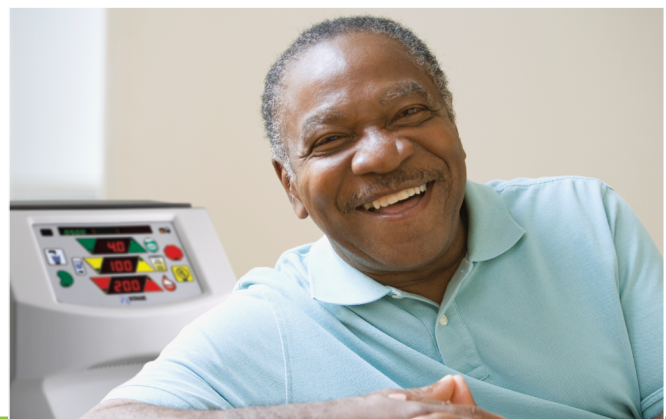




Nurse Guide

For use with NxStage® System One™,
System One S, and Versi® HD Cyclers
includes Solo and Nocturnal therapies



Market disclaimer

This Nurse Guide is for use in the United States (and its territories) only.

This document is not intended to replace the NxStage user guide or PureFlow™ SL user guide 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 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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1: Introduction

Overview

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 supporting the needs of our customers' home training teams. This updated curriculum includes materials that cover the proper use and operation of the NxStage System One and VersiHD 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 various learning tools and methods to enhance the training experience.

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 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, VersiHD, and PureFlow SL user guides or cartridge instructions for use. Always review and refer to the System One, VersiHD, 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 team 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 and VersiHD.

More Frequent Home Hemodialysis overview

Quality of life benefits

- More frequent hemodialysis may offer health and quality of life benefits such as:
 - Improved survival ^{1,2,3,4}
 - Reduced stress on the heart ^{1,5}
 - Reduced cardiovascular hospitalizations and mortality ^{1,2,3}
 - Better blood pressure control with fewer medications ^{1,6,7,8}
 - Improved appetite ⁹
 - More energy
 - Better sleep ^{10,11}
 - Better sex life ¹²

Potential risks

- There are risks associated with more frequent dialysis in the home as well and the patient should be aware of these:
 - Risk of vascular access complications
 - Risk of infection
 - Technique failure
 - Burden of therapy

Therapy options

- Keep the patient's dialysis journey and lifestyle in mind. Therapy options should be discussed at frequent intervals so that the patient and care partner are reminded that there are a variety of therapies that they may experience.
- Home therapy options may include:
 - More frequent HHD:
 - Nocturnal
 - Solo (during waking hours only)

References

1. FHN Trial Group, Chertow, G.M., Levin, N.W., Beck, G.J. et al. In-center hemodialysis six times per week versus three times per week. *N Engl J Med.* 2010; 363: 2287–2300
2. Weinhandl ED, Gilbertson DT, Collins AJ. Mortality, Hospitalization, and Technique Failure in Daily Home Hemodialysis and Matched Peritoneal Dialysis Patients: A Matched Cohort Study. *Am J Kidney Dis.* 2016;67(1):98-110.
3. Weinhandl, E.D., Liu, J., Gilbertson, D.T., Arneson, T.J., Collins, A.J. Survival in daily home hemodialysis and matched thrice-weekly in-center hemodialysis patients. *J Am Soc Nephrol.* 2012;23:895–904
4. Termorshuizen F, Dekker FW, van Manen JG, Korevaar JC, Boeschoten EW, Krediet RT. Relative contribution of residual renal function and different measures of adequacy to survival in hemodialysis patients: an analysis of the Netherlands Cooperative Study on the Adequacy of Dialysis (NECOSAD)-2. *J Am Soc Nephrol.* 2004;15(4):1061-1070.
5. McCullough, P.A., Chan, C.T., Weinhandl, E.D., Burkart, J.M., and Bakris, G.L. Intensive hemodialysis, left ventricular hypertrophy, and cardiovascular disease. *Am J Kidney Dis.* 2016; 68: S5–S14.
6. Raimann, J.G., et al. The Effect of Increased Frequency of Hemodialysis on Volume-Related Outcomes: A Secondary Analysis of the Frequent Hemodialysis Network Trials. *Blood Purif* 2016;41:277–286.
7. Morfin, J.A., Fluck, R.J., Weinhandl, E.D., Kansal, S., McCullough, P.A., and Komenda, P. Intensive hemodialysis and treatment complications and tolerability. *Am J Kidney Dis.* 2016; 68: S43–S50.
8. Bakris, G.L., Burkart, J.M., Weinhandl, E.D., McCullough, P.A., and Kraus, M.A. Intensive hemodialysis, blood pressure, and antihypertensive medication use. *Am J Kidney Dis.* 2016; 68: S15–S23.
9. Daugirdas JT, Blake PB, Ing TS, editors. *Handbook of Dialysis*, 5th Edition. Lippincott Williams and Wilkins, Philadelphia, 2014.
10. Jaber BL, et al. Impact of Short Daily Hemodialysis on Restless Legs Symptoms and Sleep Disturbances. *CJASN* May 2011 vol. 6 no. 5 1049-1056.
11. Hanley, P.J., Pierratos, A. Improvement of sleep apnea in patients with chronic renal failure who undergo nocturnal hemodialysis. *N Engl J Med:* 2001; Vol. 344, No. 2.
12. Kraus M, Finkelstein FO, Daouri R, et al. Short Daily Hemodialysis (SDHD) improves overall quality of life (QOL) and physical intimacy: interim results from the FREEDOM study. Abstract presented at the American Society of Nephrology Conference, 2011.

Training approaches and locations

There are a variety of ways to complete patient training. These may include the following:

- Individual one-on-one nurse and patient training in the center.
- Training more than one patient per day, for example, one patient in the morning and one patient in the afternoon.
- Training two or more patients at a time in a group setting.
- The location can also vary and may include:
 - A training room located at the center
 - A conference room for a group of patients
 - The in-center dialysis area
 - A patient's home
- Training that is being billed for must take place in the appropriate location based on Centers for Medicare and Medicaid Services (CMS) guidelines.
- General education can be provided in any location.
- Some examples of topics that the nurse could provide education or training on before using NxStage equipment, performing treatment, and troubleshooting, include the following:
 - Cannulation
 - Aseptic technique
 - Universal precautions
 - Managing fluids and dry weight
 - Understanding vital signs
- To learn more about different training approaches contact your NxStage Clinical Consultant.

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 the following in mind when using this guide:

- 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 not a script that you read verbatim.
- Use the guide along with the *Training Flipbook*, online modules, videos, and patient quick reference guides.
- You may want to add notes and reminders.

The Nurse Guide is modular, allowing the flexibility to customize the 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, is dictated by the patient's training schedule.

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

Solo therapy

This guide is intended to be used by the nurse to train both solo patients and patients with care partners. Although, the content is written as though the patient has a care partner, you can adjust this for the solo patient. (For example, in the sections which ask the patient and care partner to divide responsibilities for treatment). For solo, you can cross out these sections in the related quick reference guides. For more detailed instructions on Solo treatment, see "Appendix A: Solo" on page 201 of this Nurse Guide.

System One and VersiHD cyclers

There are different types of cyclers that you may be using for training, the System One, the System One S, or the VersiHD cycler.



You will see references to the *VersiHD User Guide*, *VersiHD Reference Guide* and *Training Flipbook for VersiHD* throughout this Nurse Guide.

For more information on using the VersiHD cycler, see "Appendix C: VersiHD" on page 213 of this Nurse Guide.

Nocturnal therapy

For more information on Nocturnal therapy, see "Appendix B: Nocturnal" on page 207 of this Nurse Guide.

How the Nurse Guide is organized

The Nurse Guide is organized into lessons, rather than a training schedule.

Each lesson includes:

- Objectives
- Supplies
- What to do or explain when teaching each lesson.
- Reinforcement tips for patients and care partners who need help mastering a subtopic.
- Visual cues (icons) to remind you which tool from the patient toolkit to use for each lesson.

What each color represents

The margins on the left and right of each page have a color and an icon appears at the beginning of each section. The color-coding for each section is consistent across all curriculum materials (*Nurse Guide*, *Training Flipbook*, online modules, and patient quick reference guides).

Color	Icon	Meaning
		Get ready for training
		Prepare for treatment
		Complete your treatment
		Keep calm and carry on
		Plan for success

Layout

The Nurse Guide is formatted to provide you with easy visual cues and simple, direct instructions.

Sample

Each lesson appears at the top and bottom of the page for easy scanning.

III: Interpret your prescription

Nurse guide

Lesson 3: Changes to the cyclor settings

 **Objectives**

Patients should be able to:

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

Supplies

- Nurse Guide
- Flipbook
- Patient quick reference guide:
 - how do I enter my treatment information?

Instructions

Tool	Do or explain
 Changes to Cyclor Settings	- Explain that most of the cyclor's system settings are preprogrammed as listed in Appendix A "System Settings Default Value" and do not need adjustment; however, there are a few system settings are customized for each patient. - Explain that patients may need to change their cyclor settings if their prescription changes or their machine is replaced. Appendix A of the <i>System One User Guide</i> provides 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 cyclor. 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

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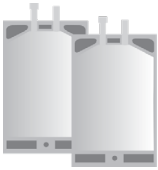
Lesson 3: Changes to the cyclor settings

Color-coding in the margins of the page with the title of the section or chapter. For example, the section is Interpret your prescription within the Prepare for Treatment chapter.

Supporting materials

The Nurse Guide directs you to specific sections of several resources that give additional information and instructions. Within the resources, some key concepts are repeated using different media to facilitate learning.

	Training Flipbook or Training Flipbook for VersiHD	A bound book that you can place on a table or in your lap. ■ One side contains text, pictures, and graphics to support your demonstrations and explanations to the patient. ■ The other side gives the nurse the main talking points.
	Quick Reference Guide or VersiHD Reference Guide chapter	The patient and care partner's primary learning tool. These booklets are used during and after training to support learning. They provide high-level, critical information, but do not replace the user guides, which are much more detailed.
	Online Modules	Computer-based, self-study training that 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 cyclor. 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 Cyclor and PureFlow SL.
	Props	Any supplies needed to complete practice activities.
	User guide	The document that contains the detailed instructions for using a device, such as the System One, VersiHD or PureFlow SL.

	Disposables	These are single-use supplies such as bagged dialysate, and fluid warmer disposables.
	Calendars and Schedules	Patient schedule, training calendar.
	Documents	Forms, records, and checklists.
	Cycler equipment	The cycler.
	PureFlow SL equipment	The PureFlow SL.

Nurse resources

NxSTEPS nurse resources include modules, quick reference guides, and the Patient Schedule Customization Tool. You may access these resources from a center, personal, or public computer.

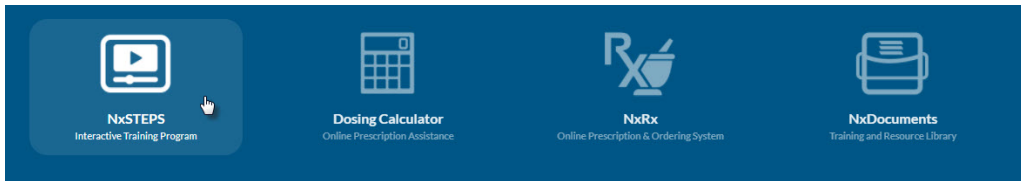
Logging into NxSTEPS

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

1. Go to <http://www.nxstage.com>.
2. Click on the NxStage Websites drop down menu.

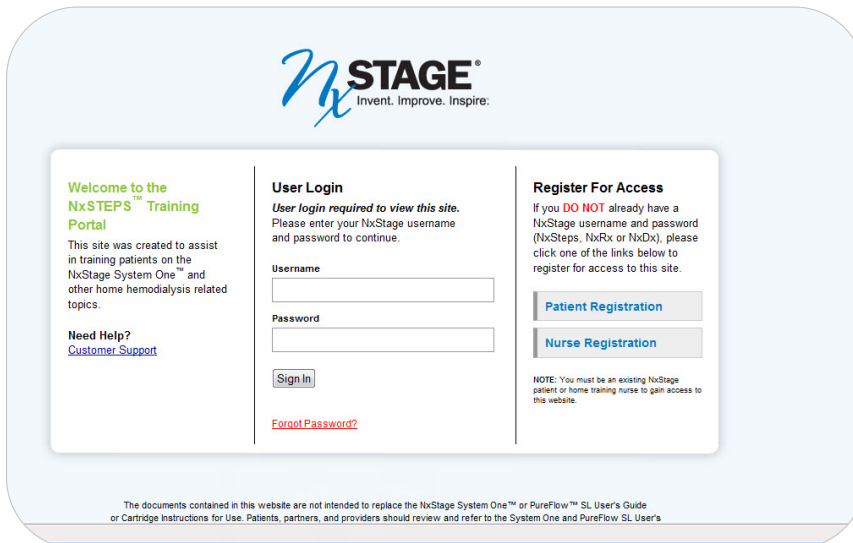


- The following screen appears:



3. Click NxSTEPS.

- This following screen appears:



4. Enter your NxStage NxRx® or Nx Dx™ username and password, and then click “Sign In.”



Note: If you do not have a NxStage NxRx or Nx Dx username and password, complete the “Nurse Registration.” You need to know your NxStage account number. After you complete the registration, you are logged into the site automatically. Registration is required only once. After initial registration, complete the User Login using your established username and password.

- When you have successfully logged in, the following screen appears:

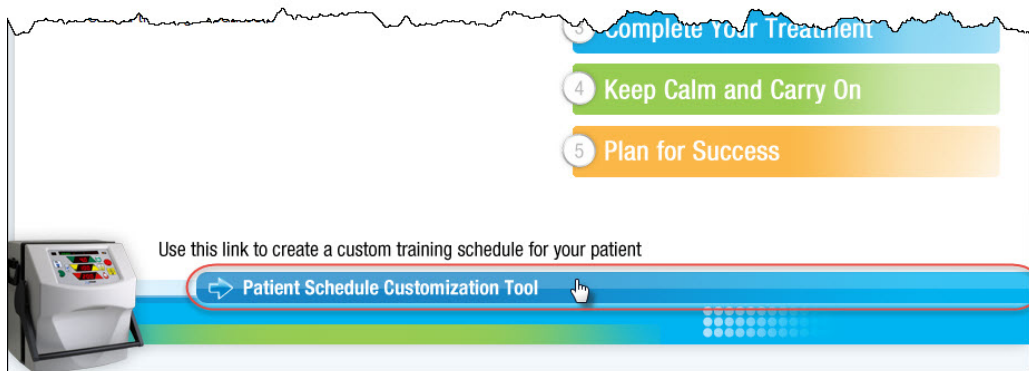


The numbered topics and color-coding match the material presented in the *Training Flipbook* and Nurse Guide. Click on any of the five headings to access the online content for that topic.

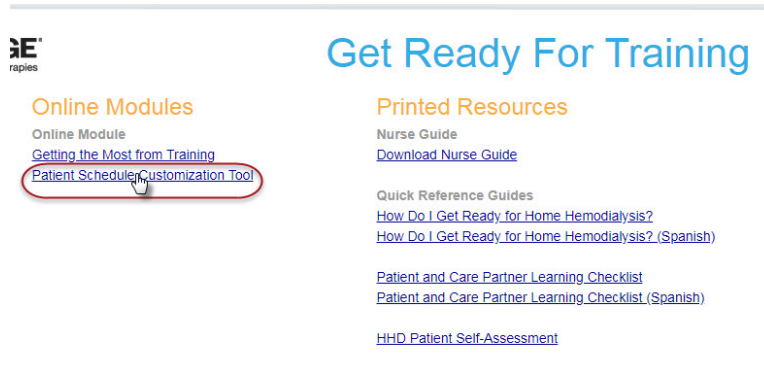
The Patient Schedule Customization Tool

The Patient Schedule Customization Tool allows you to customize the training schedule for the patient. You can access this tool from the home screen and from Get Ready for Training topic

- The Patient Schedule Customization Tool is on the home screen.



- And within the Get Ready for Training topic.



Requirements for using the online modules

- Viewing the online modules requires a high-speed internet connection for downloading and the most recent version of Adobe Flash Player.
 - Review the Nurse Guide.
- 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: *Training 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 according to the dialysis center's policies and to meet the patient and care partner's needs and medical condition.
3. Review the supply list to confirm that you have all the tools and props needed for that subtopic.
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, certain sections may be taught before or after treatment (for example, proper handwashing technique or troubleshooting alarms, if an extra cyclor is not available).

Documenting training and comprehension

Use the *Patient and Care Partner Learning Checklist* included within each User's *Quick Reference Guide* binder or the Patient Schedule from the Customization Tool to record when the instruction was provided and learning objectives were 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 patient and care partners who were unable to achieve competency.

Teaching tools and strategy

Nurses can test the patient and care partner's comprehension throughout the training by using the teach-back method, see "Teach-back method" on page 20 of this Nurse Guide. There is also an online Learning Checkpoints module and a printable version which test the patient and care partner's understanding of a specific topic.

Learning Checkpoints

After reviewing a section with a patient and care partner you can have them take the Learning Checkpoints online module to make sure they understand the material. You can access this module through the topics highlighted below:



Click on one of these three topics to access the Learning Checkpoints.

Teach-back method

NxStage also recommends that nurses use the “teach-back” method throughout the training to make sure the patient and care partner are understanding the concepts. The teach-back method stresses the importance of asking the patient and care partner open ended questions about a particular topic and having them *tell you in their own words* what they are supposed to do.

Using the teach-back method effectively

1. Use plain language when communicating with patients.
2. Ask the patient and care partner to explain back to you what you have told them, using their own words.
3. Avoid asking questions that can be answered with a simple yes or no.
4. If the patient and care partner are not able to teach back correctly, explain again and re-check.

For more information on the teach-back method see <http://www.teachbacktraining.org/>

Notes

Notes



2: Get ready for training

Chapter overview

Lesson 1: Readiness and expectations	24
Lesson 2: Roles and Responsibilities.....	26
Lesson 3: Challenges	27

Lesson 1: Readiness and expectations



Objectives

Patients and care partners should be able to:

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

Supplies

- Nurse Guide
- Online module:
 - *Getting the Most from Training*
- Customized Patient Training Schedule
- HHD Patient Self-Assessment Form
- Open Connections booklets and forms:
 - Open Connections Booklet
 - Action Plan
 - What Motivates You

Instructions

Use this tool	Do or Explain
 HHD Patient Self-Assessment Form	- Have the patient and care partner complete the “Prior to starting NxStage HHD therapy” column of the form. Tell them to use an average of the three months prior to starting therapy on NxStage home hemodialysis (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 online module at the beginning of each week of training. - Ask if they have any questions and address them.
 Patient Schedule	- Give the patient and care partner a copy of their schedule. - Explain that the schedule was created 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.
	- Use the Open Connections booklet and cover the “Week One” suggested topics. - Use the “What motivates you” goal sheet and help the patient verbalize and document their life goals.

Lesson 2: Roles and Responsibilities

Objectives

Patients and care partners should be able to:

- Define the roles of the patient and nurse educator in the training experience.

Supplies

- Nurse Guide
- Patient quick reference guides:
 - Get ready for home hemodialysis*

Instructions

Use this tool	Do or Explain
 Get ready for home hemodialysis	1. Have the patient and care partner turn to the “Preparing Your Home” section of the quick reference guide. 2. Review the tasks that must be completed at the patient’s home before starting home hemodialysis. 3. Set a date for the patient and care partner to have all of the “Preparing Your Home” tasks completed. 4. Instruct the patient and care partner to review the “Assigning the Tasks” section. 5. Explain that each task is discussed during the training program and the patient and care partner need to decide who performs certain tasks associated with hemodialysis. Encourage the patient to take on the majority of the treatment tasks. 6. The best practice for the successful adaption to home hemodialysis includes performing a home visit and providing guidance on how to best set up the patient’s dialysis area and where to store their supplies.  Note: The checklist on the remaining pages of the quick reference guide will be finalized during future training sessions as those decisions are made.

Lesson 3: Challenges

Objectives

Patients and 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.



3: Prepare for treatment

Section overview

I: Keep it clean.....	31
II: Access your blood.....	41
III: Interpret your prescription	67

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I: Keep it clean

Chapter overview

Lesson 1: Dirty, clean, or sterile	32
Lesson 2: Aseptic technique	34
Lesson 3: Universal precautions	38

Lesson 1: Dirty, clean, or sterile

Objectives

Patients and care partners should be able to:

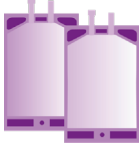
- Explain the difference between dirty, clean, and sterile.
- Assess environment or equipment conditions as dirty, clean, or sterile.

Supplies

- Online module
 - *Keep It Clean*
- Nurse Guide
- *Training Flipbook or Training Flipbook for VersiHD*
- Bagged dialysate
- Fluid warmer disposables

Instructions

Use this tool	Do or explain
 Keep it clean	■ Have the patient and care partner take the online module. During this module the patient and care partner will learn to: • Describe the steps of proper handwashing technique. • Explain the difference between dirty, clean, and sterile. • Recognize the components of the cartridge and related equipment that must remain sterile. ■ Ask if the patient and care partner have any questions after watching the video. ■ Ask, “What are the differences between dirty, clean, and sterile?” ■ Review the differences, if necessary.

Use this tool	Do or explain
 dirty, clean, or sterile?	Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i>, have the patient and care partner identify: - Which items are dirty, clean, or sterile (page 1-1). Review the answers provided in the <i>Training Flipbook</i> 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 <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i>, refer to the appropriate cartridge and point out the sterile locations. - Which connection points on the SAK are sterile (page 1-5).
 Bagged dialysate, fluid warmer disposables, Vascular access needles	Using the patient's supplies have the patient identify other sterile connection points.

Supporting concepts for Lesson 1: Dirty, clean, or sterile

If you have a patient or care partner who needs additional help with the concepts:

- Review the *Training Flipbook* or *Training Flipbook for VersiHD* (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 or care partner identify whether an item is dirty, clean, or sterile.

Lesson 2: Aseptic technique

Objectives

Patients and care partners should be able to:

- Demonstrate proper aseptic techniques.
- Recognize signs and symptoms of infection.
- Understand when to call the center to report unusual symptoms.

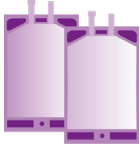
Supplies

- Nurse Guide
- *Training Flipbook or Training Flipbook for VersiHD*
- Patient quick reference guides:
 - *Keep It Clean*
- Solution to simulate germs
 - (Glo Germ or GlitterBug used per manufacturer's directions)
- Soap (either non-antibacterial or antibacterial) 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

Instructions

Use this tool	Do or explain
 Keep It Clean	■ Have the patient and care partner read the “Introduction” of the quick reference guide. ■ Explain that aseptic technique is a set of practices that reduces the risk of germs entering the patient’s body. ■ Ask, “When is it important to maintain aseptic technique during dialysis treatment?” Reinforce the concept that it is important to maintain aseptic technique during the entire treatment time. ■ Refer to “How do I wash my hands,” in the quick reference guide. Explain that proper handwashing is one of the actions required to maintain aseptic technique.

