

## Section A: Preliminary information

### Executive summary

Clinical practice guidelines (or clinical guidelines) are intended to optimise patient care by providing guidance to health and medical professionals on specific topics, medical conditions or clinical scenarios. This clinical guideline aims to provide guidance to sonographers when they are requested to perform a duplex ultrasound (US) examination to investigate chronic venous disease (CVD) of the lower limb. This diagnostic study is universally referred to as a venous insufficiency (VI) or chronic venous insufficiency (CVI) ultrasound examination.

Information in this clinical guideline is provided using 1) educative material, 2) general guidance and 3) recommendations in Sections B-G. Table A1 summarises the types of information or guidance in each of the sections of the clinical guideline.

- Educative material is background information that sonographers performing duplex US for CVD, most probably already have existing knowledge. However, the guideline development group believed that educative sections would be a useful resource for sonographers to update, refresh or fill gaps in their knowledge.
- General guidance and recommendations answer questions around the practice of duplex US for CVD which has been developed using available evidence from the literature and the combined clinical knowledge of the guideline working group. General guidance has been used when questions cannot be answered succinctly using a specific recommendation.
- Recommendations are direct and actionable statements that provide direct answers to questions.

Recommendations are supported by summary statements which present the evidence to justify the recommendation. Each recommendation is also supplemented with different ratings; 1) level of evidence, 2) strength of evidence and 3) consensus. The three levels of evidence ratings (high, moderate, low) indicate rigour of the evidence available in the literature. The three strength of evidence ratings (high, moderate, low) not only considers the rigour of the evidence available in the literature but also factors in the practical application of the recommendation in clinical practice, weighting the balance between benefits and harm, as well as the balance between benefits and costs. The consensus rating indicates whether there was moderate or high agreement among experts in the working group regarding the recommendation. Table A2 provides a summary of all the recommendations in this clinical guideline, along with their ratings.

Supplementary files are provided as additional resources for sonographers. An image gallery is available, and within this clinical guideline, relevant images within the image gallery are denoted in purple text. A complete reference list is provided as a separate document.

It is important for sonographers to understand that this clinical guideline serves as guidance only. Clinical decision making must also consider the specific clinical circumstances of each case, including patient preferences, referrer preferences and any local protocols.

### Funding organisation

The development of this clinical guideline was funded and has been endorsed by the Australasian Sonographers Association (ASA). A volunteer guideline development group was convened for the purpose of developing the clinical guideline. A list of the guideline working group members can be found in Appendix 1. Disclosure statements have been received by all members of the guideline working group.

Table A1: Summary of clinical guideline sections and the information type they contain.

