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2019 Guideline for Management of Wounds in Patients With Lower-Extremity Venous Disease (LEVD)

An Executive Summary

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ABSTRACT

This article provides an executive summary of the *2019 Guideline for Management of Wounds in Patients with Lower-Extremity Venous Disease (LEVD)* published by the Wound, Ostomy and Continence Nurses Society (WOCN). The executive summary presents an overview of the systematic process used to update and develop the guideline. It also lists the specific recommendations from the guideline for assessment, prevention, and management of LEVD and venous leg ulcers (VLUs). In addition, the guideline includes a new section regarding implementation of clinical practice guidelines. The LEVD guideline is a resource for WOC nurse specialists and other nurses, physicians, therapists, and health care professionals who work with adults who have or who are at risk for VLU.

KEY WORDS: Chronic venous disorders, Chronic venous leg ulcer, Clinical practice guideline, Lower-extremity venous disease, Stasis ulcer, Varicose ulcer, Venous insufficiency, Venous leg ulcer, Venous ulcer.

INTRODUCTION

Lower-extremity venous disease (LEVD) encompasses a full spectrum of morphological and functional abnormalities of the venous system.[1] This spectrum includes chronic venous disease and chronic venous insufficiency; the latter produces more advanced functional abnormalities of the venous system such as moderate or severe edema, skin changes, or venous leg ulcers (VLUs). Venous leg ulcers are open skin lesions, generally appearing around the gaiter area (between the ankle and calf muscle) of the lower leg near the malleoli, in areas affected by venous insufficiency. Chronic VLUs are deemed nonhealing after a duration of at least 6 weeks without resolution.[2] Symptoms of LEVD such as itching, swelling, depression, fatigue, pain, and social isolation are common; and the latter 3 problems affect up to 50% of individuals with VLUs.[3-6]

Venous leg ulcers are a major health care problem. Approximately 7 million individuals worldwide have LEVD, and 2 million persons with LEVD will experience VLU.[7] Venous leg ulcers account for 80% to 90% of all leg ulcers.[8] The refractory nature of VLUs negatively affects health-related quality of life including the ability to work, requirements for effective prevention and management, and frequent health care visits.[9] Lower-extremity venous disease and VLUs are costly in terms of loss of productivity and out-of-pocket costs for dressings and health care. The cost of VLU care is estimated at $14 billion per year in the United States.[10] The mean direct cost of treating 1 VLU has been reported to be $15,732, and the mean cost of surgical intervention for nonhealing ulcers has been reported to be as high as $33,907.[11]

Correctly applied, compression therapy is the cornerstone of management for chronic venous insufficiency and VLUs.[12,13] However, approximately 60% of VLUs remain unhealed after 12 weeks of compression, and about 70% recur within 3 months after they heal.[14-16] An important factor to consider that may contribute to poor healing and recurrence of VLUs is that patients might have mixed venous and arterial disease.[17,18] It is estimated that 10% to 18% of patients with LEVD also have arterial insufficiency.[18] Therefore, an ankle-brachial index (ABI) should be performed on all patients with nonhealing leg

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wounds and prior to use of compression to determine whether compression can be safely applied (ABI ≥ 0.80), or if the level of compression should be reduced (ABI > 0.50 to < 0.80).[17] Compression should be avoided if the ABI is less than 0.50, ankle pressure is less than 70 mm Hg, or the toe pressure is less than 50 mmHg, and the patient referred for a vascular/surgical evaluation and treatment.[17]

Recurrence of VLUs is high due to the chronicity of the condition and failure of treatments to effectively manage the underlying problem.[19] Recurrence of VLUs has been associated with increased age, history of deep vein thrombosis, and the occurrence and duration of previous leg ulcers.[19] Patients' choices and their ability to tolerate, perform, and adhere to a treatment plan may also affect their outcomes. Lack of patient education that focuses on prevention of VLUs and self-care also contributes to wound recurrence.[20] Multiple psychological factors, such as feelings of powerlessness, have been identified that may play a role in a patient's ability to self-manage their care; these factors also negatively influence health-related quality of life.[21]

The primary purpose of this executive summary is to provide a synopsis of the recommendations from the updated *2019 Guideline for Management of Wounds in Patients with Lower-Extremity Venous Disease* from the Wound, Ostomy and Continence Nurses Society (WOCN).[22] This article lists the specific recommendations from the guideline for assessment, prevention, and management of LEVD and VLUs. The article also describes the systematic process used to develop the guideline. In addition, the guideline includes a new section regarding implementation of clinical practice guidelines (CPGs).

The LEVD guideline is a resource for WOC nurse specialists and other nurses, physicians, therapists, and other health care professionals who work with adults with/or are at risk for VLUs. The complete guideline, which includes a summary of the available evidence and a complete reference list that supports the recommendations, is available in print and digital form from the Wound, Ostomy and Continence Nurses Society Bookstore (http://www.wocn.org). Refer to Supplemental Digital Content 1 (available at: http://links.lww.com/JWOCN/A54) for a complete reference list for the guideline. The guideline has been accepted by the ECRI Institute (https://guidelines.ecri.org/) for inclusion in their online guideline repository.

GUIDELINE DEVELOPMENT

The WOCN Society established a task force of 6 certified, wound, ostomy, and continence nurses (CWOCNs) and a certified wound care nurse (CWCN) from the Society's membership who represented a wide range of experience and clinical practice backgrounds. Two members of the task force were selected as the primary authors (T.K., G.B.) for the guideline. Each member of the guideline task force submitted a disclosure form, which was reviewed by the WOCN Society's Chief Operations Officer who determined that no conflict of interest existed with any individual task force member in regard to the topic or development of the guideline.

For the 2019 update, the previous 2011 guideline was reviewed and a revised topical outline was developed. Thirty-eight questions were developed to guide the literature search for evidence regarding screening and diagnosis for LEVD, assessment parameters for patients with LEVD, prevention and management of patients with LEVD, and management of VLUs (Table 1).