Use this tool	Do or explain
 aseptic technique	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-7), explain when the patient's hands should be washed. ■ Describe when to wash with soap and water and when it is okay to use an antiseptic hand rub. ■ If the patient's hands are visibly soiled, they must wash them with soap and water. ■ If the patient's hands are not visibly soiled, they can use a waterless, alcohol-based antiseptic hand rub (with 60-90% alcohol content).
 Keep It Clean	■ Have the patient and care partner read the proper handwashing techniques in the quick reference guide. ■ Refer the patient to the World Health Organization (WHO) guidelines on handwashing. These guidelines can be found online. ■ Ask the patient and care partner, "How long should you wash your hands with soap and water for?" Make sure the patient understands that they should wash their hands for at least 20 seconds.
 GlitterBug or Glo Germ  Keep It Clean Soap (either non-anti-microbial or antimicrobial) and water Waterless, alcohol-based antiseptic hand rub with 60-90% alcohol content	■ Instruct the patient and care partner to apply a solution (for example, GlitterBug) to simulate germs to their hands. ■ Have them practice proper hand-washing techniques as described in the quick reference guide using both: • Soap and water. • Waterless, alcohol-based antiseptic hand rub. ■ Show them any areas where they have not effectively removed germs from their hands.

Use this tool	Do or explain
 Keep It Clean	Review the remaining topics in the quick reference guide: - How to check your supplies - Keeping connection points sterile - Swabbing multiple use bottles - Cleaning equipment after treatment - Properly disposing of single use items - Follow the instructions in the <i>Access Your Blood quick reference guide</i> for information on preparing or handling the vascular access.
 Practice Cartridge, Practice SAK, and Practice Vascular Access	Using the practice cartridge, practice SAK, and practice vascular access, have the patient and care partner practice making the connections listed below. The patient and care partner should maintain aseptic technique and not touch any connection points: - On the practice cartridge: - Remove the cap from the saline “T” on the arterial line. - Disconnect the saline line from the dialysate inlet line. - Keep the dialysate inlet line sterile. - Connect the saline line to the saline “T” - On the practice SAK: - Remove a cap from one of the SAK dialysate outlets. - Connect the dialysate outlet to the cartridge dialysate inlet line. - On the practice patient access: - Remove the cap or syringe from the end of the practice vascular access line. - Disconnect the arterial blood line (red clamp) from the priming spike. - Connect the arterial bloodline to the practice vascular access line.
 Keep It Clean	- Give the patient the 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.

Use this tool	Do or explain
 Thermometer	Have the patient do the following: ■ Check their temperature, ■ Correctly read the thermometer ■ Write their “normal” temperature in the <i>Keep It Clean</i> quick reference guide.

Supporting concepts for Lesson 2: Aseptic Technique

If a patient or care partner needs additional help with the concepts:

- Review the online module with the patient or care partner and point out important concepts.
- Use the GlitterBug lotion and let the patient or care partner touch the equipment and their binder to demonstrate how germs can reach 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, they are maintaining aseptic technique and preventing infection.

Lesson 3: Universal precautions

Objectives

Patients and care partners should be able to:

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

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Patient quick reference guides:
 - *Keep It Clean*
- Black marker
- Sterile gloves

Instructions

Use this tool	Do or explain
 Keep It Clean	Review “What are universal precautions?” in the quick reference guide: ■ What universal precautions are. ■ Why it is important to take precautions. ■ Who should follow the precautions. ■ What actions to take to follow universal precautions.
 personal protective equipment	Use the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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: 1. Have the patient and care partner put on gloves. 2. Use a black marker to mark the outside of the gloves on the fingers or palms to simulate contamination. 3. Have the patient and care partner practice removing and disposing of the gloves without touching the contaminated marked area.

Use this tool	Do or explain
 Sterile gloves	Show the patient and care partner 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 concepts for Lesson 3: Universal precautions

If a patient or care partner needs additional help with the concepts:

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



II: Access your blood

Chapter overview

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Lesson 1: Needle use and connections



Objectives

Patients and care partners should be able to:

- Recognize and overcome perceived dangers or fears related to cannulating the vascular access.
- Identify the vascular access type.
- Determine the 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 and perform the correct cannulation technique.
- Monitor and evaluate their access during treatment.
- Explain access pressures and their relevance.

In addition to the above objectives Solo patients should be also able to:

- Learn how to perform the required tasks with their non-access arm.
- Become adept at all tasks required to perform their solo treatment.
- Insert and remove fistula needles with one hand.
- Apply and remove tape with one hand.
- Use a tourniquet with one hand.
- Hold vascular access puncture sites securely.
- Perform all tasks remaining seated while needles are in place during treatment.

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Patient quick reference guides:
 - *Access Your Blood*
- Training Tips
 - *Supplemental Taping Procedure: NxStage Training Tip*
 - *Tips for Solo Home Hemodialysis - Nurse*
 - *Tips for Solo Home Hemodialysis - Patients*
- Online module
 - *Not As Scary As You Think*
- Cannulation practice tools or props:
 - Practice Access arm
 - Cannulation block

- Tubing
- Needles
- Water bottle with koozie and piece of tubing
- 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 (Dual-head Teaching Stethoscope, if available)

Instructions

Preparing for treatment



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

Use this tool	Do or explain
 Get ready for home hemodialysis	■ Assign the “Tasks” section of the quick reference guide. ■ Have the patient and care partner decide who will be responsible for each vascular access task and write this down in the guide. ■ Encourage the patient to self-cannulate, see “Preparing for treatment” on page 53.  Note: If your patient is performing solo treatments, cross out the care partner column of the table in the quick reference guide.

Use this tool	Do or explain
 Not As Scary As You Think	- Have the patient and care partner complete the online module. - Review any concerns they may have, using the list of questions from the online module as a guide. - Acknowledge that fear of needles is a common concern for patients and care partners. Offer to have a current HHD patient speak with the patient about their needle experience and overcoming their fears. - For more information, see “Preparing for treatment” on page 53.
 Access Your Blood	- Discuss the need for local anesthetic. Options include: - EMLA cream (lidocaine with prilocaine) - CryoDose TA 1% Intradermal lidocaine 1% ethyl chloride spray - If the patient is using an anesthetic, have the patient 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.  Note: Patients should be assessed frequently to determine the need for continued use of local anesthetics. - For more information, see “Preparing for treatment” on page 53.

Access types

Use this tool	Do or explain
 needle use and connections	- Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-10), briefly explain the three different access types: - Arteriovenous fistula (AVF) - Arteriovenous graft (AVG) - Central venous catheter (CVC)  Note: If your patient has a CVC, skip to the “catheter access” section on page 1-18 of the <i>Training Flipbook</i> or the <i>Training Flipbook for VersiHD</i>. For more information, see “Access types” on page 53.

Evaluating the access

Use this tool	Do or explain
 needle use and connections  Access Your Blood	■ Using the <i>Training Flipbook or Training Flipbook for VersiHD</i> (page 1-11), explain how to evaluate the access prior to each cannulation. ■ Tell the patient and care partner to report any abnormalities to the dialysis center. Look, listen, and feel Using the quick reference guide, show the patient how to evaluate their access and what to look for. ■ Always compare the access extremity to the other extremity. ■ Look at the location of the previous treatment cannulation sites and choose the next site using rope-ladder principles for site rotation, unless using buttonhole technique. ■ For more information, see “Evaluating the access (AVF or AVG)” on page 53.
 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 the patient and care partner should and shouldn't feel. Listen: ■ Explain that when the patient is at the center, you will listen to the access for the bruit. ■ If the patient is going to use a stethoscope at home, teach them what to listen for. ■ If available, use a dual-head teaching stethoscope so both you and the patient can listen at the same time. Practice: ■ Have the patient and care partner practice evaluating the patient's access. Ask them to describe what they see, feel, and hear.

Choosing the insertion site

Use this tool	Do or explain
 needle use and connections	■ Show the patient and care partner how to choose sites for needle placement. ■ Using the <i>Training Flipbook or Training Flipbook for VersiHD</i> (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. • “One-site-itis” is not an appropriate cannulation pattern. • The buttonhole (constant site) technique may be used for a fistula. • Explain the key points in choosing the best insertion sites. ■ Identify the cannulation pattern the patient will use (buttonhole or rope-ladder technique). Avoid recently used sites.
 Access Your Blood	■ Have the patient or care partner record their average and maximum access pressures in the “access my blood: my info” section of the quick reference guide. ■ For more information, see “Choosing the insertion site” on page 54.

Using the anesthetic agent

Use this tool	Do or explain
 Anesthetic Agent	■ Show the cannulator how to administer the selected anesthetic agent. Have the cannulator practice administration of the anesthetic agent.  Note: Avoid injecting lidocaine deeper than intradermal; doing so may puncture the vessel and cause a hematoma over the vessel. ■ For more information, see “Using the anesthetic agent” on page 54.

Parts of the needle

Use this tool	Do or explain
 needle use and connections  Access Your Blood  Not As Scary As You Think	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-13), identify and describe the parts of the fistula needle. ■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-14), have the patient and care partner identify the parts of the needle. ■ Have the patient record the type, gauge, and length of the needle they are using in “access my blood: my info” section of the quick reference guide. ■ Have the patient watch “Not as scary as you think” online module. ■ For more information, see “Parts of the needle” on page 54.

Approaching the access

Use this tool	Do or explain
Fistula or ButtonHole Needle	■ Show the 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 any surface, it is considered to be contaminated. Discard the needle and use a new one. • Wear glasses, if needed. • Ensure the room is well-lit.
Fistula or ButtonHole Needle prop of your choice: Access Arm Cannulation Block Segment of Tubing from an Unused Sterile Blood-line Set	■ Using a fistula or ButtonHole needle, simulate the cannulation process on the practice access: • Show the cannulator how to approach the access. • Using the prop of your choice, show the cannulator how to insert the needle. • Using the “Tandem Hand” technique, the cannulator places their thumb and forefinger just behind your thumb and forefinger nail. • Have the cannulator perform the process. • Ask the patient or care partner to explain what they feel as the needle goes into the prop. ■ Have the cannulator practice the procedure until they are comfortable; provide guidance as needed. ■ Tell the cannulator to practice at home to become more comfortable. ■ For more information, see “Approaching the access” on page 55.

Supplies and prep

Use this tool	Do or explain
 Access Your Blood	■ Tell the patient to turn to the “Prepare the Access Site” section in the quick reference guide. ■ Review the list of supplies with the patient. ■ Describe which disinfectant to use for antimicrobial cleansing. Choose from these recommended options (follow manufacturer’s instructions for use): • 2% chlorhexidine gluconate/70% isopropyl alcohol • EXSEPT PLUS • 10% povidone iodine • 70% isopropyl alcohol ■ If the patient needs additional supplies, have the patient or care partner record them in the “access my blood: my info” section of the quick reference guide. ■ For more information, see “Supplies and prep” on page 55.
 Access Your Blood	■ Using the quick reference guide, explain how to wash the access and disinfect sites. ■ It is recommended to use a mask before disinfecting and inserting needles. ■ Remind the patient and care partner not to touch the access area. • Explain the risks of infection.

Use this tool	Do or explain
 Access Your Blood	■ Using the quick reference guide, for patients with a buttonhole fistula, explain how to remove scabs when preparing the access: • Gently scrub with a clean gauze pad or a disposable facial sponge, then dry with a clean paper towel. • If you have a buttonhole fistula, you should also try to loosen scabs as you wash the access sites. • Loosen the edges of the scab by gently stretching the skin around the scab. • 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 who are not using a buttonhole fistula wash and disinfect access sites.

Cannulate the access

Use this tool	Do or explain
 Access Your Blood	■ Have the patient and care partner review the “Access Your Blood: AVF and Graft” section of the quick reference guide. ■ Explain that you will use the Tandem Hand technique until the cannulator is comfortable and confident with cannulation. • Follow this process for at least three dialysis sessions. Then, reverse the positions so the patient handles the needle and 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. ■ For patients using EMLA cream, remind them of the following: • Apply the cream under an occlusive dressing at least 1 hr before treatment. • The maximum analgesia occurs 2-3 hours after application. • Analgesia lasts for 1-2 hours after the dressing is removed.
 Access Your Blood	Once the patient or care partner has demonstrated cannulation proficiency and confidence, use the quick reference guide to show the patient or care partner how to cannulate the access.
	Cannulation tips: ■ Never probe blindly into a poorly defined vessel. ■ Never force the needle against resistance. ■ Do not 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. ■ Take care not to push or flatten the needle completely against the skin, which could change the angle of the needle. ■ Always keep your access visible. ■ For more information, see “Cannulate the access” on page 55.

Post-dialysis

Use this tool	Do or explain
 Needle Use and Connections	Using the <i>Training Flipbook</i> (page 1-15), demonstrate how to safely remove needles after dialysis. - Remember to put on clean gloves and use aseptic technique. 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. - Remove the pressure dressing a few hours later; remove adhesive bandages the next day. - Demonstrate how to remove needles for the first several dialysis sessions. Then allow the patient or care partner to remove the needles on their own with your guidance.



Additional information

This section contains background information or additional tips for the nurse. This information may be too technical for the patient or care partner. Share this information with the patient and care partner as appropriate.

Preparing for treatment

- The KDOQI Work Group encourages patients who are capable and whose access is suitably positioned to self-cannulate.
- Patients should be encouraged and empowered to self-cannulate
- For fistula access, the buttonhole cannulation technique is preferred.
- Ideally, teach patients to self-cannulate with sharps first, then advance to buttonhole technique instructions.
- When teaching patients to self-cannulate consider using the Tandem Hand and Touch Cannulation (for BH only) techniques.
- To reduce the risk of buttonhole infections consider the following:
 - Patients with artificial heart valves or valvular disease should not use buttonhole cannulation technique.
 - The best practice for creating successful buttonhole sites is to have the self-cannulating patient create the buttonhole themselves. The angle at which the track forms is directly related to the angle at which the cannulator inserts the needle.
 - It is imperative that the patient's cannulation technique be observed and evaluated at intervals.
- True needle phobia (frequently inherited) is found in approximately 3-4% of the U.S. population. People with this condition may experience a vasovagal reflex that could result in major complications, including tachycardia, followed by bradycardia, hypotension, vertigo, nausea, diaphoresis, and, although rare, asystole and death.
- The cannulator needs to be taught how to administer intradermal lidocaine 1%.

Access types

- **Arteriovenous fistula (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.
- **Arteriovenous graft (AVG):** A synthetic or, less frequently, biologic conduit implanted subcutaneously and inserted between an artery and a vein.
- **Central venous catheter (CVC):** A synthetic, relatively large tube made of rigid material, placed into a high-flowing central vein.

Evaluating the access (AVF or AVG)

- 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.
- Depending on the type of graft material and surgeon preference, grafts can be used as early as two days to two weeks. Follow the surgeon's and manufacturer's recommendations.
- Maturation of an AVG:
 - An AVG can typically be used two weeks after insertion and once swelling has subsided. Vessel maturation is not necessary.

Choosing the insertion site

- 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 placement prevents recirculation. Choose needle length according to vessel depth and length.

Using the anesthetic agent

- When using EMLA cream be aware of the following:
 - Follow manufacturer's instructions for use of EMLA cream (lidocaine 2.5% / prilocaine 2.5%).
 - This product requires absorption time for effectiveness.
 - Remind the patient or care partner to apply at the appropriate time and then wash the access prior to needle insertion.
- For intradermal lidocaine 1% be aware of the following:
 - 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.
- Possible side effects of EMLA cream:
 - May cause systemic effects if too much is absorbed.
 - Application should be limited to the cannulation sites.
- Possible side effects of intradermal lidocaine:
 - Lidocaine injections put the cannulator at twice the risk of a needle accident.
 - Lidocaine injections may cause shrinkage and scarring of the surrounding tissue.

Parts of the needle

- The gauge and length of the needle are determined by the dialysis center's policy or, if the patient is coming from an in-center program, the size needle 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 blood line. Longer tubing may be needed if the patient is self-cannulating an upper arm.

- Various tubing lengths are available from NxStage Medical.

Approaching the access

- Consider the placement of the base of the hand.
- Have the cannulator 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. This is vital for buttonhole.
- When teaching patients to self-cannulate, be sure they are seated comfortably and have their access extremity positioned at a consistent angle. For example, in a recliner chair with a TV table and pillow.
- Show the patient how to position their access extremity in a comfortable position that ensures a good angle and ease of insertion.
 - If the access is in an arm, placing a pillow and/or a sturdy table under the arm is suggested.
 - Remind the patient that the way they position their access extremity should be consistent and is critical to cannulation success.

Supplies and prep

2% Chlorhexidine gluconate/70% isopropyl alcohol antiseptic

- Rapid onset (**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.

Isopropyl alcohol

- Has a short bacteriostatic action time.
- It should be applied in a rubbing motion for 1 minute immediately prior to needle insertion.

Povidone iodine

- Povidone iodine needs to be applied for **2-3 minutes** for its full bacteriostatic action to take effect.
- Povidone iodine must be allowed to dry before needle insertion.

Cannulate the access

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 more steep 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 subside 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 method 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 $\frac{3}{4}$ 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 approach 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; judgment should be used to determine when to progress based on the patient’s needs.
 - Use pre-pump arterial monitoring to ensure that the blood pump speed does not exceed the needle capacity. Arterial pressure should not exceed -250 mmHg.
 - In general, lower blood flow rates should be used initially for first cannulations.

Buttonhole

- The buttonhole should be created by the self-cannulating patient or an expert cannulator who has assessed and chosen the most superficial, straight, and problem-free sites on the outflow vein.
- Six to twelve sharp entries are required 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 continues to cut adjacent tissue, enlarges the insertion site, and causes bleeding along the track. This damage changes the existing scar tissue along the track and distorts the path of the tunnel.
- While 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.



Note: There is a learning curve. You 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.

- Hold the needle behind the wings to better visualize the flashback while inserting.

Supporting concepts for Lesson 1: Needle use and connections

If you have a patient or care partner who needs additional help with the concepts:

- For patients with needle anxiety or fear of blood, have them watch another patient being cannulated a few times. Each time, 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 6-8 inch length of plastic tubing (from an unused practice cartridge for cannulating practice). Place the tubing between an empty water bottle and a koozie.
- Allow the cannulator to become confident inserting the arterial needle before moving on to inserting both needles.
- Use the Tandem Hand and Touch Cannulation Technique to teach patients to self-cannulate.

Lesson 2: Care and complications: fistula or graft



Note: Reinforce that the patient should always protect the access; it is their “lifeline.”



Objectives

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.

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Patient quick reference guides:
 - *Access Your Blood*

Instructions

Use this tool	Do or explain
 care and complications	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-16), share these guidelines for proper access care.

Vascular access complications

Use this tool	Do or explain
 Access Your Blood	■ Using the “Managing Complications” section in the quick reference guide, first explain arterial and venous access pressures and the relationship to blood flow, and then discuss needle or flow problems.

Use this tool	Do or explain
 care and complications	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-17), discuss how to handle complications. ■ A quick response to needle infiltration helps minimize damage to the access. Proper needle insertion, taping, and removal technique decrease the potential for infiltration. ■ If the patient experiences Alarms 11 or 24, and/or suspects poor arterial blood flow: • Check blood pressure; treat hypotension if present. • Decrease the blood flow rate. • Stop the blood pump and adjust the needle. • Consider recannulation. • If unsuccessful, end treatment and call the center. ■ Explain your dialysis center's recommendations regarding repeated alarms. Tell the patient and care partner how often alarms can go unresolved before the patient must end treatment and rinseback blood.
	■ Remind the patient why they should contact the dialysis center. ■ For more information, see "Vascular access complications" on page 60.



Additional information

Vascular access complications

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 complications 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

Supporting concepts for Lesson 2: Care and complications: fistula or graft

If you have a patient or care partner who needs additional help with the concepts:

- Using the *Training Flipbook* or *Training Flipbook for VersiHD* (page 1-17), review how to handle complications.

Lesson 3: Accessing the blood with central venous catheters

Objectives

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 and exit site before, during, and after treatment.

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- *Access Your Blood* quick reference guide

Instructions

Evaluating the catheter

Use this tool	Do or explain
 catheter access	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-18), explain how to evaluate the access. ■ Explain how to evaluate the catheter access and how to look for any signs and symptoms of infection and other possible complications. Feel for: ■ Have the patient and care partner practice evaluating the catheter access. ■ For more information, see “Evaluating the catheter” on page 64.

Supplies and prep

Use this 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 <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-19), explain the proper aseptic technique to use whenever the catheter ports are opened and/or the catheter dressing is changed.

Catheter access

Use this tool	Do or explain
 Access Your Blood	■ Refer the patient to the catheter access section of the 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 this tool	Do or explain
 Access Your Blood	Catheter accession ■ Prepare to connect to blood lines, following your dialysis center instructions. ■ The recommended practices are listed below:  Note: If using closed connector cap devices like Tego or Interlink needleless connectors, follow manufacturers instructions for use for changing caps. 1. Clean the catheter hub or connection with an approved disinfecting agent. 2. Using strict aseptic technique, open the catheter. 3. Withdraw the locking solution, and discard and flush lumens with saline, assessing for ease of flow. 4. Securely connect to blood lines. Following your dialysis center instructions: • Make sure the connection is secure to prevent accidental disconnection, but do not overtighten. Overtightening may damage the catheter port during disconnection. • Check vital signs, flow pressures, and patient comfort prior to setting prescribed flow. • Maintain visibility of access and connections at all times.

Use this tool	Do or explain
 Access Your Blood	Have the patient and care partner continue to follow along in the quick reference guide as you show them how to disconnect the blood lines following the dialysis center's instructions. ■ Use strict aseptic technique. ■ Verify that both catheter limb clamps are securely closed and caps are tightly connected. ■ Secure the catheter limbs to the patient's skin as directed.  Note: Remind the patient and care partner to report any problems with blood flow or alarms to their center. For more information, see “Catheter access” on page 65. of this Nurse Guide.

Catheter care and complications

Use this tool	Do or explain
 catheter access	Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-20), explain the possible complications of catheter use: ■ Explain your dialysis center's recommendations regarding repeated alarms (how often alarms can go unresolved before the patient must end treatment and rinseback blood). ■ For more information, see “Catheter care and complications” on page 65.



Additional information

Evaluating the catheter

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 palpation:
 - 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 an 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.

Catheter access

1. Firmly infuse anticoagulant lock (to the volume of the lumen, per the manufacturer's instructions), displacing the saline.
2. Quickly reclamp the lumen to prevent negative pressure in the catheter from pulling blood into the side holes.

Catheter care and complications

The algorithm for catheter dysfunction is located in the 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.

Supporting concepts for Lesson 3: Accessing the blood with central venous catheters

If a patient needs additional help with the concepts:

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



III: Interpret your prescription

Chapter overview

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Lesson 1: Dialysis prescriptions and the cyclor



Objectives

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 for each treatment.
- Enter dialysis prescription data into the cyclor.

