

Critical Care PROCEDURE

CATEGORY: System-Level Clinical

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TITLE: **BLADDER SCAN**

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PURPOSE

To outline the procedure for bladder scanning. The system is not a diagnostic device and is only intended as a measuring tool.

INDICATED FOR USE IF

- The patient is unable to void
- The patient experiences discomfort, urgency or incontinence post void or post catheter removal
- The patient's catheter is not draining
 - A physician order is not required to perform a bladder scan, but one is required to perform an intermittent catheterization on a patient with urinary retention.
 - The bladder scanner may be used on patients of all ages

Special Instructions

- **Do not** perform a bladder scan on:
 - a pregnant patient, a patient with ascites, or a patient with open wounds in the suprapubic or abdominal area.
- Be aware of the following conditions and use care while scanning on:
 - Patients who have had abdominal surgery. Scar tissue, surgical incisions, sutures and staples can affect ultrasound transmission and accuracy
 - Catheterized patients. A catheter in the bladder may affect the accuracy of the bladder volume measurement. However the volume may still be useful in detecting whether a catheter is blocked.
 - Obese patients. Obesity may affect bladder volume measurements.

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PROCEDURE**Equipment**

- Non Sterile Gloves
- Bladder scanner
- Ultrasound transmission gel or ultrasound gel pads
- Approved disinfectant and a soft cloth moistened (to clean probe prior to disinfecting)
- Washcloth (to clean gel off patient)

See **Appendix A** for BVI 3000 Bladder Scanner

See **Appendix B** for Prime Bladder Scanner

MethodPatient and Family Education

Provide an explanation of the procedure and why it is being performed.

Assessment and Preparation

1. Perform hand hygiene before patient contact.
2. Verify the correct patient using two identifiers.
3. If the patient is female follow the steps below according to the model being used.
 - For the BVI 3000, use the female option for women who have not undergone a hysterectomy and for all other patients use the male option.
 - For the Prime, chose the female option and answer the question appropriately for the female patient.
 - **Selecting the wrong gender or selecting the female gender for a woman who has had a hysterectomy may result in an inaccurate measurement on some devices.**
4. For a pre-void measurement, confirm that the patient's bladder is full and ask what time the last void occurred.
5. For a post-void residual volume measurement, instruct the patient to empty the bladder before the scan.
6. Place the patient in a reclining or supine position.
7. Clean the probe with isopropyl alcohol or other approved disinfectant.

Procedure

1. Perform hand hygiene and don gloves.
2. Verify the correct patient using two identifiers.
3. Explain the procedure to the patient and ensure that he/she agrees to treatment.
4. Turn the bladder scanner on.
5. Select the appropriate patient type (male, female, pediatric or obese)
6. Palpate the pubic bone and apply a generous amount of ultrasound gel or an ultrasound gel pad, above the pubic bone, taking care not to incorporate air bubbles that may interfere with transmission.
7. Place the probe on the gel above the symphysis pubis and point it toward the expected location of the bladder, tilting the probe slightly toward the patient's coccyx or the patient's head per the manufacturer's recommendations. In an obese patient, lift as much abdominal adipose tissue out of the way as possible and apply more pressure into the abdomen.
8. Apply enough pressure with the probe that there is adequate skin contact with the probe at all times during the scan.
9. Press the scan button on the probe and hold it steady until the scanner beeps, or press and release the scan button per the manufacturer's recommendations.

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10. Assess probe placement as instructed by the manufacturer.
11. Scan the bladder to obtain the measured volume.
12. Obtain the bladder scan results.
13. Turn the scanner off.
14. Remove the gel or gel pad from the patient.
15. Clean visible contaminants from the exterior of the device with a moistened soft cloth and allow the device to air dry before disinfecting with an approved disinfectant.
16. Discard supplies, remove gloves, and perform hand hygiene.
17. Document the procedure and patients tolerance in the patient's record.

Monitoring and Care

1. Assess, treat, and reassess patients condition.
2. If the bladder scan residual is greater than or equal to 400 mL, notify the physician to obtain an order to perform an intermittent catheterization (unless a previous order exists). Reassess the patient in 4 hours and PRN for indications to rescan the bladder.
3. If bladder scan results are less than 400 mL, continue to monitor the patient and reassess the patient in 4 hours and PRN for indications to rescan the bladder.