METHODS

The 2 primary authors of the guideline independently conducted systematic searches of MEDLINE, Scopus, CINAHL, and Cochrane Library databases, with the assistance of a medical reference librarian, to identify studies, systematic reviews, and meta-analyses published in English from August 2010 through December 2017. The following Medical Subject Headings (MeSH) and search terms were used to search for each specific question related to LEVD and VLUs: leg ulcer, lower-extremity wounds, venous ulcers, venous insufficiency, venous stasis ulcers, stasis ulcers, varicose ulcers, wound healing, risk factors, wound infection, hydrocolloid bandages, biological dressings, cellular therapies, advanced wound healing technology, occlusive dressings, compression stockings, intermittent pneumatic compression devices, color Doppler ultrasonography, ankle-brachial index, debridement, quality of life, prevalence and incidence of venous disease/disorders, and wound assessment. The search targeted meta-analyses, randomized controlled trials (RCTs), prospective clinical trials, retrospective studies, qualitative studies, and systematic reviews. The search included studies reporting primary data relevant to LEVD and VLUs and specific therapies or diagnostic modalities. If available and relevant, national guidelines and published expert opinion were included to support recommendations in areas that were clinically important, but where research was lacking or did not exist. Titles of references and abstracts were retrieved from the electronic searches and screened by the primary authors to determine whether they were relevant to LEVD, VLUs, and the search questions; and were in accordance with the inclusion criteria for selection of studies (Table 2). Reference lists of selected publications were also reviewed for relevant publications. After the initial screening, full-text articles were obtained and reviewed that met the inclusion criteria and were relevant to the search questions. Also, during the task force's review and consensus discussions of the document in 2018 and 2019, additional relevant articles were included. For the updated guideline, 403 new full-text articles were reviewed for the guideline, 76 articles were excluded, and 327 articles were included as evidence for the updated guideline's recommendations as cited in the text and reference list.

Data Extraction

From the selected, full-text articles, the 2 primary authors extracted the following data, which were compiled into evidence tables relative to each of the 38 search questions: source/citation (author, publication date, title, and publication); type/design of study; sample (size, setting/location, and description of subjects); intervention(s), outcome measures, and length of follow-up; results, including statistical significance of findings (*P* value, odds ratio, hazard ratio, relative risk/risk ratio, confidence interval, sensitivity/specificity, etc, as appropriate to the study); and limitations. For studies of diagnostic or screening tests, data were included if a valid reference standard was used. For systematic reviews/meta-analyses, data included the number and quality of RCTs reviewed and the results.

Based on the judgment of the primary authors, studies were assessed as acceptable or unacceptable for inclusion and were excluded if there were methodological issues or insufficient

TABLE 1.
Questions Used to Guide the Literature Review[a]

Topic	Question
Screening and diagnosis for LEVD	1. What are the risk factors for developing LEVD? 2. What is the most reliable, noninvasive method to diagnose LEVD? 3. What reliable and valid classification systems/criteria are available for LEVD?
Assessment parameters for patients with VLUs	4. What key parameters should be included in assessment of the patient with a VLU? 5. Should ankle-brachial index screening be conducted on all patients with VLUs and repeated on a periodic basis? 6. What are the most effective methods to assess the negative impact of LEVD and VLUs (including pain) on the patient's quality of life?
Prevention/management of patients with LEVD	7. What interventions prevent the progression of LEVD? 8. What medications (pharmacological methods) are effective in the management of LEVD? 9. What surgical interventions are effective in the management of LEVD? 10. Does compression therapy reduce LEVD complications, such as VLUs? 11. Is compression therapy indicated/contraindicated in the following situations: after surgical intervention, venous eczema/dermatitis, and cellulitis? 12. Is exercise/physical activity effective to prevent or reduce LEVD complications such as edema? 13. Does leg elevation improve negative symptoms of LEVD such as edema? 14. Are there effective treatments for venous claudication (cramping pain)? 15. What interventions have demonstrated cost-effectiveness and clinical effectiveness for prevention or management of LEVD?
Management of VLUs	16. What indicators predict healing of VLUs? 17. What medications are effective in treating VLUs? 18. What surgical interventions are the most effective for treating VLUs? 19. Is elastic compression more effective than inelastic compression in the healing of VLUs? 20. Are multicomponent compression systems more effective than single-component compression for healing VLUs? 21. Are multilayer compression systems more effective than single-layer compression for healing VLUs? 22. What strength of compression stockings should be worn after a VLU has healed? 23. What nutritional factors influence healing of VLUs? 24. What psychological factors influence healing of VLUs including patients' perception of quality of life? 25. What medications are most effective in managing wound pain? 26. Is leg elevation effective to promote wound healing of VLUs? 27. What topical dressings are most effective for healing VLUs? 28. What adjunctive therapies are effective treatments for healing VLUs? 29. Is debridement indicated or contraindicated for VLUs? 30. If indicated, which debridement methods are most appropriate for VLUs? 31. Are topical and/or systemic antibiotics effective treatments for healing VLUs? 32. When should a VLU be cultured for possible infection? 33. When should a biofilm be suspected? 34. What interventions are effective for skin complications such as venous eczema/dermatitis or lipodermatosclerosis? 35. When should patients with VLUs be referred for further evaluation? 36. How should patient preferences and values regarding LEVD/VLU treatments be assessed? 37. What patient education strategies are effective for patients with LEVD and VLUs? 38. What interventions have demonstrated cost-effectiveness in addition to clinical effectiveness for the treatment of VLUs?

Abbreviations: LEVD, lower-extremity venous disease; VLUs, venous leg ulcers.
[a]From Wound, Ostomy and Continence Nurses Society.[22]

detail to evaluate the results. Additionally, the primary authors rated the research (Levels I-VI) using criteria as identified in Table 3.[23,24] Differences of opinion about the quality/rating of the studies for inclusion in the guideline were resolved by discussion between the 2 primary authors or by consensus after a review and discussion by the task force.

TABLE 2.
Inclusion and Exclusion Criteria for Selection of Studies[a]

Inclusion Criteria	Exclusion Criteria
Published in English; peer-reviewed literature	Foreign-language publication
Available abstract for screening	Abstract not available for screening
Primary focus on lower-extremity venous disease/VLUs or reported specific data relevant to venous disease/VLUs	Full-text article not available
	Secondary reports of research
10 subjects included in studies/case studies	Conference abstracts/posters
Human studies	Description of study or outcomes lacked sufficient detail to draw conclusions
Primary research reports relevant to lower-extremity venous disease/VLUs and the search questions	

Abbreviation: VLUs, venous leg ulcers.
[a]From Wound, Ostomy and Continence Nurses Society.[22]

TABLE 3.
Criteria for Level-of-Evidence Ratings for Research Evidence[a]

Level of Evidence	Criteria
Level I	A randomized controlled trial demonstrating a statistically significant difference in at least one important outcome defined by $P < .05$. Level I trials can conclude the difference is not statistically significant if the sample size is adequate to exclude a 25% difference among study arms with 80% power
Level II	A randomized controlled trial not meeting Level I criteria
Level III	A nonrandomized controlled trial with contemporaneous controls selected by some systematic method. A control might have been selected due to its perceived suitability as a treatment option for an individual patient
Level IV	A before-and-after study or a case series of at least 10 patients using historical controls or controls drawn from other studies
Level V	A case series of at least 10 patients with no controls
Level VI	A case report of fewer than 10 patients

[a]From Wound, Ostomy and Continence Nurses Society.[22]

Synthesis of Evidence and Development of Recommendations

The primary authors summarized and synthesized the data and prepared a descriptive, narrative summary of the available evidence derived from the systematic search and review of the literature. The guideline is organized into a topical outline format that addresses key content areas for assessment, prevention, and treatment of patients with/or at risk for LEVD and/or ulcers. The summary and synthesis of evidence derived from the review and evaluation of literature was integrated into the appropriate content sections of the guideline, and a draft was presented to all task force members for review, discussion, clarification, and development of consensus. A series of conference calls was conducted during 2019 in which the task force reviewed/evaluated the evidence in the draft guideline until consensus was reached.