| Section   | Section Heading   | Type of guidance information                 |
|---|---|--|
| Section B: Background   | Glossary (A reference for terms and abbreviations used in this guideline)   | Educative.                                   |
|   | Definition of chronic venous disorder, chronic venous disease, and chronic venous insufficiency (Clarification of terms used in this guideline)   | Educative.                                   |
|   | Contributing risk factors   | Educative.                                   |
|   | Signs and symptoms  | Educative.                                   |
|   | Pathophysiology   | Educative.                                   |
|   | Prevalence and socioeconomic burden   | Educative.                                   |
|   | The role of duplex ultrasound in chronic venous disease   | Educative.                                   |
| Section C: Venous anatomy of the lower limb   | Some notes about general terminology<br>(Provides understanding of terminology used in this guideline.)   | Educative.                                   |
|   | Venous anatomy of the lower limb<br>(Provides extensive anatomical descriptions of venous anatomy relevant to duplex ultrasound examination for chronic venous disease.)  | Educative.                                   |
| Section D: Pre-examination considerations   | What is the purpose of venous insufficiency ultrasound examination?   | Educative.                                   |
|   | What are the indications, contraindications and limitations of duplex ultrasound to investigate chronic venous disease?   | Educative.                                   |
|   | What patient preparation is required?   | General guidance.                            |
|   | What explanation should be provided to the patient prior to the examination?  | General guidance.                            |
|   | What medical and surgical patient history should the sonographer collect?   | General guidance.                            |
|   | How should the sonographers perform clinical assessment prior to the examination?   | General guidance.                            |
| Section E: Performing and interpreting venous insufficiency (VI) ultrasound examination | What information does the referring vascular care provider need?  | Educative.                                   |
|   | Scanning protocol for VI ultrasound examination (includes general guidance and guidance for specific veins in how to assess and interpret images using B-mode, colour and spectral Doppler, vein diameter measurement, cutoff values for duration of reverse flow to diagnose venous reflux, considerations for pre-and post-treatment assessment). | General guidance and Recommendations (E1-E5) |
|   | Differential Diagnosis  | Educative                                    |
| Section F: General considerations.  | What qualification or training is required for sonographers performing duplex ultrasound to investigate chronic venous disease?   | Recommendation (F1)                          |
|   | What are potential limitations, and difficulties that may be encountered in the examination?  | General guidance                             |
|   | Are there any ethical concerns?   | General guidance                             |
|   | When should a bilateral examination be performed?   | General guidance                             |
|   | What instrumentation and settings are required to perform the exam?   | General guidance                             |
|   | How long should the venous insufficiency ultrasound examination take?   | General guidance                             |
|   | What are relevant safety issues, and risk of injuries? How should they be mitigated?  | General guidance                             |
|   | How should the venous insufficiency examination be reported?  | General guidance                             |
|   | What criteria should be used to triage patients by urgency for performing and reporting the duplex ultrasound examination?  | General guidance                             |
| Section G: Technical considerations   | What time of the day should the venous insufficiency ultrasound examination be performed?   | Recommendation (G1)                          |
|   | What position should the patient be in during the venous insufficiency ultrasound examination?  | Recommendation (G2)                          |
|   | What provocation manoeuvres should be used to elicit venous reflux?   | Recommendation (G3)                          |

Table A2: List of recommendations in this clinical guideline with evidence and consensus ratings.

| Section  | Recommendation  | Level of evidence | Strength of evidence | Consensus |
|--|---|-------------------|----------------------|-----------|
| Section E:<br>Performing and interpreting venous insufficiency (VI) ultrasound examination | <b>Recommendation E1:</b> A complete duplex ultrasound examination for chronic venous disease of the lower limb should evaluate deep, superficial, and perforating veins for patency and competency. B-mode ultrasound and spectral Doppler imaging are essential for the assessment; however, colour Doppler is also an important complimentary tool for assessing vein patency and competency.  | Strong            | Strong               | High      |
|  | <b>Recommendation E2:</b> In relation to the method of measuring vein diameter between the anterior and posterior vein walls, we recommend that the measurement should be made:   |                   |                      |           |
|  | a. with patient's legs in a dependent position:   | Moderate          | Strong               | High      |
|  | b. from a transverse image of the vein  | Moderate          | Moderate             | High      |
|  | c. between the inner walls  | Weak              | Moderate             | High      |
|  | d. with the vein at rest and not during any reflux provocation manoeuvres   | Weak              | Moderate             | High      |
|  | e. with the vein uncompressed   | Weak              | Strong               | High      |
|  | <b>Recommendation E3:</b> Sonographers should not use static colour images for the representation and documentation of venous reflux within a sampled vein segment; instead, a spectral Doppler trace should be used.   | Strong            | Strong               | High      |
| Section F:<br>General considerations   | <b>Recommendation E4:</b> For best accuracy in detecting venous reflux, a spectral Doppler trace should be made:<br>· from a longitudinal image of the vein<br>· with the sample gate placed in the centre of the vein and covering the entire lumen of the vein<br>· with spectral Doppler sampling performed with a 45-60 degree angle between the vein wall and the ultrasound beam.   | Strong            | Strong               | High      |
|  | <b>Recommendation E5:</b> Venous reflux is defined as:<br>• > 1second of reversed flow in the femoropopliteal segments (e.g., common femoral, femoral and popliteal veins).<br>• >0.5 seconds of reversed flow in superficial veins (e.g., the GSV, SSV, ASV, PAGSV, Giacomini vein), calf veins (e.g. posterior tibial veins) and deep (profunda) femoral veins.<br>• >0.5 seconds for perforating veins.  | Moderate          | Strong               | High      |
|  | <b>Recommendation F1:</b> We recommend that sonographers who perform duplex ultrasound in Australia and New Zealand to assess for chronic venous disease in the lower limb should have a recognised qualification. Student sonographers should be supervised by a sonographer or other qualified specialists in vascular ultrasound who have experience in performing venous insufficiency scans.   | Moderate          | Strong               | High      |
| Section G:<br>Technical considerations   | <b>Recommendation G1:</b> For increased sensitivity in the detection and measurements of venous reflux, it is preferable to perform duplex ultrasound in the afternoon to investigate chronic venous disease.   | Moderate          | Moderate             | High      |
|  | <b>Recommendation G2:</b> We recommend that evaluation of reflux with duplex ultrasound should be performed with the patient standing, with the lower limb under examination non-weight bearing whenever possible. A sitting or reverse Trendelenburg position can be used if the patient cannot stand or if it is not safe for them to stand.  | Moderate          | Strong               | High      |
|  | <b>Recommendation G3:</b> We recommend that to confirm valvular incompetence, venous reflux should be elicited using the following manoeuvres for the following veins:<br>• Common femoral vein: Valsalva to increase intra-abdominal pressure and/or distal augmentation.<br>• Saphenofemoral junction: Valsalva manoeuvre to increase intra-abdominal and/or distal augmentation.<br>• Vein segments distal to saphenofemoral junction: Distal augmentation.<br>Distal augmentation is performed using manual or cuff compression distal to the point of examination. Sonographers should be aware of alternate methods to elicit venous reflux that may be more applicable in different circumstances such as;<br>• where patient or sonographer comfort is compromised,<br>• when the patient cannot perform Valsalva,<br>• the patient has a large body habitus,<br>• or if venous reflux is suspected but cannot be demonstrated using Valsalva or distal augmentation. | Moderate          | Strong               | High      |