Expected Outcomes

- Accurate measurement of urine present in bladder, pre-procedure volume (suprapubic bladder aspiration), or post-void residual volume

Unexpected Outcomes

- Inaccurate measurement of bladder volume

Documentation

- Indications for performing the bladder scan
- Time of procedure and amount of urine present in bladder
- Whether volume of urine scanned is pre-void volume or post-void residual volume
- Amount of urine voided pre-procedure (if known)
- Nursing actions taken based on bladder scan results
- Unexpected outcomes and related nursing interventions
- Patient and family education
- Patients tolerance to procedure performed

EDUCATION AND TRAINING**Education/Training Related Information**

A bladder scan is also known as a bladder ultrasound. The bladder scanner is a portable ultrasound machine that computes urine volume within the bladder. The bladder scanner may be used to check bladder volume before and after voiding when the patient presents with urinary frequency, incontinence, or inability to void, thus aiding in the diagnosis of urinary retention or incomplete emptying of the bladder. Measuring post-void residual volume can be achieved non-invasively with bladder scanning or invasively with straight catheterization. Use of the bladder scanner decreases the number of bladder catheterizations necessary to check post-void residual volume, thus reducing the risk for catheter-associated urinary tract infections (CAUTIs) and the discomfort associated with catheterization. It may also be used to assess for the minimum amount of urine volume needed for successful suprapubic urine aspiration, thus decreasing the number of attempts needed to obtain an adequate specimen. Use of the bladder scanner can also assist with determining whether a urinary catheter is blocked, if the measurement indicates a full bladder when the bladder should have been emptied by the catheter.







TITLE: **BLADDER SCAN****Maintenance and Battery Life**

Refer to Bladder Scanner Operation Manual- Verathon Bladderscan Prime

CONSOLE BATTERY LEVEL ICONS

The battery level icon is displayed in the Status bar at the top of the touch-screen. The icon and the percentage value next to the icon indicate the remaining battery power. For information about charging the battery, see the procedure [Charge the Battery](#) on page 17.

Table 6. Battery Level Icon






| ICON | FUNCTION |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------|
|  | Battery approximately 100% charged. |
|  | Battery approximately 80% charged. |
|  | Battery approximately 60% charged. |
|  | Battery approximately 40% charged. |
|  | Battery approximately 20% charged. |
|  | Battery discharged. Replace or recharge battery immediately. |

Refer to Bladder Scanner Operation Manual- BVI 3000

BATTERY ICON

The battery icon, located in the upper-right corner of the LCD, indicates the power status of the battery currently installed in your instrument.





Table 2. Battery Icons

| ICON STATUS | PERCENT REMAINING | DESCRIPTION |
|-------------------------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 100% | A fully darkened battery icon indicates that the battery is fully charged and ready for use. |
|  | 75% | A battery icon that is almost full indicates a partially discharged battery. |
|  | 50% | When the battery icon is half-darkened, the battery is partially discharged. This is the most common display, shown during the majority of the battery's charge life. |
|  | 25% | An almost empty battery icon indicates that the battery is nearly discharged. While a few more scans can still be performed, the battery should be replaced at this point. |
|  | 0% | When the battery is fully discharged, the battery icon is completely clear and the BVI 3000 does not work. The discharged battery must be replaced with a charged one. |

TITLE: **BLADDER SCAN****APPENDIX A**BVI 3000 Bladder Scanner**Special Instructions**

- Do not use with patients who have open skin or wounds in the suprapubic region.
- Use with care in surgery patients. Scar tissue, incisions, sutures and staples affect ultrasound transmission and reflection.

