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INVITED REVIEW

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The effectiveness of nursing interventions in adherence to self-care for preventing venous ulcer recurrence: A systematic literature review

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Abstract

Venous ulcers affect up to 3% of the global population, with a high impact on economies and quality of life. This is exacerbated by its recurrence rates, which reach 70% at 12 months after healing. The perpetuation of these cycles of healing and recurrence is not interrupted or even attenuated by the self-care activities recommended and directed toward their prevention. In this context, we sought to identify the effectiveness of interventions that promote adherence to self-care to prevent venous ulcer recurrence. In August 2022, we conducted a literature search via EBSCO in the following databases: CINAHL Complete, MEDLINE Complete, Cochrane Database of Systematic Reviews, Scopus, and Web of Science. The inclusion criteria were researched in the form of randomised controlled trials or systematic literature reviews, and 99 studies were identified. During the different times of selection, four studies met the defined inclusion criteria and were included. As the main conclusions, the emphasis goes to the importance of the use of compression and the greater effectiveness of higher compression classes for the prevention of recurrence. Different educational methodologies seem to be important to increase knowledge about prevention, specifically regarding the aetiology of recurrence and the implementation of prevention measures.

KEYWORDS

adherence, nursing interventions, recurrence, self-care, venous ulcer

Key Messages

- Venous ulcer recurrence rates may range from 57% to 78% up to 12 months after healing. The use of compression is decisive to prevent recurrence, but so are limb elevation and venous return exercises, with attention to risk factors such as nutrition and physical activity;

- Due to the low adherence to these self-care measures aimed at preventing recurrence, this SLR sought to investigate the effectiveness of interventions that promote adherence to this form of self-care;
- This SLR indicated that prevention begins with training on the aetiology of venous ulcers, their recurrence, and each of the recommended prevention measures. The use of compression and of the highest possible class was associated with recurrence rates;
- Further studies should be developed with greater methodological robustness, focusing on the effectiveness of interventions that promote self-care, further expanding the variability of these same interventions.

1 | INTRODUCTION

Venous ulcers represent 70% to 80% of the different types of leg ulcers and affect 0.3% to 3% of the global population.[1–6] Due to their higher prevalence, venous ulcers are also the most important, because of their impact on the health-related quality of life of patients and on health services, particularly in the economies of Western societies.[1,6–11]

Given the chronicity of the venous disease and the comorbidities inherent to its aetiology, in the common history of venous ulcers, cycles of healing and recurrence persist.[4,7] Venous ulcer recurrence rates range from 57% to 78% up to 12 months after healing.[4,6,11,12]

Understanding that its aetiology underlies a chronic condition is the initial key to its prevention, which is implemented by prevention measures, so that these recurrence rates can be mitigated,[12] reducing the impact of such ulcers.

The use of compression devices is the most relevant prevention measure for the recurrence of venous ulcers, constituting the universal gold standard.[1,2,12,13] At the same time, physical activity, exercises promoting venous return, the elevation of the lower limbs during rest, or hygiene and limb hydration are also recommended.[2–4,12–14]

Recurrence of venous ulcers is unequivocally associated with the chronicity of its risk factors.[4] However, it is also related to aspects such as follows: lack of support or cooperation; low levels of motivation[4]; conflicts with professionals[1]; the impact on everyday life, in particular on one's professional life; difficulty in applying and removing compression devices[12]; low levels of self-care and self-efficacy; and, very significant, lack of knowledge about the aetiology of venous ulcers and its relationship with chronic venous disease,[6,11,12,15] as well as about the benefits and effectiveness of self-care activities.[1,4]

Consequently, the therapeutic education of these patients and their caregivers should be multifaceted, ensuring the understanding that chronic conditions persist in their aetiology,[1,12] and seeking to increase knowledge about the pathophysiology and aetiology of venous ulcers and skills related to self-care measures, through different forms of communication.[1,10,12]

In this context of high complexity, there is little information about the interventions of health professionals to promote self-care for the prevention of recurrences, especially in terms of the effectiveness of interventions whose objective is to promote knowledge about the aetiology/pathophysiology and adherence to prevention measures.[10] Thus, it is necessary to determine the effectiveness of nursing interventions aimed at promoting adherence to self-care activities to prevent recurrences.

The present systematic literature review (SLR) aimed to identify the effectiveness of interventions promoting adherence to self-care for the prevention of venous ulcer recurrence.

2 | MATERIALS AND METHODS

This systematic review was prepared in accordance with the Cochrane guidelines for the preparation of systematic reviews of interventions.[16] This article was drafted according to the PRISMA guidelines.[17] The protocol for this review was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under number CRD42022359832.

2.1 | Eligibility criteria

The eligibility criteria for inclusion and exclusion of studies are presented in Table 1. The studies considered for inclusion included quantitative primary or secondary research articles. In relation to the design of the investigations, randomised controlled trials (RCTs) were included that sought to evaluate the effectiveness of intervention programs. In addition, SLRs aimed at any of the methodologies that were part of these inclusion criteria were also included.

TABLE 1 Study eligibility criteria.

