**Purpose**

This document serves a guideline to evaluate the deep and superficial venous systems for evidence of valvular incompetence to identify sites of incompetence if any exists. If thrombus exists either deep or superficial, please refer to DVT document for reporting.

**Common Indications**:

Common indications for the investigation of lower limb venous insufficiency include, but are not limited to:

* Skin changes, venous eczema, hyperpigmentation
* Venous ulcers
* Recurrent swelling of the lower calf and ankles
* Pain or feelings of heaviness in the lower extremity
* Visible varicose veins
* Venous claudication
* Pain and oedema of the lower extremities

Contraindications and/or limitations for the evaluation of venous insufficiency are unlikely; however, some limitations due exist for a full investigative exam:

Obesity

* Dressings, open wounds/ulcers
* Severe oedema/swelling.
* Limited mobility e.g. unable to stand.
  + Patient can sit and let legs hang to the side, CVS should adjust couch height to a ergonomic position to reduce RSI.
* Cognitive functions e.g. Alzheimer’s or dementia
* Patient discomfort, particularly calf tenderness.

**Equipment:**

Linear and Curvi-liner probes should be available with a machine optimised for vascular. Compliance with the Medical Devices Directive is necessary. Electrical safety testing is required annually, with regular maintenance and quality assurance testing to specified level by qualified personnel.

The examination couch needs to be height adjustable to minimise RSI. A step stool or stand should be used with two levels to reduce RSI for the CVS. Alternatively, a couch with the ability to tilt with a minimum of 30 degrees would suffice. The CVS’s chair should provide good lumbar support, be height adjustable and allow for the CVS to move close to the examination couch.

**During the exam**

The qualified CVS should perform the following

* Introduce themselves
* Confirm the identity e.g. full name and date of birth
* Explain why the examination
  + Why the exam is being performed and the requirements of the patient.
* A cursory glance of the extremity to be evaluated in full lighting should be performed.
  + which includes observation of the presence of any signs or symptoms of peripheral venous disease: swelling, pain, tenderness, discoloration, varicosities and ulceration.

**Examination:**

* Ask them to remove their clothing to evaluate the lower limb from groin to ankle.
  + Please keep in mind if the patient is the opposite sex to the CVS, ask if they would like a chaperone. If none is available than the exam should be rescheduled notating the patient’s preference.
* Inform them they may feel faint during the exam and to look forward not down. If they become faint or feel uneasy to let the CVS know as soon as possible to avoid a critical incident.
* The patient will be examined standing. Ask the patient how long they can stand. If the patient visually appear to unsteady or a reasonable doubt exists they will not be able to stand for a minimum of 45 minutes follow the below.
  + A table with the ability to tilt a minimum of 30 degrees is not available, the patient can hang legs on side of couch at a 90-degree angle.
  + Attempt to at the minimum scan from the groin to the knee if comfortable for the CVS to assess for incompetence.
  + The CVS can proceed to scan from the knee to the calf to evaluate the venous system with legs handing. Please note this is not ideal and the report should state patient was scanned in an modified a manner. This has the potential to give inaccurate or incomplete results

The following techniques should be applied to all venous segments:

* B mode should be utilised to assess vein diameter and anatomy and compressibility of the vein which should be performed in transverse view.
* Pulsed and colour Doppler should be utilised to assess flow characteristics
  + Colour flow is can be used to assess for incompetence
  + Doppler should be used to reinforce findings if colour suggests incompetence for timing.
* Determining if incompetence exits by the following.
  + A distal compression of the venous system while simultaneously observing colour doppler will yield of incompetence exists.
  + Notate direction and timing by Doppler.
* Start the examination in the groin at the common femoral vein (CFV) and assess the compressibility and flow
* Flow should be spontaneous
  + Abnormal flow in the CFV or abnormal superficial veins in the groin/abdomen may be due to iliac vein outflow pathology. Investigate the cause and report any abnormal findings by examining the iliac veins and inferior vena cava.
  + Examine the lower limb veins FV, Popliteal, PTV, and Peroneal veins. The GSV, Anterior Accessory and any Varices to the distal calf are also to be evaluated. Notate the diameter of any incompetent veins in at least 3 location in the thigh and calf, (Prox,mid,distal). If thrombus is identified the extent of the thrombus should be noted. Incompetence (defined as a reflux time >0.5s for superficial and >1s for deep veins)should also be noted.
    - However please check with vascular Consultant who might wish to change timings above.
* Deep veins should be assessed.
* The Sapheno-Femoral Junction (SFJ) should be assessed for competency
* The GSV should be assessed prox, mid and distal thigh and calf for incompetence.
* Notate any incompetent perforators.
* Evaluate the SSV and Saphno-Politeal junctions.
* The anatomy associated with the origin of the SSV can vary. This should be commented, vein of Giacomini.
* Any Varicose veins not associated with the GSV of SSV should be evaluated as they may be linked to incompetent perforators.

**Reporting:**

* Any abnormal flow patterns
* Which veins have been assessed, the competency of the veins, the origin of the incompetence, the extent of incompetent segments, the presence/absence of any thrombus.
* If there has been previous treatment to veins, i.e. ablations or stripping.
* If there is any thrombus notate the location, length, degree of patency and estimated age of thrombus.
* Any limitations
* An appropriate number of annotated images that represent the entire ultrasound examination - in accordance with local protocols and SVT Image Storage Guidelines.
* Notate size of GSV and course, does the vein exit the fascia and if so where does the vein re-enter?
* Any critical findings i.e. Deep Vein Thrombosis or Superficial thrombosis, <3.0cm from a deep venous junction, should be forwarded to ambulatory care and the requesting consultant.