's patient treatment record (these values will disappear when the Cycler is powered off): › Volume of dialysate used › Ultrafiltration volume › Liters of blood processed › Total treatment time ▪ Remind the patient that if they are using PureFlow, they need to stop the Cycler before pausing PureFlow SL.
 Dialysis Center Treatment Record	▪ Using your dialysis center's treatment record, and Nx2me app (if used), explain to the patient and care partner what to record in the post-treatment information and assessment, and how to record it.
 How Do I Use the System One Cycler?	▪ Using the *how do I use the system one cycler?* quick reference guide, on step 30, write on the blank lines any documentation guidelines the patient should follow. ▪ Tell the patient and care partner that it is important to call the dialysis center after TREATMENT if any of the following abnormal signs, symptoms, or conditions exist during or after TREATMENT for possible therapy or medication adjustments: › Excessive alarms › Post-treatment weight gain › Clotting › Excessive access bleeding › Loss of blood › Abnormal vital signs or symptoms › Pink to red blood lines after rinseback › Write in any additional patient or center-specific issues for which the patient should call the dialysis center in the space provided on step 30 in the quick reference guide.

Treatment Process (continued)

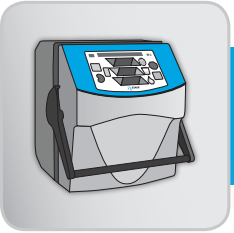
Dispose of Used Supplies

Tool	Do or Explain
 How Do I Use the System One Cycler?	▪ Using the *how do I use the system one cycler?* quick reference guide, on page 14 (step 33), instruct the patient or care partner to write any dialysis center-specific and regional guidelines for disposing of used disposables and supplies in the space provided.
 Patient's Equipment: Cycler, Computer, Warmer, Cycler Base  How Do I Use the System One Cycler?	▪ During subsequent treatments, have the patient and care partner practice performing and ending TREATMENT. Monitor and provide assistance as required.

Supporting **Treatment Process** Concepts

If you have a patient who needs reinforcement or additional help with Treatment Process, follow these tips and actions:

- Offer support and coaching to the patient and care partner as they perform steps during set-up, TREATMENT, and post-TREATMENT. Be sure to help them become increasingly self-sufficient.
- Have the patient and care partner watch the video *Using the System One Cycler.*



use the system one cycler

Treatment Wrap-Up

Clean and Disinfect Equipment

Tool	Do or Explain
 Patient's Equipment  How Do I Use the System One Cycler?	▪ Using the patient's equipment and the *how do I use the system one cycler?* quick reference guide, demonstrate and explain how to clean and disinfect the equipment. ▪ Instruct the patient and care partner that if equipment is contaminated with blood and/or pathogenic microorganisms are suspected (for example, a family member has an infectious disease), disinfect with 1:100 bleach solution or the amount of bleach recommended in the manufacturer's instructions for the specific pathogen. › Wipes with a concentration of 1:100 household bleach may be used if available. ▪ If using Nx2me app, to disinfect the iPad, wipe the exterior surface with 70% Isoprophyl Alcohol twice and allow to air dry. If a cover is used, dispose of non-reusable covers or follow the manufacturer's disinfection instructions. ▪ Monitor the patient and care partner as they clean and disinfect equipment after subsequent treatments.
 Patient's Equipment  How Do I Use the System One Cycler?	▪ Using the patient's Cycler, demonstrate how to clean the Cycler Blood Leak Detector. Tell the patient to follow along using the *how do I use the system one cycler?* quick reference guide. ▪ Tell the patient and care partner that the Blood Leak Detector should be cleaned once a month (or more frequently if necessary). ▪ Tell them that examples of extra low-lint cloths include Kimwipes (Kimberly-Clark) or lens cloths from a camera or optical store.

Supporting **Treatment Wrap-Up** Concepts

If you have a patient who needs reinforcement or additional help with Treatment Wrap–Up, follow these tips and actions:

- Have the patient practice cleaning and disinfecting the equipment after each treatment during training.

Common Procedures

Tool	Do or Explain
 NxStage System One User guide	▪ Instruct the patient to read the procedure in the *NxStage System One User guide* for checking the Dialyzer for clotting. ▪ During TREATMENT, have the patient and care partner use the *how do I use the system one cycler?* quick reference guide to perform a Manual Fluid Bolus to evaluate the Dialyzer for clotting.
 How Do I Use the System One Cycler?	▪ Using the *how do I use the system one cycler?* quick reference guide, demonstrate how to adjust the dialysate temperature during TREATMENT. ▪ Have the patient and care partner practice adjusting the Warmer dialysate temperature setting.
	▪ Complete the center specific instructions for labeling, spinning, storing, and transporting a blood sample on the blank lines provided. Then demonstrate how to obtain a blood sample before and after TREATMENT. ▪ Have the patient and care partner practice obtaining a blood sample before and after TREATMENT.
	▪ Have the patient review the procedure for repriming a Cartridge which may be used as directed for unresolved alarms in PRIME. ▪ Instruct the patient and care partner to practice demonstrating this procedure prior to TREATMENT.



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Common Procedures (continued)

Tool	needleless access ports
 CAR-172 Cartridge and IFU	▪ If the patient will be giving medications at home, using the CAR-172 needleless access port, instruct the patient to review the CAR-172 *Instructions for Use* (IFU). Have the patient practice giving medication using a practice CAR-172, medication, and syringe following the IFU steps. › During TREATMENT, monitor the patient as he/she gives their medication via the needleless access port.
 NxStage System One User guide	▪ Using the *NxStage System One User guide*, instruct the patient and care partner to read the procedures for repriming the Cartridge and flushing the Prime out of the Cartridge (if applicable to the patient). › Explain that flushing the Prime out of the Cartridge is only used for patients that have a known or suspected sensitivity to the NxStage Cartridge (Dialyzer).

Supporting **Common Procedures** Concepts

If you have a patient who needs reinforcement or additional help with Common Procedures, follow these tips and actions:

- Monitor and ensure the patient and care partner performs the procedures as required during subsequent treatments, allowing increasing self-management.

Nx2me App

Tool	Do or Explain
	Components ▪ Note to the Educator: Prior to start of patient training: ▪ Ensure the home training nurse enrolls each patient on NxRx for use of Nx2me app This allows NxStage to: › Prompt a NxStage representative to contact each patient to conduct a ConNxBox Connectivity Assessment and determine which Connectivity Kit to send to the center for the patient's home Internet connectivity. › Send iPads to the center, if appropriate. ▪ Remind the center nurse to inform the patient and care partner to expect a call from NxStage Customer Service prior to the start of training for the Connectivity Assessment.



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Nx2me App (continued)

Tool	Do or Explain
 iPad, Nx2me app User guide	▪ Instruct the patient and care partner to read the Nx2me app User guide: Chapter 1: “Introduction”, then explain that the Nx2me app is installed on the iPad and used while performing treatments to collect treatment information from the Cycler (e.g. access pressures), allow treatment information to be entered (e.g. medications and vital signs), and send information to the center. › Review any questions regarding the warnings and precautions. ▪ Instruct the patient and care partner: › Not to update the iPad software unless notified by the center or NxStage. › The Nx2me app showing the dialysis treatment must always be displayed on the iPad to capture treatment data. ▪ Tell the patient and care partner that the Nx2me app is an optional component and is not required to perform treatment with the Cycler. If the Nx2me app or the iPad stops functioning or the patient is unable to use either the Nx2me app or the iPad, the dialysis treatment should be performed as prescribed using the Cycler. › Document the treatment using the center-supplied flowsheet, and then notify the center of the Nx2me app, iPad connectivity, or usability issues. › Contact the center or NxStage Medical Technical Support for troubleshooting assistance.

Nx2me App (continued)

Tool	Do or Explain
 Nx2me app User guide iPad User guide iPad	Note to Educator: This section explains basic functions of how to use an iPad. Assess your patient and care partner's iPad knowledge to determine if this information is required for them. ▪ Instruct the patient and care partner to read the Nx2me app User guide Chapter 2: "Before Using Nx2me app". › The iPad User guide is available via safari bookmark on the iPad and provides additional detailed instructions. ▪ Have the patient and care partner tap the iPad Settings icon to view and change the: › General: iPad Auto-Lock time, Passcode Lock, Auto-Lock › Brightness › Wi-Fi ▪ Have the patient and care partner turn the iPad off, then on and enter their passcode. ▪ Explain to the patient and care partner the location and function of the iPad: › Home button: circular button on iPad face. Press to return to the "Home Screen". › Wi-Fi connection icon: displays wireless connection. The more bars the stronger the connectivity strength. › Current iPad time. › Battery/charging status icon. › Dock connector. › Safari Web browser. › Apple App. Store. › On/off. › Mute Lock. › Volume buttons. › Setting icon.



use the system one cycler

Nx2me App (continued)

Tool	Do or Explain
 iPad, iPad USB power adapter, iPad Dock connector to USB cable	▪ Demonstrate to the patient and care partner the use of the iPad USB power adapter and iPad Dock connector to USB cable connection to the iPad. Explain these components are used to provide power to the iPad and charge the iPad battery. › Have the patient charge their iPad and explain that if the iPad loses power during treatment, it will not record a complete flowsheet. ▪ Instruct the patient and care partner: › To fully charge the iPad before each treatment is started. › Not to plug in or charge the iPad in the treatment area. › Touching an iPad while plugged in during treatment may result in an electrical shock. ▪ Have the patient and care partner navigate to the iPad Settings – Wi-Fi menu, explain that there must be a wireless connection between the iPad and the Cycler ConNxBox so treatment information can be sent to the Nx2me Clinician Portal. › During training the center's Wi-Fi will be used.
 Cycler, ConNxBox Flipbook	▪ Using the flipbook (page 2-3) and the ConNxBox have the patient and care partner locate the ConNxBox reset button and Heart Beat (HB) light. ▪ Remind the patient and care partner, the ConNxBox is a computer that attaches to the back of the Cycler to securely capture, store and transmit the patient's treatment information from the Cycler and PureFlow SL to the iPad. The information is then securely sent via a web based service to the center's specific Nx2me Clinician Portal. › The reset button is used during ConNxBox set up prior to using Nx2me app › The color of the HB light, either solid or flashing green or yellow indicates positive connectivity from the ConNxBox to center's or the patient's home Wi-Fi, iPad and Internet. ▪ Have the patient and care partner look at their Cycler's computer. Explain that if the Cycler is currently equipped with a Jewel Box, they will be sent a ConNxBox to install and use instead of the Jewel Box for use with Nx2me app.

Nx2me App (continued)

Tool	Do or Explain
 Nx2me Clinician Portal, iPad, Nx2me app, Nx2me User guide	**Prepare for Use** ▪ Note to Educator: From the Nx2me Clinician Portal settings tab, for each patient, obtain the NxStage Patient ID and PIN for use when creating the Nx2me app account. ▪ Have the patient and care partner read the Nx2me app User guide: Chapter 3: “Logging into Nx2me” and Chapter 4: “Using the Nx2me app” then using the iPad assist the patient and care partner to: › Set up the iPad passcode, if desired. › Make sure the Nx2me app is installed on the iPad. › Create a Nx2me app user account which includes entering their username, password, security questions. › Enter NxStage equipment and serial numbers. ▪ Remind the patient and care partner, the Nx2me app username and password is required each time the Nx2me app is used. ▪ Explain to the patient and care partner not to delete the Nx2me app until all treatments have been transmitted. If the Nx2me app is deleted, all “Recent Treatment Sessions” as identified on the Nx2me app Welcome Screen are erased from the Nx2me app and the center may not receive all treatment information.



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Nx2me App (continued)

Tool	Do or Explain
 iPad, Nx2me app	▪ Using the Nx2me app, discuss with the patient and care partner, by clicking on login screen “Learn more about Home Hemodialysis”, they can see if the iPad is connected to the internet. › NxStage Medical web site will be displayed if there is a connection to the internet. ▪ Have the patient and care partner login to the Nx2me app using their username and password and explain that the center customizes the Nx2me app for each patient’s needs by configuring specific information on the Nx2me app related to: › Center policy and setup settings. › Patient prescription. ▪ Explain that some Nx2me app settings are defined and updated remotely by the center using the Nx2me Clinician Portal. This may generate a popup message in Nx2me app for the patient and care partner to review and confirm. ▪ View the Nx2me app Home screen and explain the information displayed and button purposes : › Center and NxStage Technical Support phone number. › Logout. › Settings. › Reference. › Recent treatment sessions and sync icon. ▪ Show the patient and care partner, by tapping the Setting button, they can view settings, the prescription and equipment information. They can change some settings. › The pencil icon will be displayed if a change is possible. › The Cycler serial number within the NxStage equipment tab must match the Cycler they are using. If not, change the serial number and update the Cycler serial number after a swap or receiving a new Cycler. › Within the Nx2me app Troubleshooting: Connection with the ConNxBox. “Looking for Cycler” is displayed if no connection exists or “Connected” is displayed if there is a connection to the Cycler.