Based on the evidence in the guideline, recommendations were developed for specific areas where evidence was sufficient to support the recommendation. In selected areas where evidence about significant clinical topics was lacking or did not exist, the recommendations were based on the consensus of expert opinion by the task force. The task force then appraised the strength of the evidence for recommendations in the guideline, using a level-of-evidence taxonomy based on the following categories: Levels A, B, C, or task force consensus (TFC) (Table 4).[23-27] The recommendations and level-of-evidence ratings were reviewed by the task force and discussed until consensus was reached. A narrative summary of the available evidence underlying the recommendations, along with the level-of-evidence, is provided in the complete guideline, and the specific references that were included are cited in the text and the final reference list.

To facilitate clinical decision-making, the recommendations in the guideline were reviewed and classified by a consensus of the task force based on an assessment of the benefits/effectiveness versus a lack of benefit/effectiveness or harms of a procedure or treatment according to the evidence and/or expert opinion as presented in the guideline. See Table 5 for an overview of the criteria for classification of the recommendations according to potential benefit/effectiveness versus harm.[27,28]

In addition, the overall quality of the evidence for recommendations was rated. During the initial review of evidence, the primary authors rated the quality of evidence from the individual studies. After a review and consensus of the guideline by the full task force, the overall quality of the evidence for the research-based recommendations was rated as high, moderate, or low according to the criteria in Table 6.[29-31] Recommendations that were based on TFC or expert opinion were designated as such in the quality-of-evidence ratings.

The completed guideline then underwent peer review by an independent group of 10 certified WOC nurses (2 CWCNs and 8 CWOCNs) and a physician for relevance, clarity, accuracy, comprehensiveness, organization, consistency with current research/best practices, and usefulness to the target population. Feedback was reviewed by the task force and incorporated into the final document as appropriate.

2019 GUIDELINE FOR MANAGEMENT OF WOUNDS IN PATIENTS WITH LOWER-EXTREMITY VENOUS DISEASE (LEVD) RECOMMENDATIONS[22]

A. Assessment

1. Prior to treatment, assess causative and contributive factors and significant signs and symptoms to differentiate among the types of lower-extremity wounds, which have different etiologies and treatment requirements, in order to establish an appropriate treatment plan. Level of evidence = TFC;

TABLE 4.
Level-of-Evidence Rating for Strength of Guideline Recommendations[a]

Evidence Rating	Criteria
Level A	Two or more supporting RCTs of at least 10 humans with LEVD/VLUs (at Levels I or II), a meta-analysis of RCTs, or a Cochrane Systematic Review of RCTs
Level B	One or more supporting RCTs of at least 10 humans with LEVD/VLUs, or 2 or more supporting nonrandomized, controlled trials of at least 10 humans with LEVD/VLUs (at Level III)
Level C	Other studies not meeting Level B criteria, 2 or more supporting case series of at least 10 humans with LEVD/VLUs, or expert opinion
Task force consensus	Where a level-of-evidence rating is not included, the information or recommendation represents a consensus of the task force members

Abbreviations: RCTs, randomized controlled trials; LEVD, lower-extremity venous disease; VLUs, venous leg ulcers.
[a]From Wound, Ostomy and Continence Nurses Society.[22]

TABLE 5.
Classification of Recommendations: Potential Benefit/Effectiveness Versus Harm[a]

Class I	Class II	Class III	Class IV
There is evidence and/or agreement of expert opinion that a procedure or treatment is beneficial and effective with greater benefit than harm Is indicated and recommended; *should be done*	There is limited evidence and/or agreement of expert opinion that a procedure or treatment can be beneficial and effective with greater benefit than harm May be indicated; is *reasonable to perform*; may be considered	Evidence and/or agreement of expert opinion about a procedure or treatment is less well established or uncertain and has conflicting evidence or divergence of opinion about the benefit and effectiveness, or there are risks/side effects that may limit benefit May be reasonable; *may be considered* in select instances	There is evidence and/or agreement of expert opinion that a procedure or treatment is not beneficial or effective, and/or can be harmful in some cases where risks/side effects outweigh the benefit Is *not indicated* or recommended; *should not be performed.*

[a]From Wound, Ostomy and Continence Nurses Society.[22]

Benefit/effectiveness/harm = Class I; Quality of evidence = TFC

2. Review and document the relevant health history. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
3. Assess the risks and contributing factors for developing LEVD such as family history, female sex, pregnancy, older age, tobacco use, systemic inflammation, obesity, comorbid conditions (cardiovascular disease), venous thromboembolism/deep vein thrombosis (VTE/DVT), excessive sitting or standing, physical inactivity, trauma, injection drug use, impaired calf muscle function, and impaired ankle range of motion. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate
4. Assess the risks and contributing factors for developing a VLU, which are similar to those for LEVD: previous leg surgery, previous VLU, obesity, family history, venous reflux, VTE/DVT, physical inactivity, older age (>50 years), female sex, multiple pregnancies, and prolonged sitting or standing. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate
5. Assess for specific triggers associated with development of VLUs: cellulitis, penetrating injury/trauma, dry skin and itching, contact allergic dermatitis, rapid onset of leg edema, burns, and insect bites. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
6. Assess the history of present and prior leg ulcers: previous treatments and tolerance (eg, medications and compression), ulcer recurrences, unusual or atypical presentations of ulcers, and/or surgical interventions or biopsies. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
7. Assess for lower-extremity symptoms associated with LEVD: pain, sleep disturbances, and leg symptoms (ie, itching, heaviness, tightening, swelling, and aching). Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate
8. Assess quality of life using valid/reliable instruments such as the Venous Insufficiency Epidemiologic and Economic Study (VEINES/QOL/Sym), Aberdeen Varicose Vein Questionnaire, and the Chronic Venous Insufficiency Quality of Life Questionnaire; and repeat the assessment on a regular basis. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate
9. Assess self-efficacy using a validated instrument such as the Venous Leg Ulcer Self-Efficacy Tool to determine the patient's perception of his/her ability to perform self-management.

