

The use of bedside ultrasound in the pre-hospital environment improves the assessment and rapid triage of trauma and critically ill patients. Focused examinations aim to rapidly identify free fluid in the abdominal, thoracic or pericardial cavities and assist in the assessment and management of patients in cardiac arrest.^[1-6]

The Focused Assessment using Sonography in Trauma (FAST) examination assesses four standardised ultrasound views that use gravity-dependent regions to rapidly identify intraperitoneal and/or pericardial fluid.

1. Cardiac (most often subxiphoid, but other views may be obtained):

- pericardium and
- heart chambers, especially the right ventricle

2. Right Upper Quadrant (RUQ):

- Morrison's Pouch (hepatorenal recess)
- liver tip (right paracolic gutter) and
- lower right thorax

3. Left Upper Quadrant (LUQ):

- subphrenic space splenorenal recess
- spleen tip (left paracolic gutter) and
- lower left thorax

4. Pelvic:

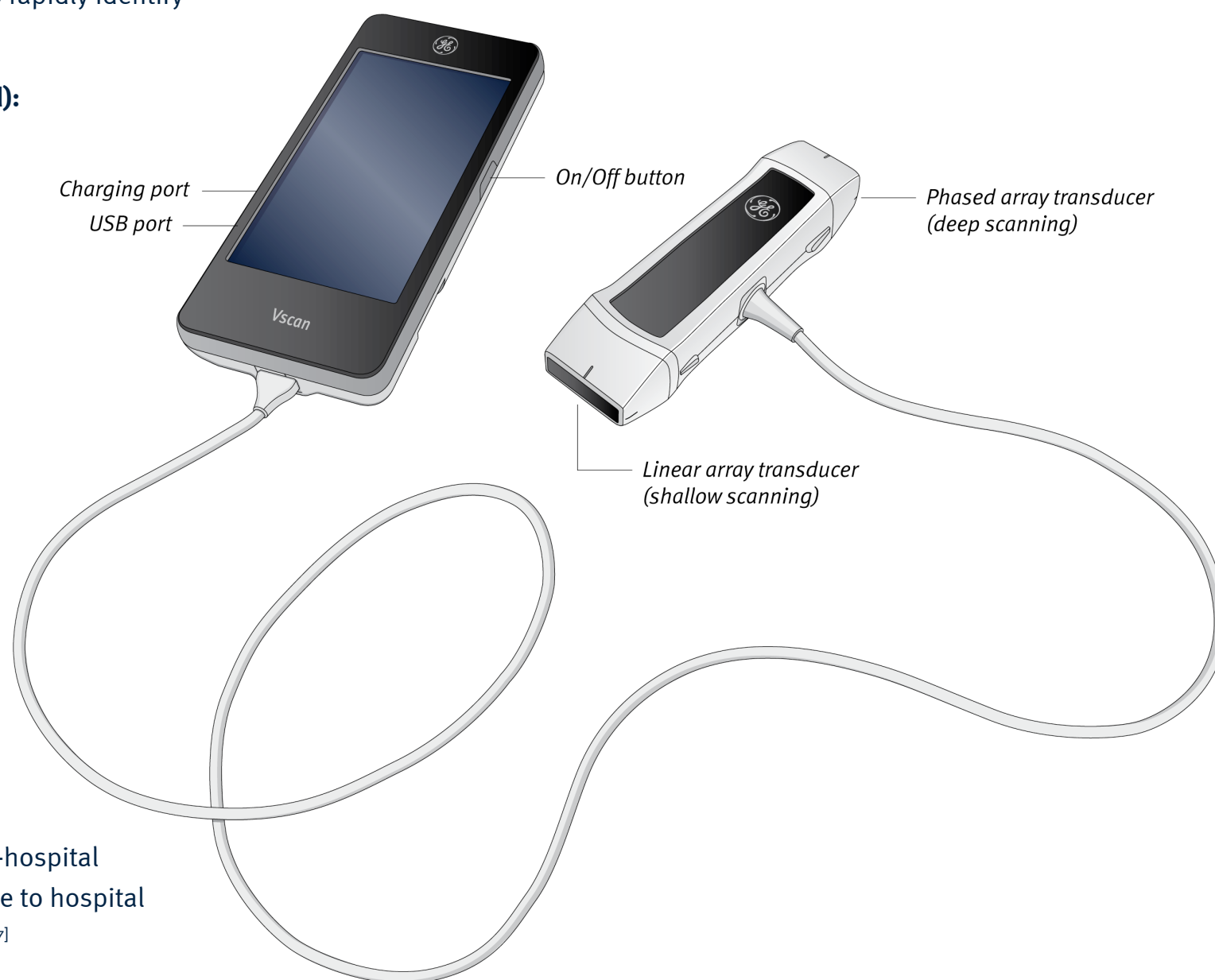
- rectovesical pouch (male patients) or
- in female patients, rectouterine/pouch of Douglas