Nx2me App (continued)

Tool	Do or Explain
 iPad, Nx2me app (continued)	▪ Have the patient and care partner close Settings and note on the home screen, the sync icon (next to review recent treatment sessions) when touched checks to see if there are new setting and manually sends treatment records not previously sent to the Nx2me Clinician Portal. Treatment records are automatically synchronized with every Nx2me app log in. › Recent treatment sessions are displayed as confirmed or unconfirmed. Any unconfirmed treatments should be confirmed prior to starting a new treatment. ▪ Have the patient click on the reference button, to view and navigate the content displayed. The content is the NxStage System One User Guide. Explain that the reference button is always displayed in the same location (upper right corner) on each screen so the patient can access this information at any time.
 NxStage Nx2me app User guide Nx2me app	**Practice for Use** ▪ Explain to the patient and care partner, they will now practice navigating and using Nx2me app without a connection to their Cycler. ▪ Using the NxStage Nx2me app User Guide and Nx2me app, have the patient and care partner first read Chapter 5: “Starting a Treatment Session” and then click on a New Treatment Session on the Home screen. ▪ Explain the navigation and status bar sections: Pre – Treatment, Monitor Treatment, Post-Treatment and Confirm Flowsheet. The status bar is segmented and sequenced to be similar to the flow of a dialysis treatment. › Discuss that the status bar color will change color, indicating conditions: normal operation (blue), caution (yellow), alarm (red). › The status bar will display “Looking for Cycler” in yellow if there is no connection between the ConNxBox and the iPad. ▪ Explain that the Nx2me app does not control the Cycler or reset alarms or cautions. The patient must press the Cycler keys to control the treatment and respond to all alarms and cautions.



use the system one cycler

Nx2me App (continued)

Tool	Do or Explain
 Nx2me app	▪ Discuss the Pre-Treatment section with the patient and care partner: the prescription, equipment, weight, vitals, assessment, add notes and meds, cancel or monitor treatment and explain: › Any new or updated prescription setting will be displayed in blue font. › Because the Nx2me app is customized for each patient by the center and all pop up messages (e.g. BP alerts to call the center) and any prescription changes must always be followed. › Any prescription changes to the Cycler treatment settings must be manually entered on the Cycler. › Cycler System Setting #44 must be set to “0”, otherwise Nx2me app will show an alert. ▪ Have the patient and care partner, scroll through the Pre- Treatment section to confirm their prescription and perform the actions using the selector wheel, pencil icon and manual entry: › On therapy fluid source, change from PureFlow to Bags. › On the Cartridge lot #, add a number. › Enter Pre-treatment weight, previous post weight, note dry weight, weight gain and weight to remove. › Enter sitting BP. › Complete the assessment. › Add a note. › Add a medication. ▪ Inform the patient and care partner that while it is important to send correct information to the center, the treatment information (including a note) is not available to the center for viewing until after the patient and/ or care partner Confirms the Treatment or selects “Return to Home Screen, I will confirm later”. ▪ Explain to the patient and care partner: › Although treatment information is available to the center, Nx2me app does not provide real-time monitoring and this information is not a substitute for direct medical or emergency care. › Notes may not be viewed by the center in a timely manner. The patient and care partner should always call the center or 911 for any emergency communication or needs. › Nx2me app does not replace the need for a trained and qualified person to observe treatment and respond promptly to alarms.

Nx2me App (continued)

Tool	Do or Explain
 NxStage Nx2me app User guide Nx2me app	▪ Tell the patient and care partner to read Nx2me app User Guide Chapter 6: “Monitoring Treatment” and then navigate to the Monitor Treatment section. ▪ Explain the screen displays for pressures, time, rates and dialysate and ultrafiltrate left to process, then have the patient enter vital signs. › The procedure to add a note or medication is the same as in the Pre-and Post Treatment sections. › Pressures may be displayed as meters or graphs. › Previous vital signs are displayed in the vital history record. › When the Cycler pumps (blood, dialysate, ultrafiltrate) are on, the blue wheel icons on this screen spin. › Within the “Add Vitals pop up”, explain the ability to enter access and saline bolus information. ▪ Remind the patient that the Cycler treatment values; rates/volumes and pressures are automatically recorded on Nx2me app at a time interval set up by the center. The patient will be prompted to record vital signs at specific times.
 NxStage Nx2me app User guide Nx2me app	▪ Have the patient and care partner read the Nx2me app User Guide Chapter 7: “Completing a Post Treatment Flowsheet”, then navigate to the Post-Treatment section and instruct the patient to: › Enter temperature and vital signs. › Complete the post assessment, if required by the center. › Complete maintenance. ▪ Tell the patient and care partner the maintenance items displayed are dependent upon which Therapy Fluid source is selected in the Pre-Treatment section (bags or PureFlow SL).



use the system one cycler

Nx2me App (continued)

Tool	Do or Explain
 NxStage Nx2me app User guide Nx2me app	▪ Instruct the patient and care partner to read Nx2me app User Guide Chapter: 8 “Confirming a Flowsheet” and navigate to the Confirm Flowsheet section. ▪ On the Confirm Flowsheet section have the patient and care partner review the complete treatment information displayed and touch the edit button noting the availability of; the pencil icon, the yes/no values and section to add a medication. ▪ Instruct the patient and care partner to edit the flow sheet. › Some flowsheet values (patient prescription, Cycler values and pressures, treatment times and post-treatment data) are not editable by the patient and care partner because this information is pulled directly from the Cycler. › During an actual treatment the patient and care partner must ensure that all treatment information is correct, click done and then Confirm Flowsheet. ▪ Instruct the patient: Not to confirm this practice flowsheet, instead, navigate to the end of the Pre-Treatment section and touch Cancel to remove this information from Nx2me app Because there is no Wi-Fi connection between the iPad and the Cycler ConNxBox or Internet during this practice session, when cancelled there will not be a record of this treatment on the Nx2me Clinician Portal. ▪ Explain when a Wi-Fi connection exists between the iPad, ConNxBox and to either the center’s or patient’s home Internet, once the flowsheet is confirmed, it is automatically sent to the center’s Nx2me Clinician Portal. › A confirmed flowsheet cannot be edited. › It is best to confirm the flowsheet after each treatment, however there is an option to “Return to the Home Screen to confirm later”, if required. › If “Return to the Home Screen to confirm later” is selected, from the Home screen touch the treatment date, review, edit, click done and confirm to send to the Nx2me Clinician Portal. ▪ Note to Educator: Unconfirmed flowsheets are not displayed on the Dashboard of the Nx2me Clinician Portal, however they are available to you for viewing by navigating to the Patient Summary tab for that patient and selecting “unconfirmed” in the lower left hand corner from the Flow Sheet Summary table.

Nx2me App (continued)

Tool	Do or Explain
 Nx2me app Recorded Webex	▪ As a review, have the patient and care partner log into the NxSTEPS portal" Complete your Treatment section to listen to and watch the Nx2me app recorded webex. ▪ Using their Nx2me app, instruct the patient and care partner to practice again: › Start a new treatment, complete the Pre, Monitor, Post Treatment sections and edit the flow sheet. › Do NOT confirm this practice flowsheet, instead navigate to the end of the Pre-Treatment section and touch Cancel. › Discuss any questions or concerns.
 NxStage System One ConNxBox Setup guide NxStage System One Jewel Box and ConNxBox Computer Removal and Installation Instruction	▪ Note to Educator: Each ConNxBox needs to be configured to connect to either the patient's home Wi-Fi or the NxStage provided Wi-Fi to communicate with the Internet for the treatment information to be sent to the Nx2me Clinician Portal. The method and Kit used to configure and connect the ConNxBox depends on the patient's home Internet connectivity environment. ▪ NxStage Medical has completed the Connectivity Assessment with the patient and care partner prior to training and you should have the appropriate ConNxBox Connectivity Kit for the patient's home use. ▪ Have the patient and care partner read the NxStage System One ConNxBox Setup Guide Chapter 1: "Introduction" and Chapter 2: "System Requirments". Help the patient and care partner identify their Connectivity Kit components. ▪ If required, using the NxStage System One Jewel Box and ConNxBox Computer Removal and Installation Instruction, have the patient remove the Jewel Box and install the new ConNxBox and upgrade ConNxBox software. › Assist the patient to update their ConNxBox software with the USB thumb drive and Upgrading ConNxBox Software Quick Start Note included in their Connectivity Kit.



use the system one cycler

Nx2me App (continued)

Tool	Do or Explain
 NxStage System One ConNxBox Setup guide	▪ Instruct the patient and care partner to read the appropriate section NxStage System One ConNxBox Setup Guide Chapter 3: “Configuring the ConNxBox for the Connectivity Kit” they received. Review any questions on configuring the ConNxBox for their home use. ▪ Explain to the patient and care partner the resources available for ConNxBox configuration assistance when they are home. › The center. › NxStage Technical Support. › ConNxBox User Guide: Chapter 4: “Troubleshooting”. › The Nx2me Connectivity Video on the NxSTEPS portal: Complete your Treatment. ▪ Remind the patient and care partner, if connectivity is lost prior to or during treatment they should always continue with their treatment as prescribed and document treatment information on their center supplied flowsheet. ▪ Note to Educator: Remember, during the patient’s center training, you will need to configure the ConNxBox for communication to your center’s Internet to receive the patient’s treatment information on your center Nx2me Clinician Portal. Explain to the patient and care partner the set up between the ConNxBox, Wi-Fi and Internet may be similar or difference from the patient’s home connectivity.
 Nx2me Connectivity Video	

Nx2me App (continued)

Tool	Do or Explain
 iPad, ConNxBox, Nx2me app, Cycler	**Using Nx2me app** ▪ Note to Educator: Decide if the patient and care partner are capable of and feel comfortable using Nx2me app to record a treatment at this time. If not, have the patient continue to perform practice flowsheets and utilize written flowsheets for documenting treatments until they are ready. ▪ Once the patient and care partner are ready to use Nx2me app for treatment documentation during training, ensure all connectivity is ready: Verify: › The iPad is fully charged. › The iPad Setting Wi-Fi is set to the center's Wi-Fi (during training) or the patient's home Wi-Fi. › The iPad network Wi-Fi icon displays connection. › The ConNxBox is connected to the internet. The HB light is either solid or flashing yellow or green. › When "Learn more about Home Hemodialysis" is tapped on the Nx2me app Login screen, NxStage Medical, Inc. web site is displayed. Treatment information can not be sent without an internet connectivity. › The Cycler serial number on the Cycler being used matches the Nx2me app NxStage Equipment Cycler serial number setting. › All Nx2me app setting updates are reviewed and acknowledged and treatment changes to the Cycler are made if required. › Any unconfirmed flowsheets are reviewed and confirmed.



use the system one cycler

Nx2me App (continued)

Tool	Do or Explain
 Cycler Nx2me app	▪ Instruct the patient and care partner to prepare their Cycler and perform vascular access procedures in preparation for treatment. › Remind the patient to always follow universal precautions when using Nx2me app. › Prior to touching the iPad, always remove gloves and use antiseptic gel. ▪ Tell the patient, once TREATMENT is pressed on the Cycler, Nx2me app automatically starts recording treatment information. › The status bar should display a blue “normal” connection status “Confirm Prescription and Enter Vitals”. ▪ Remind the patient and care partner: › There must always be a Wi-Fi connection between the ConNxBox and the iPad to continuously record treatment information › Nx2me app must be displayed on the iPad screen for treatment information to be captured. › The Nx2me app application will not work if it is closed, the iPad is turned off, or the Home button on the iPad is pressed during treatment. › There must be connectivity between the ConNxBox and the patient’s Wi-Fi and Internet for treatment information to be sent to the Nx2me Clinician Portal.

Nx2me App (continued)

Tool	Do or Explain
 Nx2me app Cycler	▪ Have the patient and care partner navigate to the Monitor Treatment screen. › Point out the blue status bar displaying “Treatment in Progress” and the center and NxStage Technical Support phone numbers. ▪ Discuss the Caution 7 and then 8 displayed within the yellow status bar, explaining that similar to the Cycler, within the Nx2me app status bar Cautions appear in yellow and alarms in red. › If the iPad is set to mute, or the audio volume is turned down, caution and alarm sounds are not audible on Nx2me app. ▪ Note the Caution 7 and then 8 pop-up windows displayed (unless disabled by the center during the set up of the patient’s Nx2me app) and have the patient tap “More Information”. › The Caution or alarm pop-up window is displayed whenever there is a Cycler caution or alarm. On Nx2me app the patient can clear the notification or obtain more information. › When more information is clicked, the information displayed is the same as the NxStage System One User Guide specific caution or alarm information. › Clearing the caution or alarm on Nx2me app does not clear it on the Cycler. The patient must respond to all alarms and cautions by pressing the Cycler Control Panel keys. › Note “Your Support info” button at the bottom of the alarm or caution User Guide instruction. Tap to see the support information displayed. This information is helpful if Technical Support is called to assist with an alarm. ▪ Explain to the patient and care partner the NxStage System One User Guide is always available to view by clicking on the reference button and selecting the section required.



use the system one cycler

Nx2me App (continued)

Tool	Do or Explain
 Nx2me app Cycler (continued)	▪ Explain the pressures displayed to the patient and care partner. › The venous pressure will record at the beginning of treatment if the blood flow rate is initially set to 200ml/min before increasing to the prescribed rate. › These pressures are the same as those displayed on the Cycler in the green status bar, except the arterial pressure is displayed correctly with a negative sign. › The pressures can be displayed as a graph or meter. On the meter display, the red bars indicate pressure alarm limits and the vertical line within each pressure indicates the patient's pressure. ▪ Have the patient and care partner, add vital signs, assess access, enter saline bolus volume (if given), click save then enter a note and medication (if required). ▪ Instruct the patient to explain to you the times remaining, flow rates and what the spinning blue wheels indicate. › The dialysate and ultrafiltrate rates and left to process values are the same as those on the Cycler. › If there is a discrepancy between the Cycler and Nx2me app information, consider the Cycler correct. ▪ Remind the patient and care partner to always observe and monitor their treatment directly so that alarms and harmful conditions can be promptly responded to. Do not use Nx2me app to observe the treatment. ▪ Monitor the patient and care partner's use of Nx2me app completing the Post-Treatment and Confirm Flowsheet sections, then print off the newly confirmed flowsheet from the Nx2me Clinician Portal, review it with the patient and care partner and answer questions, issues or concerns.

Nx2me App (continued)

Tool	Do or Explain
 Nx2me app User guide	**Maintenance** ▪ Instruct the patient and care partner to read Nx2me app User Guide Chapter: 9 “Cleaning and Disinfecting Equipment”, then explain that the iPad and accessories must be cleaned and disinfected (if required) before and after every treatment. ▪ Have the patient and care partner clean and disinfect the iPad. › Note that NxStage disinfection instructions required the use of 70% isoprophyl alcohol instead of bleach. › Clean and disinfect in a well ventilated area. ▪ Explain to the patient and care partner iPad covers may be used. › Choose a cover for use in healthcare environments and clean and disinfect as recommended by the manufacturer. › Disposable covers may also be used. Dispose of cover after each treatment.

Supporting **Nx2me app** Concepts

If you have a patient who needs reinforcement or additional help with the Nx2me app, follow these tips and actions:

- Monitor and ensure the patient and care partner preform the procedures as required during subsequent treatments, allowing increasing self-management.



goals and objectives

PureFlow SL Components

Patients and care partners should be able to:

- Identify PureFlow SL components, disposables, and major controls.
- Identify LINX Water Pre-treatment System (if specified).

PureFlow Process

Patients and care partners should be able to:

- Assemble PureFlow.
- Assemble LINX (if used).
- Prime a PAK.
- Make a batch.
- Check chloramines/chlorine.
- Use a batch.
- Drain and unload the SAK.