Supplies

- NxStage Dosing Calculator
- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- User guides:
 - *NxStage System One User Guide*
 - *NxStage System One S User Guide*
 - *NxStage VersiHD User Guide*
 - *NxStage Nx2me® User Guide (if used)*
 - *NxStage Nx2me Clinical Portal User Guide (if used, for home training nurse only)*
- System Setting List
- Online module
 - *Entering My Treatment Information*
- Blood pressure cuff
- Patient quick reference guide or *VersiHD Reference Guide*:
 - *Complete your treatment*
- Gloves
- Cyclor, set up for treatment
- Calibrated digital scale (medical-grade preferred)
- iPad and Nx2me app (if used)
 - Bluetooth devices (if used) for use with Nx2me app
- Nx2me Clinician Portal (if used, for home training nurse only)

Instructions

Use this tool	Do or explain
 Nx2me Clinician Portal	■ Use the Dosing Calculator to help determine the best prescription for the patient. ■ If using Nx2me, enroll the patient and then set up the patient in the Clinician Portal. • Enter the patient's prescription, App settings, and alert criteria.  Note: If you are using Nx2me Clinician Portal, set up the patient's Nx2me app from the Clinical Portal with the following information: • The PIN that has been assigned for that patient in Clinician Portal. The patient will use this PIN to set up their password in the Nx2me App. • Patient's therapy prescription (including treatment parameters). • Settings and alert criteria (including alert parameters). • Type of pre- and post-assessment. ■ Before this lesson, record the patient's therapy prescription in the their copy of the quick reference guide or <i>VersiHD Reference Guide</i>. ■ Give the patient and care partner the quick reference guide or <i>VersiHD Reference Guide</i>. ■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-21), review the components of the patient's hemodialysis prescription.
 Complete your treatment	
 dialysate prescriptions and cyclers Dosing Calculator	

Use this tool	Do or explain
 Complete your treatment	Pre-treatment assessment Teach the patient how to do a pre-treatment assessment, including vital signs and weights. ■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient fill in the vital signs, ranges, and dry weight parameters in the blank spaces provided. ■ Discuss when the patient or care partner 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 it as needed. ■ Emphasize that inaccurate estimation of dry weight may lead to taking off too little or too much fluid, resulting in significant consequences. Factors that affect dry weight 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 increase typically occurs as diet, appetite, improved sense of well-being, and physical exercise increase. ■ Changing residual renal function. Evaluating the patient's dry weight Teach the patient and care partner how to evaluate the patient's dry weight. This includes instructions on: ■ How to evaluate for peripheral edema. ■ How to evaluate blood pressure. Answer any questions the patient or care partner has about their prescription. ■ For more information, see "Dialysis prescription and the cycler" on page 74.

Determine the ultrafiltration (UF) volume and rate

Use this tool	Do or explain
 Complete your treatment	■ Explain that the ultrafiltration volume should be safely removed during the treatment without causing symptoms during dialysis or damage to vital organs. Determining the ultrafiltration (UF) volume Explain how to determine the ultrafiltration volume to be removed for each treatment: ■ Subtract the patient's dry weight from the patient's pre-dialysis weight. Remind the patient and care partner of the following: • Always use accurate weights. • The UF volume may change with each treatment depending on the patient's weight gain/loss. ■ After the pre-dialysis weight has been determined, the patient should add the following to the ultrafiltration volume: • Fluid consumed • Any planned fluid bolus Pre- and post-dialysis weight Explain what pre- and post-dialysis weight means. ■ Pre-dialysis weight determines the ultrafiltration volume (excess fluid to be removed). ■ Post-dialysis weight is the best indication of how much ultrafiltration has occurred during treatment. ■ Post-dialysis weight could be affected by food and fluid intake during treatment. ■ If post-dialysis weight does not reflect intended ultrafiltration, it may influence the ultrafiltration volume for the next treatment. ■ Explain to the patient how to obtain an accurate pre- and post-dialysis weight: • Weigh yourself right 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 yourself with similar-weight clothing each day. • Measure weight three times. Weights should be within 0.1 Kg of each other. Disregard any weight out of this range, and then average the remaining weights.

Use this tool	Do or explain
 Complete your treatment	■ Determine the maximum ultrafiltration volume and maximum ultrafiltration rate for each patient. ■ If the ultrafiltration volume exceeds this maximum, the patient must call the dialysis center for instructions prior to treatment. ■ Write the patient's maximum ultrafiltration volume per treatment, and other center-specific instructions in the blank spaces in the quick reference guide or <i>VersiHD Reference Guide</i>. Determining the ultrafiltration rate ■ Explain how to determine the ultrafiltration rate for each treatment. The ultrafiltration rate may vary with each treatment depending on the ultrafiltration volume. ■ Even a moderate fluid removal rate during individualized hemodialysis session times is associated with decreased patient survival.¹ • Data suggests that exceeding 10ml/kg/hr may lead to cardiac stunning.² • Additional data suggest that the following is preferred and minimizes the risk of death: $\leq 8\text{mL/kg/hr}$.³ ■ Consider adjusting the system settings in the System One cyclor (software version 4.10 or greater) that will ensure these limits are not exceeded. • # 80 Maximum Ultrafiltration Rate L/hr. Adjustable between 0.01 – 2.4 L/hr.  Note: For example, 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 to remove the rinseback volume will be longer than anticipated. ■ Write the patient's maximum ultrafiltration rate per treatment, and other center-specific instructions in the blank spaces in the quick reference guide or <i>VersiHD Reference Guide</i>. • If the patient's ultrafiltration rate exceeds this maximum, the patient must call the dialysis center for instructions prior to treatment.

Entering treatment information into the cyclor

Use this tool	Do or explain
 Complete your treatment	■ Give the patient and care partner the quick reference guide or <i>VersiHD Reference Guide</i>. ■ Explain that this guide provides the basic steps to enter treatment information into the cyclor. • 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 increases to the prescribed rate while monitoring arterial and venous pressure.
 dialysis prescriptions and cyclor	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 1-22), explain how to enter the patient's prescription in the cyclor. As you demonstrate, share these tips: • The Rate display is the default display or home screen. • Press the VOLUME TOGGLE to view the Volume display. "VOL" appears in the bottom window. • On the Volume display, work from top to bottom (green, then yellow). • On the Rate display, work from bottom to top (red, then yellow, then green). • The Volume display automatically returns to the Rate display after 10-50 seconds of inactivity. The amount of time is based on the cyclor model, software version, and System Settings. • The patient or care partner may need to return back to the Volume display to finish entering the 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 windows. If the patient or care partner sees an incorrect flow fraction and a treatment time of 99:59, the patient or care partner has not correctly entered all the required data.
 Entering My Treatment Information	■ Tell the patient and care partner to complete the online module. • Explain that the blood flow and dialysate rates on the cyclor reflect 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.

Use this tool	Do or explain
 Complete your treatment	Using the prescription table in the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient or care partner practice entering the treatment settings into the cyclor. - Under the “Your Prescription” column of the table enter the following values: - Dialysate volume - Blood flow rate - Fluid removal UFV and UFR



Additional information

This section contains background information or additional tips for the nurse. This information may be too technical for the patient or care partner. Share this information with the patient or care partner as appropriate.

Dialysis prescription and the cyclor

- Accurately determining dry weight ensures that excess fluid is removed during daily dialysis and that the patient achieves a normotensive (normal blood pressure) and normovolemic (normal blood volume) state.
- True dry weight is subject to change based on whether the patient experiences a condition, such as increased appetite or exercise, that causes a loss or gain of non-fluid body tissue.
- Physicians and nurses assessing the patient’s dry weight should evaluate the following:
 - Weight pre- and post-dialysis
 - Blood pressure 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

References

- Chazot C, Vo-Van C, Lorriaux C, et al. Even a moderate fluid removal rate during individualised haemodialysis session times is associated with decreased patient survival. *Blood Purif.* 2017;44:89-97.
- Flythe JE, et al., Rapid fluid removal during dialysis is associated with cardiovascular morbidity and mortality. *Kidney Int.* 2011;79(2):250-257.
- Assimon, M.M. et al. Ultrafiltration Rate and Mortality in Maintenance Hemodialysis Patients. *Am J Kidney Dis.* 2016;68(6):911-922.

Supporting concepts for Lesson 1: Dialysis prescriptions and the cyclor

If a patient or care partner needs additional help with the concepts:

- Tell the patient or care partner to re-take the Entering My Treatment Information online module.
- Enter various ultrafiltration and dialysate volumes to demonstrate a change in treatment times.

Lesson 2: Therapy-related and other medications

Objectives

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.

Supplies

- Nurse Guide
- Patient quick reference guide or *VersiHD Reference Guide*:
 - *Complete your treatment*
- Heparin vial
- Syringe with needle
- Alcohol wipes
- Fistula needle or central venous catheter (CVC)

Instructions

Practice Heparin dosage

Use this 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 the top of the vial with an alcohol wipe. • Write the date on the vial when opening it 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 correct heparin dose.  Note: Follow your dialysis center's instructions for the proper use and storage of heparin.
Sample Fistula Needle or Sample CVC	■ Demonstrate the proper procedure for delivering a heparin dose into the venous fistula needle or Central Venous Catheter (CVC). ■ Using a sample fistula needle or sample CVC, have the patient and care partner practice delivering a mock heparin dose.
	■ Discuss the side effects of heparin and what actions to take if experiencing these side effects. ■ Explain there will be more detailed training on managing complications in the upcoming weeks.

Use this tool	Do or explain
 Complete your treatment	■ Refer the patient and care partner to the “Your Medications” section of the quick reference guide or <i>VersiHD Reference Guide</i>. Have them list all of the patient’s current medications in the table provided in the guide. ■ Review each prescribed medication with the patient and care partner. After consulting with the prescribing physician, discuss the purpose and potential side effects of each medication. Medications may include: • Erythropoetin Stimulating Agents (ESAs) • Vitamin D analogues • Antihypertensives • Vitamins and iron • Heparin ■ Using the table in the quick reference guide or <i>VersiHD Reference Guide</i>, discuss the times when the patient should be taking each medication. • Have the patient write down the times they will be taking their medications in the table. • 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 the patient and care partner.  Note: 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 more frequent treatment.

Supporting concepts for Lesson 2: Therapy-related and other medications

If a patient or care partner needs additional help with the concepts:

- Have the patient or care partner write out medications, what each is for, and when each is taken.
- Discuss the consequences of taking medications incorrectly.
- Ask the patient daily if they have been able to keep their medication schedule. Discuss any challenges.

Lesson 3: Changes to the cyclor settings



Objectives

Patients and care partners should be able to:

- Update the cyclor system settings appropriately if their prescription and/or system changes.

Supplies

- Nurse Guide
- *Training Flipbook or Training Flipbook for VersiHD*
- *NxStage System One User Guide or VersiHD User Guide*
- System Settings List
- Patient quick reference guide or *VersiHD Reference Guide*:
 - *Complete your treatment*

Instructions

Use this tool	Do or explain
 changes to cyler settings	■ Explain that patients may need to change their cyler settings if their prescription changes or their machine is replaced. The cyler's user guide provides directions for changing system settings. ■ Explain that most of the cyler's system settings do not need to be adjusted because they are pre-programmed. These settings are listed in "Manufacturer's default settings" of the user guide. ■ Refer to the System Settings list. There are two different lists-one for the center and one for the patients. Fill in the system settings sheet for the patient while explaining the setting description and purpose. ■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (pages 1-23 and 1-24), walk the patient and care partner through the process of changing system settings. ■ Using the patient's system setting sheet, show the patient how to enter system settings mode and adjust the settings.
 changes to cyler settings	■ Remind the patient and care partner that: • All settings must be set before starting prime. • System settings cannot be changed during treatment. • After changing system settings, they must turn the cyler off to save the settings. ■ Have the patient and care partner practice changing cyler settings. Refer to the user guide and the System Settings List, if necessary.
 changes to cyler display language	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (pages 1-25 and 1-26) Walk the patient through the process of changing the language displayed on the cyler using the System Menu button.
 Complete your treatment System Settings List	Help the patient or care partner complete the Suggested Settings in the System Settings table in the quick reference guide or <i>VersiHD Reference Guide</i>. Have the patient review the System Settings List. ■ For more information, see "About cyler system settings" on page 80.



Additional information

This section contains background information or additional tips for the nurse. This information may be too technical for the patient or care partner. Share this information with the patient and care partner as appropriate.

About cyclor system settings

- Cyclor system settings are parameters which configure the cyclor for operation.
- To keep the cyclor use as simple as possible, NxStage sends the cyclor to the center/patient with system settings preset for typical use with the CAR-170/CAR-172.
- If the patient is receiving a cyclor that was previously used by another patient, make sure that the cyclor has been properly cleaned and decontaminated according to the procedures in the redeployment instruction guide.
- Check the system settings and reset as needed for each patient.
- If you are using the CAR-124, remember to adjust the system settings according to the Instructions for Use.
- To optimize the use of the cyclor for each patient, the center/patient may change certain system settings, such as initial flow rates for blood, therapy, ultrafiltration, dialysate volumes, and weight to remove.
- Always follow the patient's 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 cyclor is powered on.



NOTE: After updating Parameter Number 0 - Cartridge Type, press the top window **ADJUSTMENT ARROWS** to scroll through the remaining system settings. Confirm that the settings are correct before turning the cyclor power off and on to save the desired settings. Failure to do so may result in an incorrect set-up error upon powering on the cyclor. Check your cartridge's instructions for use for the suggested system settings.

- To enable the System One S or VersiHD cyclor for dialysate flow rates greater than 12 L/hr:
 1. Set the system setting parameter #0 (Cartridge Type) to 0.
 2. Set parameter #1 (Maximum Flow Fraction) to either $\geq 200\%$ or per the dosing calculator for the selected therapy option.
- The system setting #38 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 may set a pre-determined UF rate based on the average ultrafiltration rate of the patient and their hemodynamic response to fluid removal.
 - System setting #3 defaults to “0”.
 - This system setting can be set to the patient’s average ultrafiltration rate.
- The steps explaining how to enter treatment information into the cyclor described in the NxSTEPS resources are appropriate for use with the cyclor software version 4.11 or higher.

For System One S cyclor with software version 4.11 or higher or VersiHD cyclor

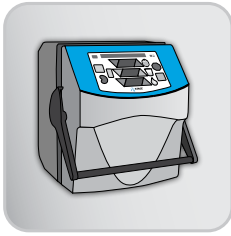
If the patient is using the System One S Cyclor with software version 4.11 or higher or the VersiHD cyclor, another option for entering treatment information into the cyclor is to use system settings #80 and #81 to set a maximum ultrafiltration and dialysate rate for the patient’s treatments.

- System setting #80 (Maximum Ultrafiltration Rate) is adjustable between 0 to 2.40 L/hr. The default is set to 2.40 L/hr.
 - The patient pushes the ultrafiltration up adjustment arrow until a “3” appears in the yellow caution window. This indicates that the maximum flow rate is met.
- Literature suggests that ultrafiltration rates less than 10mL/kg/hr improve mortality. Even a ultrafiltration rate of 8 mL/kg/hr is a risk factor.
- System setting #81 (Maximum Fluid (Dialysate) Rate) is adjustable between 0.1 to 18 L/hr.
 - Adjust the system setting #1 (Flow Fraction) to $\geq 200\%$ so the flow fraction does not constrain the dialysate flow rate.
 - If using the cyclor with dialysate rates greater than 12 L/hr with PureFlow, the SAK type must be a 40X series. Operating the cyclor at higher dialysate flow rates with the SAK-30X series will cause balance chamber alarms.
 - To deliver 18 L/hr when using the System One S or VersiHD cyclor, System Setting #0 (Cartridge Type) must be set to: 0 (for CAR-170 and CAR-172).
 - On the Rate screen, the patient pushes the dialysate up adjustment arrow until a “3” appears in the yellow caution window. This indicates that the maximum flow rate is met.

Supporting concepts for Lesson 3: Changes to the cyclor settings

If a patient needs additional help with the concepts:

- Review system settings in the user guide.
- Have the patient and care partner continue to practice changing cyclor settings. Refer to the user guide and the System Settings List, if necessary.

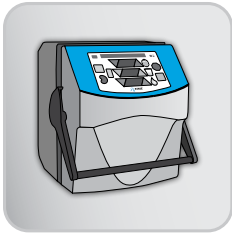


4: Complete your treatment

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I: Use the NxStage cyclor

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Lesson 1: Cyclor and associated components



Objectives

Patients and care partners should be able to:

- Identify associated components and major controls of the cyclor and Nx2me Connected Health® (if used).
- Describe the direction and flow of blood and dialysate through the cartridge.
- Describe the warmer and its ancillaries and explain their function.
- Describe the function of the cyclor base and fluid detection sensor.

Supplies

- Online module
 - *Using the System One Cyclor*
- Nurse Guide
- *Training Flipbook or Training Flipbook for VersiHD*
- Quick reference guide or *VersiHD Reference Guide*
 - *Complete your treatment*
- System One Treatment Checklist Using CAR-170/172
- User guides:
 - *NxStage System One, NxStage System One S, or NxStage VersiHD*
 - *Express Fluid Warmer*
 - *NxStage Cyclor Base and Fluid Detection Sensor*
 - *NxStage Jewel Box and ConNxBox™ Computer Removal and Installation Instructions*
 - *NxStage Nx2me app and connectivity*
- Removable labels (from *User's Quick Reference Guide*)
- Disposables:
 - CAR-170/CAR-172
 - Warmer disposable set
 - Waste line extension
 - Prescribed dialysate bags (Express Fluid)
 - Dialysate SAK
 - One bag of saline
(three bags, if using CAR-124)

- Equipment:
 - Cyclor (with Jewel Box or ConNxBox computer)
 - Express Fluid Warmer
 - Cyclor base and fluid detection sensor
 - iPad with Nx2me app
- Heparin vial
- 2-10 mL luer lock syringe
- 1-20 mL luer lock syringe
- If CAR-170/172 is used:
 - Practice cartridge
 - Cartridge instructions for use
 - Medication (if using CAR-172)
 - Syringe (if using CAR-172)
 - Alcohol swab
- If CAR-124 is used:
 - CAR-124
 - Dialyzer
 - CAR-124 Instructions For Use
 - *how do I use the system one cyclor with the CAR-124?* quick reference guide

Instructions

Use this tool	Do or explain
 Using the System One Cyclers	■ Instruct the patient and care partner to review the <i>Using the System One Cyclers</i> online module for an overview of how the cyclers and its components work together. ■ Explain that they will have the opportunity to review this module before starting their treatment. ■ Explain that this section of the training focuses on equipment components, starting with the cycler. ■ Explain that the cycler pumps the blood, dialysate, and effluent, controls the therapy, and monitors all safety systems.  Note: The 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). ■ Keep in mind the following when using System One S or VersiHD cyclers: • You cannot run dialysate flow rates higher than 12 L/hr when using express fluid bags. • You can use the NxStage PureFlow SL to supply dialysate at flow rates greater than 12 L/hr. • If you are using PureFlow for dialysate flow rates greater than 12 L/hr, you will need to use the SAK-400 series. • Using express bags with flow rates greater than 12 L/hr may result in multiple alarms. Therefore, when patients travel, they will need a secondary prescription for express bags. ■ Higher dialysate flow rate capabilities allow physicians more options for adjusting the patient's prescription.

Use this tool	Do or explain
 Patient's Cyclers and Removable Labels  cyclers	- Using the following resources identify and describe the cycler components listed below as you place the labels on the cycler: - The <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (pages 2-1 through 2-4) - The patient's cycler - The removable labels from the <i>User's Quick Reference Guide</i>  Note: The removable labels are for training purposes only. They are not intended to be actual component labels.  Note: You do not have labels for all of the listed components.
 Patient's Cyclers and Removable Labels  cyclers components and major controls	Cycler components (back view): - Remind the patient and care partner that if they need to call Technical Support they should write down the equipment serial number before calling. Cycler computer - Jewel Box or ConNxBox connections (underside of the computer): Heart Beat (HB) light: Solid or flashing yellow or green indicates the ConNxBox is connected. - Treatments should not be performed without a Jewel Box or ConNxBox attached to the back of the cycler.

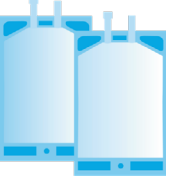
Use this tool	Do or explain
 Patient's Cyclor and Removable Labels  cyclor components and major controls	Cyclor control panel: ■ Explain that when you press the VOLUME TOGGLE the display changes from rate to volume for 10 seconds. If you are using software versions 4.11 and higher, the time is 50 seconds or per system setting #77 (Volume Display Timeout). ■ Explain that the cyclor control panel is used to control and monitor the therapy. • On the System One cyclor, the control panel buttons have a green LED that is lit when they are active. • On the VersiHD cyclor the active buttons are lit, and the inactive buttons are grayed-out. ■ Explain that the colors of the adjustment arrows match the cartridge clamp colors: • The dialysate adjustment arrow and the cartridge dialysate line clamps are green. • The ultrafiltration adjustment arrows and the cartridge waste line clamps are yellow. • The blood flow adjustment arrows and the arterial blood line clamps are red. ■ Point out that the green dialysate bag, yellow trash can, and red blood drop on the user interface are not buttons. ■ Explain the function of the control panel buttons.
 cyclor components and major controls  Patient's Cyclor and Removable Labels	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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 bar on the cyclor. Status bar ■ The status bar has the following three windows: • Green operating • Yellow caution • Red alarm Green operating window: ■ During TREATMENT mode, it displays the scrolling therapy parameters. This indicates a “safe” operating condition when no cautions or alarms are displayed. • During PRIME mode, it displays the time remaining until the mode ends.

Use this tool	Do or explain
	■ Yellow caution window: Displays a caution. Action may be required. ■ Red alarm window: • Displays an alarm. Action is required. • Displays “000” to signify the end of a mode (PRIME, TREATMENT, RINSEBACK).
 Cyclor and Removable Labels	■ Remove all the labels you have placed on the cyclor. ■ Instruct the patient and care partner to place the labels on the appropriate cyclor components and explain the function of the component to each other. Provide assistance as needed.
 Patient Cyclor	■ Explain that you use the same windows on the cyclor to enter both rate and volume information. ■ Explain that the Rate screen is the default (home screen). ■ Show the patient and care partner how to switch to the Volume screen by pressing the VOLUME TOGGLE.
 cyclor components and major controls	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 2-6) identify and describe the cyclor Rate windows listed below. Rate windows: ■ Dialysate rate ■ Ultrafiltration rate ■ Blood flow rate The pump ON indicators for the System One cyclor ■ During TREATMENT mode, a red dot in the lower, right-hand corner of each window of the Rate screen indicates that the pump is running. ■ During RINSEBACK mode, the red dot is visible in the dialysate and blood flow rate windows when the blood pump is on. The pump ON indicators for the VersiHD cyclor ■ During TREATMENT mode, a rotating arrow located on the left side of each window indicates that the pump is running. For more information, see “Pump On Indicators” on page 216 of this Nurse Guide.

Use this tool	Do or explain
 cyclor components and major controls	- Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 2-6), identify and describe the cyclor Volume windows. Volume windows:  Note: You know you are viewing the Volume display when you see “VOL” in the bottom window. - Dialysate volume - Ultrafiltration volume - Explain that the dialysate and ultrafiltration volumes count down on the Volume windows as the treatment progresses. - Treatment is complete when the ultrafiltration and dialysate volumes reach zero.
 Patient Cyclor	- Open the cyclor door and point out the following locations: - Pressure sensors - Air detectors - Dialysate, effluent, ultrafiltration, and blood pumps - Depressed location for the cartridge fluid balance chambers - Blood leak detector and mirror
 cyclor components and major controls	- Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 2-7), explain the following: - Cartridge blood pathway - Cartridge fluid pathway - Explain that the dialysate pump and the effluent pump move as a single unit 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 ensure that the amounts of dialysate delivered and effluent (spent dialysate or waste) removed are equal. - The cyclor 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 extra fluid at the programmed rate. - Explain that some cartridges have a SecureClip®, which secures the connection between the venous blood line and the venous access line to minimize the risk of accidental disconnection and blood loss.

Use this tool	Do or explain
 cyclers components and major controls	Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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  cyclers components and major controls	- Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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 listed components. - 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 <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> 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 typical cartridges used in the home are the following: - CAR-170 - CAR-172 (with needleless injection ports and a heparin infusion line). - NxStage also offers the CAR-124, which does not have a pre-attached dialyzer.
 cyclers components and major controls	- Use the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 2-11) to point out that the CAR-172 is similar to the CAR-170, except for the following differences: - The CAR-172 has venous and saline needleless injection ports to administer medications. - The CAR-172 also has a heparin infusion line for longer treatment times, such as in nocturnal treatment. These longer treatment times may require maintenance heparin dosing, and using a syringe infusion pump.
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.