PICOS	Inclusion	Exclusion
Participants	• Over 18 years old; • Active venous ulcers; • Healed venous ulcers; • History of recurrence of venous ulcers.	• Presence of other types of wounds
Intervention	• Evaluation of the effectiveness of an intervention program to promote adherence to self-care activities to prevent recurrence of venous ulcer (use of compression, limb elevation, venous return exercises, physical activity and adequate diet) • Evaluation of the effectiveness of some type of intervention for adherence to at least one of the recurrence prevention measures.	• Studies aimed only at treatment and not recurrence prevention
Context	• No restrictions on the context of the study (community, hospital or clinic)	
Outcome	• Primary outcomes-adherence to self-care measures: ○ Use of compression; ○ Limb elevation; ○ Venous return exercises; ○ Physical activity and proper diet. • Secondary outcomes: ○ Reduction of venous ulcer recurrence rates; ○ Adherence to interventions aimed at changing modifiable determinants: diet, exercise or quitting smoking.	• Lack of focus on at least one of the interventions.
Types of studies	• Randomised controlled trials; • Systematic literature reviews.	• Qualitative studies; • Opinion/review articles; • Conference papers/abstracts; • Non-intervention studies; • Protocols without results.

The present SLR only considered studies whose full texts were available in Portuguese, English, or Spanish. Studies published from 2016 onward were included, a timeframe that takes into account the contemporaneity of the topic and that the known SLR,[18] which specifically focuses on interventions that promote adherence, in this case only the use of compression, dates precisely from 2016.

2.2 | Searching and selection of studies

The articles to be part of this SRL were searched for via EBSCO in the following databases: CINAHL Complete, MEDLINE Complete, Cochrane Database of Systematic Reviews, Scopus, and Web of Science, with keywords and subject headings, with a strategy adjusted to each of the databases (Appendix A), in August 2022. The references of the included studies were also analysed for studies that the research strategy might not have found. The included studies, according to the defined criteria, were entered into Rayyan software to facilitate organization and management, while also simplifying the collaboration of other stakeholders. This software immediately allowed the removal of duplicates, and collaboration between two researchers who, through the analysis of titles and abstracts, excluded those that did not fit the objective of the review or did not meet the other inclusion criteria. The selected studies were analysed in their entirety by the same two researchers, with further exclusions of studies that did not meet the inclusion criteria. In both phases, any differences were discussed by the researchers until a consensus was found.

2.3 | Quality assessment and data extraction

To assess the quality of the included studies, the Revised Cochrane risk-of-bias tool for randomised trials (RoB 2)[19] and the AMSTAR 2 Tool[20] for systematic reviews of RCTs were used. To extract information, an Excel table was used in which the studies were numbered and the following information was inserted: author; title; type of study; objectives; source; language; date of the study; region or country; context of the study; study design; sample size and characteristics of the participants; type of interventions and professionals who performed them; measured results; and conclusions.

2.4 | Data synthesis

It was not possible to perform a meta-analysis, as had been outlined in the review protocol, because of the high heterogeneity and different types of interventions, methods, evaluations and monitoring instruments.

Therefore, we opted for a narrative synthesis of the information contained in the included studies, according to the primary and secondary outcomes.

3 | RESULTS OF THE REVIEW

3.1 | Search results

Based on the search carried out in the described databases, 99 studies were identified, of which 20 duplicates were rejected. Based on the analysis of titles and abstracts, six were considered eligible (Figure 1). After reading through the documents, one study was rejected because it was in German and therefore did not meet the eligibility criteria, while another was excluded because it dealt only with the treatment of venous ulcers and not the prevention of their recurrence (Appendix B).

3.2 | Characteristics of included studies

This review included four studies, all published in English, with two RCTs and the two SLRs. The RCTs were conducted in Serbia and Croatia with 361 (170 male and 138 female) and 208 (96 male and 112 female) participants respectively. In the case of the two SLRs, one was conducted in Australia and included three RCTs and one ongoing study, including 20, 67, and 184 participants. The other RSL, from Norway and Sweden, included 5 RCTs, with 100, 100, 300, 153 and 31 participants (Table 2).

3.3 | Risk of bias assessment

A risk of bias assessment was performed for each of the studies included in this review. The RoB 2[19] was used for the randomised studies, while the AMSTAR 2 tool was chosen[20] for the systematic reviews of randomised clinical trials.

Regarding the two randomised studies, study 1[21] was classified as having 'some concerns' (Figures 2 and 3), highlighting a concern in domain 1 related to the randomization process, as a result of having 'no information' about the possible blinding of the allocation sequence until the participants were enrolled and