Maintenance

Patients and care partners should be able to:

- Properly maintain the PureFlow SL.
- Specify why, how, and when source water, product water, and dialysate are sampled.
- Perform Conductivity Preventative Maintenance Test.

Supplemental Procedures

Patients and care partners should be able to:

- Adjust the heater setting.
- Update and activate the software.
- Change the SAK type.
- Pause and stop the PureFlow SL.
- Remove the PAK.
- Drain the SAK using alternate methods.
- Remove the Control Unit.
- Replace the LINX DI cells (if used).

supply list

- Nurse Guide
- Flipbook
- *PureFlow SL User guide*
- *LINX Water Pre-Treatment System User Guide* (if used)
- *NxStage System One User guide*
- *how do I manage pureflow SL?* quick reference guide
- *Using PureFlow SL* video
- *LINX Water Pre-Treatment System Installation and Use* Video (if used)
- Removable labels from the User's Quick Reference Guide
- PureFlow SL equipment:
  - Cabinet with tub
  - Control Unit
  - Power cord
  - Pre-Treatment Kit, which includes:
    - Mounting bracket
    - Sediment filter
    - Water Line
    - Drain Line
    - Water source connectors A, B, and C
    - Pre-Treatment Unit Instructions for Use
- PureFlow SL disposables:
  - Purification Pack (PAK)
  - Dialysate Sack (SAK) (type prescribed by physician)
  - Control Unit Waste Line Adapter (Waste Line Adapter)
  - Control Unit Conductivity Sensor Adapter (Condo Adapter)
- LINX Water Pre-Treatment System (if used), which contains:
  - LINX System Unit
  - Three Unit Connectors
  - Feed (source) Water Line
  - Drain Line
  - LINX-treated Water Line
  - Line Release Tool
  - Power Cord



supply list (cont.)

- Cycler
- Cycler Base and Fluid Detection Sensor
- Conductivity Preventative Maintenance Test Kit with *Instructions for Use*
- Mild detergent
- 1:100 bleach solution
- 1:10 bleach solution
- 30 or 60 mL syringe
- Gloves
- Mask
- Alcohol prep pads
- Recirculation connector
- Chloramines/chlorine test strip (dialysis center recommendation)
- Cup (to collect product water for chloramines/chlorine testing)
- NxStage DTK-001 (if used)
- Specimen cup or tubes to collect product water and dialysate samples
- LINX DI Cell replacement kit (if used)

PureFlow Components

Tool	Do or Explain
 Using PureFlow SL	▪ Have the patient and care partner watch the video, *Using PureFlow SL.* ▪ Remind them that this video is available online and can be reviewed at any time.
 PureFlow SL	▪ Explain that the PureFlow SL: › Is an accessory to the NxStage System One that prepares dialysate for use during hemodialysis. › Uses drinking water and prepackaged concentrate to prepare Dialysate. The drinking water must meet the PureFlow SL source water purity requirements. › Produces ultrapure water and mixes this water with the prepackaged concentrate in appropriate amounts. › Tests the prepared dialysate. › Warms the dialysate. › Stores the dialysate. › Delivers the dialysate to the NxStage System One Cycler when needed for therapy.
 Using PureFlow SL	▪ Show the “Overview” section of the video, *Using PureFlow SL.*



create and maintain pureflow

PureFlow Components (continued)

Tool	Do or Explain
  PureFlow SL and Removable Labels	▪ Using the flipbook (pages 2-17 & 2-18), the patient's PureFlow SL, and the removable labels for the PureFlow SL from the User's Quick Reference Guide, identify and describe the components listed below as you place the labels on the PureFlow SL. Note: you do not have labels for all of the components listed. **Equipment** 1. **Cabinet:** Contains the Control Unit and Tub. 2. **Tub:** Holds the Dialysate SAK. 3. **Tub serial number label:** Identifies the Tub. 4. **Control Unit and Control Panel:** Contain the controls and interface for purifying water and mixing and delivering dialysate to the System One Cycler. › Only Control Units with software version 1.15 or higher can be used with the SAK 40x series. 5. **Control Unit Serial Number label:** Identifies the Control Unit. 6. **Waste line connector:** Yellow connector on the front of the Control Unit for connecting the Waste Line Adapter. 7. **Conductivity sensor connector:** Orange connector on the front of the Control Unit for connecting the Condo Adapter. 8. **Water outlet connector:** White connector on the front of the Control Unit for connecting the PAK Water Inlet Line. 9. **PAK electrical connector:** Connector on the left side of the Control Unit for connecting the electrical cable from the PAK. **Disposables** **Purification Pack or PAK:** Filters and purifies tap water. 1. Electric Cable 2. Water Inlet (white clamp) 3. Water Outlet (blue clamp) **Control Unit Adapters:** two disposable adapters. The Waste Line Adapter (yellow clamp) connects to the Waste Line Connector and the Cartridge Waste Line. The Condo Adapter (orange clamp) connects to the Conductivity Sensor Connector and either the PAK Water Outlet Line during PAK PRIME or SAK Water Inlet Line during Make Batch. **Dialysate Sack or SAK:** Disposable bag that contains Dialysate concentrate and includes connection lines. 1. SAK label 2. Lot number and expiration date 3. SAK information label

PureFlow Components (continued)

Tool	Do or Explain
 PureFlow SL and Removable Labels	▪ Remove the labels you placed on the PureFlow SL and the disposables. ▪ Instruct the patient and care partner to place the labels on the appropriate PureFlow SL components and disposables and explain the functions of the components to each other. Provide assistance as needed. › **Note:** you do not have labels for all of the components listed.
  PureFlow SL and Removable Labels	▪ Using the flipbook (page 2-19), the patient's PureFlow SL, and the removable labels for the PureFlow SL, identify and describe the PureFlow SL Control Panel components listed below as you place the labels on the Control Panel. **Control Panel** › **Control Panel display:** Provides software version, operating information, including alarms, cautions, modes, and times. › **UP:** Used to display information on the Control Panel display and make operational changes. › **DOWN:** Used to display information on the Control Panel display and make operational changes. › **GO:** Starts a mode (PRIME PAK, MAKE BATCH) and confirms a prompted action. › **STOP:** Stops the mode and acknowledges and silences alarms. **Operating Conditions** › **Green**: When on, indicates safe operating condition. › **Yellow**: When flashing, provides a visual caution alert. › **Red**: When flashing, provides a visual alarm alert.



create and maintain pureflow

PureFlow Components (continued)

Tool	Do or Explain
 PureFlow SL and Removable Labels	▪ Remove the labels you placed on the PureFlow SL Control Panel. ▪ Instruct the patient and care partner to place the labels on the appropriate locations on the Control Panel and explain the functions of the components to each other. Provide assistance as needed.
  SAK	▪ Using the flipbook (page 2-20 and 2-21), and the SAK, identify and describe the SAK lines and components listed below for the SAK your patient will be using. › Two types of SAKs are supplied by NxStage. SAK30x series is used to supply dialysate flow rates of up to 12 L/hr. The SAK-40x series supplies dialysate flow rates greater than 12 L/hr. **SAK Lines** › **SAK Dialysate Outlet Line (green clamp):** Connects the SAK to the Cartridge Dialysate Inlet Line. › **SAK Water Inlet line (blue clamp):** Connects the SAK to the PAK. › **SAK Conductivity line (orange clamp):** Connects the SAK to the Condo Adapter. **SAK Components** › Dialysate Outlets › Dialysate Outlet Line (green clamp) › 1.2 micron filter › Five-way connector › 0.2 micron filter › Blue reopening clamp › Rotating luer lock connector with connector tab › Blue Non-reopening clamp › Dialysate Pump Line › Blue check valve › Line collar assemblies › SAK Information Label **Additional SAK-40x series Components:** › Water Inlet Pod › 1.2 micron filters › Pressure relief line ▪ Explain where to find the SAK type, expiration date, and lot number.

PureFlow Components (continued)

Tool	Do or Explain
 Control Unit Rear Connectors	▪ Using the flipbook (page 2-22), the Control Unit, and the removable labels, point out the following connectors on the rear of the Control Unit as you place the labels on each item. › **Note:** you do not have labels for all of the components listed. 1. Power Switch 2. AC Power Connector from Cycler 3. Heater Power Connector 4. Dialysate Tub Connector (J2) 5. USB Connector to Cycler 6. UV Light Connector (J1) 7. Water Inlet Connector (from Pre-Treatment Unit) 8. Water Outlet to UV Light 9. UV Light 10. Drain Line Connector 11. Model Serial Number Label
 Control Unit and Removable Labels	▪ Remove the labels you placed on the rear of the Control Unit. ▪ Instruct the patient and care partner to place the labels on the appropriate locations on the Control Unit. Provide assistance as needed.
 Pre-Treatment Unit	▪ Using the flipbook (page 2-23), identify and describe the components of the Pre-Treatment Kit. › Pre-Treatment Unit: 1. Pressure Regulator 2. Air vent 3. Water line from water source 4. Check valve 5. Water line to Control Unit 6. Sediment filter › Water Source Connectors: 7. Faucet adapter 8. Under sink adapter 9. Washer hook-up adapter



create and maintain pureflow

LINX Components

Tool	Do or Explain
 LINX and Flipbook	▪ Using the flipbook (pages 2-24), explain to the patient and care partner that the LINX Water Pre-Treatment System is installed between the source water connection and the PureFlow SL to reduce the total dissolved solids (TDS) including chemical contaminates and sediment, in water before it enters the PureFlow SL PAK. › After the patient and care partner's source water TDS and hardness results are sent to NxStage Medical Inc. The LINX Water Pre-Treatment System will be sent to the patient (if specified). › Using the LINX System to reduce high levels of TDS in source water prolongs PAK life.
 Flipbook	▪ Using the flipbook (pages 2-25) explain the LINX Installation Kit Components. Describe the components including line colors and connections to the source water, PureFlow SL and drain: › LINX System Unit › Green LINX Feed (source) Water Line 6.1 meter (20 feet) › Blue LINX-treated Water Line 12.2 meters (40 feet) › Power Cord 1.8 meters (6 feet) › White LINX System Drain Line 1.8 meters (6 feet) › LINX DI Cells Replacement Kit ▪ Have the patient review the LINX Water Pre-Treatment System User Guide Warning and Precautions. Discuss any questions or concerns.

Supporting **PureFlow Components** Concepts

If you have a patient or care partner who needs reinforcement or additional help with PureFlow SL or LINX Components, follow these tips and actions:

- Have the patient and care partner review the “Using the PureFlow” section of the video, *Using PureFlow SL* and/or the LINX Installation and Use video.
- Have the patient or care partner identify and describe each component of the PureFlow SL. Provide guidance and additional information as needed.
- Have the patient or care partner write a list of key components of the PureFlow SL, disposables, Pre-Treatment Kit and LINX Water Pre-Treatment System.



create and maintain pureflow

PureFlow SL Process Assembling PureFlow SL

Tool	Do or Explain
 Using PureFlow SL	▪ Show the "Assembly" section of the video, *Using PureFlow SL.*
 PureFlow SL User guide and LINX Water Pre-Treatment System  LINX Water Pre-Treatment Installation and Use Video	▪ Explain that the *PureFlow SL User guide* is the complete reference for the PureFlow SL and includes all warnings and precautions. ▪ Have the patient and care partner read Section 3, "Installation," in the PureFlow SL *User guide.* ▪ If using LINX, have the patient and care partner read section 3 "Preparing to Install LINX", section 4 "Installing LINX" and section 5 "Using LINX" in the *LINX Water Pre-Treatment User guide* and view the LINX Installation video. › Discuss any questions or concerns regarding LINX home installation.
 PureFlow SL  Installing the PureFlow SL  How Do I Manage PureFlow SL?	▪ Using the flipbook (page 2-25), show the patient and care partner what the Control Unit rear connectors look like when properly installed. ▪ Using the *how do I manage pureflow SL?* quick reference guide, have the patient and care partner install the Control Unit, Pre-Treatment Unit, and Drain Line. Provide guidance as needed. › If LINX is used, discuss how installation of LINX Water Pre-Treatment System changes the connections to the source water and PureFlow SL. › Explain to the patient and care partner, that after LINX installation and connection to power, the LINX System internal operations are automatic when the center green light is lit. (e.g. When the PureFlow SL needs to draw water, the LINX system will operate).

PureFlow SL Process (continued)

Assembling PureFlow SL

Tool	Do or Explain
 PureFlow SL User guide	▪ Have the patient and care partner read Section 4, “Priming a New Purification PAK,” in the *PureFlow SL User guide.*
 Using PureFlow SL	▪ Show the “Installing and Priming the PAK,” section of the video, *Using PureFlow SL.*
 How Do I Manage PureFlow SL?	▪ Using the quick reference guide, have the patient or care partner prime a PAK. Provide guidance as needed. ▪ Explain the following: › An alarm will occur if the water is not on. › Loose connections will cause leaks. ▪ Before moving on, make sure the patient and care partner read and understand all steps and additional information in the “Prime a PAK” section of the quick reference guide.

Make a Batch

Tool	Do or Explain
 PureFlow SL User guide	▪ Have the patient and care partner read Section 5, “Making a Batch of Dialysate” in the *PureFlow SL User guide.*



create and maintain pureflow

PureFlow SL Process (continued)

Make a Batch (continued)

Tool	Do or Explain
 Using PureFlow SL	▪ Show the "Making a Batch of Dialysate," section of the video *Using PureFlow SL*.
 How Do I Manage PureFlow SL?	▪ Using the *how do I manage pureflow SL?* quick reference guide, have the patient or care partner load the SAK and make a batch of dialysate. Provide guidance as needed. ▪ If the patient and care partner will be using dialysate flow rates greater than 12 L/hr, ensure the equipment meets the following requirements: › PureFlow SL Control Unit is software version 1.15 or higher. › 40x series SAK is used and the correct SAK type is selected in the User Maintenance > Settings menu of the PureFlow SL Control Unit.