TABLE 6.
Quality-of-Evidence Ratings for Recommendations[a]

Type of Evidence	Quality Rating
Well-designed and well-conducted, RCTs, or meta-analyses of such trials, which addressed the population of interest, and directly assessed effects on health outcomes Studies directly addressed the question; used adequate randomization, blinding, and allocation concealment; were adequately powered; used intention-to-treat analyses; and had high follow-up rates High level of certainty about the estimate of effect	High
RCTs with minor limitations, which affected confidence in/or applicability of the results Well-designed, well-conducted controlled or observational studies Meta-analyses of such studies Moderate certainty about the estimate of effect	Moderate
RCTs, nonrandomized controlled/quasi-experimental studies, or observational studies (prospective, retrospective cohort, case-control, cross-sectional studies) with major limitations affecting confidence in/or applicability of the results; or meta-analyses of such studies Limitations included: inadequate randomization; lack of blinding of participants or outcome assessors; inadequate power; outcomes of interest are not prespecified for the primary outcomes; low follow-up rates; and findings were based on subgroup analyses. Whether the limitations are considered minor or major depends on the number and severity of the flaws in design or conduct of the study Uncontrolled clinical observations without an appropriate comparison group (eg, case series or reports) Low certainty about the estimate of effect	Low

Abbreviation: RCTs, randomized controlled trials.
[a]From Wound, Ostomy and Continence Nurses Society.[22]

Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Expert opinion

10. Assess the nutritional status of the patient including intake and the availability and ability to obtain adequate food. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
11. Assess biomarkers associated with risks of LEVD as appropriate: C-reactive protein, fibrinogen, interleukin-10, and interleukin-8. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
12. Conduct a physical examination of the lower leg:
    - Inspect the lower extremity for skin changes including hemosiderosis/hemosiderin staining, venous eczema/dermatitis, hyperpigmentation, atrophie blanche, varicose veins, ankle flaring, scarring from previous ulcers, and lipodermatosclerosis.
    - Determine the type and characteristics of lower-extremity edema to differentiate the clinical presentation of edema due to LEVD from other conditions such as lymphedema and lipedema, which may be misdiagnosed.
    - Determine perfusion status:
      – Assess skin temperature (cool skin), capillary and venous refill, paresthesia, and color changes of the skin with elevation or dependency of the limb.
      – Determine presence or absence of pedal pulses. Palpate both dorsalis pedis and posterior tibial pulses of each lower extremity. Presence of palpable pulses does not rule out lower-extremity arterial disease; nor does absence of pulses indicate arterial disease, especially, in the presence of edema.
      – Perform a screening ABI to identify/rule out arterial insufficiency.
    - Recheck the ABI periodically (every 3 months) for patients with nonhealing, lower-extremity ulcers. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
    - Measure the skin temperature using a noncontact infrared thermometer, including areas over previously healed VLUs, to identify areas of potential inflammation or infection. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
    - Determine neurosensory status: Screen both feet for loss of protective sensation with a monofilament (5.07/10-g Semmes-Weinstein monofilament); check vibratory sensation with a tuning fork (128 Hz); and check the Achilles tendon reflex with a reflex percussion hammer. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
    - Determine the functional ability including ankle range of motion and use of any assistive devices. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
13. Classify the clinical manifestations of LEVD according to the "C" component of the basic Clinical, Etiological, Anatomical, Pathophysiological (CEAP) classification. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
14. Determine and document the characteristics of the wound and periwound at each dressing change: location; size and shape; wound edges; wound bed; exudate; condition of periwound skin; and absence/presence of odor, bleeding, and complications (eg, cellulitis and eczema/dermatitis). Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
15. Monitor the healing status of the wound at least weekly: Measure the percentage change in ulcer area to assess healing and determine whether adjunctive therapies are warranted for ulcers that do not heal or show significant healing within 4 weeks of appropriate treatment. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
16. Measure the ankle and calf circumference on a weekly basis to determine the effectiveness of treatments (eg, compression therapy, leg elevation, and exercise) to reduce edema. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
17. Identify factors that may impede wound healing: location, long duration, large size of the wound, comorbid conditions, suspected biofilm, inflammation, infection, lack of adherence to prevention and treatment programs (especially compression therapy), psychosocial factors including depression and social isolation, and use of medications such as steroids or long-term topical or systemic antibiotics. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate
18. Identify, monitor, and document pain in the lower-extremity and/or wound pain using a valid and reliable pain scale to determine the following: onset; duration; location; exacerbating and alleviating factors; use and response to analgesics; severity/intensity (mild to severe); characteristics of leg pain (eg, variability; stinging, throbbing, cramping, or sharp/shooting; leg heaviness and achiness; and worsens with prolonged leg dependency); and changes or alterations in pain, which may indicate a change in healing status or disease. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
19. Differentiate venous claudication from arterial, ischemic claudication:
    - *Venous claudication*. Exercise-related leg pain due to venous outflow obstruction; occurs in the absence of arterial disease; and is relieved by leg elevation.
    - *Arterial, ischemic claudication and pain*. Reproducible cramping, aching, fatigue, weakness, and/or frank pain in the buttock, thigh, or calf muscles (rarely the foot) that occurs after exercise; is typically relieved with 10 minutes' rest; and is increased by leg elevation and alleviated by dependency of the limb or rest. Pain that occurs at rest in the absence of activity indicates severe arterial disease. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Expert opinion
20. Evaluate laboratory parameters such as albumin, prealbumin, hemoglobin, hematocrit, homocysteine, hemoglobin A_{1c} ($HbgA_{1c}$), prothrombin time, and inflammatory biomarkers (eg, C-reactive protein and fibrinogen) to establish potential for healing. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
21. Identify factors that are associated with VLU recurrence: long duration of a VLU; decreased physical activity; lack of leg elevation; not wearing compression; high body mass index; malnutrition; depression; low self-efficacy; and presence of comorbid conditions and other general risks for

LEVD and VLUs. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate

22. Refer patients as indicated for further evaluation and diagnostic testing to determine the severity of LEVD with vascular studies such as a venous duplex ultrasound, which is the most reliable noninvasive test to diagnose anatomical and hemodynamic abnormalities, reflux, or obstruction in any venous segment (superficial and deep). Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
23. Refer patients with the following conditions for further evaluation and treatment: cellulitis; VTE/DVT; variceal bleeds; intractable pain; eczema/dermatitis that is unresponsive to appropriate topical therapy and/or short-term topical steroids; and ulcers that are atypical in appearance or unresponsive to 4 weeks of appropriate therapies. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC