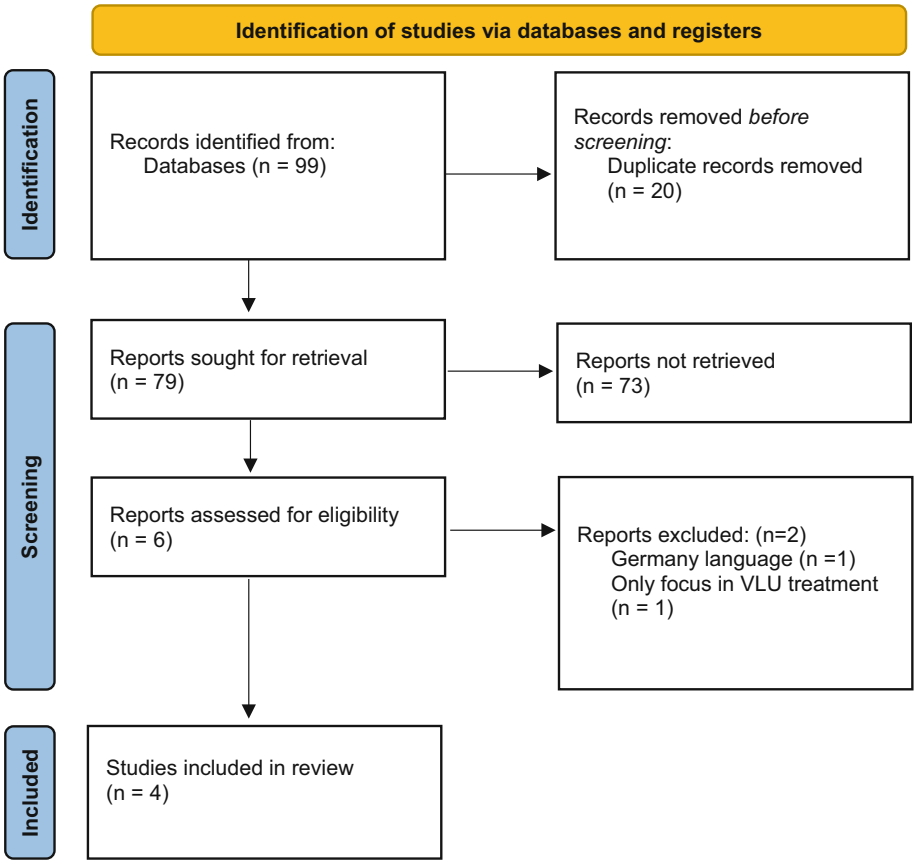

FIGURE 1 PRISMA flow diagram for study identification and selection process.

TABLE 2 Characteristics of the included RCTs.

	Author/Year/ Country	Study design participants (I;C)	Participant characteristics/ Selected studies	Intervention and control treatment		Intervention duration/ follow-up	Outcomes
				I	C		
Study 1	Dragan J. Milic; Sasa S. Zivic; Dragan C. Bogdanovic; Mladjan D. Golubovic; Milan V. Lazarevic; Konstansa K. Lazarevic - 2018 - Serbia	RCT I: 186 C: 175	Patients aged at least 18 years with recently healed leg ulcerations of venous aetiology. 361 patients were randomised, and 308 patients (170 men, 138 women; mean age, 59 years) completed the study.	Randomization in group A: 186 patients who wore a heel-less open-toed elastic class 3 compression device knitted in tubular form (Tubulcus; Laboratoires Innothera, Arcueil, France)	Randomization in group B: 175 patients who wore a class 2 elastic stocking (Rudo, Nis, Serbia).	5-year follow-up: • In first 2 years of follow-up: All patients were instructed to wear compression stockings continuously (both during the day and at night). • In the third, fourth, and fifth years of follow-up, patients were instructed to wear elastic stockings during the day only.	• Rates of ulcer recurrence after the 5-year of follow-up were 28.98% for the class 3 compression group and 60% for the class 2 compression group ($p < 0.001$, log-rank test); • Patients in the class 3 compression group experienced significantly longer absolute (46 vs. 40 months; $p < 0.001$, Mann–Whitney U test) and proportional (77% vs. 67%; $p < 0.001$, Mann–Whitney U test) ulcer-free time after 5 years; • Rates of noncompliance after 5 years were 10.23% for the class 3 compression group and 6.25% for the class 2 compression group ($p = 0.188$, χ^2 test). Noncompliance in regard to compression class between study groups was statistically nonsignificant.
Study 2	Mirna Žulec; Danica Rotar Pavlic; Ana Žulec - 2022 - Croatia	RCT I: 112 C: 96	208 patients 96 men 112 women	Educational intervention on knowledge of self-care among patients with venous leg ulcers, mainly on wound dressing practice, compression therapy, physical activity and nutrition. An educational brochure was	Without intervention	Re-examined after 3 months at their scheduled exams.	Knowledge improvement was seen in the following areas: • Compression therapy: the measurement results showed a statistically significant shift, Wilks Lambda = 0.88, F (1.11) = 15.38, $p < 0.001$. There are, therefore, compelling reasons to conclude that the educational brochure influenced the knowledge of compression therapy. In one-way ANOVA, Wilks Lambda = 0.768, F (1.11) = 33.459, $p < 0.001$,

(Continues)

TABLE 2 (Continued)

	Author/Year/ Country	Study design participants (I;C)	Participant characteristics/ Selected studies	Intervention and control treatment		Intervention duration/ follow-up	Outcomes
				I	C		
				made and distributed to patients, who were surveyed about caring for venous leg ulcers.			participants showed a statistically significant increase in awareness that compression therapy is necessary after VLU healing; • Positioning: participants intuitively know that keeping their legs horizontal will lower edema and swelling. After education, the answer 'on the bed, above the heart level' was more often given, with a statistically significant difference. This also included opinions about positive effect of walking on VLU healing; • Warning signs; • Nutrition; • Knowledge of effective VLU treatment.
SLR 1	Carolina D. Weller; Rachelle Buchbinde; Renea V. Johnston - 2016 - Australia	SLR Included randomised controlled trials of interventions that aimed to help people with venous leg ulcers adhere to compression treatments, compared with usual care, no intervention, or another active intervention.	Baquerizo Nole, 2015 RCT - 20 participants Over 60 years old.	To improve patient knowledge about VLU disease and its management, delivered by video to the intervention group.	Compared to a control group who received the same information in text form (written pamphlet).	The questionnaire used to assess knowledge was administered prior to the educational intervention at baseline, post educational intervention (administered immediately after the intervention) (post-test), and 4 weeks later (4 week post-test).	Measured knowledge of venous leg ulcer pathophysiology, management and lifestyle, compression therapy, and reasons to seek care between visits at baseline, immediately after the intervention, and 4 weeks later, using a test.