Test for Chloramines/Chlorine

Tool	Do or Explain
 PureFlow SL User guide	▪ Have the patient and care partner read the pages on testing for chlorine/chloramines in Section 5, "Using Your PureFlow SL," of the *PureFlow SL User guide.*
 How Do I Manage PureFlow SL?	▪ Explain that the patient or care partner must test for chloramines/chlorine and record the results of that test before using each new batch of dialysate. ▪ Review the chloramines/chlorine testing instructions for the test kit your dialysis center uses. For best results, we recommend testing within 2 hours of making your batch and with test strips capable of detecting 0.1 parts per million chloramines/chlorine or with ultra low total chlorine test strips that are insensitive to interference agents. ▪ Using the quick reference guide, have the patient or care partner test for chloramines/chlorine. Provide guidance as needed.

The test kit should determine the chloramines/chlorine concentration to less than or equal to 0.1 ppm.

PureFlow SL Process (continued)

Use a Batch

Tool	Do or Explain
 PureFlow SL User guide	▪ Have the patient and care partner read the pages on using a batch with your NxStage System One Cycler in Section 5, "Using Your PureFlow SL," of the *PureFlow SL User guide.*
 Using PureFlow SL	▪ Show the "Use Batch" section of the video *Using PureFlow SL.*
 How Do I Manage PureFlow SL?	▪ Using the quick reference guide, have the patient or care partner use the batch. Provide guidance as needed. ▪ Explain the following: › The batch must be used before the Batch Expiration Time which is tracked by the PureFlow SL Control Unit. The tracked time begins at the start of mixing the batch. › The green clamps on both the SAK and the Cycler Cartridge must be open during treatment to allow dialysate flow. › The Control Unit should display "Batch in Use" during treatment, with a solid green light on the Control Unit Display. › You must press **GO** on the Control Unit before pressing **TREATMENT** on the Cycler to allow dialysate flow and avoid alarms.



create and maintain pureflow

PureFlow SL Process (continued)

Tool	Do or Explain
	› You must always stop the Cycler **before** pausing the PureFlow. › Once you clamp a nonreopening clamp on the SAK, the line the clamp is on can no longer be used. › Do not turn off the PureFlow SL between treatments. Turning off the PureFlow SL will allow the dialysate to cool; it will take several hours to reheat it. › The black drain line must be in a drain before starting treatment.

Drain, Flush, and Unload the SAK

Tool	Do or Explain
 PureFlow SL User guide	▪ Have the patient and care partner read the pages on draining and unloading the SAK in Section 5, “Use Your PureFlow SL,” of the *PureFlow SL User guide.*
 Using PureFlow SL	▪ Show the “Drain Batch and Unload SAK,” section of the video, *Using PureFlow SL.*
 How Do I Manage PureFlow SL?	▪ Using the quick reference guide, have the patient or care partner drain and unload the SAK. Provide guidance as needed. ▪ Explain that the PureFlow SL conducts a final flush when you stop the drain or the drain is complete. This final flush must be complete before the SAK can be unloaded.

PureFlow SL Process (continued)

Supporting **PureFlow SL Process** Concepts

If you have a patient or care partner who needs reinforcement or additional help with any PureFlow SL process, follow these tips and actions.

- Instruct the patient or care partner to rewatch the video and stop it at any point to take notes.
- Have the patient or care partner read the quick reference guide to review steps for assembling the PureFlow SL, priming the PAK, making a batch, testing for chloramines, using a batch or draining a batch, final flush, and unloading the SAK.
- Demonstrate any procedures the patient or care partner have not mastered and allow the patient or care partner to perform the procedures while you provide guidance and additional information as needed.



create and maintain pureflow

Maintenance

General Cleaning

Tool	Do or Explain
 How Do I Manage PureFlow SL?	▪ Using the quick reference guide, review the procedure for cleaning and disinfecting exterior surfaces of the PureFlow SL after each treatment.

Clean or Replace the Filters

Tool	Do or Explain
 PureFlow SL User guide	▪ Have the patient and care partner read the sections listed below in the *PureFlow SL User guide.* › Maintenance schedule › Procedure for cleaning or replacing the Air Filter › Procedure for replacing the Sediment Filter › Procedure for flushing the Drain Line
 PureFlow SL and PureFlow SL User guide	▪ Explain that the Air Filter must be cleaned or replaced every three months. ▪ Using the instructions in the *PureFlow SL User guide,* have the patient or care partner clean the Air Filter. Provide guidance as needed.
 How Do I Manage PureFlow SL?	▪ Explain that the Sediment Filter must be replaced annually or more frequently as needed. ▪ Using the instructions in the *PureFlow SL User guide*, have the patient or care partner practice changing the Sediment Filter. Provide guidance as needed.

Maintenance (continued)

Flush the Drain Line

Tool	Do or Explain
 PureFlow SL?  How Do I Manage PureFlow SL?	▪ Explain that the Drain Line should be flushed monthly or more frequently as needed in order to remove any waste contamination buildup which can block flow and result in cycler alarms. › Do not flush the Drain Line while a batch is in use. ▪ Have the patient and care partner follow along in the quick reference guide as you demonstrate how to flush the Drain Line. ▪ Using the quick reference guide, have the patient or care partner practice flushing the Drain Line. Provide guidance as needed.

Source Water Testing

Tool	Do or Explain
 How Do I Manage PureFlow SL?	▪ Explain that source water must be tested prior to use with PureFlow SL to ensure it does not exceed the maximum limits for chemical contaminates as listed in *PureFlow SL User guide,* "Specifications—Source Water Source Purity". *Source water is home tap water used to feed the PureFlow PAK to produce product water.* ▪ The patient or care partner should send a source water sample for testing before training begins to determine if PureFlow can be used. ▪ Source water results for total dissolved solids (TDS) and hardness are required to determine if the LINX Water Pre-Treatment System is specified for use with PureFlow SL. ▪ All source water samples sent for testing must be properly stored, packaged, and shipped according to your dialysis center or testing lab's instructions.



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Maintenance (continued) Product Water Testing

Tool	Do or Explain
 How Do I Manage PureFlow SL?	▪ Define "product water" for the patient and care partner. ▪ Explain that product water is tested for chemical contaminants to ensure it meets the Association for the Advancement of Medical Instrumentation (AAMI) standards (Water Treatment for Hemodialysis) per CMS Conditions for Coverage for End-Stage Renal Disease Facilities Guidelines. ▪ Explain the following about product water testing: › **For Source Water from Public Water Supplies:** Initially (first PAK in the patient's home) and annually. › **For Source Water from Private Water Supplies:** Initially (first PAK in the patient's home) and at intervals sufficiently spaced in time to capture the possible seasonal variability of the source water quality. › Testing should be performed at or near the end-of-life of the PAK. › Testing is **NOT** required after installing and priming a new PAK disposable. › Testing is **NOT** required after changing the PureFlow SL Control Unit hardware. › If testing is to be performed on new PAKs (i.e. those that have made three or less 60 liter batches), product water samples should be collected within four hours of complet-ing a batch. This will ensure accurate, interference-free AAMI panel results. ▪ Explain that product water should be obtained for testing near the estimated end of the PAK life, which occurs when either of the following appears on the PureFlow SL: › Caution 5, "Last Batch Caution" › "Batch Use: GO" appears at the end of a "passed" chloramines test. ▪ Have the patient and care partner follow along in the quick reference guide as you demonstrate how to obtain product water. ▪ Using the quick reference guide, have the patient or care partner practice obtaining a product water sample. Follow aseptic technique when obtaining a product water sample. Provide guidance as needed. ▪ Discuss the water testing schedule with the patient and care partner.

Product water: purified water produced by the PureFlow SL PAK.

The recommen-dations in this section for water and dialysate product testing are based on CMS guidelines. Some facilities elect or are required to test more often; refer to your dialysis center's policy.

Your dialysis center's testing procedures and supplies may vary; review the specific procedures for your dialysis center with the patient and care partner.

Maintenance (continued)

Dialysate Testing

Tool	Do or Explain
 How Do I Manage PureFlow SL?	▪ Dialysate is produced when product water (from the PAK) is mixed with dialysate concentrate within the SAK. ▪ Explain that the patient or care partner should test dialysate for bacteria and endotoxins quarterly, near or at the end of SAK life. This testing can be performed before the last treatment with the batch. The Dialysate Outlet Line can be used for treatment after dialysate testing. ▪ Discuss dialysis center's instruction for use of a specimen cup, tube or DTK-001 to obtain a sample of dialysate. › Stress the importance with the patient and care partner of the need for using strict aseptic technique when obtaining the sample to prevent sample contamination and erroneous test results. ▪ Using the quick reference guide have the patient and care partner practice obtaining a sample of dialysate to send for testing. ▪ Discuss the dialysate testing schedule with the patient and care partner.

Conductivity Sensor Preventative Maintenance

- Explain that preventative maintenance on the Conductivity Sensor is performed in response to either a Caution 10 (PM Due in XX Days) or Alarm 79 (Maintenance Required).
- Explain that the patient or care partner should contact NxStage Technical Support when Caution 10 or Alarm 79 is displayed to request the test kit and instructions. Use the included *Instructions for Use* to perform the procedure.



create and maintain pureflow

Maintenance (continued)

Supporting Maintenance Concepts

If you have a patient or care partner who needs reinforcement or additional help with Maintenance or Water and Dialysate Testing, follow these tips and actions:

- Have the patient or care partner review Section 8, “Maintenance Schedule, Cleaning or Replacing the Air Filter, Replacing the Sediment Filter, Flushing the Drain Line” sections in the *PureFlow User guide.*
- Demonstrate the maintenance procedures and allow the patient or care partner to perform the procedures while you provide guidance and additional information as needed.
- Have the patient or care partner write out a schedule of when the maintenance procedures should be performed.
- Demonstrate procedures for obtaining product water and dialysate samples. Have the patient or care partner write the procedures in their own words and then perform the procedures while you provide guidance and additional information as needed.

Supplemental Procedures

Tool	Do or Explain
 PureFlow SL User guide	▪ Have the patient and care partner read Section 6, “Supplemental Procedures,” in the *PureFlow SL User guide.*

Supplemental Procedures (continued)

Adjust the Heater Setting

Tool	Do or Explain
 How Do I Manage PureFlow SL?	▪ Using the quick reference guide, *how do I manage pureflow?* review the procedure for adjusting the heater settings. ▪ Using the quick reference guide, have the patient or care partner adjust the heater settings. ▪ Explain the following: › The heater settings can be changed any time there is fluid in the system (making a batch or using a batch); otherwise, the display will read “Heater Off”. › Since changing the temperature of a large batch of dialysate can take several hours, adjust the heater setting only one setting at a time and allow enough time for the dialysate to reach the new temperature before making another change.

Change the SAK Type

 How Do I Manage PureFlow SL?	▪ Using the quick reference guide, review the procedure for changing the SAK type. ▪ Explain the following: › The PureFlow SL must be in STANDBY mode to change the SAK type. › The SAK type should be checked before making each batch and if the Control Unit is replaced to ensure it matches the patient’s prescription. ▪ Using the quick reference guide, have the patient or care partner practice changing the SAK type. Provide guidance as needed. › Make sure the SAK type is returned to the patient’s prescribed type before making a batch.

Pause PureFlow

 How Do I Manage PureFlow SL?	▪ Using the quick reference guide, review the procedure for pausing and draining PureFlow SL. ▪ Review the procedure for pausing the PureFlow SL during any mode. ▪ Have the patient or care partner practice pausing the PureFlow SL. Provide guidance as needed.



create and maintain pureflow

Supplemental Procedures (continued)

Remove the PAK

Tool	Do or Explain
 How Do I Manage PureFlow SL?	▪ Using the quick reference guide, review the procedure for removing a PAK. ▪ Using the quick reference guide, have the patient or care partner practice removing a PAK. Provide guidance as needed.

Drain the SAK Using Alternative Methods



How Do I Manage PureFlow SL?



PureFlow SL User guide

- Using the quick reference guide, review the steps for draining the SAK manually from User Maintenance menu on the control panel.
- Using the *PureFlow SL user guide,* review the procedure for removing fluid directly from the SAK (Section 7 in user guide, “Manually Draining the SAK”).
  - › Alternative drain methods may be used during a power outage or an unrecoverable alarm.

Remove the Control Unit



How Do I Manage PureFlow SL?

- Explain that the Control Unit must be removed if service or maintenance is required.
- Using the quick reference guide, review the procedure for removing the Control Unit.
- Have the patient or care partner practice removing the Control Unit. Provide guidance as needed.

Supplemental Procedures (continued)

Tool	Do or Explain
 PureFlow SL User guide	▪ Instructions for updating and activating the PureFlow SL software are included in Section 6, "Supplemental Procedures," in the *PureFlow SL User guide.* ▪ Explain that if the patient and care partner experience any problems with updating or activating the software, they should contact NxStage Technical Support.

Replacing the LINX DI Cells

Tool	Do or Explain
 LINX Water Pre-Treatment System User Guide	▪ Instruct the patient and care partner to read Section 5 LINX System Bypass Mode and Section 6 Replacing the LINX DI cells in the LINX Water Pre-Treatment System User Guide.
 How Do I Manage PureFlow Quick Reference Guide	▪ Using the quick reference guide, *how do I manage pureflow SL,* review the procedure for replacing the LINX DI cells.

Supporting **Supplemental Procedures** Concepts

If you have a patient who needs reinforcement or additional help with Supplemental Procedures, follow these tips and actions:

- Review the locations of the supplemental procedures in the *PureFlow User guide*.
- Have the patient or care partner write a list of supplemental procedures, where they are located in the user guide, and when they are be used.
- Demonstrate any procedures for which the patient requires more assistance and allow the patient or care partner to perform the procedures while you provide guidance and additional information as needed.



goals and objectives

Resources and Responses

Patients and care partners should be able to:

- Recognize fears related to alarms and identify ways to overcome them.
- Describe troubleshooting resources and when to use each.
- Recognize the organization and content of user guides:
  - *NxStage System One*
  - *NxStage PureFlow SL*
  - *Express Fluid Warmer*
  - *NxStage ComfortMate Fluid Warmer*
  - *NxStage Cycler Base and Fluid Detection Sensor* (if used)
  - LINX Water Pre-Treatment System (if used)
  - Appropriate disposable *Instructions for Use*

- Acknowledge that it is the machine's job to sound an alarm.
- Identify how the Cycler and PureFlow SL notifies them to situations that require attention and the differences between alarms and cautions.
- Describe the standard response to Cycler and PureFlow SL alarms and cautions.
- Describe the troubleshooting warnings related to the Cycler and PureFlow SL.

Causes of Air and Pressure Alarms

Patients and/or care partners should be able to:

- Describe typical causes for common alarms and cautions.