Use this tool	Do or explain
Patient's CAR-124, Dialyzer, and CAR-124 IFU	■ If the patient is using the CAR-124, review the cartridge components using the patient's cartridge, dialyzer, and the CAR-124 instructions for use.
 Patient's Cyclor Base and Fluid Detection Sensor  cyclor components and major controls	■ If the patient is using the cyclor base and fluid detection sensor: • Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 2-12) and the patient's cyclor base and fluid detection sensor, explain the components of the cyclor base and fluid detection sensor and the function of each. ■ Explain that the cyclor base and fluid detection sensor is designed to alert the patient of potential cartridge leaks. When fluid comes in contact with the fluid detection sensor's stainless steel bars, an alert sounds. ■ Describe how the cyclor base fits under the Express Fluid Warmer bottom mount (if used). ■ Explain that the cyclor base and fluid detection sensor may not detect dialyzer leaks 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 that it is working properly. ■ Remember that the extended cyclor base and fluid detection sensor are required for nocturnal and solo treatments.
 Patient's Express Fluid Warmer  cyclor components and major controls	■ If the patient is using bagged dialysate and the Express Fluid Warmer, explain that this warmer and the warmer disposable set safely warm dialysate to the programmed comfort setting, monitor the dialysate output temperature, monitor the Express Fluid Warmer plate temperature, and trap air in the warmed dialysate bag. • It takes 30 to 60 minutes for the warmer to pre-heat the dialysate to a comfortable temperature. Because the room temperature and the initial temperature of the dialysate vary, the pre-heating time varies as well. ■ Using the <i>Training Flipbook</i> (pages 2-15 and 2-16) or the <i>Training Flipbook for VersiHD</i> (pages 2-13 and 2-14) and the patient's equipment, identify and describe the warmer's components and warmer disposable set.

Use this 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 confirm that the dialysate the patient uses matches their prescription. ■ Locate and explain how to verify: • SAK, bag, or box catalogue number • Correct composition (potassium, lactate, chloride, calcium) • Lot number • Expiration date

Supporting concepts for Lesson 1: Cyclor and associated components

If a patient or care partner needs additional help with the cyclor and associated components:

- Review the pages from the *Training Flipbook* or *Training Flipbook for VersiHD*.
- Instruct the patient or care partner to relabel the equipment components.

Lesson 2: Prepare for treatment

Objectives

Patients and care partners should be able to:

- Safely install and set up the cyclor and start PRIME.
- Safely install and set up the warmer and the warmer disposable set (if used).
- Safely set up and use the Nx2me app (if used).
- Acknowledge and respond to alarm tests.
- Remove air from the cartridge.
- Make non-patient cartridge connections.
- Correctly connect the waste line extension.

Supplies

- Online module
 - *Using the System One Cyclor*
- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- *Complete your treatment* quick reference guide or *VersiHD Reference Guide*
- System One Treatment Checklist Using CAR-170/172
- User guides:
 - *NxStage System One*
 - *NxStage System One S*
 - *VersiHD*
 - *Express Fluid Warmer*
 - *NxStage Cyclor Base and Fluid Detection Sensor*
 - *NxStage Jewel Box and ConNxBox Computer Removal and Installation Instructions*
 - *NxStage Nx2me app (if used)*
- Dialysis center's patient flowsheet

Instructions

Install the equipment

Use this tool	Do or explain
 Patient's Equipment and Related User Guides:  NxStage Jewel Box and ConNxBox Computer Express Fluid Warmer NxStage System One NxStage System One Cyclor Base and Fluid Detection Sensor	■ Tell the patient and care partner that they will 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: • <i>NxStage Jewel Box and ConNxBox Computer Removal and Installation Instructions</i> • <i>Express Fluid Warmer</i> section: “Installing your NxStage Express Fluid Warmer” • <i>NxStage System One</i> or <i>VersiHD</i> chapter: “Preparing for Use” • Remind the patient and care partner that it takes two people to lift the cyclor, and that the cyclor door handle is used for opening or closing, not for lifting. If using the cyclor base: Read through the following instructions in <i>NxStage System One Cyclor Base and Fluid Detection Sensor User Guide</i>: ■ Unpacking the Fluid Detection Sensor and Base Accessory Kit ■ Installing the base and fluid detection sensor.  Note: Make sure that the ConNxBox and Express fluid warmer are both connected to the cyclor before placing the cyclor in the cyclor base. ■ Conduct and monitor the initial self-test. For information on the PureFlow SL and LINX®, see “II: Create and maintain PureFlow” on page 119 of this Nurse Guide.

Use this tool	Do or explain
 Patient's Cyclor and cyclor's user guide: System Settings  Complete your treatment	■ Using the cyclor's user guide, the cyclor, and the patient's cyclor system settings, have the patient verify that the system settings displayed on the cyclor match the default system values and their prescription. • The process for adjusting the cyclor system settings is covered in the <i>Interpret Your Prescription</i> module. However, it is important at this time to ensure the patient's cyclor has the correct settings. • Remind the patient and care partner to verify or change (if required) the cyclor system settings if a new cyclor is received (for example, if the cyclor has been sent to NxStage for preventive maintenance or repair). ■ If the patient is using CAR-124, note and change the cyclor system settings so they are consistent with the Instructions For Use.
 user guides: NxStage System One or VersiHD Express Fluid Warmer NxStage Cyclor Base and Fluid Detection Sensor	Understanding the user guides ■ 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 following chapters in each user guide: • <i>NxStage System One</i> or <i>VersiHD</i> chapter: "Hemodialysis" • <i>Express Fluid Warmer</i> section: "Using Your Express Fluid Warmer" • <i>NxStage System One Cyclor Base and Fluid Detection Sensor</i> chapter: "Using the Cyclor Base and Fluid Detection Sensor with the NxStage System One"

Use this tool	Do or explain
	Using System One S or VersiHD cycler with flow rates greater than 12 L/hr ■ If your patient plans to use the NxStage System One S cycler or VersiHD with dialysate flow rates greater than 12 L/hr, confirm the following: • System One S cycler part number is NX1000-3 and software (SW) version 4.11 or higher or VersiHD part number is NX1000-16. • System setting #1 (Flow Fraction) is set to either $\geq 200\%$ or per the Dosing Calculator for the selected therapy option. • 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. ■ This Nurse Guide gives instructions on how to use CAR-170. ■ For more information on PureFlow see the <i>Create and Maintain PureFlow</i> chapter and the online module. ■ For more information on CAR-124, see the CAR-124 Instructions for Use and <i>how do I use the system one cycler with the CAR-124?</i> quick reference guide.  Note: The CAR-124-C has not been validated for use with dialysate flow rates greater than 12 L/hr. ■ The CAR-172 is the same as the CAR-170, except for the additional saline and venous needleless injection ports and the heparin infusion line. For more information, refer to the following IFUs. • CAR-170 Instructions for Use • CAR-172 Instructions for Use

Use this tool	Do or explain
 Using the System One Cyclor	■ Instruct the patient and care partner to watch the <i>Using the System One Cyclor</i> video. • Answer any questions the patient and care partner have about the video. • Remind the patient and care partner that they are not expected to memorize the steps. Once they are at home, they can reference printed resources, including the user guides and quick reference guides. They will also receive approximately three to four weeks of supervised practice during training. • Remind the patient that they will be given numerous opportunities to practice setting up the equipment and using it before going home. • Remind the patient and care partner that they can watch the video at any time during training and also from home.

Pre-treatment documentation and important reminders

Use this tool	Do or explain
 Dialysis Center Specific Patient Flowsheet	■ Explain how to complete and document the pre-treatment assessment using the following tools: • Flowsheet • Nx2me Connected Health Pre-Treatment section (if used) • The quick reference guide ■ 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 in the margins in the “Preparing for Treatment” section of the quick reference guide or <i>VersiHD Reference Guide</i>.
 Complete your treatment	

Prepare for treatment

Use this tool	Do or explain
 Patient's Equipment: Cyclor, Computer, Warmer, Cyclor Base  Complete your treatment	Using the patient's equipment and the quick reference guide or <i>VersiHD Reference Guide</i>, explain and demonstrate how to set up the equipment for treatment. ■ Remind the patient and care partner that a they must not use a disposable if any of any of the following conditions are true: • The disposable is contaminated. • It is past expiration date. • It is missing components. ■ 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 do not complete successfully, do not use the equipment; call NxStage Technical Support. • To customize use of this quick reference guide, cross out information pertaining to any equipment not used.

Use this tool	Do or explain
 Patient's Equipment: Cyclor, Computer, Warmer, Cyclor Base  Complete your treatment	Describe the cyclor self-tests: ■ When priming is complete the following windows display all “8’s”: • The Status bar • Rate/Volume window ■ After you press the MUTE button, you see the display test and hear an alarm. The following numbers and letters appear: • In the Status window: 1234, AbCd, and EFgH. • In the three Rate/Volume windows: 987, 654, and 321. Describe the Express Fluid Warmer self-tests: ■ When the interconnect power cord is connected to both the cyclor (cyclor is connected to power) and the Express Fluid Warmer the following happens: • The lights on the front of the Express Fluid Warmer flash red, yellow, and then green. • The Standby and hot surface indicator lights turn on and off. • An alarm sounds and then all the lights go out, except for the Standby light. ■ Always unplug the warmer from the cyclor after each treatment. The self-test will not occur if it remains plugged in. Loading the cartridge ■ Demonstrate how to load the cartridge into the cyclor to ensure that the safety and control systems function properly. • Note the cartridge “smiley face” faces the front of the cyclor 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.” Express Fluid Warmer Setup ■ Explain that the Express Fluid Warmer IV pole holds 21 liters of dialysate and that a 5-liter bag of dialysate sits directly on the warmer plate. • Use additional IV poles if more fluid is required. • The dialysate bag is placed on the Express Fluid Warmer before priming the cartridge because it takes 30 to 60 minutes for the warmer to pre-heat the dialysate to a comfortable temperature.

Use this tool	Do or explain
 Patient's Equipment: Cycler, Computer, Warmer, Cyclor Base  Complete your treatment	■ Have the patient and care partner practice setting up for TREATMENT. Provide assistance as needed.

Supporting concepts for Lesson 2: Prepare for treatment

If a patient or care partner needs additional help with preparing for treatment:

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

Lesson 3: The treatment process

Objectives

Patients and care partners should be able to:

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

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- *Complete your treatment* quick reference guide or *VersiHD Reference Guide*
- System One Treatment Checklist Using CAR-170/172
- User guides:
 - *NxStage System One* or *VersiHD*
 - *Express Fluid Warmer*
 - *NxStage Cyclor 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*)
- Dialysis center's patient flowsheet
- Equipment:
 - Cyclor (with Jewel Box or ConNxBox computer)
 - Express Fluid Warmer
 - Cyclor base and fluid detection sensor
 - Nx2me app (if used)

Instructions

Treatment documentation and important reminders

Use this tool	Do or explain
 Dialysis Center's Patient Flowsheet	- Using your dialysis center's patient flowsheet and Nx2me Connected Health (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

Use this tool	Do or explain
 Patient's Equipment: Cyclor, Computer, Warmer, Cyclor Base  Complete your treatment	- Using the patient's equipment and the quick reference guide or <i>VersiHD Reference Guide</i>, demonstrate how to perform and end a treatment. Instruct the patient and care partner to follow along in the quick reference guide. - Before your demonstration, make sure that the patient and care partner have successfully completed the online module <i>Entering Treatment Parameters</i> and know how to enter the patient's treatment settings.  Note: If using the System One or System One S cyclor, make sure to press ADJUSTMENT ARROWS firmly when changing the rate or the volume.

Use this tool	Do or explain
 Patient's Equipment: Cyclor, Computer, Warmer, Cyclor Base  Complete your treatment	■ Using the “Your treatment prescription” table in the quick reference guide, or the “Treatment overview” in the <i>VersiHD Reference Guide</i>, fill in the patient’s treatment information and the patient’s maximum ultrafiltration volume and rate. ■ Instruct the patient and care partner to call the dialysis center before treatment if the determined volume and/or rate exceeds these numbers. ■ Using the “Your treatment prescription” table in the quick reference guide fill in the patient’s heparin dose and the arterial and venous pressure ranges. If you are using VersiHD, enter this information in the “Treatment Overview” in the <i>VersiHD Reference Guide</i>. • Typical arterial pressures are between -50 and -200 mmHg. Remind the patient that the cyclor displays the arterial access pressure without the negative sign; therefore, when the arterial pressure decreases (becomes more negative), the arterial pressure displayed on the cyclor increases, indicating a more restricted blood flow. • Typical venous pressures are between 20–300 mmHg • Venous pressure is a positive pressure and reflects the pressure exerted when blood is being pushed into the vascular system. ■ Verify that the initial dialysate volume displayed on the cyclor control panel is correct. • The dialysate volume displayed is determined by cyclor system setting #5, which should have been adjusted prior to setup. • The cyclor system setting #5 should be changed if the patient’s prescription changes.

Use this tool	Do or explain
	■ Explain that once treatment has been initiated, certain informational cautions may appear in the yellow caution window. • A Caution 7: Alarms Overridden Caution (Yellow Caution) followed by a Caution 8: Pressure Limits Not Locked (Yellow Caution) is shown as the cyclor system stabilizes following a change in commanded flow rates. • A Caution 2: Fluid Balance System Check Underway (Yellow Caution) occurs when the cyclor 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. • Remember that the starting blood flow rate is slower than your prescription. You should program the start-up blood flow at 200 mL/min (system setting #4). • If the arterial access cannot deliver the programmed blood flow rate, the arterial pressure may decrease (a “larger” negative 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 after the patient lines are connected to the access, you can place sterile saline-filled syringes on the red and blue ports of the priming spike. This does the following: • Protects the sterility of the priming spike ports. • Allows for a saline flush, if required for a temporary disconnection.  Note: Follow CMS guidelines for saline syringes in the treatment area and whether or not this will differ when the patient goes home.

Control and monitor treatment

Use this tool	Do or explain
 Patient's Equipment: Cyclor, Computer, Warmer, Cyclor Base  Complete your treatment	■ Explain that the steps outlined in the “Monitoring the treatment” section of the quick reference guide or <i>VersiHD Reference Guide</i> can facilitate safe treatment and help prevent unnecessary alarms and problems.
 Patient's Equipment: Cyclor, Computer, Warmer, Cyclor Base  Complete your treatment	■ Explain that TREATMENT mode 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 mode has ended: • The yellow caution window displays 000. • The dialysate and ultrafiltration windows display 0.00. • The blood pump continues to run. ■ Explain that if required, the patient can end a treatment before the volume targets are met by pressing and holding STOP for two seconds. • Make sure the patient and care partner understand that it is not recommended to end a treatment early. However, this procedure, when necessary, assures a quick transition to rinseback without requiring the use of emergency rinseback.

End treatment

Use this tool	Do or explain
(continued)  Patient's Equipment: Cyclor, Computer, Warmer, Cyclor Base  Complete your treatment	(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 cyclor system settings #12 and #13. • Evaluate the patient lines after RINSEBACK mode is complete. They should be clear of blood or slightly pink. If they are not, press the ADD FLUID key to repeat a complete or partial rinseback. • Modifying the patient's cyclor 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 counts up, as this amount is extra fluid given to the patient.
 System One Treatment Checklist using CAR-170/172	■ Review <i>System One Treatment Checklist Using CAR-170/172</i> with the patient and care partner. Inform them that this tool is intended to help them remember the major steps when using the cyclor during PRIME, TREATMENT, and RINSEBACK. • Explain that, to use this tool effectively, they should check off each completed step. 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 cyclor to determine if this checklist is appropriate for use by the patient.

Post-treatment documentation and important reminders

Use this tool	Do or explain
 Patient's Equipment: Cycler, Computer, Warmer, Cyclor Base	If the patient is not using the Nx2me app: - After RINSEBACK mode ends, have the patient press the VOLUME TOGGLE and record the following treatment information on the dialysis center's patient flowsheet: - Volume of dialysate used - Ultrafiltration volume - Liters of blood processed - Total treatment time - The above values disappear when the cycler is turned off. - Remind the patient and care partner that if they are using PureFlow SL, they need to stop the cycler before pausing PureFlow SL.
 Dialysis Center Flowsheet	Using your dialysis center's flowsheet and Nx2me app (if used), explain what to record in the post-treatment information and assessment, and how to record it.
 Complete your treatment	- Using the "Reviewing the treatment summary" section of the quick reference guide or the <i>VersiHD Reference Guide</i>, write in any documentation guidelines the patient should follow. - Tell the patient and care partner that it is important to call the dialysis center after treatment (for possible therapy or medication adjustments) if any of the following abnormal signs, symptoms, or conditions exist during or after treatment: - 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 in the quick reference guide.

Dispose of used supplies

Use this tool	Do or explain
 Complete your treatment	Using the space provided under the “Disposal guidelines” in the the quick reference guide or <i>VersiHD Reference Guide</i>, instruct the patient or care partner to write any dialysis center-specific and regional guidelines for disposing of used disposables and supplies.
 Patient's Equipment: Cyclor, Computer, Warmer, Cyclor Base  Complete your treatment	During subsequent treatments, have the patient and care partner practice performing and ending a treatment. Monitor and provide assistance as required.

Supporting concepts for Lesson 3: The treatment process

If a patient or care partner needs additional help with the treatment process concepts:

- 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 Cyclor*.

Lesson 4: Treatment wrap-up

Objectives

Patients and care partners should be able to clean and disinfect the equipment.

Supplies

- Cleaning and disinfecting supplies:
 - Gloves
 - Soft dry brush
 - Mild detergent (such as a dishwashing liquid)
 - Paper towels
 - Bleach solution or disposable bleach wipes that are recommended by the center
 - Low-lint cloths
 - > 70% Isopropyl alcohol (if using the Nx2me app)
 - Patient's equipment
 - Complete your treatment quick reference guide or *VersiHD Reference Guide*

Instructions

Clean and disinfect equipment

Use this tool	Do or explain										
 Patient's Equipment  Complete your treatment	- Using the patient's equipment and the quick reference guide, demonstrate and explain how to clean and disinfect the equipment. - Use a soft cloth and mild detergent to clean all equipment exterior surfaces. - Instruct the patient and care partner that if equipment is contaminated with blood and/or if pathogenic microorganisms are suspected (for example, a family member has an infectious disease), disinfect with either a bleach solution prepared according to the table below or the amount of bleach recommended in the manufacturer's instructions for the specific pathogen. If you are using a bleach solution prepared according to the table below, allow the solution to remain in contact with the surface for 10 minutes. <table border="1"> <thead> <tr> <th>Sodium hypochlorite concentration</th><th>Water-to-bleach solution</th></tr> </thead> <tbody> <tr> <td>5.0% - 5.9%</td><td>Add 16 oz water and 2 oz household bleach</td></tr> <tr> <td>6.0% - 6.9%</td><td>Add 20 oz water and 2 oz household bleach</td></tr> <tr> <td>7.0% - 7.9%</td><td>Add 24 oz water and 2 oz household bleach</td></tr> <tr> <td>8.0% - 8.9%</td><td>Add 28 oz water and 2 oz household bleach</td></tr> </tbody> </table>  Note: Most common household bleaches have a concentration of 5.25% - 6.15% sodium hypochlorite. Refer to the product label for the actual strength of the product. - If blood or microorganisms are suspected, use wipes with a concentration of 0.525% - 0.615% household bleach if available.	Sodium hypochlorite concentration	Water-to-bleach solution	5.0% - 5.9%	Add 16 oz water and 2 oz household bleach	6.0% - 6.9%	Add 20 oz water and 2 oz household bleach	7.0% - 7.9%	Add 24 oz water and 2 oz household bleach	8.0% - 8.9%	Add 28 oz water and 2 oz household bleach
Sodium hypochlorite concentration	Water-to-bleach solution										
5.0% - 5.9%	Add 16 oz water and 2 oz household bleach										
6.0% - 6.9%	Add 20 oz water and 2 oz household bleach										
7.0% - 7.9%	Add 24 oz water and 2 oz household bleach										
8.0% - 8.9%	Add 28 oz water and 2 oz household bleach										

Use this tool	Do or explain
	■ If the patient is using the Nx2me app: • Disinfect the iPad by wiping the exterior surface with 70% isopropyl alcohol twice and allowing it to air dry. • Disinfect the cover (if used), following the manufacturer's disinfection instructions. • Dispose of non-reusable covers. ■ Monitor the patient and care partner as they clean and disinfect equipment after subsequent treatments.
 Patient's Equipment  Complete your treatment	■ Using the patient's cyclor, demonstrate how to clean the cyclor blood leak detector. Tell the patient and care partner to follow along using the quick reference guide or <i>VersiHD Reference Guide</i>. ■ 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 concepts for Lesson 4: Treatment wrap-up

If a patient or care partner needs additional help with treatment wrap-up concepts:

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

Lesson 5: Common procedures

Objectives

Patients and care partners should be able to:

- Reprime a cartridge.
- Flush the priming fluid from the cartridge before treatment manual fluid bolus
- Treat hypotension
- Administer medications using the CAR-172
- Emergency rinseback
- Check Chloramines
- Obtain a blood sample

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Quick reference guide or *VersiHD Reference Guide*:
 - *Complete your treatment*
 - *Keep calm and carry on*
- User guides:
 - *NxStage System One or VersiHD*
 - *PureFlow SL*
- Blood sampling supplies
 - BD Vacutainer blood collection tubes
 - Blood collection tubes
 - Labels
- Practice CAR-170 or CAR-172
- CAR-170 or CAR-172 *Instructions for Use* (IFU)

Instructions

Use this tool	Do or explain
 NxStage System One User Guide or VersiHD User Guide	■ Instruct the patient and care partner to read the section in the user guide called “Common Procedures.” ■ During treatment, have the patient use the <i>Complete your treatment</i> quick reference guide or <i>VersiHD Reference Guide</i> to perform a manual fluid bolus. Manual Fluid Bolus ■ Explain to the patient that a manual fluid bolus can be performed for multiple purposes: • When evaluating the dialyzer for clotting. • For treating hypotension. ■ Explain that treating hypotension (low blood pressure) can be accomplished by several methods: • Delivering a manual fluid bolus. • Stopping the ultrafiltration. • Both a manual fluid bolus and stopping or adjusting the ultrafiltration rate and/or volume. ■ Hypotension may occur during treatment if the ultrafiltration rate or volume are too high. ■ Discuss with the patient the amount of normal saline that they should be using for a manual fluid bolus and fill in the quick reference guide <i>Keep calm and carry on</i> on the correct page.
 Complete your treatment  Keep calm and carry on	
 Complete your treatment	Emergency Rinseback ■ Have the patient read the emergency rinseback procedure in the user guide section on common procedures and the quick reference guide <i>Complete your treatment</i> or the <i>VersiHD Reference Guide</i>. ■ Have the patient and care partner practice the emergency rinseback procedure.

Use this tool	Do or explain
 PureFlow SL User Guide  Complete your treatment	Testing for Chloramines - Have the patient turn to the chapter of the user guide called “Using Your PureFlow SL.” - Have them read the procedure for testing for chloramines. - Explain that the patient 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, test within two hours of making the batch using either 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 or <i>VersiHD Reference Guide</i>, have the patient test for chloramines/chlorine. Provide guidance as needed.  Note: The test kit should determine the chloramines/chlorine concentration to less than or equal to 0.1 ppm.
 Complete your treatment	- Have the patient and care partner review the procedure for repriming a cartridge, which may be used as directed for unresolved alarms in PRIME mode. - Instruct the patient and care partner to practice demonstrating this procedure prior to TREATMENT mode.
 CAR-172 Cartridge and IFU	- If the patient is giving medications at home using the CAR-172 needleless injection port, instruct the patient to review the CAR-172 <i>Instructions for Use</i> (IFU). - Have the patient practice giving medication using a practice CAR-172, medication, and syringe and following the IFU steps. - During treatment, monitor the patient as they give their medication via the needleless injection port.

