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All Sites	VAS-DP-8	Kelly Swagell	
Title		Version Date	Version Number:
Upper limb venous ultrasound		Dec 2021	1.1

### Scope & purpose

An upper limb venous duplex is used to evaluate the deep and superficial venous systems of the upper limb in order to identify the presence of thrombus. The patients may be symptomatic or the scan may be done prior to the insertion of catheters into the central veins.

Common indications for the performance of upper limb venous duplex evaluation include:

- Swelling
- Pain
- Tenderness
- Palpable cord
- Assessment before, after or during central line placement

### Personnel

Clinical vascular scientists (CVS), including trainees.

### Principles / performance characteristics

For an upper limb venous scan the deep and superficial veins are imaged from the supraclavicular fossa to the wrist using B-mode, colour Doppler and spectral Doppler to assess for the presence of thrombus.

### Service users & background

A wide range of patients may be referred for this scan, from outpatient and inpatient settings. Ideally, if the scan is requested for the exclusion of deep vein thrombosis (DVT) then the patient would be scanned on the same day that the referral is received. Once the patient has had their scan they would normally be seen on the same day by the referring team with the results. If they are not and there is a positive finding for DVT then the referring team are contacted to inform them of the results.

There are few contraindications for upper limb venous duplex ultrasound; however, limitations may include the following:

- Raised BMI
- Severe oedema / swelling
- Dressings, casts, open wounds, staples, haematoma etc.
- Acoustic shadowing
- Patients who are unable to cooperate due to reduced cognitive functions e.g. Alzheimer's or dementia and through involuntary movements
- Examinations undertaken at the patient's bedside may be limited due to equipment and room dimensions
- IV or catheters that limit visualisation of vessels
- Patient discomfort
- Bone; A short segment of the subclavian vein cannot be examined as it moves under the clavicle

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### Facilities, equipment & special supplies

Duplex ultrasound machine with both linear and curvilinear transducers available. There should be a selection of transducers delivering a wide range of frequencies (high and low).

The examination couch should be height adjustable and ideally the head rest should be able to go up and down. The CVS's chair should provide good lumbar support, be height adjustable and allow for the CVS to move close to the examination couch.

Ultrasound gel to provide a couplant between transducer and patient.

Cleaning materials should be available in line with local and manufacturer's guidelines. These are available either in each procedure room or located in the laboratory store room.

### Calibration

Across all sites annual calibration and safety checks of the ultrasound equipment are performed by Clinical Engineering (Trust contract with GE Healthcare).

### Quality control

Second opinions from vascular scientist colleagues are requested routinely if clarification is sought.

Trainee vascular scientists have all upper limb venous scans checked until they are signed off by a senior colleague for competency.

### Environmental & Safety Controls

Infection control procedures followed in accordance with Trust infection control and risk assessment policies – Please see 'Personal Protective Equipment (PPE) for infection prevention and control' policy, 'Hand Hygiene' policy and 'Staff Risk Assessments' which are all available through the Trust Intranet.

Tristel wipes are for cleaning the ultrasound machines and probes after patient use. Universal Clinell wipes are for cleaning all other equipment. Where high risk infection presents or post-op wounds are present use probe covers with sterile gel or Tegaderm dressings, in addition to routine cleaning.

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## Upper venous limb ultrasound procedure (ref 1)

	<b><i>Preceding document:</i></b> VAS-MP-6 Patient management
1.	<p>The examination may be unilateral or bilateral dependent upon clinical symptoms. The patient is asked to remove their clothing to expose the upper limb from wrist to neck.</p> <p>The following appropriate techniques should be used to evaluate the upper limb venous system:</p> <ul style="list-style-type: none"> <li>• <b>B-mode</b> should be used to image the vein with and without compression. Adequate compression of the central veins (IJV, distal brachiocephalic vein and subclavian vein) is unlikely due to their anatomical position. Incomplete compression of the other upper limb veins may indicate possible thrombus. If thrombus is present, echogenicity can be used a guide to determine its age (chronic/acute). It is also important to determine the occlusive nature of the thrombus using B-mode in conjunction with colour flow.</li> <li>• <b>Spectral Doppler</b> should be used within the subclavian or brachiocephalic vein to assess the waveform (i.e. whether it is phasic in nature). If necessary, compare this with the other side as venous flow differs widely from patient to patient. In order to augment the phasic nature of flow it may be necessary to ask the patient to exaggerate their breathing by taking a deep breath in and out. Continuous flow can be an indicator of more proximal occlusion.</li> <li>• <b>Colour Doppler</b> should be used to assess for the presence/absence of flow in any areas where compression is incomplete. Gentle squeezing of the hand/forearm can be performed to augment flow and identify occlusive/non-occlusive thrombus.</li> </ul> <p>The machine controls should be optimised continually throughout the scan to obtain the best image to aid with diagnosis.</p>
2.	<p>The following veins should be assessed in a standard scan:</p> <ul style="list-style-type: none"> <li>• Internal jugular vein (IJV)</li> <li>• Distal brachiocephalic vein</li> <li>• Subclavian vein</li> <li>• Axillary vein</li> <li>• Brachial vein</li> <li>• Ulnar veins</li> <li>• Radial veins</li> <li>• Cephalic vein</li> <li>• Basilic vein</li> </ul> <p>For a central venous access scan only the following veins are imaged: IJV, distal brachiocephalic vein and subclavian vein.</p>
	<b><i>Subsequent documents:</i></b> VAS-MP-6 Patient management, VAS-MP-1 Results

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## Reporting

The diagrammatic report is a record and interpretation of observations made during the upper limb venous duplex ultrasound examination; it should be written by the CVS undertaking the examination.

The report should include correct patient demographics, date of examination, examination type, the name and status of the CVS and any clinical history deemed relevant.

The report should include:

- The presence/absence of phasic flow in the proximal veins
- Which veins have been assessed and the presence/absence of any thrombus,
- Where thrombus is identified, the location, length/extent, degree of patency and where possible the estimated age should be documented (acute vs chronic)
- Any limitations e.g. if veins not imaged due to cannula insertion

If a DVT is detected and the patient is an outpatient and not being seen by the referring team that day then the patient should remain in the department until the referring team are contacted and informed of the results.

Any incidental findings should be documented and further imaging recommended when clinically appropriate.

## References

1. VAS-ED-4. Vascular Technology Professional Performance Guidelines Upper and Limb Venous Duplex Ultrasound: DVT.