TABLE 2 (Continued)

Author/Year/ Country	Study design participants (I;C)	Participant characteristics/ Selected studies	Intervention and control treatment		Intervention duration/ follow-up	Outcomes
			I	C		
		Edwards, 2009 RCT - 67 participants. 90% were more than 60 years old.	Evaluated the effectiveness of standard wound care in a community clinic called 'Leg Club' (34 participants) and preventive care.	Compared with the same wound care in the home by a nurse (33 participants) conducted in Queensland, Australia	Both the Leg Club and control groups received nursing care for up to 6 months consisting of: • comprehensive assessment, including ankle brachial pressure index (ABPI); • referral for further circulatory assessment as indicated; • venous ulcer treatment based on research protocols; • advice and support about venous leg ulcers; • follow-up management.	The proportion of participants healed at 3 months was higher in the Leg Club group (12/28, 43%) than in the home visit group (7/28, 25%), relative risk (RR) 1.71 (95% confidence intervals (CI) 0.79 to 3.71), due to imprecision around the results and risk of bias. It is uncertain if the proportion of participants healed at 6 months was different between treatment groups (Leg Club: 15/33 (45%), home visit group 10/34 (29%), RR 1.55, 95% CI 0.81 to 2.93).
		Heinen, 2012 RCT - 184 participants The mean age was 66 years old (27–91 years). Women made up 60% of the study sample.	Investigating the effectiveness of a community-based exercise and behaviour modification program called 'Lively Legs' for promoting adherence with	Compared with 'usual care' alone (92 participants), conducted in 11 outpatient dermatology clinics in the Netherlands.	Lively Legs counselling sessions (up to six) that included evaluation of patient lifestyle; health education related to patient heath beliefs; motivation for	Recurrence of venous ulcer at 18 months; it was uncertain if there was a difference in the number of people with recurrent ulcers between treatment groups, 32/69 with recurrence in Lively Legs group versus 38/67 in usual care group (RR 0.82, 95% CI 0.59 to 1.14). It was uncertain if there was a

(Continues)

TABLE 2 (Continued)

Author/Year/ Country	Study design participants (I;C)	Participant characteristics/ Selected studies	Intervention and control treatment		Intervention duration/ follow-up	Outcomes
			I	C		
			ambulant compression therapy and physical exercise (92 participants), plus usual care (wound care, compression bandages at an outpatient clinic)		increasing exercise; other barriers and facilitators for behaviour change; and goal setting on one or more lifestyle topics. The outpatient clinic was the setting for Lively Legs counselling; the session time varied from 45 to 60 min for the first session and from 20 to 30 min for subsequent sessions. Where possible, an informal caretaker was present at each session.	difference in the number people who fully adhered to compression therapy at 6 months (47/92 in Lively Legs vs. 35/92 in outpatient clinic; RR 1.34, 95% CI 0.97, 1.87); 12 months (45/92 Lively Legs vs. 42/92 outpatient clinic; RR 1.07, 95% CI 0.79 to 1.45); and 18 months (42/92 Lively Legs versus 41/92 outpatient clinic; RR 1.02, 95% CI 0.74 to 1.41), due to the low-quality evidence. It was uncertain at 18 months if there was a difference in the number of people healed between treatment groups, 51/92 healed in Lively Legs group versus 41/92 in usual care group (RR 1.24, 95% CI 0.93 to 1.67; Analysis 2.1), due to possible imprecision around the results and risk of selection bias (low-quality evidence).
		O'Brien, 2014 Ongoing study	The self-management exercise intervention consists of a 12-week home-based unsupervised progressive resistance exercise program,	Usual care alone for promoting exercise and healing rates	The programme is administered by telephone calls from the principal researcher at 4 time points (Week 1, 3, 6 and 9) over the 12-week intervention. Participants will	

TABLE 2 (Continued)

	Author/Year/ Country	Study design participants (I;C)	Participant characteristics/ Selected studies	Intervention and control treatment		Intervention duration/ follow-up	Outcomes
				I	C		
				aimed at strengthening the calf muscle of the leg, given in addition to usual care.		also be encouraged to walk at least three times per week for 30 min	
SLR 2	Kristin Thuve Dahm; Hilde Tinderholt Myrhaug; Hilde Strømme; Brynjar Fure; Kjetil Gundro Brurberg - 2019 - Norway Sweden	SLR and meta-analysis According to the following criteria: (a) study population of elderly (≥70 years) with venous insufficiency and swollen legs without recent (≤ 2 years) deep vein thrombosis; (b) evaluating the preventive effects of European standard class 2 or 3 compression stockings; (c) compared to a different class of compression stockings, other interventions to promote venous backflow or no intervention; (d) assessed on thrombosis, leg ulcer and mobility (primary outcomes) or	Kapp, 2013 $n = 100$ Age (Mean): 79 Home nursing	Class 3 stockings (34–46 mmHg) below knee length	Class 2 stockings (23–32 mmHg) below knee length		Ulcer recurrence: 6 months RR: 0.64 (0.20 to 2.03) Compliance 6 months Class 3: 17/44 Class 2: 35/49 RR: 0.54 (0.36 to 0.82)**
			Clarke-Moloney, 2012 $n = 100$ Age (Mean): 69 Hospital and community leg ulcer clinic Ireland	Class 2 stockings (23–32 mmHg) knee or thigh length	Class 1 stockings (18–21 mmHg) knee or thigh length		Ulcer recurrence: 12 months RR: 0.59 (0.23 to 1.49)
			Nelson, 2006 $n = 300$ Age (Mean): 64 Hospital leg ulcer clinic England	Class 2 stockings (25–35 mmHg) knee or thigh length	Class 1 stockings (18–24 mmHg) knee or thigh length		Ulcer recurrence: 12 months RR: 0.47 (0.25 to 0.91)** 5 years RR: 0.82 (0.61 to 1.12) Compliance 5 years Class 2: 86/149 Class 1: 108/151 RR: 0.81 (0.68 to 0.96)**
			Vandongen 2000 $n = 153$ Age (Mean): 67 Hospital leg ulcer clinic Australia	Class 3 stockings (35–45 mmHg) below knee length Venous leg ulcer healed for 2 weeks. Patients had to apply the stockings themselves	No compression stockings		Ulcer recurrence: 6 months RR: 0.46 (0.27 to 0.76)** 12 months RR: 0.43 (0.27 to 0.69)** Compliance not reported