Use this tool	Do or explain
 NxStage System One User Guide or VersiHD User Guide	Flushing the priming fluid - Using the cyclor's user guide, instruct the patient and care partner to read the procedures for flushing the priming fluid out of the cartridge (if applicable to the patient). - Explain that flushing the prime fluid out of the cartridge is used only for patients with a known or suspected sensitivity to the NxStage cartridge (dialyzer).
 Complete your treatment	Drawing blood samples - On the blank lines provided, complete the center-specific instructions for labeling, spinning, storing, and transporting a blood sample. - 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.

Lesson 6: Connected health training

- Connected health is made up of the following applications:
 - The Nx2me app
 - The Clinician Portal
- Train the patient how to use the iPad, the Nx2me app, and setting up connectivity at home, following the patient training outline and presentations provided on the Nx2me Launchpad.



II: Create and maintain PureFlow™

Chapter overview

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Lesson 1: PureFlow SL Components

Objectives

Patients and care partners should be able to:

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

Supplies

- Online module
 - *Using the PureFlow SL*
- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- PureFlow SL and Removable Training Labels
- Control Unit and Removable Training Labels
- SAK-30X or SAK-40X series

Instructions

Use this tool	Do or explain
 Using PureFlow SL	■ Have the patient and care partner watch the video, <i>Using PureFlow SL</i>. ■ Remind them that this video is available online and can be viewed at any time.
 PureFlow SL	■ Explain that the PureFlow SL: • Is an accessory to the cyclor that prepares dialysate for use during hemodialysis. • Uses drinking water and pre-packaged concentrate to prepare dialysate. The drinking water must meet the PureFlow SL source water purity requirements. • Produces ultra-pure water and mixes this water with the pre-packaged sterile filtered dialysate concentrate in appropriate amounts. • Tests, warms, and stores the prepared dialysate. • Delivers the dialysate to the cyclor when needed for therapy.

Use this tool



Using PureFlow SL

PureFlow SL and
Removable Training
Labels

Do or explain

- Show the “Overview” section of the video, *Using PureFlow SL*.

Using the training labels

Follow the instructions below when describing the PureFlow SL components and disposables.

1. Gather the labels and the equipment or disposables you will be placing labels on.
2. Identify and describe the components or disposables.
3. Place the labels on the components or disposables.
4. Remove the labels and ask the patient to place them back onto the components or disposables.
5. Explain the function of the components or disposables.
6. Provide assistance, if needed.
7. Remove labels after the training session.



Note: you do not have labels for all of the components listed.



Note: The removable labels are for training purposes only. They are not intended to be actual component labels.

Use this tool	Do or explain
 create and maintain pureflow  PureFlow SL and Removable Training Labels	Components of the PureFlow SL - Open the <i>Training Flipbook</i> to pages 2-17 and 2-18 (or the <i>Training Flipbook for VersiHD</i> to pages 2-15 and 2-16) and describe the components and disposables. - Follow the instructions in “Using the training labels” on page 121 of this Nurse Guide. Control panel components - Open the <i>Training Flipbook</i> to page 2-19 (or the <i>Training Flipbook for VersiHD</i> to pages 2-17) and describe the control panel components. - Follow the instructions in “Using the training labels” on page 121 of this Nurse Guide. - Explain the control panel’s 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 SAK-30X or SAK-40X	SAK lines - Open the <i>Training Flipbook</i> to pages 2-20 and 2-21 (or the <i>Training Flipbook for VersiHD</i> to pages 2-18 and 2-19) and describe the SAK lines. - Follow the instructions in “Using the training labels” on page 121 of this Nurse Guide. - Explain that there are two different series of SAKs available: - The SAK-30x series allows for dialysate flow rates of up to 12 L/hr. - The SAK-40x series allows for dialysate flow rates up to 18 L/hr. - Explain where to find the SAK type, expiration date, and lot number. - Only control units with software version 1.15 or higher can be used with the SAK-40X series.

Use this tool	Do or explain
 control unit rear connectors  Control Unit and Removable Training Labels	Control unit connectors ■ Open the <i>Training Flipbook</i> to page 2-22 (or the <i>Training Flipbook for VersiHD</i> to page 2-20) and describe the control unit connectors. ■ Follow the instructions in “Using the training labels” on page 121 of this Nurse Guide.
 pre-treatment unit	Pre-treatment unit and source water adapters ■ Open the <i>Training Flipbook</i> to page 2-23 (or the <i>Training Flipbook for VersiHD</i> to page 2-21) and describe the components of the pre-treatment unit and source water adapters. ■ Follow the instructions in “Using the training labels” on page 121 of this Nurse Guide.

Linx components

Use this tool	Do or explain
 LINX components	■ Using the <i>Training Flipbook</i> (page 2-24) or the <i>Training Flipbook for VersiHD</i> (page 2-22) 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. It reduces the total dissolved solids (TDS) 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, the LINX Water Pre-treatment System is sent to the patient (if specified). • Using the LINX system to reduce high levels of TDS in source water extends PAK life.
 LINX components	■ Using the <i>Training Flipbook</i> (page 2-25) <i>Training Flipbook for VersiHD</i> (page 2-23), 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 meters (20 feet) • Blue LINX-treated water line 12.2 meters (40 feet) • Power cord 1.8 meters (6 feet) • Black LINX system drain line 6.1 meters (20 feet) • LINX DI cells replacement kit ■ Have the patient review the <i>LINX Water Pre-Treatment System User Guide</i> "Warning and Precautions." Discuss any questions or concerns.

Supporting concepts for Lesson 1: PureFlow SL components

If a patient or care partner needs additional help with PureFlow SL or LINX components concepts:

- 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.

Lesson 2: The PureFlow SL process

Objectives

Patients and care partners should be able to:

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

Supplies

- Online module
 - *Using the PureFlow SL*
- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- *PureFlow SL User Guide*
- *LINX Water Pre-Treatment User Guide*
- *LINX Water Pre-Treatment Installation and Use Video*
- PureFlow SL
- *Complete your treatment* quick reference guide or VersiHD Reference Guide
- Purification pack (PAK)
- SAK-30X or SAK-40X

Instructions

Assembling the PureFlow SL

Use this tool	Do or explain
 Using PureFlow SL	■ Show the “Assembly” section of the video, using the PureFlow SL.
 PureFlow SL User Guide and LINX Water Pre-Treatment System  LINX Water Pre-Treatment Installation and Use Video	■ Explain that the <i>PureFlow SL User Guide</i> is the complete reference for the PureFlow SL and includes all warnings and precautions. ■ Have the patient read the “Installation” chapter in the <i>PureFlow SL User Guide</i>. ■ If using LINX, have the patient read the following sections in the <i>LINX Water Pre-Treatment User Guide</i>: • “Preparing to Install LINX” • “Installing LINX” • “Using LINX” ■ Have the patient view the LINX Installation video. ■ Discuss any questions or concerns regarding LINX home installation.

Use this tool	Do or explain
 PureFlow SL  Installing the PureFlow SL  Complete your treatment	■ Using the <i>Training Flipbook</i> (page 2-26) or <i>Training Flipbook for VersiHD</i> (page 2-24), show the patient what the control unit rear connectors look like when properly installed. ■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient install the control unit, pre-treatment unit, and drain line. Provide guidance as needed. • If LINX is used, discuss how installing the LINX Water Pre-Treatment System changes the connections to the source water and PureFlow SL. • Explain to the patient that, after the LINX is installed and connected to a power source, the LINX system automatically operates when the PureFlow SL needs to draw water.
 PureFlow SL User Guide	■ Have the patient read the section, “Priming a New Purification PAK,” in the <i>PureFlow SL User Guide</i>.
 Using PureFlow SL	■ Show the “Installing and Priming the PAK” section of the video, <i>Using PureFlow SL</i>.
 Complete your treatment	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient prime a PAK. Provide guidance as needed. ■ Explain the following: • An alarm occurs if the water is not on. • Loose connections cause leaks. ■ Before moving on, make sure the patient reads and understands all the steps and additional information in the “Priming a PAK” section of the quick reference guide.

Nurse Guide

Make a batch

Use this tool	Do or explain
 PureFlow SL User Guide	Have the patient read the “Making a Batch of Dialysate” chapter, in the <i>PureFlow SL User Guide</i>.
 Using PureFlow SL	Show the “Making a Batch of Dialysate,” section of the video <i>Using PureFlow SL</i>.
 Complete your treatment	- Using the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient load the SAK and make a batch of dialysate. Provide guidance as needed. - If the patient is using dialysate flow rates greater than 12 L/hr, ensure the equipment meets the following requirements: - PureFlow SL control unit has software 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.

Test for Chloramines/Chlorine

Use this tool	Do or explain
 PureFlow SL User Guide	- Have the patient turn to the chapter of the user guide called “Using Your PureFlow SL” - Have them read the procedure for testing for chloramines.

Use this tool	Do or explain
 Complete your treatment	■ Explain that the patient must test for chloramines/chlorine and record the results of that test before using each <i>new batch</i> of dialysate. ■ Review the chloramines/chlorine testing instructions for the test kit your dialysis center uses. ■ For best results, NxStage recommends 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 or <i>VersiHD Reference Guide</i>, have the patient test for chloramines/chlorine. Provide guidance as needed.  Note: The test kit should determine the chloramines/chlorine concentration to less than or equal to 0.1 ppm.

Use a batch

Use this tool	Do or explain
 PureFlow SL User Guide	■ Have the patient turn to the chapter of the user guide called “Using Your PureFlow SL” • Have them read the procedure for Using a Batch with your NxStage System One Cyclor.
 Using PureFlow SL	■ Show the “Use Batch” section of the video <i>Using PureFlow SL</i>.

Use this tool	Do or explain
 Complete your treatment	- Using the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient use the batch of dialysate for their treatment. Provide guidance as needed. Explain the following: - Make sure to use the batch before the batch expiration time. - Batch expiration time is tracked by the PureFlow SL control unit. - The tracked time begins at the start of mixing the batch. - The total batch life is 96 hours. - Make sure that the green clamps on both the SAK and the cyclor cartridge are open during treatment to allow dialysate flow. - The control unit displays “Batch in Use” during treatment, with a solid green light on the control unit display. - Press GO on the control unit <i>before</i> pressing TREATMENT on the cyclor to allow dialysate flow and avoid alarms. - Always stop the cyclor <i>before</i> pausing the PureFlow SL. - Once you close a non-reopening clamp on the SAK, the line the clamp is on can no longer be used. - Do not turn off the PureFlow SL between treatments. This allows the dialysate to cool and it takes several hours for the dialysate to reheat. - Make sure that the black drain line is in a drain before starting treatment.

Drain, flush, and unload the SAK

Use this tool	Do or explain
 PureFlow SL User Guide	Have the patient read the pages on draining and unloading the SAK in Chapter 5, “Use Your PureFlow SL,” of the <i>PureFlow SL User Guide</i>.
 Using PureFlow SL	Show the “Drain Batch and Unload SAK” section of the video, <i>Using PureFlow SL</i>.

Use this tool	Do or explain
 Complete your treatment	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient 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.

Supporting concepts for Lesson 2: PureFlow SL process

If a patient or care partner needs additional help with any PureFlow SL process concepts:

- Instruct the patient or care partner to re-watch 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 has not mastered and allow the patient to perform the procedures while you provide guidance and additional information as needed.

Lesson 3: Maintenance

Objectives

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 a conductivity preventive maintenance test.

Supplies

- Online module
 - *Using the PureFlow SL*
- Nurse Guide
- *Training Flipbook or Training Flipbook for VersiHD*
- *PureFlow SL User Guide*
- PureFlow SL
- *Complete your treatment* quick reference guide or *VersiHD Reference Guide*
- Drain Line Cleaning Kit

Instructions

General cleaning

Use this tool	Do or explain
 Complete your treatment	Using the quick reference guide or <i>VersiHD Reference Guide</i>, review the procedure for cleaning and disinfecting exterior surfaces of the PureFlow SL after each treatment.

Clean or replace the filters

Use this tool	Do or explain
 PureFlow SL User Guide	- Have the patient and care partner read the sections listed below in the 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	- Explain that the air filter must be cleaned or replaced every three months. - Using the instructions in the user guide, have the patient or care partner clean the air filter. Provide guidance as needed.
 PureFlow SL User Guide	- Explain that the sediment filter must be replaced annually or more frequently as needed. - Using the instructions in the user guide, have the patient or care partner practice changing the sediment filter. Provide guidance as needed. - Have the patient write the date of first use of the PureFlow on the sediment filter to help remember when it needs to be replaced and order with their supplies when needed.

Flush the drain line

Use this tool	Do or explain
 PureFlow SL  Complete your treatment Drain Line Cleaning Kit	■ Explain that the drain line should be flushed monthly or more frequently as needed to remove any waste contamination buildup, which can block flow and cause cyclor alarms. • Do not flush the drain line while a batch is in use. ■ Use one of the following methods to flush the drain line: • Flush with bleach and water. • Flush with the Drain Line Cleaning Kit provided by NxStage, using the provided instructions for use. ■ Have the patient and care partner follow along in the quick reference guide or <i>VersiHD Reference Guide</i> as you demonstrate how to flush the drain line. ■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient or care partner practice flushing the drain line. Provide guidance as needed.

Source water testing

Use this tool	Do or explain
 PureFlow SL User Guide	■ Define “source water” for the patient and care partner:  Note: Source water is home/tap water that supplies the PAK. ■ Explain that source water must be tested before use with PureFlow SL to ensure it does not exceed the maximum limits for chemical contaminants as listed in the <i>PureFlow SL User Guide</i>, “Specifications—Source Water Purity.” ■ The patient or care partner should send a source water sample for testing before training begins to determine if the PureFlow SL can be used. • This sample can be obtained from the patient’s home faucet that will be connected to the PureFlow SL. ■ 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.

Product water testing

The recommendations in this section for water and dialysate product testing are based on Centers for Medicare and Medicaid Services (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.

Use this tool	Do or explain
 Complete your treatment	■ Define “product water” for the patient and care partner.  Note: Product water is purified water used to make dialysate. ■ 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: ■ If you are using source water from public water supplies: • Test the first PAK in the patient's home and then test annually. ■ If you are using source water from private water supplies: • Test the 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. ■ You do NOT have to test the product water at the following times: • After installing and priming a new PAK disposable. • After changing the PureFlow SL control unit hardware. ■ If testing is to be performed on new PAKs (for example, those that have made three or fewer 60-liter batches), product water samples should be collected within four hours of completing a batch. This step ensures accurate, interference-free AAMI panel results. ■ 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 or <i>VersiHD Reference Guide</i>, 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.

Dialysate Testing

Use this tool	Do or explain
 Complete your Treatment	■ 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 per CMS guidelines, 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 your dialysis center's instruction for use of a specimen cup, tube, or DTK-001 to obtain a sample of dialysate. • Stress with the patient and care partner the importance of using strict aseptic technique when obtaining the sample to prevent sample contamination and erroneous test results. ■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, 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 preventive maintenance

Use this tool	Do or explain
	■ Explain that preventive 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 to request the test kit and instructions when Caution 10 or Alarm 79 is displayed. Use the included <i>Instructions for Use</i> to perform the procedure.

Supporting concepts for Lesson 3: Maintenance

If a patient or care partner needs additional help with maintenance or water and dialysate testing concepts:

- Have the patient or care partner review the following sections in chapter of the *PureFlow SL User Guide* called “Maintenance”:
 - Maintenance Schedule
 - Cleaning or Replacing the Air Filter
 - Replacing the Sediment Filter
 - Flushing the Drain Line
- Demonstrate the maintenance procedures. 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 for performing the maintenance procedures.
- Demonstrate procedures for obtaining product water and dialysate samples. Have the patient or care partner write down the procedures in their own words and then perform them, while you provide guidance and additional information as needed.

Lesson 4: Supplemental procedures

Objectives

Patients and care partners should be able to:

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

Supplies

- Nurse Guide
- *PureFlow SL User Guide*
- PureFlow SL
- *LINX Water Pre-Treatment User Guide*
- *Complete your treatment* quick reference guide or *VersiHD Reference Guide*

Instructions

Use this tool	Do or explain
 PureFlow SL User Guide	▪ Have the patient and care partner read “Supplemental Procedures” in the user guide.

Adjust the heater setting

Use this tool	Do or explain
 Complete your treatment	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, review the procedure for adjusting the heater settings with the patient and care partner. ■ Have the patient adjust the heater settings. ■ Explain the following: • The heater settings can be changed if fluid is in the system (making a batch or using a batch); otherwise, the display reads “Heater Off”. • 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.

Changing the SAK type

Use this tool	Do or explain
 Complete your treatment	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, 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. • If not in STANDBY, press and hold STOP. ■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, have the patient and 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 SL

Use this tool	Do or explain
 Complete your treatment	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, review the procedure for pausing and draining PureFlow SL. ■ Review the procedure for pausing the PureFlow SL during any mode. ■ Have the patient and care partner practice pausing the PureFlow SL. Provide guidance as needed.

Remove the PAK

Use this tool	Do or explain
 Complete your treatment	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, review the procedure for removing a PAK. ■ Have the patient and care partner practice removing a PAK. Provide guidance as needed.

Drain the SAK using alternative methods

Use this tool	Do or explain
 Complete your treatment  PureFlow SL User Guide	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, review the steps for draining the SAK manually from the User Maintenance menu on the control panel. ■ In the “Alarms and Troubleshooting” chapter of the user guide, review the section on Manually Draining the SAK. • Use this method for draining the SAK during a power outage or an if you get an unrecoverable alarm.

Remove the control unit

Use this tool	Do or explain
 Complete your treatment	■ Explain that the control unit must be removed if service or maintenance is required. ■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, review the procedure for removing the control unit. ■ Have the patient and care partner practice removing the control unit. Provide guidance as needed.

Replacing the LINX DI cells

Use this tool	Do or explain
 LINX Water Pre-Treatment System User Guide	■ Instruct the patient and care partner to read the following chapters in the <i>LINX Water Pre-Treatment System User Guide</i>. • “LINX System Bypass Mode” • “Replacing the LINX DI cells” ■ Have the patient and care partner view the LINX Water Pre-Treatment System installation video.
 LINX Water Pre-Treatment System Installation video	
 Complete your treatment	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, review the procedure for replacing the LINX DI cells.

Notes



5: Keep calm and carry on

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I: Troubleshooting alarms

Chapter overview

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Lesson 1: Resources and responses



Objectives

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 the following user guides:
 - NxStage System One, System One S, or VersiHD
 - NxStage PureFlow SL
 - Express Fluid Warmer
 - NxStage Cyclor Base and Fluid Detection Sensor
 - LINX Water Pre-Treatment System (if used)
 - Appropriate disposable Instructions for Use
- Identify how the cyclor and PureFlow SL notify them of situations that require attention and the differences between alarms and cautions.
- Describe the standard response to cyclor and PureFlow SL alarms and cautions.
- Describe the troubleshooting warnings related to the cyclor and PureFlow SL.

Supplies

- Online module
 - *Troubleshooting the System One Cyclor*
 - *Responding to Alarms and Cautions*
- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Quick reference guides or *VersiHD Reference Guide*:
 - *Keep calm and carry on*
 - *Complete your treatment*
- Equipment user guides:
 - *NxStage PureFlow SL*
 - *NxStage System One or VersiHD*
- Equipment:
 - NxStage cyclor
 - NxStage PureFlow SL

Instructions

Use this tool	Do or explain
	Patient resources Begin the discussion of alarms and cautions by talking about the resources the patient and care partner have 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: • User guides and quick reference guides or <i>VersiHD Reference Guide</i>. • Hands-on practice during training. • Online modules. • Dialysis center nurse. • NxStage Technical Support.
 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 <i>cycler's user guide</i>, instruct the patient and care partner to review the types of red alarms and yellow cautions. • In the <i>PureFlow SL User Guide</i>, point out the cycler alarms and cautions section. ■ Instruct the patient and care partner to read all precautions and risks in the troubleshooting sections of the following user guides, then discuss: • <i>PureFlow SL User Guide</i> • <i>System One User Guide</i> or <i>VersiHD User Guide</i> • <i>Express Fluid Warmer User Guide</i>

Use this tool	Do or explain
 Keep calm and carry on	■ Give the patient and care partner the <i>Keep calm and carry on</i> quick reference guide or <i>VersiHD Reference Guide</i>. ■ Instruct the patient and care partner to preview the guide you have provided them. ■ Explain that the quick reference guide or <i>VersiHD Reference Guide</i>: • Is a supplement to the user guides that is to be used for reference. • Should be kept readily available during treatment. • Focuses on the most common alarms only. It does not include the entire list of cautions and alarms. Refer to the cyclor's user guide for a complete list of cautions and alarms.
 Troubleshooting the System One Cyclor	■ Have the patient and care partner view the video as an overview prior to teaching troubleshooting the cyclor. • Explain that each alarm is taught separately and they have ample time for practicing troubleshooting. • Remind the patient and care partner that they can watch the video again at any time during or after training.
 Cyclor	■ Explain how the cyclor provides visual and auditory communication to notify the patient and care partner of situations that may require attention. ■ Using the cyclor, point out the location and purpose of the cyclor status bars. Explain what the colors of the status bars mean when lit: • Green: Normal operating condition. Treatment parameters are displayed. • Yellow: Caution number is displayed. Intervention may or may not be required. • Red: Alarm number is displayed. All cyclor pumps stop. The patient or care partner must correct the problem and reset the alarm to continue. ■ Using the cyclor's user guide instruct the patient and care partner to read the sections on dialyzer and blood circuit clotting. Discuss the key measures that can be taken to prevent clotting from occurring, including: • Responding to and correcting alarms promptly. • If unable to resolve alarms in a timely manner, rinseback blood to prevent blood loss. • Remind the patient and care partner that clotting starts as soon as the blood pump is turned off.

Use this tool	Do or explain
 Cycler	Describe the audible alerts that indicate a caution or alarm: ■ Red alarms: The cycler steadily chimes. ■ Yellow cautions: The cycler intermittently chimes. • Cautions that do not require an intervention chime every two minutes. • Cautions that require an intervention chime more frequently. ■ 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 cycler door closed, turn the cycler on. • “88” appears in the yellow caution window and a chime sounds. 3. Turn the cycler off.
 resources and responses  Keep calm and carry on	■ Teach the patient the acronyms for responding to cautions and alarms: • Cautions Acronym: MIT- MUTE-INVESTIGATE/INTERVENE-TREATMENT • Alarms Acronym: MIST-MUTE/ INTERVENE-STOP-TREATMENT ■ Explain that the steps used to respond to cycler alarms are similar regardless of the alarm. ■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-1) and the quick reference guide or <i>VersiHD Reference Guide</i>, review the steps for responding to cycler alarms and cautions.

Use this tool	Do or explain
 PureFlow SL Control Panel Resources	■ Explain that, like the cyclor, 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 the sample alarm. The colors on the control panel mean the following: • Green: Normal operating condition. Monitor only. • Yellow: Caution 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 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 that indicate an alarm or caution: • Red alarms: Fast beep • Yellow cautions: Intermittent beep
 Standard Response for PureFlow SL Alarm & Caution  Keep calm and carry on	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-2) and the quick reference guide or <i>VersiHD Reference Guide</i>, review the steps for responding to PureFlow SL alarms and cautions.