Method

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1. Turn on the bladder scanner by pressing the ON/OFF button. |  |
| 2. Press Scan. Select the appropriate gender. If female without a uterus, must select male. | |
| 3. With the patient supine, apply gel. Have the patient lie in the supine position with the abdominal muscles relaxed. Palpate the patient's symphysis pubis (pubic bone). Place a generous amount of gel midline on the patient's abdomen, approximately one inch above the symphysis pubis. Do not spread the gel over the patients abdomen. |  |
| 4. Aim toward the bladder. Standing at the patient's right side, place the probe on the gel and aim toward the expected location of the bladder. For most patients; tilt the probe slightly toward the coccyx so the scan clears the pubic bone. Locate the patient icon on the scan head and ensure the head of the icon points toward the head of the patient when you place the scan head on the patient's abdomen. |  |
| 5. Press and release the scan button, located on the scan head. Hold the scanhead steady throughout the scan. As the scan progresses, you will hear several beeps; once completed, the beeps will stop and the Aiming screen will be displayed. |  |
| 6. Verify the scan. Complete the scan a second time as this helps maximum accuracy. Press X on the LCD screen to clear the scan results. | |

Troubleshooting

| Question | Instructions |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Instrument doesn't turn on | Check the battery icon in the upper right corner of the LCD. If the battery icon is clear or has a battery symbol with an X within it, this indicates that the battery is discharged. Change the battery which can be found on your units designated area. |
| No scan head message | Ensure the scan head is connected. |
| Two volumes present | One is for the largest volume, the other if for the current volume. |
| Clearing the screen | Press the "X" button. |
| Aiming the icon | Accurate results are obtained when the bladder is centered on the crosshairs of the aiming icon. If the bladder is not centered, re-aim the scan head and re-scan the patient. |

APPENDIX B

Prime Bladder Scanner

The following section explains how to perform a scan, as follows:


1. Start the System
2. Prepare for the Exam
3. Input Patient Information or Operator ID (Optional)
4. Measure Bladder Volume
5. Review Exam Results
6. Print, Save, or Exit an Exam
7. View Cost Savings

After the exam has been saved, you can manage saved exam results as follows:

8. Recall a Saved Exam
9. Delete a Saved Exam
10. Export Saved Exams

MEASURING BLADDER VOLUME


PROCEDURE 1. START THE SYSTEM

1. If a charged battery is inserted in the console and the screen is blank, then the instrument is in standby mode. Press the **Standby** button .

If the system has a discharged battery or a battery is not inserted, insert a charged battery.

2. Allow the instrument to start. The Home screen appears when the instrument is fully started.



Note: If you do not wish to use the system immediately, wait for startup to complete, and then press the **Standby** button .

PROCEDURE 2. PREPARE FOR THE EXAM

1. Ensure you are familiar with the instrument touch-screens and probe displays. For more information about the components and user interface, see the [Introduction](#) chapter on page 7.
2. Check the instrument battery icon to ensure the battery has sufficient power.
Note: If the battery icon is 20% full or less, replace the battery with a fully charged battery before proceeding.
3. Ensure that the instrument has been properly cleaned according to the instructions in the [Cleaning & Disinfecting](#) chapter on page 48.
4. On the Home screen, tap the appropriate procedure button, **Male**, **Female**, or **Small Child**.
5. If the patient is female, ask the patient if she has a uterus. On the console screen, answer the question appropriately for the female patient.



6. On the Before You Scan screen, select whether you are standing on the patient's left or right side. The currently selected orientation is displayed in dark text on a white background.



PROCEDURE 3. INPUT PATIENT INFORMATION OR OPERATOR ID (OPTIONAL)

The BladderScan Prime system lets you enter the following patient information:

- Patient ID
- First name
- Last name
- Sex
- Date of birth

Once entered, the Patient ID displays on appropriate BladderScan Prime screens. Patient information can also be printed on reports.

The Operator ID may also be updated at this time. The Patient ID and Operator ID fields are displayed at the top of many screens. You can tap the field and update Patient or Operator ID information whenever the field is visible.

1. On the Before You Scan screen, tap **Patient ID**. The Patient and Operator ID screen appears.



2. On the Patient Data screen, tap **Patient ID**, use the virtual keyboard to type a value, and then press **Enter**.
3. Tap **Patient First Name**, and then use the virtual keyboard to enter the patient's first name.
4. Tap **Patient Last Name**, and then use the virtual keyboard to enter the patient's last name.
5. Tap **Patient Sex**, and then tap the sex for the patient.
6. In the **Date of Birth** field, tap the month, day, or year, vertically swipe to view a value, and then tap the value to select it. Repeat as needed to set the desired month, day, and year.
7. Tap **Operator ID**, and then use the virtual keyboard to enter or update the operator's identifying information.
8. When you are finished inputting the patient's information, tap **Back**.