## Target audience

The primary target audience for this clinical guideline are sonographers in Australia and New Zealand who perform venous insufficiency assessment for CVD of the lower limb using duplex ultrasound. Sonographers are specialist allied health professionals who perform ultrasound examinations on patients referred by their health/medical practitioner to a diagnostic ultrasound service. Sonographers typically perform and interpret sonographic examinations, providing a summary of the findings to other health professionals involved in the reporting, and providing care and treatment. Health professionals who provide the diagnosis and management of CVD include radiologists, vascular surgeons, phlebologists and/or general practitioners.

At the time of writing, sonographers practising within the Australian Medicare framework are accredited and listed with the Australian Sonography Accreditation Registry (ASAR) as either an Accredited Medical Sonographer (AMS) or Accredited Student Sonographer (ASS). In New Zealand, sonographers hold a current annual practising certificate issued by the New Zealand Medical Radiation Technologists Board (NZMRTB). While the term 'sonographer' is used throughout this clinical guideline, and sonographers are the primary target audience, this clinical guideline may be used or adopted for use by other professionals using ultrasound to assess the venous system, such as phlebologists, radiologists, and/or vascular surgeons.

## Scope of this clinical guideline

This clinical guideline provides advice and recommendations on the appropriate sonographic approaches when patients with signs and/or symptoms of CVD are referred to a medical imaging facility for a duplex US assessment of the lower limb. The clinical guideline is applicable to sonographers who have patients referred to them for an initial duplex US, for a review of a previous duplex US assessment, for follow-up duplex US subsequent to changes in signs and symptoms, or for postoperative assessment with or without varicose vein recurrence.

Specifically, this clinical guidance provides guidance on how to identify veins, including tributaries and varicosities, relevant to the patient's signs and symptoms, and possible future treatments. Attention is given to the sonographic appearances of the vein path, structure and flow haemodynamics relevant to CVD. Pre-existing knowledge and skills to identify acute venous disease (i.e., deep vein thrombosis, superficial vein thrombosis) are assumed and not covered in this clinical guideline.