B. Prevention and Management of LEVD and VLU Risk Reduction

24. Encourage patients to undertake a program of physical activity to strengthen the calf muscle and increase ankle range of motion. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Expert opinion
25. Recommend patients with varicosities wear compression stockings, manage their weight, engage in physical activity such as walking, and avoid wearing constricting garments and crossing legs to reduce the risk of VLUs. Level of evidence = TFC; Benefit/effectiveness/harm = Class II; Quality of evidence = TFC
26. Consider using the WOCN Society's algorithm, *Compression for Primary Prevention, Treatment, and Prevention of Recurrence of Venous Leg Ulcers: An Evidence-and Consensus-Based Algorithm for Care Across the Continuum* (http://vlu.wocn.org/#home), to identify the appropriate type and level of compression for adults. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
27. Screen patients for arterial disease with a Doppler measurement of the ABI by suitably trained staff prior to the use of compression. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
28. Educate individuals with sufficient blood flow (ABI ≥ 0.80) to use the strongest compression they can apply or tolerate to prevent VLUs or reduce recurrence. Level of evidence = A; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate
29. Consider light compression for individuals with LEVD and lipodermatosclerosis, who are unable to apply, tolerate, or afford the cost of high-level compression garments. Level of evidence = B; Benefit/effectiveness/harm = Class I; Quality of evidence = Low
30. Have compression stockings fitted by trained personnel. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
31. Closely supervise and monitor the use of reduced compression (23-30 mmHg) for individuals with mixed venous/arterial insufficiency (ABI >0.50 to <0.80), which should be provided under the direction of wound care specialists. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
32. Educate patients that compression must be worn every day for the prevention of venous edema and ulceration for all CEAP classifications, and for prevention of VLU recurrence. Level of evidence = A; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate
33. Avoid compression if ABI is less than 0.50, the ankle pressure is less than 70 mmHg, or the toe pressure is less than 50 mmHg; and refer the patient for further evaluation and treatment. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
34. Consider use of cryotherapy/cooling treatment to manage symptoms of LEVD. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
35. Consider vein surgery or minimally invasive procedures to treat varicose veins:
    - Endovascular laser ablation. Level of evidence = A; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
    - Open surgery, endovascular surgery, or subfascial endoscopic perforator vein surgery. Level of evidence = C; Benefit/effectiveness/harm = Class III; Quality of evidence = Low
36. Consider medications/supplements such as phlebotonics/flavonoids to decrease lower-extremity symptoms associated with LEVD (ie, pain, heaviness, edema, pruritus, and cramps):
    - Micronized purified flavonoid fraction. Level of evidence = A; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate
    - Horse chestnut seed oil extract. Level of evidence = A; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate
    - Dobesilate calcium. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate
    - Mesoglycan. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate
37. Educate patient/caregivers about risk factors and triggers for developing VLUs and self-management strategies to minimize risks: using lifelong compression; daily leg elevation; weight management; engaging in daily physical activities; maintaining a well-balanced diet; avoiding trauma; seeking professional health care for signs of increased swelling, redness, pain, or skin breakdown in the lower extremity; abnormal sensations in the skin; and medication options. Level of evidence = TFC; Benefit/effectiveness/harm = class I; Quality of evidence = TFC

C. Wound Management

38. Recommend patients with LEVD and lower-extremity ulcers seek care guided by a clinical wound expert. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion

Wound Treatment

39. Cleanse the ulcer and periwound skin at each dressing change with a noncytotoxic cleanser (eg, potable tap water, distilled water, cooled boiled water, or saline/salt water),

while minimizing trauma to the ulcer and surrounding skin ulcers. No one cleanser has been shown to be optimal for VLUs. Level of evidence = C; Benefit/effectiveness/harm = Class I; Expert opinion

40. Avoid the use of known skin irritants and allergens on the skin especially in patients with venous eczema/dermatitis because a high percentage of individuals with LEVD/VLUs experience hypersensitivity to various ingredients and products. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
41. Patch test individuals with known sensitivities or delayed wound healing prior to use of new products. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Expert opinion
42. Use a topical steroid for patients with eczema/dermatitis for 1 to 2 weeks to reduce inflammation and itching, and refer to a dermatologist if the treatment is ineffective. In severe cases, a prolonged treatment with a topical steroid and/or use of systemic steroids might be warranted. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
43. Debride the ulcer to remove devitalized tissue when debridement is consistent with the patient's condition and goals of therapy. No one method of debridement has been shown to be optimal for VLUs. Level of evidence = A; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
44. Consider debridement if there is a high index of suspicion that biofilm is present (ie, wound fails to heal, despite proper wound care and antimicrobial therapy). Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Expert opinion
45. Choose the method of debridement based on an assessment of the condition of the ulcer (eg, presence or absence of infection and amount of necrotic tissue), pain tolerance, and individual circumstances such as the setting and availability of various debridement methods. Level of evidence = TFC; Benefit/effectiveness/harm = Class II; Quality of evidence = TFC
46. Closely monitor the ulcer when any debridement method is used. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
47. Consider topical anesthetic agents to provide pain relief during debridement such as a lidocaine and prilocaine-based cream. Level of evidence = A; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate
48. Select dressings according to accepted wound care principles: characteristics of the ulcer/periwound skin; level of exudate; patient needs such as comfort, cost, and ease of application; and availability of dressings. There is no one optimal type of dressing for treatment of VLUs and/or for use under compression wraps. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
49. Assess the wound at every dressing change to determine whether the type of dressing or frequency of changes should be modified. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
50. Identify and treat infection:
    - Avoid the routine use of topical or systemic antibiotics in VLUs without signs of clinical infection. Level of evidence = A; Benefit/effectiveness/harm = Class I; Quality of evidence = High
    - Determine the bacterial bioburden by tissue biopsy or Levine quantitative swab technique when clinical symptoms of infection are present, or if biofilm is suspected due to wound deterioration or lack of healing. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
    - Consider topical antibiotics for superficial infection, using culture-guided antibiotic therapy. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Expert opinion
    - Consider a trial of nontoxic, topical antimicrobials/antiseptics for localized, clinical infection as an alternative to topical antibiotics:
        - Silver-based dressings. Level of evidence = A; Benefit/effectiveness/harm = Class III; Quality of evidence = Moderate
        - Cadexomer iodine. Level of evidence = A; Benefit/effectiveness/harm = Class III; Quality of evidence = Low
    - Treat deep tissue infection, cellulitis/advancing cellulitis, bacteremia, or sepsis with systemic, culture-guided antibiotic therapy. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
51. Consider use of analgesic-containing dressings such as ibuprofen-releasing dressings to reduce wound pain. Level of evidence = B; Benefit/effectiveness/harm = Class III; Quality of evidence = Moderate