Use this tool	Do or explain
 PureFlow SL	■ Instruct the patient and 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, 3. Turn the power on. • The alarm sounds and an error message appears on the control panel display. 4. Turn off the power and reconnect the J1 connection.



Additional information

- After training on each alarm or caution, make sure the patient or care partner continue to troubleshoot all subsequent alarms and cautions during treatment.

Practice sessions

- Conduct practice sessions for responding to alarms and cautions 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 blood lines.
- To perform practice troubleshooting sessions after treatment, follow these steps:
 1. Following rinseback, close the clamps on the arterial and venous blood lines and disconnect the lines.
 - a. Connect the arterial blood line to the priming spike line the red clamp.
 - b. Connect the venous blood line to the priming spike line with the blue clamp.
 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. Make sure that there is a small amount of dialysate available for practice (when required).
 5. Leave the clamps open on the dialysate and waste lines.
 6. Open the blood line clamps and the red and blue priming spike clamps.
 7. Press **TREATMENT**.

Supporting concepts for Lesson 1: Resources and responses

If a patient or care partner needs additional help with the concepts:

- Instruct the patient or care partner to practice responding to alarms and cautions using the online module *Responding to Alarms and Cautions* while referring to the cyclor user guide and the *Keep calm and carry on* quick reference guide or the *VersiHD Reference Guide* and/or watching the *Troubleshooting the Cyclor* video again.

Lesson 2: Troubleshooting common cyclor alarms



Objectives

Patients and care partners should be able to:

- Describe typical causes and resolutions for common cyclor alarms and cautions.
- Correctly respond to alarms and cautions due to air in the blood circuit or in the patient blood lines.
- Correctly respond to blood and fluid circuit pressure alarms.

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Quick reference guide or *VersiHD Reference Guide*:
 - *Keep calm and carry on*
- *NxStage System One User Guide*
- *NxStage System One Cyclor*

Instructions

Air alarms and cautions



Note: Only the top three or four most common causes and operator actions for a given alarm are listed in this training. Refer to the user guides for a complete list of alarm causes and operator actions.

Use this tool	Do or explain
	■ Tell the patient and care partner that you are now going to focus on cyclor air and pressure alarms. ■ Explain that you'll describe the causes and proper responses to the most common cyclor alarms, starting with air cautions and alarms.
 causes for common cyclor alarms and cautions	■ Explain that, during treatment and rinseback, air should not be in the fluid circuit or in the patient blood lines. ■ Explain that air entering the blood stream can lead to an air embolism, which can result in serious injury or even death. ■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-3) or a practice cartridge and the patient's cyclor, explain where and how the cyclor detects air. • Tip: To identify cyclor air detection locations, remember "air is square."
 Keep calm and carry on	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, refer to "Alarm 10: Check for Venous Air During TREATMENT." ■ Explain your dialysis center's instructions for responding if the patient 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 or <i>VersiHD Reference Guide</i>. ■ Explain the preventive measures for air embolism: • Never rinseback blood if air is in the venous blood line. • Ensure blood lines are properly attached to needles or the catheter. • Always close the clamp on 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" section of the quick reference guide.

Use this tool	Do or explain
 Alarm 10: Check for Venous Air During TREATMENT or Alarm 11: Check for Arterial Air During TREATMENT	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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.
 NxStage System One User Guide	■ Instruct the patient and care partner to read the pages on Alarms 10 and 11 in the <i>NxStage System One User Guide</i>. ■ Remind the patient and care partner to keep the user guide readily available during treatment.

Use this tool	Do or explain
 Keep calm and carry on	■ Have the patient and care partner use the quick reference guide or <i>VersiHD Reference Guide</i> to practice responding to Alarms 10 and 11. Creating 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.  Note: Patients should not be connected to the cartridge during practice sessions. To 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 cyclor displays the last commanded blood flow rate (350-400). 6. Press TREATMENT a second time to clear the Caution 12. This step returns the blood flow rate to the prescribed rate of 350-400 and venous pressure should reflect this. 7. If you see air in the venous blood line, press STOP immediately and repeat the air recovery process.

Use this tool	Do or explain
	To 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. 6. Check for air in the arterial blood line, if air is seen repeat the air recovery process.
 Caution 14: Check Fluid Line Inlet: Air Detected in Fluid Line Inlet	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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:
 NxStage System One User Guide	■ Instruct the patient and care partner to read the pages on Caution 14: Check Fluid Line Inlet: Air Detected in Fluid Line Inlet in the user guide.
 Keep calm and carry on	■ Have the patient and care partner use the quick reference guide or <i>VersiHD Reference Guide</i> to practice responding to Caution 14.
	■ Tell the patient and care partner you are now going to review cyclor pressure alarms and their potential causes.

Pressure alarms and cautions

Use this tool	Do or explain
 pressures	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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.
 NxStage System One User Guide	■ Instruct the patient and care partner to read the section on vascular access flow in the user guide. ■ Tell the patient what the normal arterial and venous pressures they should expect during treatment are. ■ 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. • If the cyclor is not alarming, but the patient’s arterial or venous pressures are different from their normal ranges do the following: 1. Reduce the blood flow rate. 2. If there are no issues with the patient’s access, check for clotting, kinks, or other obstructions.
 pressure alarms and cautions	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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 • Alarm 24: Check Arterial Access: Access Pressure at Low Limit • Caution 25 Access Pressure Pod Error: Reset Access Pressure Pod • Alarm 20: Check Blood Circuit: Venous Pressure Low • Alarm 30 Check Blood Circuit: Venous Pressure High During TREATMENT

Use this tool	Do or explain
 NxStage System One User Guide	■ Instruct the patient and care partner to read the pages in the 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.
 Keep calm and carry on	■ Have the patient and care partner review Caution 25 and Alarms 20, 24, and 30 in the quick reference guide or <i>VersiHD Reference Guide</i>. Have them use the guide to practice responding to Caution 25 and Alarm 30. ■ Use the instructions below during a practice session to create a Caution 25, and then an Alarm 30. Provide assistance as appropriate to help the patient and care partner resolve the alarms.  Note: Patients should not be connected to the cartridge during practice sessions. To create an Caution 25: 1. Make sure that you are in TREATMENT mode. 2. Adjust the blood flow rate to 350-400 mL/min. Note the access pressure. 3. Disconnect the access pressure pod line. Note the access pressure.
 fluid circuit path	To create an Alarm 30: 1. Make sure that 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 L. 4. Close the clamp on the venous blood line to create an Alarm 30. 5. Point out that all “pump on” indicators are off until the alarm is reset. ■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-10), describe the cartridge fluid circuit path (dialysate and waste fluid pathways). Explain how the cyclor routes the fluid and ensures that the same amount of fluid that goes in comes out.

Use this tool	Do or explain
 fluid circuit pressure detected	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-10), show where fluid circuit pressures are monitored.

Balancing system alarms and cautions

Use this 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 <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (pages 3-11), explain the common causes for Alarm 35 and Alarm 37, 38, and 39. For software versions 4.13 and higher ■ Demonstrate how to allow additional time to resolve the alarm and minimize the potential risk of the blood circuit clotting. ■ If the patient or care partner needs more time to resolve the cause of the alarm, have them practice this scenario: 1. Press and hold STOP for 2 seconds. The blood pump starts to run at the treatment rate. • Explain that the “blood pump only” mode is beneficial because it keeps the blood moving in the circuit and helps prevent the risk of clotting. 2. Resolve the alarm. 3. Tap the TREATMENT icon to demonstrate how to resume the treatment. 4. If the balance chamber alarm persists and is unresolvable, demonstrate to the patient how to get to “End Treatment Early.” • Have the patient practice this procedure.

Use this tool	Do or explain
	■ Tell the patient that it is important to complete all of the following steps when making adjustments to the system settings: 1. Turn ON the power to the cyclor. 2. Listen for a beep and then quickly press TREATMENT to enter System Setting mode. 3. Watch for the number 0 in the top (green) window. You are now in system settings mode. 4. Press the green ADJUSTMENT ARROWS in the top window until you see the system setting parameter you want to change. 5. Press the yellow ADJUSTMENT ARROWS in the center window until you see the setting value that you want to use. 6. Using the green ADJUSTMENT ARROWS scroll through all of the system settings to confirm that they are correct. 7. Turn the cyclor off and then on again to save the desired settings. • Failure to follow the above steps may cause a setup error when you turn the cyclor on. • See the chapter of the NxStage System One User Guide called “System Settings” for instructions on updating the cyclor system settings.
	■ Explain that Alarm 35: Check Waste Line: Waste Line Pressure High develops when waste fluid cannot exit the balance chambers. • This condition could be caused by a 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 closed fluid line(s). ■ If using the PureFlow SL, Alarm 37, 38, or 39 may indicate the following: • TREATMENT was pressed on the cyclor before GO was pressed on the PureFlow SL. • Insufficient volume in the SAK. • A clogged PureFlow SL drain line. • Using the wrong SAK type in the PureFlow SL while running the System One S cyclor (NX1000-3) or higher at dialysate rates greater than 12 L/hr.

Use this tool	Do or explain
 NxStage System One User Guide	Instruct the patient and care partner to read the pages in the <i>NxStage System One User Guide</i> on Alarm 35: Check Waste Line: Waste Line Pressure High and Alarm 37, 38, 39: Check Fluid Circuit: High Balance Chamber Pressure During TREATMENT.
 Keep calm and carry on	- Have the patient and care partner use the quick reference guide or <i>VersiHD Reference Guide</i> to practice responding to Alarm 35 and Alarms 37, 38, and 39. - Use the instructions below to create Alarm 35 and Alarms 37 and 38. - Provide assistance as appropriate to help the patient and care partner resolve the alarms.  Note: Patients should not be connected to the cartridge during practice sessions. Create an Alarm 35: - Make sure you are in TREATMENT mode. - Adjust the BFR to 350-400 mL/min. - Adjust the dialysate volume target to 1L. - Adjust the dialysate rate to 4 L/hr. - Close the clamp on the waste line. - Watch for Alarms 37, 38, or 39 after resetting Alarm 35. If Alarm 35 does not automatically occur, repeat steps 1-5 above.
 Troubleshooting the System One Cyclor	Have the patient watch the video.

Lesson 3: Troubleshooting common PureFlow SL alarms

Objectives

Patients and care partners should be able to:

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

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Quick reference guide or *VersiHD Reference Guide*
 - *Keep calm and carry on*
- *NxStage PureFlow SL User Guide*
- NxStage PureFlow SL

Instructions

PAK Prime alarms and cautions



Note: Only the top three or four most common causes and operator actions for a given alarm are listed in this training. Refer to the user guides for a complete list of alarm causes and operator actions.

Use this tool	Do or explain
	▪ Tell the patient and care partner that you are now going to focus on the PureFlow SL alarms. ▪ Explain that you will describe the causes and correct responses to the most common PureFlow SL alarms.
 Fluid Flow During PAK PRIME	▪ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-13), explain the fluid flow during PAK PRIME.
 PAK PRIME Alarms	▪ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-14), explain that the PureFlow SL notifies the patient or care partner of a fluid flow problem during PAK PRIME. ▪ Review the alarms and common reasons they occur:

Use this tool	Do or explain
 NxStage PureFlow SL User Guide	■ Instruct the patient and care partner to read the following alarms in the <i>NxStage PureFlow SL User Guide</i>: • Alarm 12: PAK Exhausted • Alarm 50: Inlet Pressure Low • Alarm 51: Output Pressure High • Alarm 54: Fluid Leak in PAK
 Keep calm and carry on	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, explain the responses to Alarms 12, 50, 51, and 54.

Alarms that can occur when making a batch

Use this tool	Do or explain
 Fluid Flow When Making a Batch	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-15), describe the fluid flow path when making a batch of dialysate.
 Alarms When Making a Batch	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-16), review the alarms and common reasons they occur: • Alarm 43: Conductivity Test Failed • Alarm 44: No Flow Detected Through Conductivity Line • Alarm 51: Output Pressure High • Alarm 53: Fluid Leak in Tub
 NxStage PureFlow SL User Guide	■ Instruct the patient and care partner to read the following alarms in the user guide: • Alarm 43: Conductivity Test Failed • Alarm 44: No Flow Detected Through Conductivity Line • Alarm 51: Output Pressure High • Alarm 53: Fluid Leak in Tub

Use this tool	Do or explain
 Keep calm and carry on	Using the quick reference guide or <i>VersiHD Reference Guide</i>, explain the responses to Alarms 43, 44, 51, and 54.

Other PureFlow SL alarms

Use this tool	Do or explain
 Other PureFlow SL Alarms	Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-17), explain reasons for other PureFlow SL alarms.
 NxStage PureFlow SL User Guide	Instruct the patient and care partner to read the pages in the <i>NxStage PureFlow SL User Guide</i> on Alarm 52: Fluid Leak in Control Unit (CU).
 Keep calm and carry on	Using the quick reference guide or <i>VersiHD Reference Guide</i>, explain the responses to Alarms 54 and 833.

Lesson 4: Troubleshooting Express Fluid Warmer alarms

Objectives

Patients and care partners should be able to:

- Identify how the equipment notifies them of situations requiring attention.
- Correctly respond to warmer alarms.

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Quick reference guide or *VersiHD Reference Guide*:
 - *Keep calm and carry on*
- *Express Fluid Warmer User Guide*
- Express Fluid Warmer

Instructions

Use this tool	Do or explain
 Express Fluid Warmer	■ If the patient is using the Express Fluid Warmer, use the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (pages 3-18 and 3-19) to explain how the Express Fluid Warmer provides visual and audible alerts to notify the patient of important information or situations that may require attention. ■ Describe the common causes of an Express Fluid Warmer alarm.
 Keep calm and carry on	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, explain the standard response to Express Fluid Warmer alarms.

Use this tool	Do or explain
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. To create and Express Fluid Warmer alarm: 1. With the Express Fluid Warmer installed and a bag of dialysate on the warmer, plug in the fluid warmer and turn the power on. 2. Lift the dialysate bag off of the Express Fluid Warmer to create the alarm. 3. Refer to "Bag Sensor Alarm" in the troubleshooting section of the <i>Express Fluid Warmer User Guide</i> for instructions to resolve the alarm.

Lesson 5: Cyclor base and fluid detection sensor alarms

Objectives

Patients or care partners should be able to:

- Identify how the equipment notifies them of situations requiring attention.
- Correctly respond to cyclor base and fluid detection sensor alarms.

Supplies

- Nurse Guide
- Cyclor Base and Fluid Detection Sensor
- *NxStage Cyclor Base and Fluid Detections Sensor User Guide*
- *Keep calm and carry on* quick reference guide or *VersiHD Reference Guide*

Instructions

Use this tool	Do or explain
Fluid Detection Sensor	■ Using the patient's fluid detection sensor, demonstrate how the sensor notifies them if fluid is detected. ■ Instruct the patient or care partner to: 1. Install a battery in the sensor. • The sensor beeps when the battery is connected; this beep is not the alert. 2. Touch the sensor's stainless steel bars with a moistened finger. • The alert beeps when the steel bars come in contact with fluid. 3. Wipe the stainless steel bars dry to stop the alarm.
 NxStage Cycle Base and Fluid Detection Sensor User Guide	■ Using the user guide explain the standard response to a fluid detection sensor alarm.  Note: Because of the position of the sensor, all fluid leaks from the dialyzer may not be detected. Remind patients to look for leaks below the dialyzer during TREATMENT.

Use this tool	Do or explain
 NxStage Cycle Base and Fluid Detection Sensor User Guide	■ Instruct the patient and care partner to read the troubleshooting section of the <i>NxStage Cyclers Base and Fluid Detection Sensor User Guide</i>.

Lesson 6: Special conditions

Objectives

Patients and 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.

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Quick reference guides or *VersiHD Reference Guide*:
 - *Keep calm and carry on*
 - *Complete your treatment*
- *NxStage System One User Guide*
- Equipment:
 - NxStage cyclers
 - NxStage PureFlow SL or Express Fluid Warmer
- *Are You Ready?* Planning Guidebook for Non-Medical Emergencies

Instructions

Power failure alarms

Use this 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.

Use this tool	Do or explain
 NxStage System One User Guide or VersiHD User Guide	■ Instruct the patient and care partner to read the <i>NxStage System One User Guide</i> or <i>VersiHD User Guide</i> section on Caution 40: Perform Power Recovery: Power Failure and Alarm 41: Failed Power Recovery. ■ Explain the difference between these alerts: • Caution 40 occurs if the power is restored within the preset number of minutes (two minutes) after a power failure or the cyclor being powered off. • Alarm 41 occurs if the power is not restored within the preset number of minutes (two minutes) or if the cyclor door is opened during a power failure. ■ During a practice session, use the patient's cyclor to demonstrate a Caution 40. How to create a Caution 40: 1. Turn the cyclor power off and then back on within one minute. 2. Point out the 40 displayed in the cyclor yellow caution window. 3. Instruct the patient or care partner to follow the instructions in the user guide to resolve the caution.
 Keep calm and carry on	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, explain the appropriate responses to Alarms 41, 50, and 60 in the Special Conditions section.

Fluid temperature alarms

Use this tool	Do or explain
 Alarm 50: Check Fluid Temp: Fluid Temp High	■ Explain that the cyclor notifies the patient or care partner by displaying Alarm 50: Check Fluid Temp: Fluid Temp High when the temperature exceeds the alarm limit. ■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-20), explain that when the cartridge is appropriately loaded in the cyclor during set-up, the cyclor monitors the fluid temperature and notifies the patient or care partner if the fluid temperature is too high.
 NxStage System One User Guide or VersiHD User Guide	■ Instruct the patient and care partner to read the user guide section on Alarm 50: Check Fluid Temp: Fluid Temp High.
 Keep calm and carry on	■ Using the quick reference guide or <i>VersiHD Reference Guide</i>, 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 or care partner's ability to lower the dialysate heater setting.

Blood leak alarms

Use this tool	Do or explain
 Alarm 60: Check for Blood Leak: Blood Detected in Waste Line	- Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (page 3-21), show the location of the cartridge blood leak detector. - Explain how the cyclor notifies the patient or care partner with Alarm 60: Check for Blood Leak: Blood Detected in Waste Line if the system detects that blood may be in the waste fluid.
 NxStage System One User Guide or VersiHD User Guide	Instruct the patient and care partner to review the steps in the user guide to resolve the Alarm 60.  Note: 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.
 Keep calm and carry on	- Give the patient and care partner the quick reference guide or <i>VersiHD Reference Guide</i>. - 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 or <i>VersiHD Reference Guide</i>.

System alarms

Use this tool	Do or explain
 NxStage System One User Guide	- Instruct the patient and care partner to read the section of the user guide on Alarms 100-999 System Alarms. - Explain the possible cause(s) of the alarm: - The cyclor detects a system or communications error. - The cyclor may be in service mode. - Instruct the patient or care partner to read the steps to follow during treatment.

Emergency rinseback

Use this tool	Do or explain
 Complete your treatment	■ Using the 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 a medical or environmental emergency requiring immediate blood return, the emergency rinseback procedure should be performed. ■ Do not perform emergency rinseback if: • There is not enough time to rinseback the blood. • The blood circuit is clotted or hemolyzed. • Air is seen in the blood circuit or in the patient lines. • Blood flow stops for an extended time. ■ Have the patient and care partner perform an emergency rinseback procedure.

Temporary disconnect

Use this tool	Do or explain
 NxStage System One User Guide or VersiHD User Guide	■ Instruct the patient and care partner to read the section in the user guide on performing a temporary disconnect procedure to recirculate the blood circuit after returning their blood.
 Complete your treatment	■ Using the quick reference guide, explain that the patient can perform the temporary disconnection procedure after returning the blood. Make sure that the patient and care partner understand when and how this procedure 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 care partner should take for each situation.

Environmental emergencies

Use this tool	Do or explain
 Are You Ready? Patient Planning Guidebook for Non-Medical Emergencies	- Using the 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 <i>Complete your treatment</i> quick reference guide.

Supporting concepts for Lesson 6: Special conditions

If a patient or care partner needs additional help with the concepts:

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

Notes



II: Managing medical complications

Chapter overview

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Lesson 1: Resources and responses

Objectives

Patients and care partners should be able to:

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

Supplies

- Nurse Guide
- *Training Flipbook* or *Training Flipbook for VersiHD*
- Patient quick reference guide:
 - *Keep calm and carry on*
- Black marker
- Online module:
 - *Staying Calm in the Face of an Emergency*

Instructions

Before teaching this lesson, review the following with the patient and the care partner:

Use this tool	Do or explain
 Keep calm and carry on	■ Customize the <i>Keep calm and carry on quick reference guide</i>: • Check the signs/symptoms and possible causes that are appropriate to the patient. Note: Treating medical complications may require performing several tasks or actions in sequence (for example, giving normal saline, checking blood pressure, and turning off the ultrafiltration). Be sure to clarify the appropriate sequence that may be required. • Check, number, and complete the treatment and preventive steps the patient should follow in the quick reference guide. • Using a black marker, cross out any treatment or preventive steps in the quick reference guide that the patient should not follow. • Write in additional signs/symptoms, information, or steps the patient should follow on the blank lines provided. • Pay particular attention to the “Prevention” section of the quick reference guide. Knowing how to prevent medical complications and having discussions on these topics are important in helping the patient manage their treatments at home. Important: Do not give this quick reference guide to the patient and care partner until you have customized it.

Understanding the signs and symptoms of complications

Use this tool	Do or explain
	■ Explain that understanding the potential signs/symptoms and possible causes of medical complications gives the patient and care partner confidence to know and do the right thing during a medical emergency. ■ Tell the patient that it's important to always have a fully charged cell phone or mobile phone nearby for emergencies. ■ Explain the need to call 911 immediately for situations indicated in the quick reference guide or whenever the patient or care partner is unsure of what to do in a medical emergency. • 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.

Use this tool	Do or explain
 Keep calm and carry on	- Using the customized quick reference guide, explain the signs/symptoms and possible causes and treatment steps for each fluid issue (cramping, hypotension, and hypertension).  Note: Make sure the patient and care partner understand the sequence of the 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 or whenever the patient or care partner is unsure of what to do in a medical emergency. - Explain that it is not unusual to have to adjust blood pressure medications 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.

Rinseback procedures

Use this tool	Do or explain
 Keep calm and carry on	- 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.

Nurse Guide

Fluid, cardiac, and blood issues

Use this tool	Do or explain
 fluid issues	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> (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 or care partner explain the actions that can be taken to resolve or prevent each complication.  Note: The answers in the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> have not been customized. Refer back to the patient's customized quick reference guide when discussing appropriate treatments for each complication.
 Keep calm and carry on  cardiac, and blood issues	■ Using the <i>Training Flipbook</i> or <i>Training Flipbook for VersiHD</i> 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 online module.



Additional information

About medical complications

- Medical complications can seem overwhelming, but the chance for complications can be minimized if the patient:
 - Understands and follows the instructions and information in the user guides.
 - Learns what can cause medical complications and follows the recommended treatment and preventive measures.
 - Contacts the dialysis center, when necessary.
- The goal is to make sure that the patient is well-informed and feels confident about prevent and responding to potential medical complications.
- 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.

Additional information on fluid, cardiac and blood issues

- In addition to the common causes already defined, consider the following information when trying to determine potential causes of complications for your patient. This information is not intended to be shared with the patient and care partner.