PROCEDURE 4. MEASURE BLADDER VOLUME

Use one of the following options to measure bladder volume:

- Option 1: Pre-Scan Disabled
- Option 2: Pre-Scan Enabled

By default, the BladderScan Prime system has pre-scan disabled. To enable pre-scan, see [Configure Exam Settings](#) on page 28.

OPTION 1. PRE-SCAN DISABLED

1. With the patient lying in a supine position and with the abdominal muscles relaxed, palpate the patient's pubic bone.



2. Place an ample quantity of ultrasound gel, with as few air bubbles as possible, midline on the patient's abdomen, approximately 3 cm (1 inch) above the pubic bone.

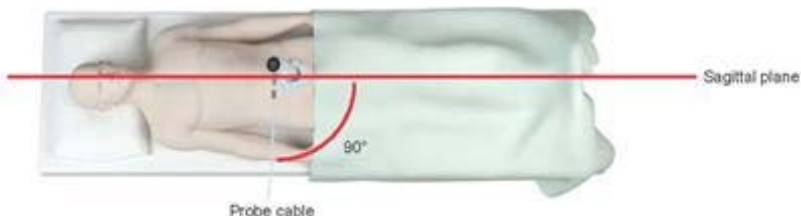


3. Hold the probe by grasping it with the probe cable running up your wrist and forearm.



TITLE: BLADDER SCAN

4. Gently press the probe onto the lower abdomen through the gel. The probe cable should be oriented at 90 degrees to the sagittal plane of the patient.



5. If you are scanning an obese patient, lift as much abdominal adipose tissue out of the way of the instrument as possible. Apply more pressure to the probe in order to reduce the amount of adipose tissue through which the ultrasound must pass.
6. Ensure that there are no air gaps between the probe and the patient's skin and that you are applying enough pressure to maintain adequate skin contact until the scan is complete.
7. Target the bladder by manipulating the probe.
- Angle the probe slowly side to side.
 - Point the probe slightly downward toward the tail bone (coccyx) and angle the probe along the body's midline.



8. Press and release the probe Scan button, or tap **Scan** on the Scanning Preview screen. The scanning process begins.



9. Hold the probe steady while the scan is in process. When you hear the end-scan tone, the scan is complete.

OPTION 2. PRE-SCAN ENABLED

You can locate the bladder with or without a bladder outline to assist with aiming. By default, the BladderScan Prime system has the bladder outline display turned on. To disable the bladder outline, see [Configure Exam Settings](#) on page 28.

1. With the patient lying in a supine position and with the abdominal muscles relaxed, palpate the patient's pubic bone.



2. Place an ample quantity of ultrasound gel, with as few air bubbles as possible, midline on the patient's abdomen, approximately 3 cm (1 inch) above the pubic bone.

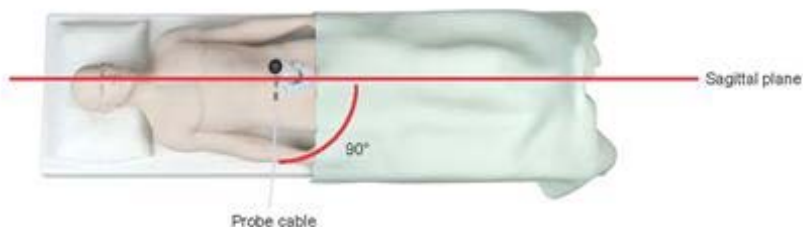


3. Hold the probe by grasping it with the probe cable running up your wrist and forearm.



TITLE: BLADDER SCAN

4. Gently press the probe onto the lower abdomen through the gel. The probe cable should be oriented at 90 degrees to the sagittal plane of the patient.