Compression Therapy

52. Select the type and level of compression based on a careful assessment of the patient. Level of evidence = A; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
53. Use the highest level and type of compression with which the patient will comply to promote healing of VLUs and prevent VLU recurrence taking into consideration that high compression, multicomponent systems, and compression with an elastic component may be more effective. Level of evidence = A; Benefit/effectiveness/harm = Class I; Quality of evidence = Moderate
54. Have compression bandages and wraps applied by skilled personnel. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
55. Do not rely on antiembolism stockings or hose that provide low pressure (≤20 mmHg) and are not designed for therapeutic compression to prevent or treat LEVD or VLUs. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
56. Use a carefully supervised trial of modified, reduced compression bandaging (23-30 mmHg at the ankle) for individuals with mixed venous/arterial disease and moderate arterial insufficiency (ABI >0.50 to <0.80) who present with ulcers and edema. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Expert opinion
57. Avoid compression if the ABI is less than 0.50, the ankle pressure is less than 70 mmHg, or the toe pressure is less than 50 mmHg; and refer the patient for further testing and evaluation. Level of evidence = C; Benefit/effectiveness/harm = Class IV; Quality of evidence = Expert opinion

58. Consider using intermittent pneumatic compression for patients who have not responded to stockings/wraps; are immobile; need higher levels of compression than can be provided with stockings or wraps (ie, those with extremely large legs); or who are intolerant of stockings or wraps. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
59. Monitor and reassess the use of compression on a regular basis to determine the effectiveness, patient's tolerance and adherence, and if any complications have developed (eg, pain, pressure injury, skin irritation, and wasting of the calf muscle). Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion

Adjunctive Therapies

60. Consider adjunctive therapies as indicated:
    - Electrical therapy. Level of evidence = C; Benefit/effectiveness/harm = Class III; Quality of evidence = Low
    - Negative pressure wound therapy. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
    - Ultrasound (high-frequency ultrasound; noncontact low-frequency ultrasound). Level of evidence = A; Benefit/effectiveness/harm = Class III; Quality of evidence = Low

Medications

61. Consider use of medications combined with usual care (eg, compression, leg elevation, and exercise) to promote ulcer healing or the rate of healing:
    - Pentoxifylline. Level of evidence = A; Benefit/Effectiveness/harm = Class II; Quality of evidence = High
    - Simvastatin. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
    - Sulodexide. Level of evidence = A; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
    - Doxycycline. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low

Nutrition

62. Refer individuals with nonhealing VLUs and suspected nutritional deficits to a registered dietitian for assessment and appropriate interventions. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion

Surgical Options

63. Consider invasive and noninvasive surgical procedures to improve VLU healing and reduce VLU recurrence:
    - Surgery. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate
    - Subendoscopic perforator surgery. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate
    - Skin grafts, biological dressings, and human skin equivalents:
        - Allograft. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
        - Bilayered skin equivalent. Level of evidence = A; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate
        - Human fibroblast dermal substitute. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
        - Split-thickness skin grafts. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
        - Hair follicle grafts. Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
64. Consider endovascular minimally invasive ablation of varicose veins to promote ulcer healing:
    - Thermal ablation (radiofrequency, endovenous laser). Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
    - Nonthermal ablation (foam sclerotherapy). Level of evidence = B; Benefit/effectiveness/harm = Class II; Quality of evidence = Moderate

D. Patient Education and Risk Reduction Strategies for Self-management to Prevent and Treat VLUs and Prevent VLU Recurrence

65. Educate patients/caregivers about the risks, pathophysiology, and disease process of LEVD; and the risks of VLUs and VLU recurrence. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC
66. Utilize varied educational approaches to teach patients' self-management including individual education and counseling, print materials, and video programs. Level of evidence = C; Benefit/effectiveness/harm = Class II; Quality of evidence = Low
67. Educate the patient and caregivers in measures/strategies for self-management to reduce risks, prevent and manage VLUs, prevent VLU recurrence, and promote overall health and wellness:
    - Lifelong commitment to wearing compression; proper fitting and use of compression stockings; and/or use and application of compression bandages/devices.
    - Monitor for signs/symptoms of problems/risks of compression bandages: If problems occur, loosen or remove the compression, and seek immediate professional health care if the symptoms persist.
    - Observe for signs of variceal bleeds: Elevate the extremity and apply pressure; seek immediate professional health care if the bleeding persists.
    - Practice good skin hygiene of the lower extremities: Use mild soap for cleansing and emollients to hydrate the skin, and avoid known sensitizing topical agents.
    - Engage in measures to improve overall health and wellness: tobacco cessation; healthy nutritional practices and weight management; discuss medication/supplement options with a health care provider; avoid crossing legs and prolonged standing; and avoid high-heeled shoes.
    - Elevate legs above the level of the heart for 30 minutes, 3 to 4 times per day, if not medically contraindicated. Level of evidence = C; Benefit/effectiveness/harm = Class I; Quality of evidence = Expert opinion
68. Teach patients to engage in regular and frequent exercise and physical activity, including home-based physical activity programs and resistance activities, to improve calf muscle pump function and reduce healing time. Level of evidence = A; Benefit/effectiveness/harm = Class II; Quality of evidence = Low

E. Health Care Provider Follow-up

69. Regularly assess and monitor patient adherence to recommendations; for problems or complications: use of compression and the condition of stockings or bandages/wraps; functional abilities; activities of daily living; presence of depression, sleep disturbances, and other concomitant illnesses; pain; and use and response to prescribed and self-prescribed pharmacologic agents. Level of evidence = TFC; Benefit/effectiveness/harm = Class I; Quality of evidence = TFC

GUIDELINE IMPLEMENTATION

Evidence-based practice (EBP) is necessary for safe, quality patient care and outcomes. The integration of EBP has been described as "the fusion of evidence, clinical expertise, and patient preference at the point of care"[32(p577)] Health care providers must know, understand, and communicate the evidence supporting an intervention to engage the patients and their caregivers, whether lay persons or other health care providers, to achieve EBP.[32]

Despite the availability of CPGs and their potential to improve the quality and outcomes of patient care, the adoption and implementation of CPG recommendations are limited and inconsistent.[32-39] Therefore, dissemination of the CPG alone is insufficient to improve patient care and outcomes. Strategic implementation is required to ensure adoption and adherence to relevant CPGs.