(Continues)

TABLE 2 (Continued)

Author/Year/Country	Study design participants (I;C)	Participant characteristics/Selected studies	Intervention and control treatment		Intervention duration/follow-up	Outcomes
			I	C		
	other health-related outcomes such as pain, discomfort, quality of life or post-thrombotic syndrome (secondary outcomes).	Jungbeck, 1997 $n = 31$ Age: (27–82) Vascular surgery dept. Sweden	Class 2 stockings (23–30 mmHg) below knee length	Class 1 stockings (13–20 mmHg) below knee length		Not reported Compliance not reported. Subjective symptoms 8 weeks1 Class 2 (Median % on VAS): Before: 46.1%, after: 14.8% Class 1 (Median % on VAS): Before: 43.8%, after: 15.6%

assigned to the interventions. Study 2[22] was classified as having a high risk of bias (Figures 2 and 3) in domain 1 related to the randomization process, as a result of having 'no information' about the possible blinding of the allocation sequence until the participants were enrolled and assigned to the interventions. In addition, domain 2, associated with the derivations of the intended intervention, was classified as presenting high risk of bias, definitely influencing their final ranking.

In the case of the two SLRs, according to the AMSTAR 2 assessment,[20] RSL 1[18] was rated as having high confidence in the review results (none or a non-critical weakness: The systematic review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest), as none of the critical domains were compromised. RSL 2[23] presented a compromised critical domain (domain 7-Justification for excluding individual studies), which classified it as 'low' regarding confidence in its results (one critical flaw with or without non-critical weaknesses: The review has one critical flaw and should not be relied on to provide an accurate and comprehensive summary that address the question of interest).

4 | OUTCOMES AND MEASURES

The primary outcome defined for this review was adherence to self-care measures aimed at preventing venous ulcer recurrence, namely the use of compression, limb elevation, and venous return exercises. The secondary outcomes were reduction of venous ulcer recurrence rates and adherence to interventions aimed at changing modifiable determinants, such as diet, physical exercise, or quitting smoking. The studies included in this review did not address interventions that, in an integrated manner, focused on all of the previously established outcomes, although study 2[22] made reference to all except venous return exercises.

Because none of the studies referred to all of the self-care measures known for the prevention of recurrences, each was analysed individually. In terms of the main outcome, the use of compression, study 1[21] compared the use of class 3 compression stockings and class 2 compression stockings in terms of recurrence rates and ulcer-free time, as well as to compliance with their use. Regarding compliance, during the 5-year follow-up period, 28 individuals did not adhere to compression therapy, representing dropout rates of 10.23% (18 individuals) for the class 3 compression group and 6.25% (10 subjects) for the class 2 compression group ($p = 0.188$, test χ^2), so there was lower compliance among the class 3 compression group, although this difference was not statistically significant.

Study 2[22] used an educational intervention, consisting of a brochure about self-care knowledge regarding the

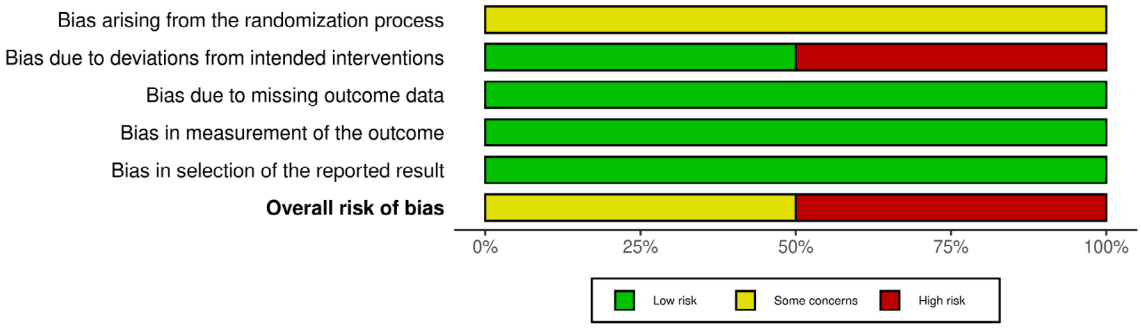

FIGURE 2 Risk of bias graph.