Fluid issues

Cramps

- The following important predisposing factors contribute to muscle cramps. These factors tend to favor vasoconstriction, resulting in poor muscle tissue perfusion leading to impairment of muscle relaxation:
 - Hypotension
 - Hypovolemia
 - High ultrafiltration rate
- Other potential causes of cramps:
 - Hypocalcemia
 - Hypokalemia

Hypotension

Other potential causes of hypotension:

- Inadequate vasoconstriction

Nurse Guide

- 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 mmHg when the patient is believed to be at “dry weight.”
- Other potential causes of hypertension:
 - Hypertension associated with inappropriate use of ESAs (erythropoiesis-stimulating agents).
 - Hypertension that is not volume-related but related to the renin-angiotension system response.

Cardiac Issues

Chest pain

Other potential causes of chest pain:

- Sensitivity to the dialyzer membrane
- Mild chest pain, discomfort, or back discomfort may occur during dialysis and the cause is unknown. This condition 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
 - Congestive heart failure (CHF)
 - Anemia
 - Removal of antiarrhythmic drugs during dialysis.

Blood Issues

Infection (fever and chills)

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

Prolonged Bleeding

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

Supporting concepts for Lesson 1: Resources and responses

If a patient or care partner needs additional help with the concepts:

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

Notes

6: Plan for success

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Lesson 1: Coping strategies



Objectives

Patients and care partners should be able to:

- Identify and plan for common challenges during the transition to home therapy.
- Articulate coping strategies for challenges that arise during home therapy.
- Expect routine calls from you and other staff members to see how they are doing once they are home.
- Feel comfortable calling the dialysis center for questions or non-emergency assistance.

Supplies

- Online module
 - *I'm Home, Now What?*
- Nurse Guide
- *Open Connections Booklet*
- NxStage Welcome Home and Travel packet
- Monthly calendar
- HHD Patient Self-Assessment Form

Instructions

Use this tool	Do or explain
 I'm Home, Now What?	■ Explain that the online module provides a few tips for success at home. ■ Tell the patient and care partner to complete the online module. ■ Answer any questions the patient or care partner may have after completing the online module. ■ Use the <i>Open Connections Booklet</i> and the suggested techniques to support the patient that will be going home soon. ■ 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 dietitian. • NxStage Technical Support and Customer Service.
 Get ready for home hemodialysis	■ Using the “Assigning the Task” section of the 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 concepts for Lesson 1: Coping strategies

If a patient or care partner needs additional help with the coping strategies concepts:

- Instruct the patient or 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.

Lesson 2: Schedule and contacts



Objectives

Patients and care partners should be able to:

- List changes in their lifestyle and 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 at 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

- Nurse Guide
- Welcome Home packet
- Monthly calendar
- HHD Patient Self-Assessment Form

Instructions

Use this tool	Do or explain
HHD Patient Self-Assessment Form	■ Instruct the patient and care partner to complete the “Final training day” column of the form; 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 assessments 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 more 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.

Use this tool	Do or explain
 Monthly calendar	■ Help the patient and care partner 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 the 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. Dialysate Testing (per Department of Health and Human Services 2008 regulation, <i>Conditions for Coverage for End-Stage Renal Disease Facilities</i>) ■ 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 specifications are met.
 Monthly calendar	When to call the center or NxStage Technical Support ■ 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 related 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 concepts for Lesson 2: Schedule and contacts

If a patient or care partner needs additional help with the Schedule and contacts concepts:

- 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.

Lesson 3: Supplies and tools

Objectives

Patients or care partners should be able to:

- Identify factors to consider when ordering and storing treatment supplies.
- Describe the procedure for returning flowsheets (if used) to the dialysis center.
- List the supplies provided by the patient, the dialysis center, and NxStage.
- Describe equipment return and exchange procedures.
- Define when and how to contact on-call dialysis center staff and NxStage Technical Support for therapy or equipment issues.

Supplies

- Nurse Guide
- User guides:
 - *NxStage System One*
 - *NxStage VersiHD User Guide*
 - *NxStage PureFlow SL*
 - *NxStage Express Fluid Warmer*
 - *LINX Water Pre-treatment System*
- NxStage Welcome Home and Travel packet
- Monthly calendar
- HHD Patient Self-Assessment Form
- *Open Connections booklet*

Instructions

Use this 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. • Make sure that the new patient's prescription with the physician's signature is submitted to NxStage Customer Service at least 10 days before the patient transitions to home therapy. ■ NxStage sends a customized <i>Welcome Home Packet</i> 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 is reviewed during the scheduled conversation with NxStage Customer Service.  Note: Call customer service to schedule the welcome home call at least one week prior to the date that the patient will be transitioning home.
 User guides: NxStage System One NxStage VersiHD NxStage PureFlow SL NxStage Express Fluid Warmer LINX Water Pre-Treatment System	Returning equipment or disposables ■ 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. ■ Explain that NxStage provides an equipment swap or exchange service when equipment needs preventive maintenance or service. ■ Explain that equipment swaps are also initiated by NxStage Technical Support for unresolved equipment issues. ■ Explain that if their 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.
	■ If the patient is using Nx2me and does not have a VersiHD cyclor (has a System One or System One S), they will need to remove the ConNxBox from the back of the cyclor before sending back the cyclor. • The ConNxBox is essential for connectivity to work with the NxStage router in the patient's home.

Use this tool	Do or explain
	Supporting patients during first week of transition to home ■ Going home with the patient to help them set up their treatment area is very important. ■ While in the patient's home, you can advise the patient on where they should perform their treatment and store their supplies. ■ Centers that support their patients well during the first week at home are more likely to have better patient retention. Flowsheets ■ If the patient is not using Nx2me and will be documenting their treatment information on flowsheets, explain the importance of sending or bringing their flowsheets to the center.

Supporting concepts for Lesson 3: Supplies and tools

If a patient or care partner needs additional help with the Supplies and tools concepts:

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



Additional information for lessons 1, 2, and 3

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.
- Average UF Volume and UF rate per treatment.
- 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.
 - Review cannulation technique

Nurse Guide

- Discuss any cannulation difficulties

Catheter:

- Check for redness and/or drainage at the site.
- Check that lines and caps are intact.

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 emphasis on phosphorus, potassium, and carbon dioxide.
- 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 has been taken as ordered
- Check for needed refills
- Evaluate hypo/hypertension is not related to dry weight
- Review anticoagulant

Supplies and equipment

- Verify quantity of supplies is adequate.
- Identify any customer service issues
- Discuss the need for swaps or returns
- Ensure appropriate cyclor system settings and treatment parameter settings
- Verify PureFlow SL SAK type is correct

Flowsheet review

- If using Nx2me, review iPad use and home connectivity status.
- If not using Nx2me, review of flow sheets since last visit:
 - Check recorded alarms
 - Check for symptoms listed on sheets but not reported
 - Check number of treatments
 - Ultrafiltration volume and ultrafiltration rate

Psycho-social assessment

- Home hemodialysis adaptation:
 - Changes in partner relationship
 - Change in activities
 - Stress assessment
 - Financial concerns
- Use the open connections booklet and reinforce that you will be calling them at home to check on them.
- Use the home hemodialysis assessment sheet with the patient.
- Discuss home visit and make arrangements to do this the first 1-5 days after the patient goes home.
- Discuss respite and when it might be used for patient or partner break.

Education

- Review and update:
 - Troubleshooting (for example, recovering from air alarms).
 - Less frequently used procedures (for example, temporary disconnection).
 - New product or procedure information
 - Set time for cannulation technique demonstration at an future clinic visit.

Lesson 4: Traveling with NxStage

Objectives

Patients or care partners should be able to:

- Understand how to prepare for travel and the resources and supplies they will need.

Supplies

- Welcome Home Packet
- NxPeditions
- Global Travel wallet

Instructions

Use this tool	Do or explain
	▪ Discuss with the patient their desire and ability to travel with their NxStage equipment and supplies. ▪ Remind patients using dialysate flow rates greater than 12L/hr that they will need to use Express fluid bags when traveling with flow rates less than or equal to 12 L/hr. ▪ Explain that NxStage can assist with getting their supplies delivered to their travel destination. ▪ Explain that Customer Service requests a travel plan lead time of 60 days to be sure all supplies will arrive on time. • Make sure to have a travel prescription for the patient in NxRx. ▪ Show the patient the travel resources available from NxStage.

Notes

Notes

Appendix A: Solo

Overview

This appendix is a supplement to the Nurse Guide and provides information on how to train a patient who is performing solo therapy.

Objectives

The patient should be able to:

- Understand the risks associated with performing home hemodialysis independently (without a partner).
- Demonstrate the ability to safely operate and troubleshoot alarm conditions with the cyclor and perform their prescribed treatment in the home.
- Participate in the Interdisciplinary Dialysis Team (IDT) discussion to understand the additional requirements for training to ensure validated competency in managing potential complications that may occur during a treatment at home.
- Understand and correctly use the safety devices required for using the NxStage cyclor for solo HHD to perform a safe dialysis treatment at home.

Requirement

- Patient training checklist is completed and patient demonstrates ability to safely perform their treatments at home.

Supplies

- | | |
|--|--|
| <ul style="list-style-type: none"> ■ <i>NxStage System One User Guide or VersiHD User Guide</i> ■ Supplement for Solo Home Hemodialysis ■ Patient Training Skills Checklist ■ Cyclor and disposables ■ Express Fluid Warmer and warmer disposables (if used) ■ PureFlow SL and disposables ■ Waste Line Extension (if used) ■ Prescribed dialysate solution source (Express bags or PureFlow SL SAK) | <ul style="list-style-type: none"> ■ 1L normal saline ■ CAR-170, CAR-172, or CAR-124 ■ 2 -10 ml sterile syringes ■ Antiseptic agent and cannulation supplies ■ Ancillary leak detection devices: Vascular Access Leak Detection Device (VALD) ■ Solo training tips for nurses and patients |
|--|--|

Get ready for training

Follow the instructions in “2: Get ready for training” on page 23 of this Nurse Guide.

Determining the suitability of solo home hemodialysis (HHD) for the patient

- Review the warnings and precautions in the solo HHD supplement with the patient to make sure they understand the increased risks associated with dialyzing independently at home.
- Explain that the following risks associated with solo HHD increase when the patient is dialyzing independently at home.
 - A needle may come out during a treatment (“needle dislodgement”) and could result in significant blood loss, loss of consciousness, and even bleeding to death.
 - Very low blood pressure during treatment which can lead to dizziness, cramping, loss of consciousness, and even death.
- Prepare the patient to spend additional time training before going home.
- Assure the patient that the Interdisciplinary Dialysis Team (IDT) will collaborate with the patient to prepare them for solo HHD.

Assessing the patient’s home environment and treatment area

- Assist the patient in setting up their treatment area in a way that provides easy access to their supplies and resources.
- Complete a home visit prior to having the patient start home treatment to ensure a safe environment for solo treatment.

Keep it clean

Follow the instructions in “I: Keep it clean” on page 31 of this Nurse Guide.

Access your blood

Follow the instructions in “II: Access your blood” on page 41 of this Nurse Guide. In addition, make sure to cover the information below.

Provide practice opportunity for the patient to learn how to do multiple tasks with one hand

- It will take practice for the patient to learn how to do their tasks independently and using one hand. (If their access is located on their arm).
- Assist the patient in learning how to perform the required tasks with their non-access arm.
- Provide the appropriate support while allowing the patient to become adept at all tasks required to perform their solo treatment.
- Assess the patient’s ability to:
 - Insert and remove fistula needles with one hand.
 - Tape and remove tape with one hand.

- Using a tourniquet with one hand.
- Hold vascular access puncture sites securely.
- Perform all tasks remaining seated while needles are in place during treatment.

Interpret your prescription

Follow the instructions in “III: Interpret your prescription” on page 67 of this Nurse Guide.

Use the NxStage cyclor

Follow the instructions in “I: Use the NxStage cyclor” on page 85 of this Nurse Guide. Make sure to add the following information:

Using the ancillary leak detection devices

- Leak sensors are required by NxStage Medical, Inc. to be used when performing solo HHD.
- Ancillary leak devices should be used to detect leaks during treatment from the vascular access and under the cyclor and cartridge.
- Patients should use a recommended Vascular Access Leak Detection Device that conforms to specifications provided by NxStage Medical, Inc.
 - The Redsense Alarm System has been validated to be used with the NxStage System One.
- Use the NxStage Fluid Detection System with the extended base under the cyclor.
- Show the patient how to operate the two additional leak devices using the manufacturer’s instructions for use (IFU) for:
 - The Vascular Access Leak Detection Device (VALD).
 - The NxStage Fluid Detection System (with Extended Cyclor Base) provided by NxStage Medical, Inc.

Create and maintain the PureFlow SL

Follow the instructions in “II: Create and maintain PureFlow” on page 119 of this Nurse Guide.

Troubleshooting alarms

Follow the instructions in “I: Troubleshooting alarms” on page 145 of this Nurse Guide.

Additional information

- Provide additional troubleshooting training.
- Patients performing solo HHD will need to be very adept and confident in troubleshooting alarms and cautions on the cyclor during treatment.
- Determine the maximum ultrafiltration volume and ultrafiltration rate for each patient.
- Consider adjusting the system settings in the NxStage cyclor to ensure these limits are not exceeded.
 - System setting # 80 Maximum Ultrafiltration rate has a default of 2.4 L/hr and is adjustable between 0.01 – 2.4 L/hr.
 - The maximum ultrafiltration rate should NOT exceed 8 mL/kg/hr. Data suggests that exceeding 8 mL/kg/hr may lead to cardiac stunning.¹
 - Even a moderate Fluid Removal Rate during individualized hemodialysis session times is associated with decreased patient survival.²
- Patients should be taught to recognize the early signs and symptoms of hypotension.
 - Often patients sense or feel “different” and these types of symptoms may precede a low blood pressure reading.
- Consider teaching patients to quickly treat their symptoms first and then check their blood pressure.
- Patients should avoid standing up during their treatment to avoid a potential hypotensive response, risking their blood lines being pulled or needle dislodgement.
- Use the skills checklist to ensure that all tasks are documented.
- Provide the patient with additional training in managing troubleshooting alarms and managing potential medical complications.
- Additional training topics may include:

• Problems with self-cannulation • Limiting ultrafiltration rate to 8 mL/kg/hr • Managing their dry weight • Signs and symptoms of hypotension • Giving a saline bolus • Troubleshooting common alarms and cautions • Defining a sensible number alarms they can experience before ending treatment • Infiltration	• Needle dislodgement • Blood loss or clotting • Emergency rinseback • Power failure • Use of emergency kit contents • Notifying Emergency Medical Services (EMS) • Specific conditions that require calling the HHD nurse and/ or center
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References

1. Flythe JE, et al., Rapid fluid removal during dialysis is associated with cardiovascular morbidity and mortality. *Kidney Int.* 2011;79(2):250-257.
2. Chazot C, Vo-Van C, Lorriaux C, et al. Even a moderate fluid removal rate during individualised haemodialysis session times is associated with decreased patient survival. *Blood Purif.* 2017;44:89-97.

Manage medical complications

Follow the instruction in “II: Managing medical complications” on page 177 of this Nurse Guide. In addition, review the information below.

Contacting Emergency Medical Services (EMS)

- The patient will need to know when it is appropriate to contact emergency medical services.
- Consider contacting your local EMS and inform them that there are patients in the community that are performing solo dialysis treatments in their homes and have been trained to do so. Provide the patient’s address if the patient agrees to this.
- Discuss with the patient potential situations in which they may need to contact their local EMS.
- Use the “Managing Medical Complications” sections in the quick reference guide.
 - Customize the “Managing Medical Complications” sections that are provided so the patient can refer to this when needed.

Plan for success

Follow the instruction in “6: Plan for success” on page 187 of this Nurse Guide. In addition, review the information below.

Retraining and assessing the patient’s competencies for solo HHD

- Consider establishing a planned and regular frequency of skills and competency assessment for the patient doing solo HHD.
- Explain to the patient that you need to assess their skills at specific intervals to ensure they are confident to perform tasks that are specific to solo HHD.

Notes

Appendix B: Nocturnal

Overview

This appendix is a supplement to the Nurse Guide and provides additional information on how to train a patient who is performing nocturnal therapy.

The NxStage cyclor may be used at night while the patient and care partner are sleeping. The nurse may decide when the appropriate time is to train patients and care partners on nocturnal therapy. Patients may need time to adjust to Home Hemodialysis initially and then transition to nocturnal therapy training. The Patient Customization Tool will provide the lesson plan to be used for nocturnal specific training.

When considering patients that may benefit from Nocturnal Home Hemodialysis, look at patients that may exhibit these clinical and lifestyle challenges:

- Large body mass with long dialysis treatments.
- Uncontrolled phosphate (PO_4).
- Hemodynamic instability.
- Excessive fluid weight gains.
- Multiple cardiovascular hospitalizations.
- Heavy medication burden.
- A desire to reduce travel time and expenses.
- Do not have a care partner available during the day.
- Want a more flexible therapy schedule to allow for work, child care, school or hobbies.

Refer to the NxStage Training Tip for Nocturnal and Hybrid HHD therapy for additional suggestions on best practice for training and managing Home Nocturnal patients.

Objectives

The patient should be able to:

- Understand the risks associated with performing home hemodialysis at night while sleeping and the need for a partner to be in the home during treatment.
- Understand and correctly use the safety and ancillary devices required for nocturnal therapy.
- Demonstrate their ability to wake and respond appropriately to alarms and cautions.
- Secure their access and needles to prevent dislodgement and disconnection events.

Requirements

The patient demonstrates the ability to perform their prescribed treatment in the home, while sleeping.

Supplies

NxStage cyclor

See “Supplies” on page 86 of this Nurse Guide.

PureFlow

- Online module
 - *Using the PureFlow SL*
- Nurse Guide
- *Training Flipbook or Training Flipbook for VersiHD*
- *PureFlow SL User Guide*
- *LINX Water Pre-Treatment User Guide*
- *LINX Water Pre-Treatment Installation and Use Video*
- PureFlow SL
- *Complete your treatment* quick reference guide or *VersiHD Reference Guide*
- Purification pack (PAK)
- SAK-30X or SAK-40X

Nocturnal

- CAR-172 or CAR-170
- Syringe infusion pump for anticoagulation (if required)
- Leak detection devices
 - NxStage Fluid Detection System
 - Vascular Access Leak Detection Device
- Nocturnal System Settings List

Get ready for training

Follow the instructions in “2: Get ready for training” on page 23 of this Nurse Guide.

Expectations or Nocturnal Home Hemodialysis (NHHD)

- Patients do well starting Nocturnal HHD after they have been home on HHD for several months, have adjusted to being home, and feel comfortable doing their treatments.
- During training, have the patient do a few extended treatment times in a simulated dark and quiet training room to adjust to the environment.

- Provide an opportunity for a prospective Nocturnal HHD patient to talk to a patient that is already doing nocturnal treatments at home.
- There will be an adjustment period for patients to be able to sleep consistently during nocturnal treatments.
- Patients will need to be supported during the adjustment time on Nocturnal therapy.
- More frequent home visits may be indicated to ensure a patient's competencies and skills.

Keep it clean

Follow the instructions in “I: Keep it clean” on page 31 of this Nurse Guide.

Access your blood

Follow the instructions in “II: Access your blood” on page 41 of this Nurse Guide. In addition, make sure to cover the information below.

- The patient needs to demonstrate proper taping technique. Refer to the *Supplemental Taping procedure* and follow your center's guidelines.
- Covering the access and needles after taping will help to keep the access area secure and may prevent catching tubing on bedclothes or linens. A see-through gauze wrap or a clean knee-high nylon with the foot cut off may work well for this purpose.

Interpret your prescription

Follow the instructions in “III: Interpret your prescription” on page 67 of this Nurse Guide. In addition, make sure to cover the information below.

- Medications may need to be adjusted once the patient starts nocturnal home hemodialysis.
 - The solute clearance is enhanced and in particular, sodium, potassium, calcium and phosphorus should be monitored closely.
 - Fluid volume management will differ and may affect blood pressure and blood pressure medication dosages.
- Anticoagulation-Determine the heparin dose to be used during treatment (per center P&P's) that prevents the circuit from clotting but does not cause adverse reactions.
- There are system settings specific to nocturnal treatments than can be adjusted to reduce nuisance alarms. Refer to the System Settings Quick Reference sheet.

Use the NxStage cyclor

Follow the instructions in “I: Use the NxStage cyclor” on page 85 of this Nurse Guide. Make sure to review the information below.

Treatment parameters differ with Nocturnal HHD

- Treatment times are typically the amount of time that the patient expects to sleep. It may vary from 5-8 hrs.
- Blood flow is usually lower than it is for daytime therapy. It can be anywhere from 200-300 ml/min.
- Ultrafiltration rate is typically lower. This is an advantage of longer treatment times. In addition, the patient is in the supine position and will be less likely to experience hypotension.
- The cartridge typically used for nocturnal is the CAR-172. This cartridge has additional features:
 - A heparin infusion line to connect the syringe infusion device tubing line.
 - A SecureClip provides added connection security of the venous blood line to the venous access line.
 - Needleless injection ports to administer medication (if required).

Create and maintain PureFlow

Follow the instructions in “II: Create and maintain PureFlow” on page 119 of this Nurse Guide.

Troubleshooting alarms

Follow the instructions in “I: Troubleshooting alarms” on page 145 of this Nurse Guide. In addition to teaching troubleshooting procedures the patient must be assessed in their ability to wake up to alarms and correctly solve the cautions and/or alarms.

Manage medical complications

Follow the instruction in “II: Managing medical complications” on page 177 of this Nurse Guide. In addition, teach the patient the importance of being proactive in addressing hypotension. They shouldn’t wait too long. They often have a sense of “feeling different.”

Plan for success

Follow the instruction in “6: Plan for success” on page 187 of this Nurse Guide. In addition, review the information below.

Discuss a plan of communication for the first few weeks that the patient and care partner are home doing NHHD.

- Have the patient “check in” by calling or texting when they start and after they complete their treatments.
- Reduce the frequency of the calls or texts as the patient feels more confident.
- Be sure that the patient knows that there is someone they can call, if needed. Either the on-call nurse or NxStage Technical Support.

More frequent home visits and planned retraining may be beneficial. This provides an opportunity to evaluate variations in skills and the home environment.

Notes



Appendix C: VersiHD

Overview

This appendix is a supplement to the Nurse Guide and provides additional information on how to train a patient who is using the VersiHD cyclor.

Objectives

The patient or care partner should be able to:

- Identify the control panel as a “touchscreen” where the user taps the icons to set and adjust the treatment parameters.
- Input the dialysis prescription data into the cyclor.
- Update the cyclor system settings appropriately.
- Identify the components of the cyclor.
- Understand and effectively use the Blood Pump Only mode option for troubleshooting the fluid balance system red alarms.
- Perform a safe dialysis treatment at home.

Reference materials

User guides:

- | | |
|--|---|
| ■ <i>VersiHD User Guide</i> | ■ <i>CAR-170 or CAR-172 Instructions for Use</i> |
| ■ <i>Express Fluid Warmer User Guide</i> | ■ <i>LINX Pre-treatment User Guide</i> (if used) |
| ■ <i>PureFlow SL User Guide</i> | ■ <i>Nx2me Connected Health Nx2me App Users Guide</i> (if used) |
| ■ <i>Fluid Detection System User Guide</i> | |

Training Materials:

- *Training Flipbook for VersiHD*
- *NxSTEPS VersiHD Reference Guide*
- *Learner's Training Skills Checklist*
- *Nurse Guide*
- *System Settings List*

Supplies

- VersiHD cycler
- Normal saline, 1L
- CAR-170 or CAR-172
- Two (2) 10 mL luer lock syringes
- One (1) 20 mL luer lock syringe
- Alcohol pads
- Anticoagulant, if prescribed
- Antiseptic agent/cleaning solution
- Prescribed dialysate source and disposables
- PureFlow SL (if used)
- Express Fluid Warmer
- Warmer disposable set
- Waste line extension
- Cleaning and disinfecting supplies
- Blood sampling supplies
- Chloramine testing supplies
- Ancillary supplies for nocturnal HHD or solo
- HHD, if performing either therapy option.