A scan is deemed positive if any free fluid is visualised. However, it is important to note that a negative scan does not exclude internal haemorrhage.

The identification of a positive FAST has the potential to improve pre-hospital trauma management and has been shown to significantly reduce time to hospital admission and time to operative treatment in this group of patients.^[7]

Vscan Extend™ is a pocket-sized, battery powered general purpose diagnostic ultrasound system. The system consists of a handheld unit with a 5 inch touch screen display and a permanently attached probe.

The Vscan Extend™ is configured with a Dual probe holding both a phased array and linear array transducer for deep and shallow scanning.



Indications

- Blunt and/or penetrating abdominal and/or thoracic trauma

Contraindications

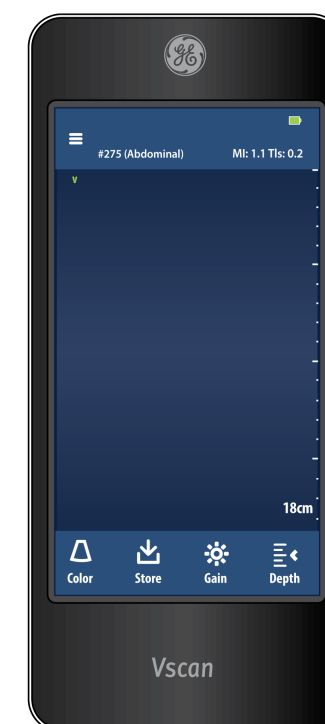
- Nil

Complications

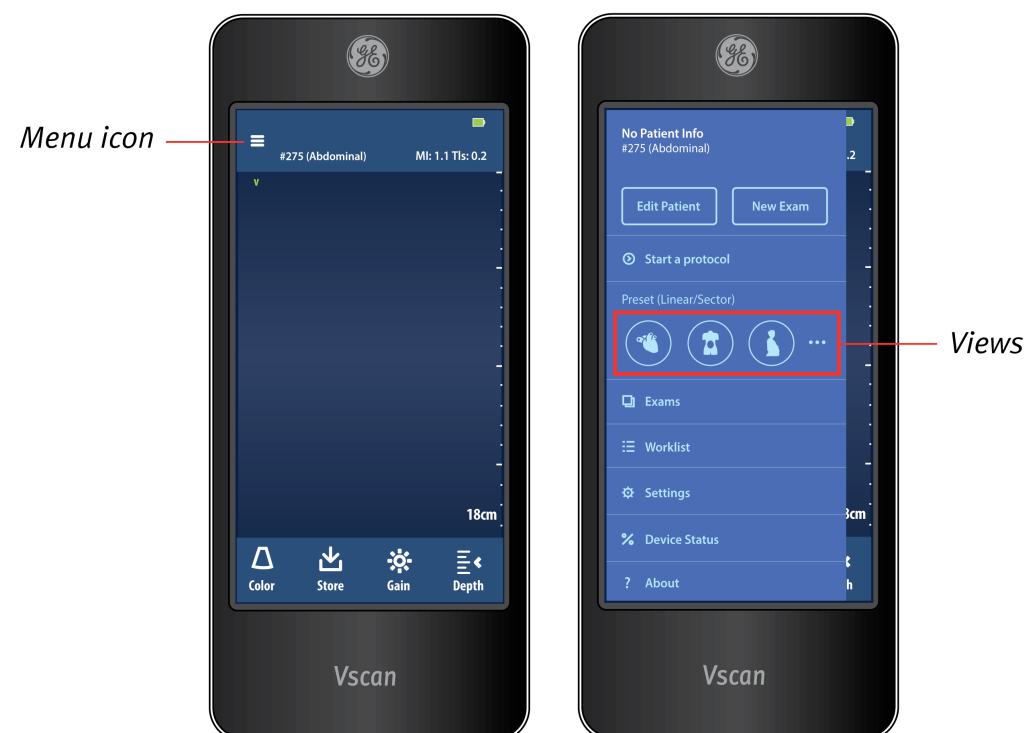