5. If you are scanning an obese patient, lift as much abdominal adipose tissue out of the way of the instrument as possible. Apply more pressure to the probe in order to reduce the amount of adipose tissue through which the ultrasound must pass.
6. Ensure that there are no air gaps between the probe and the patient's skin and that you are applying enough pressure to maintain adequate skin contact until the scan is complete.
7. Press and release the probe Scan button or tap **Aim** on the Before You Scan screen. A real-time B-mode ultrasound image appears on the console screen.
8. Target the bladder by manipulating the probe. If enabled, the *BladderTraq™* setting highlights the detected bladder area with a green outline.
 - Angle the probe slowly side to side. Center the dark (bladder) area relative to the vertical green line on the aiming screen.
 - Point the probe slightly downward toward the tail bone (coccyx) and angle the probe along the patient's midline to obtain the largest possible dark (echo free) area.



9. Press and release the probe Scan button again, or tap **Scan** on the Scanning Preview screen. The scanning process begins.
10. Hold the probe steady while the scan is in process. When you hear the end-scan tone, the scan is complete.

PROCEDURE 5. REVIEW EXAM RESULTS

This section describes the procedures that can occur after the scan. Perform the procedures that are applicable for your installation.

The accuracy range for the instrument is determined by using the following calculation: $\pm (15\% \pm 15 \text{ mL})$.

For example, if the volume measurement is 250 mL, the accuracy range is calculated as follows:

$$250 \text{ mL} \times 15\% = 38 \text{ mL}$$

$$38 + 15 \text{ mL} = 53 \text{ mL}$$


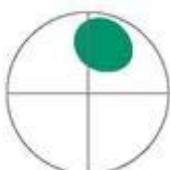

$$250 \pm 53 \text{ mL} = 197\text{--}303 \text{ mL}$$

Note: A maximum of five scans can be stored in scan history. If more than five scans are performed, the oldest scan is deleted to accommodate the newest scan.

CONFIRM AIM

- When the Results screen appears, assess the accuracy of the scan as follows:

Table 8. Bladder Measurement Accuracy

| RESULT | INDICATOR(S) | EXAMPLE |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Successful | If the scan is successful and on-target, the bladder appears in the center of the crosshairs. |  |
| Off-target or EdgeScan™ | If the bladder is not centered in the target, or if the bladder is only partially contained in the target (also known as an EdgeScan), then the scan was unsuccessful. Move or angle the probe in the direction of the bladder on the display. If the instrument displays a greater than symbol (>) preceding the volume measurement, apply less pressure and rescan. The greater than symbol may also appear if two sides of the bladder wall are outside the image cone as a result of a bladder that is larger than the ultrasound scan. |  |
| Pubic bone interference | If the scan includes the pubic bone, the display indicates that the pubic bone is inside the image cone. If this occurs, you may want to re-aim and re-scan. Although the bladder may be shown as centered in the image cone and your measurement may be complete, there is a possibility the pubic bone is obscuring part of the bladder. By re-aiming and re-scanning you can ensure you have captured the bladder fully inside the image cone. |  |

- If you want to rescan the patient, on the Results screen, tap **Scan**.
Repeat the scanning procedure as necessary to correct a less-than-optimal scan or confirm the initial measurement.
- When you are finished scanning, you can review the results in B or C modes. (C-mode is displayed by default.) You can save scan results, and you can print scan results if you have the printer installed.

VIEW B-MODE IMAGES

4. If you want to view B-mode images, tap the B-mode icon. Dual-pane B-mode images of the scan appear.



In the top-left corner of each of the B-mode images, the line through the human figure icon indicates the currently displayed plane.

5. Horizontally swipe the B-mode display to navigate through the scan planes.

VIEW MULTIPLE SCANS

When you perform more than one scan, the Results screen displays the largest volume obtained. Below the largest volume measurement, the screen indicates the most recent scan volume.



6. If you want to show individual scan measurements, tap the **Scan History** arrow.



7. Tap the scan measurement number to see the scan display.



8. Continue to the following procedure, [Print](#), [Save](#), or [Exit an Exam](#).

References and Related Documents

Agency for Healthcare Research and Quality. (2015). Toolkit for reducing catheter-associated urinary tract infections in hospital units: Implementation guide. Technical interventions to prevent CAUTI. AHRQ Pub No. 15-0073-2-EF.

Verathon. (2015). *Bladderscan BVI 3000 Operations & Maintenance Manual*. Bothell, Washington: Author.

Verathon. (2015). *Bladderscan Prime Operations & Maintenance Manual*. Bothell, Washington: Author.