Responding to Cycler Air and Pressure Alarms During Treatment

Patients and/or care partners should be able to:

- Correctly respond to air in blood circuit or in the patient blood lines alarms and cautions.
- Correctly respond to blood and fluid circuit pressure alarms.

Responding to PureFlow SL Alarms

Patients and/or care partners should be able to:

- Correctly respond to PureFlow SL alarms related to PAK PRIME and Making a Batch.

Warmer (ComfortMate Fluid Warmer and Express Fluid Warmer) Alarms

Patients and/or care partners should be able to:

- Identify how the equipment notifies them to a situation requiring attention.
- Correctly respond to Warmer alarms.

Cycler Base and Fluid Detector Sensor Alarms (if used)

Patients and/or care partners should be able to:

- Identify how the equipment notifies them of situations requiring attention.
- Correctly respond to Cycler Base and Fluid Detection Sensor Alarms.

Special Conditions

Patients and/or care partners should be able to:

- Describe steps to identify potential causes of less common alarms and respond appropriately. Less common alarms include blood leak, power failure, system alarm, and high temperature.
- Describe steps to take in case of medical or environmental emergencies or power outages.



troubleshooting alarms

supply list

- Online modules:
  - *Troubleshooting the System One Cycler*
- Nurse Guide
- Flipbook
- Patient quick reference guides:
  - *How Do I Troubleshoot Common Alarms?*
  - *How do I deal with the unusual?*
- Patient's equipment:
  - NxStage System One Cycler NxStage PureFlow SL
  - Warmer (Express Fluid Warmer or NxStage ComfortMate Fluid Warmer)
  - LINX Water Pre-Treatment System (if used)
  - NxStage Cycler Base and Fluid Detection Sensor (if used)
- Practice Cartridge
- 10 mL and 20 mL luer lock syringe
- Equipment user guides:
  - *NxStage System One*
  - *NxStage PureFlow SL*
  - *Express Fluid Warmer* (if used)
  - *NxStage ComfortMate Fluid Warmer* (if used)
  - NxStage Cycler Base and Fluid Detection Sensor (if used)
  - NxStage PureFlow Pre-Treatment System
  - LINX Water Pre-Treatment System (if used)
- Patient's Guidebook: *Are You Ready? NxStage Home Hemodialysis Patient Planning Guidebook for Non-Medical Emergencies* (TM0428)

training checklist

Resources and Responses

Tool	Do or Explain
	▪ Begin the discussion of alarms and cautions by talking about the resources the patient has when troubleshooting. Explain that: › It is the equipment's job to sound an alarm when a situation requires attention. › It is normal to have fears related to dialysis equipment alarms. › Multiple resources are available to help the patient and care partner respond to alarms, including: – Written resources, such as user guides and quick reference guides. – Hands-on practice during training. – Online modules. › There are people who support the patient and care partner when troubleshooting NxStage equipment or responding to alarms, such as: – Dialysis center nurse. – NxStage Technical Support.

training checklist

Resources and Responses (continued)

Additional Nurse Information

- After training on each alarm or caution, ensure the patient and care partner continue to troubleshoot all subsequent alarms and cautions during treatment.
- Conduct responding to alarms and caution practice sessions as described in this guide.
- Patients should not be connected to the Cartridge during practice sessions.
- Practice sessions occur throughout this section, after specific types of alarms are reviewed.
- To conduct practice sessions, a second Cycler for demonstration could be used during treatment (if available). Alternatively, conduct the training sessions at the end of the patient's treatment following disconnection from the Cartridge bloodlines.
- To perform practice troubleshooting sessions after treatment, follow these steps:
  1. Following rinseback, clamp and disconnect the arterial and venous blood lines from the patient and connect to the Priming Spike red and blue clamp lines.
  2. Leave the patient's used Cartridge in the Cycler. The connections to the Dialysate, Saline, and Waste Lines should remain in treatment configuration.
  3. Leave the Cycler on.
  4. Ensure there is a small supply of dialysate available for practice (when required).
  5. Leave the Dialysate and Waste Lines unclamped.
  6. Unclamp the blood line clamps and the red and blue Priming Spike clamps.
  7. Press **TREATMENT.**

Resources and Responses (continued)

Tool	Do or Explain
 Equipment User guides Appropriate Disposable Instructions for Use	▪ Explain that the equipment user guides and disposable *Instructions for Use* are the complete references for product use. They include all important information and must always be readily available during treatment. ▪ Instruct the patient and care partner to open each user guide that they will use and locate the table of contents and the troubleshooting section. › In the *System One User guide,* instruct the patient and care partner to review the types of Red Alarms and Yellow Cautions. › In the *PureFlow SL User guide,* point out the System One Cycler alarms and cautions section. ▪ Instruct the patient to read all precautions and risks in the Troubleshooting section of the *PureFlow SL and System One User guides*, and then discuss.
 How Do I Troubleshoot Common Alarms? How do I deal with the unusual?	▪ Give the patient and care partner the *how do I troubleshoot common alarms? and how do I deal with the unusual?* quick reference guides. ▪ Instruct the patient and care partner to preview the two quick reference guides you have provided them. ▪ Explain that the quick reference guides: › Are supplements to the user guides that are to be used for quick reference. › Should be kept readily available during treatment.

troubleshooting alarms

Resources and Responses (continued)

Tool	Do or Explain
 Troubleshooting the System One Cycler	▪ Using the *Troubleshooting the System One Cycler,* have the patient and care partner watch the video as an overview prior to teaching troubleshooting the Cycler. › Explain that each alarm will be taught separately and they will have ample time for practicing troubleshooting. › Remind the patient and care partner that they can watch the *Troubleshooting the System One Cycler* video again at any time during or after training.
 Cycler	▪ Explain how the Cycler provides visual and auditory communication to notify the patient and care partner of situations that may require attention. ▪ Using the Cycler, point out the location and purpose of the Cycler Status windows. Explain what the Cycler Status windows mean when lit: › Green: Normal operating condition. Treatment parameters are displayed. › Yellow: Caution condition number is displayed. Intervention may or may not be required. › Red: Alarm condition number is displayed. All Cycler pumps stop. The patient or care partner must correct the problem and reset the alarm to continue. › In the *System One User guide*, instruct the patient and care partner to read the sections on Dialyzer and blood circuit clotting. – Then discuss the key measures that can be taken to prevent clotting from occurring, including: 1. Responding to and correcting alarms promptly. 2. If unable to resolve alarms in a timely manner, rinseback blood to prevent potential blood loss. – Clotting starts to occur as soon as the blood pump is turned off.

Resources and Responses (continued)

Tool	Do or Explain
 Cycler	▪ Describe the audible alerts, which are sounds indicating a caution or alarm: › Red Alarms: Cycler steadily chimes. › Yellow Cautions: Cycler intermittently chimes. – Cautions that do not require an intervention chime every 2 minutes. – Cautions that require an intervention chime every 30 seconds. ▪ Instruct the patient and care partner to create a sample caution **(Caution 88: Pressure Offset Rezeroing Needed)** on the Cycler to see and hear the alert: 1. Connect the Cycler to power. 2. With the door closed, turn the Cycler power on. – "88" will appear in the Yellow Caution window and chime will sound. 3. Turn the Cycler power off.
 Resources and Responses	▪ Explain that the steps used to respond to Cycler alarms are similar regardless of the specific alarm. ▪ Using the flipbook (page 3-1) and *how do I troubleshoot common alarms?* quick reference guide, review the steps for responding to Cycler alarms and cautions.
 PureFlow SL Control Panel Resources	▪ Explain that like the Cycler, the PureFlow SL provides visual and auditory communication to notify the patient and care partner of situations that may require attention. ▪ Using the PureFlow SL, review the visual indicators and sample alarm. The visual indicators and their meanings are: › Green: Normal operating condition. Monitor only. › Yellow: Caution condition when flashing. The caution number and error message are displayed on the Control Panel display. The caution may or may not require operator intervention. › Red: Alarm condition when flashing. The alarm number and error message are displayed on the Control Panel display. The patient or care partner must resolve the problem to resume **TREATMENT**. ▪ Describe the audible alerts, which are the sounds indicating an alarm or caution: › Red Alarms: Fast beep › Yellow Cautions: Intermittent beep

troubleshooting alarms

Resources and Responses (continued)

Tool	Do or Explain
 Standard Response for PureFlow SL Alarm & Caution  How Do I Troubleshoot Common Alarms?	▪ Using the flipbook (page 3-2) and the *how do I troubleshoot common alarms?* quick reference guide, review the steps for responding to PureFlow SL alarms and cautions.
 PureFlow SL	▪ Instruct the patient or care partner to create a sample alarm **(Alarm 98: Power Failure)** on the PureFlow SL to see and hear the alert: 1. Disconnect the PureFlow SL J1 connection. 2. Connect the PureFlow SL to power, and turn the power on. – The alarm will sound and an error message will appear on the Control Panel display. 3. Turn off the power and reconnect the J1 connection.

Supporting **Resources and Responses** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Instruct patient or care partner to practice responding to alarms and cautions using the online module *Responding to Alarms and Cautions* while referring to the NxStage System One user guide and the *how do I troubleshoot common alarms?* quick reference guide and/or watch the *Troubleshooting the Cycler* video again.

Causes of and Responding to Cycler Air and Pressure Alarms

Tool	Do or Explain
	▪ Tell the patient and care partner that you are now going to focus on Cycler air and pressure alarms. ▪ Explain that you'll describe the causes and proper responses to the most common Cycler alarms, starting with air cautions and alarms.
 Causes for Common Cycler Alarms and Cautions	▪ Explain that during treatment and rinseback, air should not be present in the fluid circuit or in the patient blood lines. ▪ Explain that if air enters the blood stream, it can lead to an air embolism, which can result in serious injury or even death. ▪ Using the flipbook (page 3-3) or a practice Cartridge and the patient's Cycler, explain where and how the Cycler detects air. › Point out the Cartridge air detector locations and the Cycler air detector locations. › Explain that the Cartridge air detector segments are manually pressed into the Cycler during setup. Air is detected at these locations as fluid flows by. › Tip: To identify Cycler air detection locations, remember "air is square."
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, refer to **"Alarm 10: Check for Venous Air During TREATMENT."** ▪ Explain your dialysis center's instructions for responding if the patient or care partner suspects that air has entered the blood circuit or patient blood lines during treatment. ▪ Instruct the patient or care partner to write these instructions in the space provided in the quick reference guide. ▪ Explain the preventative measures for air embolism. › Never rinseback blood when there is air in the venous blood line. › Ensure blood lines are properly attached to needles or the catheter. › Always clamp the normal saline line after infusing saline. › Recheck all Cartridge connections before initiating treatment. ▪ Explain that air embolism is covered in more detail in the *how do I recognize a problem?* quick reference guide.

troubleshooting alarms

Causes of and Responding to Cycler Air and Pressure Alarms

Tool	Do or Explain
 Alarm 10: Check for Venous Air During TREATMENT or Alarm 11: Check for Arterial Air During TREATMENT	▪ Using the flipbook (page 3-4), explain the reasons air might enter the blood circuit or patient blood lines and cause **Alarm 10: Check for Venous Air During TREATMENT** or **Alarm 11: Check for Arterial Air During TREATMENT.** ▪ Alarm 10: › Air that wasn't completely removed from Venous Header › Air in blood circuit or patient blood lines because they were not snapped and tapped correctly › Loose arterial connections ▪ Alarm 11: › Poor flow through arterial access site › Change in needle position › Loose, disconnected, or clamped Arterial Blood Line › Air in Saline Line because the saline bag is empty *For all the alarms discussed within this training, only the top three or four most common causes and operator actions are listed. Refer to the user guides for a complete listing of all causes and operator actions.*
 NxStage *System One User guide*	▪ Instruct the patient and care partner to read the pages in the NxStage *System One User guide* on Alarms 10 and 11. ▪ Remind the patient and care partner that the user guide should be readily available during treatment.

Causes of and Responding to Cycler Air and Pressure Alarms (continued)

Tool	Do or Explain
 How Do I Troubleshoot Common Alarms?	▪ Have the patient and care partner use the *how do I troubleshoot common alarms?* quick reference guide to practice responding to Alarms 10 and 11. ▪ Use the instructions below during a practice session to create an Alarm 10, and then an Alarm 11. Provide assistance as appropriate to help the patient and care partner resolve the alarms. ▪ Patients should not be connected to the Cartridge during practice sessions. ▪ Create an Alarm 10: 1. Press **TREATMENT** (the prior treatment BFR is displayed). 2. Adjust the blood flow rate to 350-400 mL/min. 3. Inject 2 cc of air into the Post Dialyzer Port. 4. Provide assistance as needed to correctly resolve the alarm. 5. Explain the air recovery process. Pressing the **TREATMENT** key the first time shows the Caution 12 and allows the patient time to observe that air is out of the blood lines. The blood pump is running at 50 mL/min, though the cycler displays the last commanded blood flow rate (400-450). 6. You must complete the air recovery procedure by pressing **TREATMENT** a second time to clear the Caution 12. This returns the blood flow rate to the prescribed rate of 350-400 and venous pressure should reflect this. ▪ Create an Alarm 11: 1. You should be in **TREATMENT** mode to create this alarm. 2. Inject 2 cc of air into the saline “T” instead of the Post Dialyzer Port. 3. Provide assistance as needed to correctly resolve the Alarm 11. 4. When the Caution 12 is displayed, the blood flow rate displays 100 mL/min. 5. Remember the **TREATMENT** key must be pressed a second time to complete the air recovery procedure and resume the prescribed blood flow rate.

troubleshooting alarms

Causes of and Responding to Cycler Air and Pressure Alarms (continued)

Tool	Do or Explain
 Caution 14: Check Fluid Line Inlet: Air Detected in Fluid Line Inlet	▪ Using the flipbook (page 3-5), explain how air can enter the fluid circuit, resulting in **Caution 14: Check Fluid Line Inlet: Air Detected in Fluid Line Inlet:** › Dialysate source fluid volume low or empty. › Blocked, kinked, or clamped Dialysate Line(s). › Loose Dialysate Line connections.
 NxStage System One User guide	▪ Instruct the patient and care partner to read the pages in the *NxStage System One User guide* on **Caution 14: Check Fluid Line Inlet: Air Detected in Fluid Line Inlet.**
 How Do I Troubleshoot Common Alarms?	▪ Have the patient and care partner use the *How Do I Troubleshoot Common Alarms?* quick reference guide to practice responding to Caution 14.
	▪ Tell the patient and care partner you are now going to review Cycler pressure alarms and their potential causes.