- The use of focused ultrasound is a dynamic process where results can change with time. Clinical judgement must guide patient management irrespective of imaging findings.
- Free fluid in the trauma patient is assumed to be blood; however, in certain premorbid conditions, for example, chronic liver disease, ascites may mimic blood in imaging. Therefore, all FAST results need to be interpreted within the clinical context of the patient.
- The FAST examination requires a minimum of 100–200 mL of fluid for visualisation, smaller collections may go undetected.

PROCEDURE^[8]

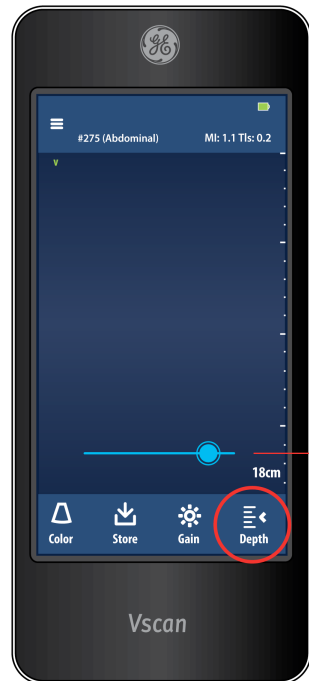
1. Apply required infection control measures (refer to the *QAS Infection Control Framework*).
2. Turn on the device by pressing and holding the power button on the right side of the unit.
3. The device automatically goes into scanning mode, creates a new patient study and defaults to the abdominal view.



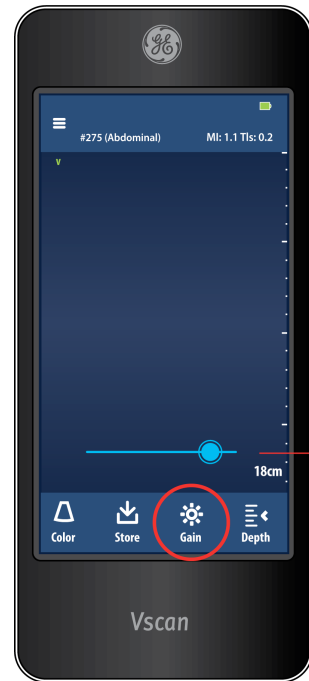
4. To change between **views**: Select the menu icon on the top left of the screen (☰) and choose preset (000) or (. . .)