Overview

Lesson 1: Introduction and dialysis overview (Chapter 1)

- Refer to the *VersiHD User Guide*.
 - Warnings and precautions are located at the beginning of each chapter and additionally throughout the user guide. The patient needs to be familiar with the conventions and the glossary of terms in the user guide when using the cycler.
 - Have the patient review all general warnings and precautions in the “Introduction” section of the user guide. Show the patient the pictures, icons and terms used in the user guide.
 - Have the patient read “An introduction to dialysis” in the “Overview” chapter of the user guide. This provides an introduction to how dialysis works, important aspects of dialysis, the parts that make up the system, and how they work together.

Lesson 2: The system and its components

- Refer to:
 - *VersiHD User Guide*
 - *Training Flipbook for VersiHD*
- Describe the names and functions of the cycler components.
- Use the illustrations of:
 - The cycler
 - The cartridge and dialyzer
 - The control panel
 - The dialysate fluids
 - The ConNxBox

Control panel

- Refer to the “Control panel” section in the “Overview” chapter of the *VersiHD User Guide*.
 - Explain that the control panel is a touchscreen, a display that is also an input device. The patient taps the icons on the control panel to set and adjust the treatment parameters.
 - This is similar to an iPhone, iPad, or other tablets the patient may be familiar with. Show the patient the picture of the control panel and the various status bars, windows, rate and volume arrows, buttons. Explain the functions associated with them. These are important to know for entering treatment information and monitoring the treatment.

Treatment icons

- The treatment icons allow the patient to perform and adjust their treatment.
 - Show the patient the list of icons in “Table 2-1: Touchscreen icons” in the user guide. Review the function of each icon with the patient.
 - Emphasize that the icons light up when they are available for use. When the pumps are running, **STOP** is always available for use.
 - Show the patient how to distinguish lit from grayed-out icons.

Rate and volume screens

- Review the System Settings chapter of the *VersiHD User Guide*.
 - The volume screen returns automatically to the rate screen after a time based on the cyclor software version and your system settings.
 - The default time is 50 sec.
 - Explain how the rate and volume screens work.
 - The rate screen is the home screen for the VersiHD cyclor. When the cyclor is turned on, the rate screen appears. When the rate screen is active, the windows show the rate (speed) of the fluid pumps.
 - Tap the **VOLUME TOGGLE** to switch the control panel to the volume view. When the volume screen is active, the bottom window shows VOL and the windows show the fluid volume remaining.

Pump On Indicators

- Review the Pump On indicator pictures in the “Overview” chapter of the *VersiHD User Guide*.
- Show the patient the difference between a pump being on and off.

Type of pump	Pump On	Pump Off
Dialysate		
Ultrafiltration		
Blood		

- Explain that these symbols appear on the left side of each rate and volume window. An arrow appears inside the symbol when the pumps are running during treatment or during automated rinseback.

Troubleshooting icon

- Explain that tapping the Troubleshooting icon  in the left upper corner of the control panel shows the name of the caution or alarm.
- The patient can use this information to locate the caution or alarm in the user guide and follow the instructions to resolve an alarm or acknowledge the caution.

System menu

- Explain that tapping the System menu icon  allows the user to change the language on the VersiHD control panel. It also allows them to view the open source software licenses and software versions.

Power on indicator light

- When the cyclor is powered on the power on indicator light is lit.
- The indicator light shows that power is being supplied to the cyclor.
- If the patient powers on the cyclor and the indicator light is not lit, the patient should call NxStage Technical Support.

Locking the screen

- During treatment, the patient should lock the touchscreen when finished using the control panel.
 - Locking the screen prevents accidental changes to treatment parameters. When the screen is locked, it can be cleaned during treatment, if needed.
- If an alarm occurs, the screen will automatically unlock.

- The screen will not lock when:
 - There is an active red alarm or yellow caution that requires action.
 - Using the Troubleshooting icon.
- Review the “Screen lock control,” section in the “Overview” chapter of the *VersiHD User Guide*.
 - Show the patient the picture of the unlock screen.
 - Explain the purpose of the control panel screen locking feature.
- The screen can be locked, when all the following conditions are met:
 - There are no active alarms.
 - No help/troubleshooting information is displayed.
 - The cyclor is in one of the following states:
 - Prime
 - Patient connect
 - Therapy
 - Rinseback
 - Post-rinseback

Show the patient how to lock the screen:

- Tap and hold the lock icon  for two seconds.
- Be sure the patient understands that:
 - If no icons are tapped for 60 seconds, the screen locks automatically.
 - When the screen is locked, the cyclor shows a lock message.
 - None of the icons are available to use, except **STOP**.
 - Tapping the **STOP** icon stops the blood pump and leaves the screen locked.

Show the patient how to unlock the screen:

1. Touch any icon while the screen is locked except **STOP**.
2. When the unlock screen appears, have the patient confirm that they recognize the unlock sequence on the screen.
3. Enter the unlock code (1-2-3) as the numbers light up on the screen.
 - When the patient taps the number, a green check mark appears.

Cartridge

- Review the following materials:
 - The cartridge pictures in the “Overview” chapter of the *VersiHD User Guide*
 - The “Cycler and components” section of the *NxSTEPS Nurse Guide*
 - *Training Flipbook for VersiHD*
 - *how do I use the CAR-124? quick reference guide* (if used)

- The instructions for use for the CAR-124 and the instructions from the dialyzer the patient uses.
- In the user guide show the patient the illustrations of the two commonly used cartridges.
 - Describe the components of the cartridge that the patient will use.
 - In the *Training Flipbook for VersiHD* show the patient the blood and fluid pathways.
 - Use a sample cartridge to describe the cartridge components and their functions.
 - Point out the labeled components in the user guide and *Training Flipbook for VersiHD*.
- For patients using the CAR-172, identify the following components on that cartridge:
 - The venous and arterial needleless injection port
 - The heparin infusion line



Note: If the heparin infusion line is not used during treatment, the patient must close the clamp and securely close the cap of the heparin line to prevent blood from leaking.

- For patients using the CAR-124, review the cartridge components.

Other associated components: The fluid detection system

- Refer to the following:
 - *NxStage Fluid Detection System User Guide*
 - *Training Flipbook for VersiHD*
 - *NxSTEPS VersiHD Reference Guide*
- In the *NxStage Fluid Detection System User Guide*, review the general warnings and precautions.
- Explain the purpose of the system and describe the system's components.
- Make sure the patient understands the importance of inspecting the parts to make sure they are not missing or damaged.
- Stress the importance of testing the sensor alarm before each treatment.
 - If the patient fails to test the alarm before each treatment, a fluid leak may go undetected.
- Patients performing either nocturnal HHD or solo HHD must use the fluid detection system and the extended cycler base with the new (plastic) filter holder.
- In the *NxStage Fluid Detection System User Guide*:
 - Review the “Alarms” section. Make sure that the patient understands the probable causes and actions to address the alarms.
 - Explain to the patient how to clean, disinfect, and travel with the fluid detection system.

The Express Fluid Warmer

- Refer to the *NxStage Express Fluid Warmer User Guide*.
- The fluid warmer and the disposable set warm the dialysate prior to administration.
- It takes 30 to 60 minutes for the warmer to pre-heat the dialysate to a comfortable temperature. Because the room temperature and the initial temperature of the dialysate vary, the pre-heating time varies as well.
- To ensure that the self-test completes successfully, unplug the fluid warmer after each treatment.



Note: If the warmer is already plugged in and in Standby mode, tapping the **UP** arrow starts the warming process but bypasses the self-test.

- Review the “General Warnings and Precautions” section in the *NxStage Express Fluid Warmer User Guide*.
- Explain the purpose of the system and describe the components of the system and their functions.
- Tell the patient that the installation portion of the training will show how to assemble the warmer onto the cyclor.
- Describe how the dialysate fluid is warmed as it is administered.
- Show the patient the components of the Express Fluid Warmer disposable.
 - Explain that the warmer disposable carries the dialysate from the hanging bags, to the warmed dialysate bag, and then passes the dialysate to the cartridge.
- In the *NxStage Express Fluid Warmer User Guide*:
 - Review the “Troubleshooting and Alarms” section. Tell the patient that they will be taught to identify and resolve warmer alarms.
 - Have the patient read the “Maintenance” section.

Dialysate

- Make sure the dialysate matches the patient’s prescription.
- The dialysate source can be either:
 - Premixed bags
 - NxStage PureFlow SL
- For patients using the PureFlow SL, refer to the following:
 - *PureFlow SL User Guide*
 - “Create and Maintain PureFlow” section of this Nurse Guide
 - *Training Flipbook for VersiHD*
 - *NxSTEPS VersiHD Reference Guide*
 - *Using PureFlow SL video*
- Use the patient’s dialysate solution source to teach the patient how to verify:
 - SAK, bag, or box product number

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- Correct composition (potassium, lactate, chloride, calcium)
- Lot number
- Expiration date
- If using the PureFlow SL, instruct the patient how to use and maintain the equipment.
- Teach the patient that the prescription written by their doctor includes the following information:
 - The type of dialysate to use
 - The volume of dialysate to use
 - The number of treatments per week
 - The duration of each treatment

Get ready for training

Follow the instructions in “2: Get ready for training” on page 23 of this Nurse Guide.

Keep it clean

Follow the instructions in “I: Keep it clean” on page 31 of this Nurse Guide.

Access your blood

Follow the instructions in “II: Access your blood” on page 41 of this Nurse Guide.

Interpret your prescription

Follow the instructions in “III: Interpret your prescription” on page 67 of this Nurse Guide.

Use the NxStage cyclor

Follow the instructions in “I: Use the NxStage cyclor” on page 85 of this Nurse Guide. In addition, review the lessons below.

Lesson 1: Unpacking and setup

- Refer to the following:
 - “Prepare for Treatment” section of the *NxSTEPS Nurse Guide*
 - “Install the equipment” section of the *NxSTEPS Nurse Guide*
 - *VersiHD User Guide*
- Use the specific user guide for each piece of equipment for the unpacking and setup instructions.
- Have the patient read the warnings and precautions in the “Preparing for Use” chapter of the *VersiHD User Guide*.
- Discuss with the patient:
 - The importance of performing treatments in an area that is safe, secure, organized, clean and well-lit.

- The minimum requirements for a safe treatment area, as listed in the user guide.
- Show the patient how to set-up the NxStage equipment that they will use for their treatments at home.

Lesson 2: System settings

- Refer to the following:
 - *VersiHD User Guide*
 - Nurse Guide for system settings
- When the doctor or center changes the prescribed treatment parameters in the treatment plan, system settings may be changed.
- For nocturnal HHD:
 - Some system settings may need to be adjusted. Refer to the Nurses Guide for recommended system settings
- Review the system settings chapter in the *VersiHD User Guide*.
- Demonstrate how to get to the System Settings mode on the cyclor. Use the step-by-step instructions in the “Changing system settings” section of the *VersiHD User Guide*.
- Explain to the patient the importance of checking all of the system settings when in system settings mode. The patient should consistently follow these steps:
 1. After updating the Parameter Number 0 setting (cartridge type), tap the arrow icons in the top window to scroll through all system settings to confirm that they are correct.
 2. Turn the cyclor off and then on again to save the desired settings.



Note: Failure to follow the above steps may cause a setup error when you turn the cyclor on.

Lesson 3 Overview

Refer to the following:

- “Hemodialysis” chapter in the *NxStage VersiHD User Guide*
- “Pre-treatment Documentation and Important Reminders” section of the *NxSTEPS Nurse Guide*
- *NxSTEPS VersiHD Reference Guide*

Have the patient read the following in the “Hemodialysis” chapter in the *VersiHD User Guide*:

- The “Overview” section, which explains the basic principles of hemodialysis and ultrafiltration.
- The warnings and precautions.

Lesson 4: Recording treatment information

- If the patient is not using Nx2me Connected Health, have them document their pre-treatment

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assessment, treatment information, post-treatment assessment, and any pertinent treatment information on the flowsheet.

- If the patient will be using Nx2me, train the patient and care partner how to use Nx2me in their home.
- Refer to the following documents:
 - *Nx2me Training Slides*
 - *Nx2me App and iPad Users Guide*
 - *Nx2me Connected Health Connectivity Setup Guide*
- In the NxRx/Nx2me Launchpad:
 - *Nx2me App and Connectivity Patient Training Outline*
 - *Nx2me App and Connectivity Patient Training Presentation*
- Locate the section “How do I determine my treatment dose?” in the *NxSTEPS VersiHD Reference Guide*.
- Show the patient how to document their pretreatment assessment information on the treatment record or flowsheet.
- For patients using Nx2me, have them enter their pre-treatment assessment information in the Nx2me App on their iPad.

Lesson 5: Setting up for treatment

- When the patient demonstrates proficiency with the entire setup and treatment process, review the *Cycler Treatment Checklist*.
- Refer to the section “How do I use the cycler,” in the *NxSTEPS VersiHD Reference Guide*.
- Gather the necessary treatment supplies.
- Help the patient locate the list of supplies in the *NxSTEPS VersiHD Reference Guide*.

Lesson 6: Determining ultrafiltration volume and ultrafiltration rate

- Refer to the Nurse Guide for system settings.
- Use the Dosing Calculator to get several prescription options for the patient.
- Discuss the appropriate treatment frequency, volume, and ultrafiltration parameters for the patient’s treatment.
- Show the patient how to determine the ultrafiltration rate for each treatment.
- Explain that accurately calculating the ultrafiltration volume and rate to be removed during each treatment is important.
- Emphasize the importance of not removing ultrafiltration fluid too quickly and preventing potential hypotension and cardiac stunning. ¹
- Explain that clinical evidence suggests the ultrafiltration rate should not exceed 8 ml/Kg/hr. ²



Note: Even a moderate fluid removal rate during an individual hemodialysis session is associated with decreased patient survival. ³

- Use the *NxSTEPS VersiHD Reference Guide* to help the patient write in their vital signs ranges, dry weight parameters, ultrafiltration volume, and rate parameters.
- Discuss when to call the center for instructions if the patient's ultrafiltration volume or rate exceeds the recommended maximum.
- System Setting 80 can be set to a maximum ultrafiltration rate so that the patient cannot exceed the recommended ultrafiltration rate for the treatment.

Lesson 7: Performing treatment

- Refer to the following resources:
 - *VersiHD User Guide*
 - *NxSTEPS VersiHD Reference Guide*
 - “Prepare for Treatment/ Interpret Your Prescription” section of the *Training Flipbook for VersiHD*
- Use the Dosing Calculator to calculate the patient's therapy prescription options.
- Demonstrate how to set up for treatment.
 - Assure the patient that during the training period they will practice preparing, setting up, and performing their treatment.
- Show the patient the table of contents from both the *VersiHD User Guide* and the *NxSTEPS VersiHD Reference Guide*. Review the procedures they would use when doing a treatment at home.

Lesson 8: Ending treatment

- Explain that treatment automatically ends when the following conditions are met:
 - The prescribed volume of treatment has been delivered.
 - The prescribed ultrafiltration has been removed.
 - All alarms are cleared.
- Use the *NxSTEPS Nurse Guide* and the *VersiHD User Guide* to teach the patient how to confirm end of treatment and perform an automated rinseback.
- The patient should understand that ending treatment early is not recommended.
- The patient can end the treatment early, before the targets are met, if required.
- How to end treatment early:
 - Tap and hold the **STOP** icon for two seconds.
This ensures a quick transition to rinseback without requiring an emergency rinseback.

Lesson 9: Recording post-treatment information

- Show the patient how to record treatment information and post-treatment assessment information on their flowsheet.
- For patients using the Nx2me App, show them how to do the following:
 - Complete their post-treatment assessment.

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- Confirm the flowsheet.
- Send the flowsheet.

Lesson 10: Disposing of used supplies

- Refer to the following:
 - *VersiHD User Guide*
 - *NxSTEPS Nurse Guide*
- Teach the patient how to dispose of used treatment supplies and how to correctly clean and disinfect the NxStage equipment.

Create and maintain PureFlow

Follow the instructions in ““II: Create and maintain PureFlow” on page 119 of this Nurse Guide.

Troubleshooting alarms

Follow the instructions in “I: Troubleshooting alarms” on page 145 of this Nurse Guide. In addition, review the lessons below.

Lesson 1: Common procedures

- Some important procedures are done less frequently by the patient at home.
- To maintain the patient’s skills, practice these procedures at regular times, such as at the monthly clinic visit or during a home visit.
- Teach the patient how to locate and read the sections on common procedures in the following:
 - *VersiHD User Guide*
 - *NxSTEPS VersiHD Reference Guide*
- Allow the patient to practice these common procedures during training.

Lesson 2: Troubleshooting overview

- Refer to the following:
 - *VersiHD User Guide*
 - *NxSTEPS Nurse Guide*
 - *Training Flipbook for VersiHD*
 - *NxSTEPS VersiHD Reference Guide*
- Focus specifically on the warnings that pertain to the risk of blood clotting and delivering a manual fluid bolus.
- Refer to troubleshooting sections/chapters in the user guides for the equipment that the patient will use:
 - *Express Fluid Warmer User Guide*
 - *PureFlow SL User Guide*

- *Fluid Detection System User Guide*
- In the *VersiHD User Guide*, ask the patient to:
 - Locate the “Troubleshooting” chapter.
 - Review the warnings and precautions.
- Explain that the patient will learn and practice the following common troubleshooting procedures:
 - Manual fluid bolus
 - Automated rinseback
 - Clotting in the dialyzer or blood circuit
 - Checking dialyzer for clotting
 - Alarm system overview
 - Standard response to red alarms
 - Overview of safety and control systems
 - Alarm types
 - Alarm and caution priorities

Lesson 3: Understanding the troubleshooting process

- The user guide describes the following troubleshooting process:
 1. The cyclor has an alarm.
 2. The patient sees and hears the alarm.
 3. The patient identifies the cause of the alarm under the “Check For” section.
 4. The patient follows the “Do” instructions.



Note: Do not continue to look for additional causes.

- Help the patient understand the following:
 - The probable cause or location of the alarm and how it relates to the safety and control systems in the cyclor and cartridge.
 - The troubleshooting process and how to follow the “Check For” and “Do” sequence to resolve the alarm.
 - How to identify the priority of the alarm.
 - How to identify the alarm number, find the alarm in the user guide, and follow the instructions to resolve the alarm.

Lesson 4: Recognize when an alarm may take more time to resolve

- Determine a reasonable number of consecutive times (2-3) that a patient may experience an alarm before they rinseback their blood, rather than continue treatment and risk the blood circuit clotting.
- Make sure the patient understands the potential result of blood loss:
 - Refer to the cartridge instructions for use for the cartridge and dialyzer blood volume.

- Some patients may be adversely affected by even a single cartridge of blood lost.
- Instruct the patient about the importance of reporting blood loss and any significant symptoms related to blood loss to their center.

Lesson 5: Resolving a Balance Chamber Red Alarm and Return to Treatment Mode

- For red alarms 35, 37, 38, and 39 a yellow caution 9 can occur after tapping the **STOP** icon. If this happens do the following:
 1. Tap the **STOP** icon to clear the red alarm.
 - Yellow caution 9 may appear. This indicates high pressure recovery.
 - Do not tap **STOP**.
 2. Tap the **TREATMENT** icon.
 - When the high pressure recovery is complete, the yellow caution 9 disappears.
 - Treatment and all the pumps resume.
 - Red alarm 37, 38 may recur a few times after the yellow caution 9 disappears, if the pressure remains high. Repeat the steps above to fix the alarm.
- Show the patient how to resolve the balance chamber alarm and return to TREATMENT mode.
- Have the patient demonstrate the response for a balance chamber alarm and resume treatment.
- Make sure the patient understands the alarm response sequence and successfully returns to treatment.

Lesson 6: Alarm requires additional time to resolve and enters Blood Pump Only mode

- If the patient needs more time to resolve the alarm, Blood Pump Only mode is available.
- This mode keeps the blood pump running at the prescribed rate to prevent clotting of the blood circuit. Clotting can lead to potential complications such as:
 - A blood clot being released into the patient's bloodstream resulting in a blockage (thromboembolism).
 - Sustained high pressures in the blood circuit resulting in a dialyzer blood leak or hemolysis.
- The potential for clotting increases every time the blood flow stops, after multiple alarms, and with prolonged alarm recovery times.
- Using this mode may help reduce a patient's alarm anxiety, because it gives them more time to think through the alarm and respond properly.
- Using this mode can help prevent clotting and/or blood loss due to repeated alarms in the fluid circuit.

Practice this scenario:

- The patient cannot fix the cause of the alarm and needs more time to resolve the cause.
 1. Tap and hold the **STOP** icon for two seconds.
 - The blood pump starts to run at the treatment rate.
 2. Explain that the Blood Pump Only mode is beneficial because the blood keeps moving in the circuit, which reduces the risk of clotting.
 3. After the patient resolves the alarm, tap the **TREATMENT** icon to return the cyclor to return to Treatment mode.

Lesson 7: Alarm cannot be resolved: End Treatment and Rinseback Blood

- If the patient cannot resolve the alarm, they should end the treatment and rinseback the blood.

To end Treatment mode:

- Tap and hold the **STOP** icon for two seconds.
 - If the ultrafiltration goal was met and additional fluid is administered through rinseback, the middle window (ultrafiltration) counts up to show the amount of extra fluid given to the patient.
 - If the patient received extra fluid from a manual saline bolus or addition rinseback volume, the post-treatment weight can be higher than expected. That extra fluid may be removed at the patient's next dialysis treatment.
- Show the patient how to end the treatment and rinseback their blood when several attempts to resolve the red alarm are unsuccessful.
- Follow the instructions in the *VersiHD User Guide* to end the treatment and rinseback the blood.
 1. After the yellow caution 9 appears, tap the **TREATMENT** icon to resume treatment.
 2. Tap the **STOP** icon.
 3. Tap the **STOP** icon again to enter Rinseback mode.
 4. Tap the **ADD FLUID** icon to begin Rinseback.
 5. Observe the blood lines. They should be cleared of blood.
 6. If more saline is needed to return all of the blood, tap the **ADD FLUID** icon again.

Power Events

- Refer to the “General events” section in the “Troubleshooting” chapter of the *VersiHD User Guide*.
- These are the general power issues that may occur:
 - The cyclor will not turn on.
 - The power on indicator light is lit green, but the screen is blank.
 - Continuous beep with nothing on the screen.
- Discuss the probable causes and actions required for each of the power-related issues.
- Tell the patient to call NxStage Technical Support if they cannot resolve the issue.

Manage medical complications

Follow the instructions in “II: Managing medical complications” on page 177 of this Nurse Guide.

References

1. Flythe JE, et al., Rapid fluid removal during dialysis is associated with cardiovascular morbidity and mortality. *Kidney Int.* 2011;79(2):250-257.
2. Assimon, M.M. et al. Ultrafiltration Rate and Mortality in Maintenance Hemodialysis Patients. *Am J Kidney Dis.* 2016;68(6):911-922.
3. Chazot C, Vo-Van C, Lorriaux C, et al. Even a moderate fluid removal rate during individualised haemodialysis session times is associated with decreased patient survival. *Blood Purif.* 2017;44:89-97.



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