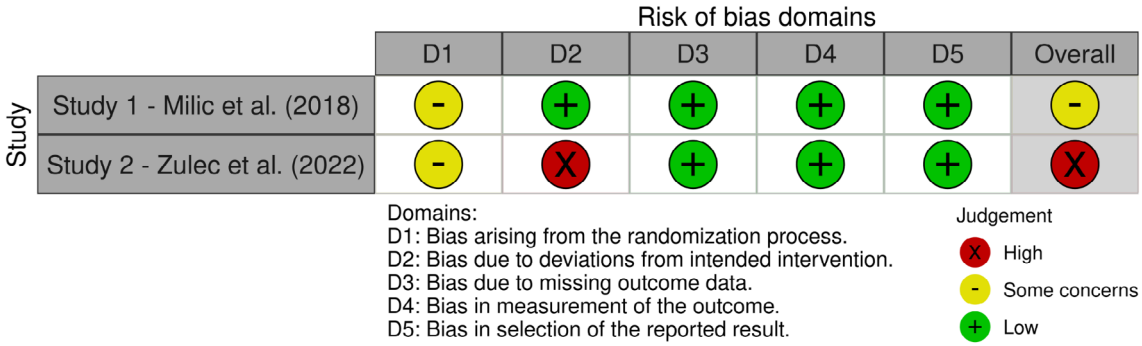

FIGURE 3 Risk of bias summary.

use of compression therapy, how to perform treatment, limb elevation and physical activity, and nutrition. It concluded that the intervention influenced knowledge about compression therapy, with a statistically significant increase (one-way ANOVA, Wilks Lambda = 0.768, F [1.11] = 33.459, $p < 0.001$) and an awareness that this is necessary even after venous ulcers are healed.

Regarding the included SLRs, the first[18] included four studies that addressed intervention measures that promoted adherence to compression, comparing this with standard care or another type of intervention according to each study. In this SLR, none of the studies presented a statistically significant relationship that demonstrated that interventions aimed at promoting adherence to compression improved the healing of venous ulcers and reduced their recurrence.

The second RSL[23] included in the present review, which included five studies and a meta-analysis of two of these studies, aimed to summarise the preventive effects of the use of compression stockings in chronic venous insufficiency and edematous lower limbs. In one of the studies, which compared the use of class 3 compression stockings with class 2 compression stockings, at 6 months, there was greater compliance with class 2 stockings (class 3: 17/44; class 2: 35/49; RR: 0.54 [0.36–0.82]). In another study, comparing class 2 and class 1 stockings, there were no significant differences in relation to compliance at 12 months (class 2: 45/50; class 1: 43/49; RR: 1.03 [0.89–1.18]). The same was true of another study at a 5-year follow-up (class 2: 86/149; class 1: 108/151; RR: 0.81 [0.68–0.96]).

Another main outcome, limb elevation, also appeared in study 2,[22] which showed that after the educational intervention, there was a statistically significant difference in the perception of the importance of raising the limbs to heart level.

Another self-care measure that was considered a main outcome, venous return exercises, was not addressed by any of the studies included in the present review.

In terms of the secondary outcomes, there was a reduction in recurrence rates. Study 1[21] suggested that class 3 compression stockings were associated with a statistically significant lower recurrence rate compared to class 2 compression stockings, with 147 recurring ulcers: 51 (28.98%) in the class 3 group and 96 (60%) in the class 2 group ($p < 0.001$, log-rank test). Individuals in the class 3 compression group experienced more absolute ulcer-free time (46 vs. 40 months; $p < 0.001$, Mann–Whitney U test) and proportional time (77% vs. 67%; $p < 0.001$, Mann–Whitney U test) during the 5 years, compared with those in the class 2 compression group.

In one of the studies included in the first SLR,[18] participation in a program called the Lively Legs program did not influence adherence to compression and, consequently, recurrence rates (32/69 of recurrence in Lively Legs group vs. 38/67 in the usual follow-up group; RR 0.82 [95% CI 0.59–1.14]). The meta-analysis included in the second

SLR[23] demonstrated that comparing the use of class 2 compression stockings with class 1, there was a reduction in ulcer recurrence at 12 months (RR 0.52; 95% CI 0.30–0.88). However, another study included in this same SLR showed no difference between class 3 and class 2 stockings at 6 months (RR 0.64; 95% CI 0.20–2.03). Yet another study showed that, compared with the non-use of compression stockings, the use of class 3 stockings was associated with a lower risk of ulcer recurrence at 6 months (RR 0.46; 95% CI 0.27–0.76) and at 12 months (RR 0.43; 95% CI 0.27–0.69).

Other secondary outcomes, such as physical activity, were mentioned in study 2,[22] which stated that after the educational intervention, a positive opinion emerged on the effect of walking for healing venous ulcers. Also in SLR 1,[18] one of the included studies referred to physical exercise, namely through a video intervention, although some methodological problems were found in the same study. This SLR also included another study addressing counselling sessions that focused on exercise motivation and some of the barriers and facilitators of behavioural change, and another study that analysed a telephone intervention for a progressive, unsupervised, twin-strengthening resistance exercise program, although this was an ongoing study and, therefore, did not yet have any results.

Regarding the secondary outcome 'nutrition', study 2[22] observed that after the educational intervention, there was an improvement in knowledge about nutrition.

The remaining secondary outcomes defined for this review were not addressed in the included studies.