A variety of challenges and obstacles can hinder the implementation of recommendations from CPGs. In addition to providing access to CPGs, purposeful strategies are necessary to identify gaps between EBP recommendations and practice and promote knowledge, acceptance, adoption, and adherence to the recommendations.[37] Implementation must be tailored to the specific context/needs of the situation (eg, patient population, type of practice, and setting). However, there is no specific optimal method for implementing a particular CPG that meets all contextual situations.[36,37,40]

When selecting a CPG to promote best practice for a clinical area, it is necessary assess the quality, currency, and content of the guideline. CPGs such as those available from the ECRI Institute's Guidelines Trust Web site (https://www.guidelines.ecri.org) have met rigorous criteria and are rated with a trustworthiness score. Other methods are available to assess the quality of guidelines such as the Appraisal of Guidelines Research & Evaluation (AGREE) Global Rating Scale (AGREE GRS; https://www.agreetrust.org/wp-content/uploads/2017/11/AGREE-GRS.pdf) and the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) system (https://www.gradeworkinggroup.org).

Appropriate individuals and stakeholders from the organization or clinical setting will need to determine whether the CPG will be adapted or adopted in whole or in part. In addition, the CPG should be reviewed to select recommendations to improve patient care and outcomes that are supported by the best evidence, and determine whether they are appropriate and feasible to implement in a specific setting given the needed resources (eg, finances, personnel, and equipment/supplies).

Barriers to Implementation

To effectively utilize a CPG to improve patient care and outcomes, it is necessary to overcome the barriers to application of the knowledge in the clinical setting.[41] The examples in Table 7 represent personal/individual, external, guideline-related, and patient-related factors that are common barriers to CPG implementation.[33,35,38,41,42]

TABLE 7.
Barriers to Implementation of Evidence-Based Clinical Practice Guidelines[a,b]

Common Barriers to CPG Implementation	Examples of Barriers
Personal/individual factors	Lack of knowledge about the CPG, the recommendations, and the evidence supporting the recommendations Beliefs and attitudes: lack of interest or agreement with the recommendations; lack of self-efficacy, skills, and motivation; habits; low expectations for improved outcomes; resistance to change; low morale; passivity and lack of engagement/commitment/ownership
External factors: environmental, organizational, system-level, and cultural	Organizational constraints (eg, inadequate processes, procedures; unstable work environment; high level of staff turnover) Lack of administrative/management support Lack of resources (eg, time restrictions; heavy workload; lack of financial resources for personnel, equipment, and supplies; lack of infrastructure/systems; reimbursement issues) Lack of facilitation, characteristics of the facilitator, or disconnect between the facilitator and other staff Lack of collaboration and cooperation: poor team functioning; "turf" issues/conflicts; competing agendas/priorities Societal and clinical norms: poor learning culture Lack of evaluation, follow-up, accountability, and sustainability
Guideline-related factors	Access to guideline Layout of guideline: clarity, wording, and quality Evidence for guideline Plausibility, complexity, applicability, and trialability of recommendations Lack of clear goals and measurable outcomes for intervention(s)
Patient-related factors	Competing claims and advice from health care providers Fear of interventions and adverse effects Psychosocial issues Lack of trust; inconsistent interpersonal relationships with health care providers

Abbreviation: CPG, clinical practice guideline.
[a]Table adapted from Fischer et al[35] (open-access article permitting unrestricted use and reproduction of content under the Creative Commons Attributive License; https://creativecommons.org/licenses/by/4.0/legalcode).
[b]Data for the table were derived from Dogherty et al,[33] Fischer et al,[35] Munce et al,[38] Franks et al,[41] and Graham et al.[42]

Planning for Implementation

A structured plan with multiple strategies to counteract the barriers to implementation of a CPG is required for successful integration/application of evidence into practice.[33,35,37,38] Teamwork and group process are essential to the process.[38] To facilitate implementation of a CPG, Franks and colleagues[41] suggested the following strategies:

- Assess the demand and need for a change in practice versus the ability to change.
- Determine the magnitude of the change and the available resources.
- Develop dissemination strategies to increase awareness of the CPG and relevance to practice, increase motivation, and increase commitment to best practice.

TABLE 8.
Applying Evidence-Based Knowledge to Clinical Practice: A Brief Guide[a]

Knowledge creation: Knowledge inquiry and synthesis	
Phase 1. Identify the created knowledge—the evidence-based CPG	Assess the currency and quality of the CPG Establish an implementation task force Choose the key facilitator/leader for implementation who is credible, trustworthy, passionate, a good communicator, flexible, open-minded, and tenacious; a clinical and process expert; has good interpersonal skills and a sense of humor; understands and uses principles of group process and change theory; and acts as a resource rather than an "authority"
Action cycle: Knowledge application	
Phase 2. Identify the problem	Review the recommendations in the CPG Identify the gaps between the CPG's recommendations and clinical practice (audit current practice) Identify high-priority need(s) for change in a clinically important area rather than attempting to implement the entire guideline at one time
Phase 3. Adapt knowledge to the local context	Determine the target users Identify who will be impacted Identify stakeholders who should be involved in the implementation process Identify or develop infrastructure/systems to implement the best practices
Phase 4. Identify barriers to EBP	Determine the personal/individual, external, guideline-related, and patient-related barriers to implementation Use focus groups, small groups, brainstorming sessions, etc Conduct surveys, questionnaires, interviews, needs assessments, etc
Phase 5. Identify facilitators for EBP	Support of key opinion leaders and leadership (management/administration) Multidisciplinary support Stakeholder engagement and support Readiness for change No conflicts of interest Shared decision-making and control
Phase 6. Select, tailor, and implement interventions depending on the local context	Establish a time frame and target date; identify the "who, what, where, when, and how" of implementation Establish role/responsibilities/accountability for implementation Determine goals/outcome measures for interventions and evaluation of success Determine costs and resources needed, and ensure adequate resources are available for implementation (eg, finances, staffing levels; equipment/supplies) Obtain management/administrative support Use multiple strategies to address the negative barriers and enhance the facilitating factors (eg, education, marketing, and consensus building) Use group process and interdisciplinary collaboration to develop partnerships and relationships; engage multidisciplinary staff, stakeholders, and patients who are impacted by the change; utilize champions; avoid conflicts of interests Develop dissemination and implementation tools tailored to key stakeholders: education/training (eg, videos, webcasts, lectures/slide presentations, and case examples/discussions); decision support tools/point-of-care tools in varied print, digital, and online formats (eg, standardized protocols and procedures, algorithms, checklists, pocket guides, mobile device applications, fact sheets, wall posters, and standing orders); train-the-trainer classes; skill-building exercises, etc Integrate tools and/or interventions with the electronic medical record, or develop alternative approaches Pilot test new interventions
Phase 7. Monitor and evaluate the use of evidence-based knowledge in clinical practice and the outcomes	Determine data to collect based on outcome measures Conduct audits, surveys, pre-/posttests, before/after questionnaires, etc Perform quality improvement projects Conduct research studies
Phase 8. Sustain use of knowledge for EBP	Provide reminders, cues Conduct follow-up audits, surveys; provide feedback of results Update changes to the CPG as they become available Role model EBP; engage mentors for support and follow-up Use feedback to reinforce positive behaviors and/or modify action plans as needed