Causes of and Responding to Cycler Air and Pressure Alarms (continued)

Tool	Do or Explain
 Pressures	▪ Using the flipbook (page 3-6), describe the arterial "pull" pressure and the venous "push" pressure. ▪ Explain that arterial pressure is a negative pressure, while venous pressure is a positive pressure. › A negative arterial pressure is created when the blood pump pulls the blood from the access. › Note that the Cycler displays the arterial pressure without the negative sign; therefore, a more negative reading is displayed as a larger positive number. ▪ Explain that a positive venous pressure is created because there is a normal resistance related to the patient's venous access. ▪ Show where the Cycler measures arterial and venous blood circuit pressures: › The Cartridge Arterial Pressure Pod senses arterial pressure and is connected to the Cycler during setup to measure the pressure. › Show the location for measuring venous pressures when the Cartridge is appropriately positioned in the Cycler.
 NxStage System One User guide	▪ In the *System One User guide,* instruct the patient and care partner to read the section on vascular access flow. ▪ Tell the patient the normal arterial and venous pressures he or she should expect during treatment. ▪ Explain that it is important for the patient and care partner to monitor and report their arterial and venous pressures, noting deviations from their normal ranges to address access flow issues, identify systemic or mechanical issues, and prevent alarms. › The typical arterial pressure ranges are between -50 and -200 mmHg. › The typical venous pressure ranges are between 20 and 300 mmHg. › In the absence of an alarm if the patient's arterial or venous pressures deviate from their normal ranges, first reduce the blood flow rate, then if an access issue is not evident, check for clotting, kinks, or other obstructions.



troubleshooting alarms

Causes of and Responding to Cycler Air and Pressure Alarms (continued)

Tool	Do or Explain
 Pressure Alarms and Cautions	▪ Using the flipbook (pages 3-7, 3-8 and 3-9), explain the common causes of arterial and venous pressure alarms and cautions. ▪ **Caution 24: Check Arterial Access: Access Pressure Decreasing to Low Limit** or **Alarm 24: Check Arterial Access: Access Pressure at Low Limit.** A low (more negative) access pressure may occur when it becomes harder for the blood pump to pull blood from the arterial access. Arterial pressure is displayed without the negative sign. This could occur for the following reasons: › Arterial access flow problem. › Arterial Blood Line kinked or clamped.
 Pressure Alarms and Cautions	▪ **Caution 25 Access Pressure Pod Error: Reset Access Pressure Pod.** This caution will display if the Access Pressure Pod Monitoring Line is disconnected, poorly connected, or kinked. › Note that the arterial pressure reading may not be accurate until the Access Pressure Pod is reset. › In addition to Caution 25, the Access Pressure Pod may also need to be reset if: – The Access Pressure Pod tops out (is full of blood and is not pulsating). – The Access Pressure Pod bottoms out (is clear or has no blood in it). – There is no access pressure reading or it is very low or at zero. ▪ **Alarm 20: Check Blood Circuit: Venous Pressure Low.** Low venous pressure may occur if the flow of blood is obstructed before it gets to the Venous Pressure Detector or a there is a decrease in venous access resistance after the Venous Pressure Detector. These could occur for the following reasons: › Blood flow rate is lower than prescribed rate. › Dislodged Venous Needle. › Disconnected Venous Blood Line. › After delivering a Manual Fluid Bolus.

Causes of and Responding to Cycler Air and Pressure Alarms (continued)

Tool	Do or Explain
 Pressure Alarms and Cautions	▪ **Alarm 30 Check Blood Circuit: Venous Pressure High During TREATMENT.** High venous pressure may occur due to an increase in resistance after the Venous Pressure Detector. This could occur for the following reasons: › Blood flow rate too high. › Venous Blood Line kinked or clamped. › Venous access infiltrated.
 NxStage *System One User guide*	▪ Instruct the patient and care partner to read the pages in the *NxStage System One User guide* on: › **Alarm 20: Check Blood Circuit: Venous Pressure Low During TREATMENT.** › **Alarm 24: Check Arterial Access: Pressure Pod at Low Limit.** › **Caution 25: Access Pressure Pod Error: Reset Access Pressure Pod.** › **Alarm 30: Check Blood Circuit: Venous Pressure High During TREATMENT.**
 How Do I Troubleshoot Common Alarms?	▪ Have the patient and care partner review Alarms 20, 24, 25, and 30 in the *how do I troubleshoot common alarms?* quick reference guide. Have them use the quick reference guide to practice responding to Alarms 25 and 30. ▪ Use the instructions below during a practice session to create an Alarm 25, and then an Alarm 30. Provide assistance as appropriate to help the patient and care partner resolve the alarms. ▪ Patients should not be connected to the Cartridge during practice sessions. ▪ Create an Alarm 25: 1. Ensure you are in **TREATMENT** mode. 2. Adjust blood flow rate to 350-400 mL/min. Note the access pressure. 3. Disconnect the Access Pressure Pod Line. Note the access pressure value.

troubleshooting alarms

Causes of and Responding to Cycler Air and Pressure Alarms (continued)

Tool	Do or Explain
 How Do I Troubleshoot Common Alarms?	▪ Create an Alarm 30: 1. Ensure you are in **TREATMENT** mode. 2. Adjust the BFR to 350–400 mL/min. 3. Adjust the volume targets: dialysate to 1 L, ultrafiltration to 0.5. 4. Clamp the Venous Blood Line to create an Alarm 30. 5. Point out that all “pump on” indicators are off until the alarm is reset.
 Fluid Circuit Path	▪ Using the flipbook (page 3-10), describe the Cartridge Fluid Circuit Path (dialysate and waste fluid pathways). Explain how the Cycler routes the fluid and ensures the same amount of fluid that goes in comes out: › With the Cartridge loaded in the Cycler, the Cycler pump pulls dialysate either from Bagged Dialysate or the PureFlow SL into the Cartridge, through the Balance Chambers, and into the Dialyzer. › It then pulls waste fluid (spent dialysate or effluent) out of the Dialyzer, through the Balance Chambers, and out to the Waste Line for disposal into the drain.
 Fluid Circuit Pressure Detected	▪ Using the flipbook (page 3-10), show the location where fluid circuit pressures are monitored. ▪ Explain that the Cycler ensures that the same amount of dialysate that goes into the Dialyzer comes out as waste fluid and will notify the patient or care partner if the Balance Chamber pressure is high. ▪ Explain that the Cycler monitors the Waste Line pressure and will notify the patient or care partner if the Waste Line pressure is high.

Causes of and Responding to Cycler Air and Pressure Alarms (continued)

Tool	Do or Explain
 Alarm 35: Check Waste Line: Waste Line Pressure High and Alarm 37, 38: Check Fluid Circuit: High Balance Chamber Pressure During TREATMENT	▪ Using the flipbook (pages 3-11), explain the common causes for Alarm 35 and Alarm 37, 38, and 39. ▪ Explain that Alarm 35: **Check Waste Line: Waste Line Pressure High** develops when waste fluid is not able to exit the balance chambers. This could occur for the following reasons: › Waste or Drain Line kinked, clamped, pinched, blocked, submerged, or not connected. › Clogged PureFlow SL Drain Line. ▪ **Alarm 37, 38, 39: Check Fluid Circuit: High Balance Chamber Pressure During TREATMENT** may occur for the following reasons: › Blocked, kinked, or clamped fluid line(s). › Empty or low dialysate source. › If using PureFlow, **TREATMENT** was pressed on the Cycler before GO was pressed on the PureFlow SL. › If using PureFlow, insufficient volume in the SAK. › Clogged PureFlow SL Drain Line. › Using the wrong SAK type in the PureFlow SL while running the System One S Cycler (NX1000-3) or higher at dialysate rates greater than 12 L/hr.
 NxStage System One User guide	▪ Instruct the patient and care partner to read the pages in the *NxStage System One User guide* on **Alarm 35: Check Waste Line: Waste Line Pressure High** and **Alarm 37, 38, 39: Check Fluid Circuit: High Balance Chamber Pressure During TREATMENT.**

troubleshooting alarms

Causes of and Responding to Cycler Air and Pressure Alarms (continued)

Tool	Do or Explain
 How Do I Troubleshoot Common Alarms?	▪ Have the patient and care partner use the *how do I troubleshoot common alarms?* quick reference guide to practice responding to Alarm 35 and Alarm 37, 38, 39. ▪ Use the instructions below to create Alarm 35 and Alarm 37, 38. ▪ Provide assistance as appropriate to help the patient and care partner resolve the alarms. ▪ Patients should not be connected to the Cartridge during practice sessions. ▪ Create an Alarm 35: 1. Ensure you are in **TREATMENT** mode. 2. Adjust the BFR to 350-400 mL/min. 3. Adjust the dialysate volume target to 1L. 4. Adjust the dialysate rate to 4 L/hr. 5. Clamp the Waste Line. › Watch for Alarm 37, 38, 39 after resetting Alarm 35. If it does not automatically occur, create the alarms as follows: › 1. Ensure you are in **TREATMENT** mode. › 2. Adjust the BFR to 350-400 mL/min. › 3. Adjust the dialysate volume target to 1 L. › 4. Adjust the dialysate rate to 4 L/hr. › 5. Clamp the Waste Line.
 Troubleshooting the System One Cycler	▪ Have the patient and care partner watch the *Troubleshooting the System One Cycler* video.

Causes of and Responding to PureFlow SL Alarms during PAK PRIME, Making a Batch, and "Other"

Tool	Do or Explain
	▪ Tell the patient and care partner that you are now going to focus on PureFlow alarms. ▪ Explain that you'll describe the causes and correct responses to the most common PureFlow SL alarms.
 Fluid Flow During PAK PRIME	▪ Using the flipbook (page 3-12), explain the fluid flow during PAK PRIME: › Water flows from the patient's home water source to the Pre-Treatment Kit (or PureFlow SL Optimizing Pre-Treatment Accessory Kit, also called OPTA), to the Water Inlet Line (white clamp), to the PAK, through the Water Outlet Line (blue clamp), and to the drain.
 PAK PRIME Alarms	▪ Using the flipbook (page 3-13), explain that PureFlow SL will notify the patient or care partner if there is a fluid flow problem during PAK PRIME. ▪ Review the alarms and common reasons they occur: › **Alarm 12: PAK Exhausted:** – PAK is beyond its useful life › **Alarm 50: Inlet Pressure Low:** – Low source water pressure or water not turned on – Kinked or not properly connected Water Inlet Line (blue line from source water to PureFlow) › **Alarm 51: Output Pressure High:** – Clamped, kinked, or improperly connected line › **Alarm 54: Fluid Leak in PAK:** – Fluid leak in the PAK (may also occur when making a batch)

Causes of and Responding to PureFlow SL Alarms during PAK PRIME, Making a Batch, and "Other" (continued)

Tool	Do or Explain
 NxStage PureFlow SL User guide	▪ Instruct the patient and care partner to read the pages in the *NxStage PureFlow SL User guide* on: › **Alarm 12: PAK Exhausted** › **Alarm 50: Inlet Pressure Low** › **Alarm 51: Output Pressure High** › **Alarm 54: Fluid Leak in PAK**
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, explain the responses to Alarms 12, 50, 51, and 54.
 Fluid Flow When Making a Batch	▪ Using the flipbook (page 3-14), describe the fluid flow path when making a batch of dialysate: › Water flows from the patient's home water source, to the Pre-Treatment Kit (or OPTA Kit), to the PAK, and to the SAK. Once the batch is made, it goes through the Conductivity Sensor Line for the conductivity check.

Causes of and Responding to PureFlow SL Alarms during PAK PRIME, Making a Batch, and "Other" (continued)

Tool	Do or Explain
 Alarms When Making a Batch	▪ Using the flipbook (page 3-15), explain that PureFlow SL will notify the patient or care partner if there is a fluid flow problem or failed conductivity check when making a batch of dialysate. Review the alarms and common reasons they occur: › **Alarm 43: Conductivity Test Failed:** – Incorrectly set SAK type – Kinked green sleeve lines – Drain Line not properly connected – A blocked Drain Line › **Alarm 44: No Flow Detected Through Conductivity Line:** – No flow through Conductivity Line due to kinked, clamped, or pinched lines, disconnected lines, or improperly connected lines › **Alarm 51: Output Pressure High:** – Due to kinked, clamped, pinched, disconnected, or improperly connected lines › **Alarm 53: Fluid Leak in Tub:** – Loose connections that are causing a leak
 NxStage PureFlow SL User guide	▪ Instruct the patient and care partner to read the pages in the *NxStage PureFlow SL User guide* on: › **Alarm 43: Conductivity Test Failed** › **Alarm 44: No Flow Detected Through Conductivity Line** › **Alarm 51: Output Pressure High** › **Alarm 53: Fluid Leak in Tub**
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, explain the responses to Alarms 51, 53, 44, and 43.

troubleshooting alarms

Causes of and Responding to PureFlow SL Alarms during PAK PRIME, Making a Batch, and "Other" (continued)

Tool	Do or Explain
 Other PureFlow SL Alarms	▪ Using the flipbook (page 3-16), explain reasons for other PureFlow SL alarms: › **Alarm 52: Fluid Leak in Control Unit (CU):** – Fluid leak in Control Unit. › **Alarm 833: CC_ADC:** – J1 connection is loose or not connected.
 NxStage PureFlow SL User guide	▪ Instruct the patient and care partner to read the pages in the NxStage *PureFlow SL User guide* on **Alarm 52: Fluid Leak in Control Unit (CU).**
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, explain the responses to Alarms 52 and 833.