5 | DISCUSSION

The impact of venous ulcers has already been widely described in the literature, lasting over time with extremely high recurrence rates.[4–6,11,12] Although it is known that several self-care measures can mitigate these rates, decisively influencing their magnitude, there is very low adherence to them,[4] with particular emphasis on the low use of compression,[5,10] despite the unequivocal, broad and consensual indication of its use for treatment and prevention.[24] Also, apparently and given the number of studies found, the scientific community is not yet strongly committed to understanding which nursing interventions could promote self-care that includes the different measures to prevent venous ulcer recurrence.

In fact, few RCTs in this study focused on the effectiveness of programs or interventions that promote self-care aimed at preventing recurrence. Furthermore, we found no studies that focused on programs that integrated all the most recommended prevention measures (use of compression, limb elevation, cleansing and hydration, and venous return exercises[24]), which could possibly enhance their effectiveness compared to the same interventions in isolation. The included studies, which focused only on isolated interventions, necessarily limit their effectiveness in reducing venous ulcer recurrence rates. According to the few studies included, a low variety of interventions promoting adherence to self-care measures was observed, possibly denoting little interest in or awareness of the need for the promotion of self-care behaviours.

Still, the use of compression was addressed in all the studies, which recognised and measured its importance, both for the treatment of venous ulcers and to prevent their recurrence. In this case, compliance with different classes of compression stockings was not found to be important or even statistically significant.

Compliance seems to be the main challenge to more long-term use.[21] In fact, venous ulcer patients tend to believe that after their closure, the problem is definitively solved and, therefore, as observed in other studies, they discontinue the use of compression.[25] This attitude seems to be closely associated with a lack of knowledge about the compression itself and the chronicity of chronic venous disease and its relationship to the aetiology of venous ulcers,[10,15] which can justify, for example, the low use of compression stockings. This reduced adherence to compression, estimated by some authors at 28%,[26] represents the main challenge for health professionals. This is a multifaceted and complex challenge, especially due to the necessary understanding of the factors that influence the behaviour of people with venous ulcers.[25]

Thus, according to what other authors have observed,[6,11,12,15] it is clear that prevention begins with knowledge about the problem and about each of the recommended prevention measures. Therefore, once again, simple measures such as educational brochures stand out.[22] They are highly effective in transmitting knowledge, although this was substantiated by only one study. However, study 2[22] went further, stating the importance of enabling people to be more confident in the development of their self-care actions, namely through the empowerment of their physical, mental and social skills, allowing them to achieve greater self-management of their condition and context. To this end, it is essential to increase knowledge about the pathophysiology and aetiology of venous ulcers, and self-care skills, through different forms of communication.[1,10,12]

Interestingly, and contrary to what has been stated by a wide range of authors, in SLR 1,[18] the promotion of a group of measures to prevent venous ulcer recurrence (use of compression, limb elevation, cleansing and hydration, and venous return exercises[2–4,12–14,24]) did not show the expected impact of integrated community programs, with no reported outcomes other than those related to compression therapy, its adherence, and healing rates.

Physical exercise was also mentioned by some of the studies,[18,22] with interventions that included it, but

without mention of any evaluation of the effectiveness of these strategies from a behavioural point of view. Even so, it is worth highlighting this finding, as it reflects that the importance of physical exercise is already recognised for improving healing, quality of life, and body functionality in individuals with venous ulcers.[27]

Study 2[22] also mentioned improvement in knowledge about nutrition after the educational intervention, but again without a measurement of its practical effect, as the study only evaluated knowledge about these aspects. We recognise the possible need for a greater appreciation of nutrition, with correction of nutritional deficiencies and obesity, considering their association with a greater predisposition to the occurrence of venous ulcers.[14]

The studies also showed concern about a decrease in venous ulcer recurrence rates, which was the secondary outcome. In this case, apparently, the higher the compression class, the lower the recurrence rate,[21] although there was sometimes contradictory information in this regard among the studies.[23] Still, overall, the studies indicated that the higher the compression class used, the better the prevention of venous ulcer recurrence. This conclusion is in line with that already presented by other authors[24] in other SLRs, namely, that the use of compression is associated with a lower risk of recurrence when compared with its non-use. However, at the same time, other studies have shown that the lack of knowledge, already mentioned, may extend beyond the aetiology of recurrence,[6,25,28] including people with venous ulcers and professionals, and regarding the prescription of stockings that are correctly adjusted and appropriate to the context and characteristics of the person, and strategies for use and for their placement and removal, but without patients' autonomy being called into question.[6] In fact, some studies[25] clearly found that the participants stated that explanations of the treatments increased their adherence to them, namely, discussions about the barriers to the use of compression and the consequences of its non-use.

The apparent difficulties in measuring the interventions carried out in the studies seem highly important because they result in gaps in the knowledge about the effectiveness of these interventions in promoting venous ulcer prevention measures. In these cases, the only outcomes assessed were those such as adherence/compliance and recurrence rates, although with many differences in the way adherence/compliance were measured, when recurrence rates were measured (at 6, 12 or 18 months), and with some methodological problems in some studies.

Furthermore, none of the studies expressed concern with identifying risk factors for the occurrence or recurrence of venous ulcers, and consequently, lacked interventions directed toward these risk factors.