Abbreviations: CPG, clinical practice guideline; EBP, evidence-based practice.
[a]Data for the table were derived from Taylor et al,[32] Dogherty et al,[33] Field et al,[34] Fischer et al,[35] Gagliardi et al,[37] Munce et al,[38] Franks et al,[41] and Graham et al.[42]

- Provide professional training/education about the CPG, and link the CPG to key performance indicators.
- Develop a collaborative, cooperative environment to give relevant stakeholder groups, including the patient, a voice in decisions about care.
- Use technology to facilitate accessibility, education, and feedback.
- Consider patient educational needs.
- Conduct research to determine enablers for facilitation of CPGs.

Successful implementation of a CPG requires a specific plan for dissemination to ensure access to the guideline; and development of implementation strategies and tools, defined roles and responsibilities, time frames/target dates, and outcome measures.[37] The Knowledge to Action (KTA) framework proposed by Graham and colleagues[42] has been used to guide the design, delivery, and evaluation of implementation strategies to apply knowledge to practice.[34,38] The KTA framework is composed of 2 components: the knowledge creation cycle in which the evidence-based CPG is developed, and the action cycle in which the knowledge is applied or implemented in practice in several phases.[42] The phases can occur sequentially or simultaneously and may overlap and influence each other. The action cycle includes the following 7 phases: (*a*) identify the problem, review, and select the knowledge; (*b*) adapt the knowledge to the local context; (*c*) assess barriers to the use of the knowledge; (*d*) select, tailor, and implement interventions; (*e*) monitor knowledge use; (*f*) evaluate outcomes; and (*g*) sustain knowledge use.[38,42]

The recommendations in the LEVD guideline were developed to be adopted and implemented by WOC nurses or other health care providers in various care settings at the point of care. The WOCN Society recognizes that, for health care providers to adopt changes, strategies are needed to identify and address the feasibility of/and barriers to implementation and integration of the CPG's recommendations into clinical practice. To facilitate that process, a Brief Guide for implementation of CPG recommendations was adapted from the KTA framework.[42] The Brief Guide is based on the assumption that the knowledge creation cycle has already occurred, and a CPG is being implemented such as the LEVD guideline. The guide includes an overview of strategies/activities for implementing/applying evidence-based knowledge from CPGs to clinical practice (see Table 8).[32-35,37,38,41,42]

IMPLEMENTATION TOOLS AND RESOURCES

Point-of-care assessment and clinical intervention tools have been developed by the WOCN Society, which include the following:

- An assessment algorithm accompanies the CPG to facilitate differential assessment and identification of different types of lower-extremity wounds as a basis for implementation of the recommendations for prevention and treatment of VLUs. The algorithm serves as a tool to prompt providers to consider key decision points when caring for patients with a wound to guide the clinician in deciding which wound guideline is appropriate to consult for recommendations about care (ie, CPG for wounds due to pressure injury or venous, arterial, or neuropathic disease).
- An evidence- and consensus-based interactive online algorithm for selecting compression therapy to treat and prevent VLUs and VLU recurrence: *Compression for Primary Prevention, Treatment, and Prevention of Recurrence of Venous Leg Ulcers. An Evidence- and Consensus-Based Algorithm for Care Across the Continuum* (2016; https://www.wocn.org/page/ClinicalTools).
- The following resources are available in the WOCN Society's online Document Library (https://www.wocn.org):
  - An ABI procedure: *Procedure for Measuring and Calculating the ABI* (2017).
  - A guide for differential assessment of lower-extremity wounds: *Venous, Arterial, and Neuropathic Lower-Extremity Wounds: Clinical Resource Guide* (2019).
- Toolkit for implementation—the Registered Nurses' Association of Ontario developed a useful toolkit that provides detailed information, forms, and tools for using the KTA framework for implementation of best practice guidelines: Registered Nurses' Association of Ontario. *Toolkit: Implementation of Best Practice Guidelines.* 2nd ed. Toronto, ON: Registered Nurses' Association of Ontario; 2012. A free download of the toolkit is available online at https://RNAO.ca/bpg/resources/toolkit-implementation-best-practice-guidelines-second-edition.

SUMMARY

To improve the care and outcomes for individuals with/or at risk for wounds due to LEVD, efforts must be taken to disseminate evidence-based guidelines. In addition, health care providers must make every effort to identify individuals with/or at risk for VLUs and implement appropriate preventive and treatment interventions. Health care providers must know, understand, and communicate the evidence supporting an intervention to engage the patients and their caregivers, whether lay persons or other health care providers, to achieve EBP.

The current guideline serves as a resource for WOC nurses and other health care providers, contributes to evidence-based prevention and management of persons with/or at risk for VLUs, and provides a framework for future wound research. Educating patients and families about the risks and etiology of LEVD and VLUs is imperative for them to develop an understanding of their role in preventing and managing LEVD and VLUs, preventing VLU recurrence, and the importance of seeing a wound specialist for the management of any wounds that develop.

KEY POINTS

- Compression is the cornerstone of effective management of LEVD and VLUs.
- Low self-efficacy and lack of knowledge about LEVD is associated with poor self-management and nonadherence to measures to prevent recurrence of VLUs such as use of compression, leg elevation, and skin hygiene.
- Patient education is a critical component of effective self-management for risk reduction, treatment, and prevention of VLUs and recurrence; and it should include education on the importance of a lifelong commitment to compression therapy to prevent VLUs, promote VLU healing, and prevent VLU recurrence.

- Prior to compression, the patient should be screened for arterial disease with an ABI.
- Patients should be fitted with the highest level of compression which they can tolerate and apply.
- Individuals with LEVD and VLUs will benefit from the care and management by a clinical wound care expert.
- Successful implementation of a CPG requires a specific plan for dissemination to ensure access to the guideline; and development of implementation strategies and tools, defined roles and responsibilities, time frames/target dates, and outcome measures.

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