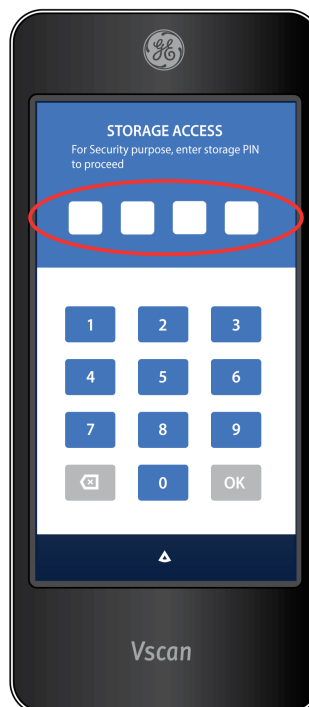
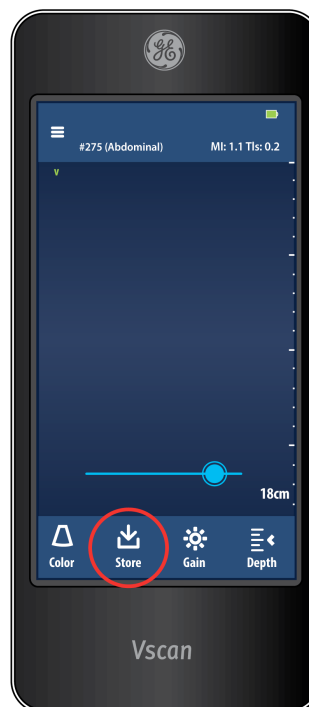
5. To change the **depth**: While scanning, select the icon on the bottom right of the screen and use the track slider to zoom in (left) or out (right).



6. To adjust the **gain**: While scanning, select the menu icon on the bottom of the screen, second from right, and use the track slider.



7. To **store** a video loop: Select the menu icon on the bottom of the screen, second from left, enter the PIN code, and press store.



8. To power off device, press the power button and select power off on the screen.
9. Clean the device and probe using disinfectant wipes.
10. To export images, plug the usb cable into the device's usb port and the other end into the PC. Turn on the device and select 'allow' on the screen.

Additional information

- Ensure the cables for each device are carefully stored to prevent damage to the fibre optics.
- A positive scan is the identification of free fluid in ≥ 1 of the four 4 views. A rim of 0.5 cm equates to approximately 500 mL of free fluid and with experience the clinician can identify volumes of < 250 mL.
- The examination should ideally be completed within 2 minutes and the results conveyed to the receiving trauma centre.
- An appropriately placed pelvic binder will not impede the pelvic view.

View	Probe positioning for optimal view
Morrison's (hepato-renal)	From the xiphisternum the probe is moved to be aligned in the midaxillary line in the patient's right upper quadrant. The probe is then angled posteriorly to gain an image with the kidney in long axis. Scan around the area to exclude free fluid lying superior to the liver.
Spleno-renal	From the xiphisternum the probe is moved to the patient's left upper quadrant in the midaxillary line. The probe is angled posteriorly to image the potential space between the kidney and the spleen, with the kidney in long axis. Scan around the spleen to exclude free fluid that may collect between the diaphragm and spleen.
Pelvis	The initial view is gained in the longitudinal position with the image including the pubic symphysis and the bladder. Once the bladder position is confirmed the probe is rotated 90 degrees to image the bladder in transverse. Free fluid is located in the pouch of Douglas (in the female) or lateral /inferior to the bladder (in the male).
Subxiphoid	The probe is positioned just below the xiphisternum, angled towards the left shoulder and tilted superficially. This can be a challenging view to obtain in patients with epigastric tenderness or large amounts of bowel gas. Often, sliding the probe to the patient's right to include a 'liver window', may improve the image acquisition.
Haemothorax	This scan is performed as an extension of the abdominal portion of the FAST, with the probe slid cephalad to include the pleural spaces above the hepato-renal and spleno-renal views. Free fluid here is seen as dark (anechoic) and may contain collapsed lung moving in the fluid. An estimation of volume can be obtained (in mL) by measuring the depth of free fluid (in cm) x 200.
Limited ECHO	Performed in the subxiphoid view with placement of the ultrasound gel away from the sternum so as not to interrupt or impede compressions. The images are obtained during the planned breaks in compressions and may require 2 cycles to complete.