Supporting **Causes and Responding to PureFlow SL Alarms during PAK PRIME, Making a Batch, and "Other"** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Instruct the patient or care partner to practice responding to alarms using the online module and during PAK PRIME and Making a Batch.
- Review with the patient the fluid flows for PAK PRIME and Making a Batch in the flipbook. Remind the patient or care partner that if the fluid flow path is interrupted or obstructed, the PureFlow SL will likely alarm.

troubleshooting alarms

Warmer Alarms

Tool	Do or Explain
 ComfortMate Fluid Warmer	▪ If the patient will be using the ComfortMate Fluid Warmer, using the flipbook (page 3-17), explain how the ComfortMate Fluid Warmer provides visual and audible alerts to notify the patient or care partner of important information or situations that may require attention: › Red alarm light comes on and the Warmer beeps for certain reasons including: – Maximum fluid temperature exceeded – Self-test on power-up failed › Steady green light indicates that the power is on.
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, explain the standard response to ComfortMate Fluid Warmer alarms: 1. Turn the Warmer off. 2. Use the *ComfortMate Fluid Warmer User guide* to identify the probable cause(s) and resolve: – If maximum fluid temperature is exceeded, turn the comfort setting knob counterclockwise one click, wait 60 seconds, and then turn the Warmer on. – If the Warmer has failed the self-test, turn it off and then on again. If the alarm occurs again, call NxStage Technical Support.
 Express Fluid Warmer	▪ If the patient will be using the Express Fluid Warmer, using the flipbook (page 3-18 & 3-19), explain how the Express Fluid Warmer provides visual and audible alerts to notify the patient or care partner of important information or situations that may require attention: › Standby Indicator: When lit, indicates that the warmer is in STANDBY mode and the heater is disabled. › Alarm: All comfort setting lights turn red and then go off, an alarm sounds, and the standby indicator light turns on. ▪ Describe the common causes of an Express Fluid Warmer alarm: › Dialysate temperature exceeded › Heater over temperature › No or empty dialysate bag on warmer › Warmer not mounted properly

Warmer Alarms (continued)

Tool	Do or Explain
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, explain the standard response to Express Fluid Warmer alarms: 1. Press either the **UP** or **DOWN** arrow to display the alarm code. 2. Use the *Express Fluid Warmer User guide* to identify the probable cause(s) and resolve. 3. Press the **UP** arrow to return to **TREATMENT.**
 Express Fluid Warmer	▪ Using the patient's Express Fluid Warmer, instruct the patient or care partner to create an alarm to practice identifying and resolving a Bag Sensor Alarm: 1. With the Express Fluid Warmer installed and a bag of dialysate on the Express Fluid Warmer connected to the Cycler, connect the Cycler to power and turn the power on. 2. Lift up the dialysate bag on the Express Fluid Warmer. – An alarm will occur. 3. Refer to "Bag Sensor Alarm" in the troubleshooting section of the *Express Fluid Warmer User guide* for instructions to resolve the alarm.

troubleshooting alarms

Cycler Base and Fluid Detection Sensor Alarm

Tool	Do or Explain
 Fluid Detection Sensor	▪ Using the patient's Fluid Detection Sensor, demonstrate how the Sensor will notify the patient or care partner if fluid is detected. ▪ Instruct the patient or care partner to: 1. Install a battery in the Sensor. – The Sensor will beep momentarily when the battery is connected; this is not the alert. 2. Touch the Sensor's stainless steel bars with a moistened finger. – An audible tone will sound; this is the alert. 3. Wipe the stainless steel bars dry to stop the alarm.
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, explain the standard response to a Fluid Detection Sensor alarm. *Because of the position of the Sensor, all fluid leaks from the Dialyzer may not be detected. Remind patients to visually inspect for leaks below the Dialyzer during TREATMENT.*
 NxStage Cycle Base and Fluid Detection Sensor User guide	▪ Instruct the patient and care partner to read the troubleshooting section of the NxStage *Cycler Base and Fluid Detection Sensor User guide.* ▪ Discuss nuisance alarms and appropriate interventions.

Special Conditions

Tool	Do or Explain
	▪ Tell the patient and care partner that you are now going to focus on less common alarms and special conditions that may occur during treatment.
 NxStage System One User guide	▪ Instruct the patient and care partner to read the NxStage System One User guide on the **Caution 40: Perform Power Recovery: Power Failure and Alarm 41: Failed Power Recovery.** ▪ Explain the difference between these alarms: › Caution 40 occurs after a power failure or the Cycler being powered off, and the power was restored in less than the preset number of minutes allowed (two minutes). › Alarm 41 occurs if the power is not restored within the preset number of minutes (two minutes) or if the Cycler door was opened during a power failure. ▪ During a practice session, use the patient's Cycler to demonstrate a Caution 40: 1. Turn the Cycler power off and then back on within 1 minute. 2. Point out the 40 displayed in the Cycler Yellow Caution window. 3. Instruct the patient or care partner to follow the instructions in the user guide to resolve the caution.
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, explain the appropriate response to Alarm 41.

troubleshooting alarms

Special Conditions (continued)

Tool	Do or Explain
 Alarm 50: Check FluidTemp: Fluid Temp High	▪ Explain that the Cycler will notify the patient or care partner when the temperature exceeds the alarm limit by displaying **Alarm 50: Check Fluid Temp: Fluid Temp High.** ▪ Using the flipbook (page 3-20), explain that when the Cartridge is appropriately loaded in the Cycler during set-up, the Cycler monitors the fluid temperature and will notify the patient or care partner if the fluid temperature is too high. ▪ Describe the causes of this alarm: › Warmer or PureFlow SL Heater settings too high › Dialysate bags too warm prior to set-up, such as when bags have been stored in warm environment › Treatment environment too warm
 NxStage System One User guide	▪ Instruct the patient and care partner to read the NxStage System One User guide on **Alarm 50: Check Fluid Temp: Fluid Temp High.**
 How Do I Troubleshoot Common Alarms?	▪ Using the *how do I troubleshoot common alarms?* quick reference guide, explain the appropriate response to Alarm 50.
 Warmer or PureFlow SL	▪ Using the patient's Warmer or PureFlow SL, instruct the patient and care partner to practice resolving a "mock" Alarm 50 resulting from a heater setting too high on the Warmer or PureFlow SL. ▪ Monitor the patient's or care partner's ability to reduce the dialysate heater setting.

Special Conditions (continued)

Tool	Do or Explain
 Alarm 60: Check for Blood Leak: Blood Detected in Waste Line	▪ Using the flipbook (page 3-21), show the location of the Cartridge Blood Leak Detector. ▪ Explain how the Cycler will notify the patient or care partner with **Alarm 60: Check for Blood Leak: Blood Detected in Waste Line** if the system suspects blood may be present in the waste fluid. ▪ Describe the causes of this alarm: › Dialyzer fiber leak › Air in effluent or flow fraction (FF) set too high › Ultrafiltration rate at zero
 NxStage System One User guide	▪ Instruct the patient and care partner to review the operator actions in the NxStage *System One User guide* to resolve the Alarm 60. *Additional information related to pink-tinged or red effluent not associated with a blood leak may be found in the "Observation of Pink Waste Fluid" pages within the troubleshooting section of the user guide.*
 How Do I Troubleshoot Common Alarms?	▪ Give the patient and care partner the *how do I troubleshoot common alarms?* quick reference guide. ▪ Explain your dialysis center's instructions for testing waste fluid for the presence of blood. ▪ Instruct the patient or care partner to write these instructions in the space provided in the Special Conditions section of the quick reference guide.
 *NxStage* System One User guide	▪ Instruct the patient and care partner to read the *NxStage System One User guide* on **Alarm 100-999** System Alarm. ▪ Explain the possible cause(s) of the alarm: › The Cycler detected a system or communications error. › The Cycler may be in service mode. ▪ Instruct the patient and care partner to read the operator actions to follow during treatment.

troubleshooting alarms

Special Conditions (continued)

Tool	Do or Explain
 NxStage System One User guide	▪ Explain that the risk of blood clotting increases when blood flow stops, such as when a red alarm occurs. ▪ Refer to the common procedures section of the *NxStage System One User guide* and instruct the patient and care partner to read the emergency rinseback procedure.

Special Conditions (continued)

Tool	Do or Explain
 How do I deal with the unusual?	▪ Using the *how do I deal with the unusual?* quick reference guide, explain the emergency rinseback procedure. ▪ Complete the dialysis center's emergency rinseback instruction within the Troubleshooting Tool. ▪ Explain that if the patient has an urgent situation requiring immediate blood return (medical or environmental emergency when there is time to rinseback blood), the Emergency Rinseback procedure should be performed unless the blood circuit is clotted or hemolyzed, air is seen in the blood circuit or in the patient lines, or if blood flow stops for an extended time. ▪ Have the patient and care partner perform an emergency rinseback procedure.

troubleshooting alarms

Special Conditions (continued)

Tool	Do or Explain
 NxStage System One User guide	▪ Instruct the patient and care partner to read the NxStage System One User guide on performing a temporary disconnect procedure to recirculate the blood circuit after returning their blood.
 How do I deal with the unusual?	▪ Using the *how do I deal with the unusual?* quick reference guide, explain the temporary disconnection procedure after returning blood. Ensure the patient and care partner understand when and how this is performed. ▪ Instruct the patient or care partner to write in the quick reference guide your dialysis center's maximum recirculation time in number of minutes. ▪ Instruct the patient and care partner to practice performing a temporary disconnection procedure after returning the blood at the end of the day's treatment. ▪ Review the "Troubleshooting Emergencies" section in the quick reference guide and discuss the actions the patient or section care partner should take for each situation.
 Are You Ready? NxStage Home Hemodialysis Patient Planning Guidebook for Non-Medical Emergencies	▪ Using the *Are You Ready?* guidebook, review and explain the need to prepare for environmental emergencies and the possible evacuation of the patient's home. ▪ Assist the patient and care partner in completing the guidebook, and tell them to gather and store the appropriate home supplies. ▪ Note: The dialysis center should make a copy of the completed guidebook and file it with the patient's records. ▪ Instruct the patient and care partner to attach the completed guidebook to the *how do I deal with the unusual?* quick reference guide.

Special Conditions (continued)

Supporting **Special Conditions** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Practice emergency rinseback procedures and temporary disconnection procedures during training and at monthly clinic meetings.



manage medical complication

goals and objectives

Patients and care partners should be able to:

- Identify signs and symptoms of:
  - Cramping
  - Hypertension
  - Hypotension
- Cardiac issues:
  - Chest pain
  - Arrhythmia
- Blood issues:
  - Infection
  - Prolonged bleeding
  - Accidental disconnection
  - Accidental disconnection
  - Hemolysis
  - Air embolism
- Take appropriate actions to treat and prevent complications.
- Have confidence in each other to know and do the right thing in the event of a medical emergency.

supply list

- Nurse Guide
- Flipbook
- Patient quick reference guide:
  - *how do I recognize a problem?*
- Online module:
  - *Staying Calm in the Face of an Emergency*

notes for the nurse

- Medical complications can seem overwhelming, but the chance for complications can be minimized if the patient and care partner:
  - Understand and follow the instructions and information in the user guides.
  - Learn what can cause medical complications and follow the recommended treatment and preventive measures.
  - Contact the dialysis center when necessary.
- There is a fine line between ensuring the patient and care partner are well-informed and having them be anxious that something bad will happen that they cannot resolve.
- The medical complications discussed in this material are not an exhaustive list of issues, signs and symptoms, causes, treatments, or prevention information.
- The patient may not experience all of the symptoms listed, or may exhibit less obvious symptoms which may require further medical investigation.
- The complications covered in this module are grouped by categories (Fluid, Cardiac, and Blood) to make it easier for the patient and care partner to learn.

before you teach this module

Tool	Do or Explain
 How Do I Recognize a Problem?	▪ Customize the *how do I recognize a problem?* quick reference guide: › Check the signs/symptoms and possible causes that are appropriate to the patient. › Check, number, and complete the treatment and preventive steps the patient should follow. › Using a black marker, cross out any treatment or preventive steps the patient should not follow › Write in additional signs/symptoms, information, or steps the patient should follow on the blank lines provided. ▪ **Important:** Do not give this quick reference guide to the patient and care partner until you have customized it.

Treating medical complications may require simultaneous actions (for example giving normal saline, checking blood pressure and turning off the UF). Be sure to clarify when simultaneous actions are required.

training checklist

Resources and Responses

Tool	Do or Explain
	▪ Explain that understanding the potential signs/symptoms and possible causes of medical complications will give the patient and care partner confidence to know and do the right thing in the event of a medical emergency. ▪ Explain the need to call 911 immediately when indicated in the quick reference guide, and also whenever the patient or care partner is unsure of what to do. › Make sure the patient and care partner know how to contact emergency personnel. ▪ Make sure that the patient and care partner know how to reach the dialysis center nurse and/or on-call staff. ▪ Have the patient and care partner practice calling the dialysis center for assistance.
 How Do I Recognize a Problem	▪ Using the customized quick reference guide, explain the signs/symptoms and possible causes and treatment steps for each Fluid Issue (cramping, hypotension and hypertension). *Be sure the patient and care partner understand the sequence of treatment steps.* ▪ Explain that some signs/symptoms, causes, and treatment steps require immediate attention and urgent action. › Emphasize the “urgent” signs/symptoms, causes, and actions (bolded in the quick reference guide). › Explain when to call the dialysis center for additional assessment or instructions for each complication. › Reinforce the importance of calling 911 immediately when indicated in the quick reference guide, and also whenever the patient or care partner is unsure of what to do. ▪ Explain that it is not unusual for blood pressure medications to be adjusted within the first or second week of NxStage therapy. › Emphasize the importance of monitoring blood pressure before, during, and after treatment. › Make sure the patient and care partner know when to call the dialysis center for instructions.

Tool	Do or Explain
 How Do I Recognize a Problem	▪ Discuss the importance of following the preventive actions for each complication to minimize the potential for these complications to occur. ▪ When discussing the rinseback blood procedure: › Explain that even if the rinseback blood procedure is "checked," the patient or care partner should NOT rinseback blood if the blood circuit is clotted, blood is suspected of being hemolyzed, or air is seen in the blood circuit or patient blood lines.
 Fluid	▪ Using the flipbook (pages 3-22 to 3-31) ask the patient and care partner to identify fluid-related complications based on a list of symptoms. ▪ As they identify each complication, have the patient and/or care partner explain the actions that can be taken to resolve or prevent each complication.

The answers in the Flipbook have not been customized. Refer back to the patient's customized quick reference guide when discussing appropriate treatments for each complication.

manage medical complication

Resources and Responses (continued)

Tool	Do or Explain
 How Do I Recognize a Problem  Cardiac, and Blood Issues	▪ Using the flipbook and quick reference guide, repeat the steps above for Cardiac issues (chest pain and arrhythmia) and Blood issues (infection, prolonged bleeding, blood circuit clotting, accidental disconnection, hemolysis, and air embolism).
 Staying Calm in the Face of an Emergency	▪ Have the patient and care partner complete the *Staying Calm in the Face of an Emergency* online module.