This clinical guideline does not provide:

- specific guidance for preoperative ultrasound assessment of the lower limb vein for vein harvesting
- specific guidance for the use of ultrasound in interventional procedures such as endovenous ablation or sclerotherapy
- specific guidance for describing in detail the anatomy, techniques for assessment with duplex US and sonographic appearances of pelvic veins.\*

*\*Note: Pelvic veins are of great clinical importance, and sonographers performing duplex US for CVD should at minimum recognise when these veins have a role in the patient's signs and symptoms. If so, then a detailed assessment of the pelvic veins may be required due to their extremely complex configurations.*

This clinical guideline provides general advice and recommendations relevant to sonographers working in private and/or hospital settings, and to those working in medical imaging, vascular laboratory or vein centres. Factors such as local protocols, preferences of referring vascular care providers, reporting clinicians, and the patient must also be considered. All recommendations are subject to the acceptability of the ultrasound method to the patient and their consent. Patient preferences will be influenced by communication with their referring vascular care provider(s) and the sonographer, information they have gained from other sources and any previous experiences.

The recommendations in this clinical guideline should be feasible in most settings in Australia and New Zealand, as the equipment (including transducer types) to meet these recommendations would be available in most comprehensive or specialised ultrasound imaging departments. There may be exceptions

in rural and remote areas. Sonographers should clearly communicate to referring vascular care provider(s) and reporting clinicians if the unavailability of appropriate equipment has compromised the quality of the examination, or restricted adherence to this guideline document.

This clinical guideline should be read in conjunction with other ASA guidelines:

|  |   |
|--|---|
| ASA Sonographer Code of Conduct  | <a href="#">ASA_Sonographer_Code_of_Conduct_MAY_22_FINAL-v1.pdf (sonographers.org)</a>  |
| Guide to Consent for Medical Ultrasound Examinations   | <a href="#">Clinical Guidelines: Consent for Medical Ultrasound Scans (sonographers.org)</a>  |
| The Guide to Consent and Chaperones for Intimate Medical Ultrasound Examinations                                       | <a href="https://www.sonographers.org/publicassets/023b27c7-047b-ef11-9133-0050568796d8/Guide-to-Consent-for-Intimate-Examinations-Sept-24.pdf">https://www.sonographers.org/publicassets/023b27c7-047b-ef11-9133-0050568796d8/Guide-to-Consent-for-Intimate-Examinations-Sept-24.pdf</a> |
| Guidelines, Policies and Statements ASA and ASUM joint Guidelines for reducing injuries to all Ultrasound Users (2020) | <a href="#">ASA-ASUM_WRMSD_GL-Web-Version-11-2020.pdf (sonographers.org)</a>  |
| ASA Clinical Statement: Infection prevention and control (2021)  | <a href="#">UPDATE---PUB_0874_CS-Infection-Prevention-and-control-update.pdf (sonographers.org)</a>   |
| ASA Clinical Statement: Safe use and storage of ultrasound gel (2021).   | <a href="#">PUB_0872_Safe_Use_and_Storage_of_Ultrasound_Gel_FEB21.pdf (sonographers.org)</a>  |

When writing this clinical guideline, consideration was given to existing clinical practice guidelines intended to guide vascular care providers in the management of CVD to avoid providing advice that contradicts guidance relevant to treating clinicians.

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## Disclaimer

The information in this clinical guideline, as outlined above, is general in nature and does not constitute professional advice. The ASA (including its officers, employees and agents) does not make any representation or warranty as to, or take any responsibility for, the accuracy, reliability, completeness or currency of any information or recommendations contained in this clinical guideline, nor its usefulness in achieving any purpose. The ASA is not liable to users of this clinical guideline for any loss or damage, however caused, resulting from its use and accepts no responsibility for the accuracy of the information or your reliance on it. The ASA does not endorse any product or service identified in this clinical guideline. The ASA reserves all of its rights. See [www.sonographers.org](http://www.sonographers.org) for the full ASA Publication Disclaimer.

## Date of clinical practice guideline and timeline for updating

This clinical guideline will be reviewed five years from the date of publication, or earlier if significant new evidence becomes available.

## Supplementary materials

- *Supplementary file 1: Short form guideline*
- *Supplementary file 2: Sample Patient Information Pamphlet*
- *Supplementary file 3: Sonographer reporting and worksheets*
- *Supplementary file 4: Image Gallery*

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