Supporting **Manage Medical Complications** Concepts

If you have a patient who needs reinforcement or additional help with the concepts, follow these tips and actions:

- Have the patient and care partner repeat the online module.
- Have the patient and care partner write down the signs/symptoms, possible causes, treatments and preventative measures for each complication.
- Have the patient and care partner use the flipbook to quiz each other on recognizing complications based on the signs/symptoms and on what to do if that complication occurs.

additional nurse information

The following is intended as additional information for you as you consider other potential causes of complications that may be relevant to your patient, in addition to the common causes already defined. This information is not intended to be shared with the patient and care partner.

Fluid Issues

Cramps

- Important predisposing factors that contribute to muscle cramps are:
  - Hypotension
  - Hypovolemia
  - High UF rate
  - These factors tend to favor vasoconstriction resulting in poor muscle tissue perfusion leading to impairment of muscle relaxation.
- Other potential causes of cramps:
  - Hypocalcemia
  - Hypokalemia

Hypotension

- Other potential causes of hypotension:
  - Inadequate vasoconstriction
    - Autonomic neuropathy
    - Anemia
    - Eating during treatment
  - Cardiac Factors
    - Electrolyte imbalance
    - Diastolic dysfunction
    - Arrhythmia
    - Ischemia
  - Uncommon Causes
    - Septicemia
    - Dialyzer reaction
    - Occult hemorrhage
    - Pericardial tamponade
    - Air embolism
    - Hemolysis

Hypertension

- Definition: Predialysis systolic pressure > 140 and/or diastolic pressure > 90 mm Hg when the patient is believed to be at “dry weight.”
- Other potential causes of hypertension:
  - Hypertension associated with inappropriate use of ESA’s (erythropoiesis-stimulating agents).
  - Hypertension that is not volume related but related to the renin-angiotension system response.



manage medical complication

Cardiac Issues

Chest pain

- Other potential causes of chest pain:
  - Sensitivity to dialyzer membrane
  - Mild chest pain, discomfort, or back discomfort may occur during dialysis and the cause is unknown. This occurs in a small percentage of patients.
  - Angina
  - Pericarditis
  - Cardiomyopathy or heart failure
  - Arrhythmias:
    - Atrial fibrillation
    - Ventricular arrhythmias or ectopy

Arrhythmia

- Other potential causes of arrhythmia:
  - Hypoxemia related to:
    - Pulmonary edema
    - Chronic obstructive pulmonary disease (COPD)
    - Pulmonary embolus
    - CHF
    - Anemia
  - Removal of antiarrhythmic drugs during dialysis.

Blood Issues

Infection (fever and chills)

- Other potential causes of infection:
  - Urinary tract infection—in particular, patients with polycystic kidney disease
  - Pneumonia
  - Viral infections
  - Introductions of pyrogens or endotoxin

Prolonged Bleeding

- Other potential causes of prolonged bleeding:
  - Coagulation or platelet disorders

goals and objectives

Coping Strategies

Patients and care partners should be able to:

- Decide how work will be divided between patient and care partner.
- Identify and plan for common challenges during the transition to home therapy.
- Articulate coping strategies for challenges that arise during home therapy.

Schedule and Contacts

Patients and/or care partners should be able to:

- List changes in their lifestyle, physical and psychological health on NxStage HHD, identifying improvements and challenges. Develop a plan to address challenges.
- Describe the purpose of scheduled dialysis center visits and agree to attend them.
- Develop a dialysate batch-making and water/dialysate sampling schedule for the first month home.
- Determine a treatment schedule, and identify the impact of changes or delays to that schedule.
- Define when and how to contact on-call dialysis center staff and NxStage Technical Support for therapy or equipment issues.

Supplies and Tools

Patients and care partners should be able to:

- Identify factors to consider when ordering and storing treatment supplies.
- Describe the procedure for returning flow sheets to the dialysis center.
- List the supplies provided by the patient, the dialysis center, and NxStage.
- Describe equipment return and exchange procedures.

supply list

- Online module
  - *I'm Home, Now What?*
- Nurse Guide
- User guides:
  - *NxStage System One*
  - *NxStage ComfortMate*
  - *Fluid Warmer NxStage PureFlow SL*
  - *NxStage Express Fluid Warmer*
- NxStage Welcome Home and Travel packet
- Monthly calendar
- HHD Patient Self-Assessment Form

training checklist

Coping Strategies

Tool	Do or Explain
 I'm Home, Now What?	▪ Explain that the online module, *I'm Home, Now What?*, provides a few tips for success at home. ▪ Tell the patient and care partner to complete the online module *I'm Home, Now What?* ▪ Discuss any questions the patient or care partner have after completing the online module. ▪ Provide any additional suggestions, tips, or ideas that may support the patient and care partner during home therapy. ▪ Ask the patient and care partner if they anticipate any other challenges, and help them develop strategies to cope with these challenges. ▪ Remind the patient and care partner of the support available after training, including: › Dialysis center staff, including the physician, training nurse, social worker, and dietician. › NxStage Technical Support and Customer Service.
 how do I get ready for home hemodialysis?	▪ Using the "Assigning the Task" section of the *how do I get ready for home hemodialysis?* quick reference guide, finalize the division of tasks or responsibilities with the patient and care partner. Modify the list if required. ▪ Explain that after completing the training program, the patient or care partner may decide to make changes in their tasks during home therapy.

Supporting **Coping Strategies** Concepts

If you have a patient or care partner who needs reinforcement or additional help with the Coping Strategies concepts, follow these tips and actions:

- Instruct the patient and care partner to write down specific challenges they think they'll face while adjusting to home therapy. Help them create a plan to address these challenges.

Schedule and Contacts

Tool	Do or Explain
 HHD patient Self-Assessment Form	▪ Using the *HHD Patient Self-Assessment Form*, instruct the patient and care partner to complete the Final training day column, then discuss their assessment, comparing it to the assessment completed on day one of training (prior to starting HHD). Identify and create a plan for addressing any concerns or issues. › This final training day assessment provides a baseline of lifestyle, physical and psychological health for comparison to future assessments. Having the patient and care partner complete ongoing assessment at the suggested frequency, reminds the nurse, patient and care partner of the patient's specific benefits while on HHD and stimulates discussion and development of an action plan for any issues or concerns identified. › This form may also be used with patients on HHD therapy for greater than one year. To do so, write in the existing patient assessment date on the second row. ▪ Explain that after completing the formal training program, it is important that the patient and care partner attend the patient's scheduled dialysis center visits to allow the dialysis center staff to assess and monitor the patient's health, as well as provide any required additional education. ▪ Explain what the patient and care partner can expect at their dialysis clinic visits.

Additional Nurse Information

Monthly clinic visits may include the following assessments by the nephrology team.

- Dry Weight
  - Weight: Pre and post-treatment.
  - Blood pressures: Pre and post-treatment or interdialytic.
  - Shortness of breath: Observed or reported.
  - Edema: Observed or reported.
  - Muscle cramping: Interdialytic or post-treatment.
- Access
  - Blood flow rate: Blood flow rate and venous pressure readings during treatment
  - Fistula/Graft:
    - Check bruit and thrill.
    - Inspect for pseudoaneurysm.
    - Inspect for redness or ecchymosis.
    - Record access evaluations and events.
  - Catheter:
    - Check for redness and/or drainage at site.
    - Check that lines and caps are intact.
    - Verify that stitch is present, if applicable.
    - Record access evaluations and events.
- Lab review
  - Anemia parameters:
    - Hemoglobin
    - Hematocrit
    - Iron stores
    - Erythropoietin record
    - Check dialyzer clearing post-treatment
  - Bone parameters:
    - Calcium/phosphorus
    - Parathyroid hormone level
  - Chemistries: All chemistries, with an emphasis on potassium, and carbon dioxide.

Schedule and Contacts (continued)

Additional Nurse Information

- Diabetes management:
  - Home glucose records
  - Hemoglobin A1c
- Cardiovascular: Lipid profile and homocystine levels
- Adequacy:
  - Compare to target and to previous measurements
  - Compare pre and post-BUN and creatine levels with previous
  - Check patient's activity level and appetite

- Nutritional assessment
  - Weight: Compare to desired body weight, note any recent gain or loss
  - Bone metabolism
  - Albumin
  - Adequacy: Compare to target
  - Appetite: Check for any change using three-day history
- Medication review
  - Verify medication taken as ordered
  - Check for needed refills
  - Evaluate hypo/hypertension not related to dry weight
  - Review anticoagulant
- Supplies and equipment
  - Verify appropriate use
  - Identify any customer service issues
  - Discuss the need for swaps or returns
  - Ensure appropriate Cycler system settings and treatment parameter settings
  - Verify PureFlow SL SAK type is correct
- Treatment record review
- Review of flow sheets since last visit:
  - Check recorded alarms
  - Check for symptoms listed on sheets but not reported
  - Check number of treatments
- Psycho-social assessment
- Home hemodialysis adaptation:
  - Changes in partner relationship
  - Change in activities
  - Stress assessment
  - Financial concerns
- Education
- Review and update:
  - Troubleshooting (for example, recovering from air alarms)
  - Less frequently used procedures (for example, temporary disconnection).
  - New product or procedure information.

Schedule and Contacts (continued)

Tool	Do or Explain
 Monthly Calendar	▪ Provide the patient or care partner a monthly calendar, and help him or her develop a typical monthly home therapy schedule, which may include when to: › Perform treatment (days per week, time of day, and allowable time between treatment) › Take a day off › Make a batch › Drain a batch › Draw and send blood samples › Visit dialysis center › Obtain and send product water and dialysate samples (use the water and dialysate testing information below to help make the schedule) › Reorder supplies ▪ Discuss the impact of changes or delays to the schedule. ▪ Explain that the patient or care partner must obtain water and dialysate samples and send them out for testing. ▪ Review when and why water and dialysate testing are performed. **Product Water Testing** (per Department of Health and Human Services 2008 regulation, *Conditions for Coverage for End-Stage Renal Disease Facilities*) ▪ Test Product Water › Product water is tested for chemical analysis of the standard AAMI test panel contaminates to ensure the AAMI specifcations are met. › **For Source Water from Public Water Supplies:** Initially (first PAK in the patient's home) and annually. › **For Source Water from Private Water Supplies:** Initially (first PAK in the patient's home) and at intervals sufficiently spaced in time to capture the possible seasonal variability of the source water quality. › Testing should be performed at or near the end-of-life of the PAK. › Note: If testing is to be performed on new PAKs (e.g. those that have made three or less 60 liter batches), product water samples should be collected within **four hours** of completing a batch. This will ensure accurate, interference-free AAMI panel results. › Testing is **NOT** required after installing and priming a new PAK disposable. › Testing is **NOT** required after changing the PureFlow SL Control Unit hardware. Each batch: Test prior to use of the batch for analysis of chlorine/chloramine levels to ensure the AAMI and manufacturer's specifcations are met.

Schedule and Contacts (continued)

Tool	Do or Explain
 Monthly Calendar	**Dialysate Testing** (per Department of Health and Human Services 2008 regulation, *Conditions for Coverage for End-Stage Renal Disease Facilities*) ▪ Test Dialysate › Quarterly: Test within the first month of home therapy near the estimated end of a batch. › Test performed for bacteriological and endotoxin analysis to ensure AAMI specifcations are met. ▪ Explain when to call the dialysis center and NxStage Technical Support for assistance. In general, the patient or care partner should call: › The dialysis center first for questions rela–ted to their prescription, medical condition, and routine equipment use. › NxStage Technical Support, if needed, for equipment-related technical questions and issues or as directed by the equipment user guides for maintenance or troubleshooting.

Supporting **Schedule and Contacts** Concepts

If you have a patient or care partner who needs reinforcement or additional help with the Schedule and Contacts concepts, follow these tips and actions:

- Review the typical home therapy monthly schedule with the patient and care partner. Answer any questions they have related to the schedule. Discuss any expected changes or delays to the schedule.

Supplies and Tools

Tool	Do or Explain
 Welcome Home Packet	▪ Call NxStage Customer Service (during week two of training) to inform them of the expected date the patient will transition from training to home therapy. › Ensure the new patient prescription with the physician's signature is submitted to NxStage Customer Service at least 10 days before the patient transitions to home therapy. ▪ NxStage will send a customized *Welcome Home Packet* to the patient and care partner with their first home delivery. This packet includes instructions and forms to assist the patient and care partner with obtaining supplies. This packet will be reviewed during the scheduled conversation with NxStage Customer Service. **Note to Educator:** Inform Customer Service if you want to participate in the scheduled conversation with the patient and care partner.

Supplies and Tools (continued)

Tool	Do or Explain
 User guides: - NxStage System One - NxStage ComfortMate Fluid Warmer - NxStage PureFlow SL - NxStage Express Fluid Warmer - LINX Water Pre-Treatment System	▪ Using the appropriate user guides, have the patient and care partner review the instructions for returning equipment and disposable products to NxStage. ▪ Explain that equipment needs to be cleaned or disinfected before shipping and that it should be returned in the original packaging boxes.
	▪ Explain that NxStage provides an equipment swap or exchange service when equipment needs preventative maintenance or service. ▪ Explain that equipment swaps are initiated by NxStage Technical Support for unresolved equipment issues. ▪ Explain that if equipment needs to be swapped out, some components should be detached and kept at home for use with the new equipment. › The patient or care partner should verify with NxStage Technical Support the components that should be kept.
	▪ Explain to the patient and care partner why it is important to send dialysis center treatment records or flow sheets to the dialysis center. ▪ Explain how and when to send the treatment records or flow sheets to the dialysis center.

Supporting **Supplies and Tools** Concepts

If you have a patient or care partner who needs reinforcement or additional help with the Supplies and Tools concepts, follow these tips and actions:

- Have the patient and care partner review the *NxStage Welcome Home Packet* again.



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This document is not intended to replace the NxStage System One or PureFlow SL User Guides or Cartridge Instructions for Use and does not include all of the information necessary to use the system safely and effectively. Patients, partners, and providers should review and refer to the System One and PureFlow SL User Guides and Cartridge Instructions for Use for complete information including all warnings and precautions.
CAUTION: Federal law restricts the NxStage System One and PureFlow SL to sale by or on the order of a physician.

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