The main limitation of the present SLR was the impossibility of conducting a meta-analysis, due to the heterogeneity of the selected studies, although there was still strong systematization in their organization, selection, and analysis. Another limitation was the small number of studies that met the inclusion criteria (2 RCTs and 2 SLRs), with relatively small samples in some cases, especially the studies in the SLRs. Some studies also presented risks of bias. Of course, any conclusions to be drawn from this SLR are also conditioned by the absence of any studies that focused on preventing the recurrence of venous ulcers as a whole, through holistic approaches, namely in the form of programs that include all the self-care measures that are already known. At the same time, despite some exceptions, there were few evaluations of the effectiveness of interventions in promoting self-care, which should be the preferred field of action of health professionals, particularly nurses.

Therefore, there is still a lack of knowledge regarding the effectiveness of programs that focus on prevention as a whole, specifying and expanding the activities that promote recurrence prevention measures.

Further studies should be developed with the greatest robustness from the methodological point of view, focusing on the effectiveness of interventions that promote self-care, mitigating this problem.

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CONFLICT OF INTEREST STATEMENT

There are no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX A: SEARCH STRATEGY

- Search Strategy for CINAHL

	Search	Results
S1	(MH 'Venous Ulcer')	2929
S2	Varicose ulcer	2197
S3	Venous leg ulcer	1740
S4	Venous leg ulcer*	1880
S5	Varicose ulcer*	2200
S6	VLU	357
S7	Venous insufficiency	2147
S8	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7	5362
S9	(MH 'Recurrence+')	53 324
S10	Recurren*	153 726
S11	Relapse	37 778
S12	S9 OR S10 OR S11	170 120
S13	S8 AND S12	519
S14	Prevention	744 811
S15	Control	1 203 150
S16	Prevent*	903 252
S17	S14 OR S15 OR S16	1 424 864
S18	S13 AND S17	264
S19	(MH 'Patient Compliance+')	55 339
S20	(MH 'Organizational Compliance')	7848
S21	(MH 'Guideline Adherence')	16 731
S22	(MH 'Adherence Behaviour (Iowa NOC)')	5
S23	Complian*	105 740
S24	Concordance	12 779
S25	Adheren*	72 489
S26	(MH 'Health Behaviour')	55 591
S27	Concord*	18 084
S28	Compliance-enhancing interventions	8
S29	Treatment nonadherence	2014
S30	S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29	219 630
S31	(MH 'Physical Activity')	47 099
S32	(MH 'Exercise+')	125 552
S33	(MH 'Exercise Positions+')	2179
S34	(MH 'Therapeutic Exercise+')	60 163
S35	(MH 'Group Exercise')	1747
S36	(MH 'Walking+')	35 085
S37	(MH 'Compression Therapy')	2947
S38	Muscle pump activat*	8
S39	Leg exercise	857
S40	Compression socks	51
S41	Leg elevation	98
S42	Emollient	2019
S43	Moisturiser	598
S44	S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43	203 152
S45	(MH 'Patient Education+')	83 838
S46	(MH 'Health Education+')	138 689
S47	(MH 'Program Development+')	93 417
S48	(MH 'Community Programs')	9453
S49	(MH 'Managed Care Programs+')	17 512
S50	(MH 'Program Implementation')	30 726
S51	(MH 'Program Evaluation')	46 039
S52	(MH 'Program Planning')	4033
S53	(MH 'Behavioural Changes')	11 939
S54	(MH 'Behaviour Therapy+')	39 302
S55	Educat* program*	39 139
S56	Therapeutic education*	994
S57	Self-care program*	313
S58	Self-help group	6304
S59	(MH 'Support Groups+')	12 030
S60	Leg group	521
S61	S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60	329 862
S62	(MH 'Community Health Nursing+')	34 173
S63	(MH 'Nursing Organizations+')	117 890
S64	(MH 'Practical Nursing')	1705
S65	(MH 'Nursing Protocols+')	6712
S66	(MH 'Nursing Outcomes')	3835
S67	(MH 'Nursing Interventions')	9352
S68	(MH 'Advanced Nursing Practice+')	15 189
S69	(MH 'Nursing Practice+')	71 775
S70	(MH 'Practical Nurses')	6030
S71	Nurse led intervention	726
S72	Nurs*	1 003 537
S73	S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72	1 009 095
S74	S17 OR S30 OR S44 OR S61 OR S73	2 713 668
S75	S13 AND S78	343
S76	S13 AND S78	9*

(Continues)

* Full Text; Publication date: 20160101–20 211 231; Randomised Controlled Trials.

- Search Strategy for MEDLINE

	Search	Results
S1	(MH 'Varicose Ulcer')	5175
S2	Venous ulcer*	6825
S3	Varicose ulcer*	5377
S4	Venous leg ulcer*	2572
S5	VLU	418
S6	Venous insufficiency	9439
S7	S1 OR S2 OR S3 OR S4 OR S5 OR S6	15 625
S8	(MH 'Recurrence+')	195 970
S9	Relapse	157 146
S10	Recurren*	768 426
S11	S8 OR S9 OR S10	867 003
S12	S7 AND S11	1673
S13	Prevention	2 008 221
S14	Prevent*	2 960 139
S15	Control	5 031 190
S16	S13 AND S14 AND S15	1 606 838
S17	(MH 'Patient Compliance+')	83 967
S18	(MH 'Compliance')	4043
S19	(MH 'Treatment Adherence and Compliance+')	268 282
S20	(MH 'Guideline Adherence')	34 674
S21	(MH 'Advance Directive Adherence')	533
S22	(MH 'Behaviour+')	1 999 260
S23	(MH 'Health Behaviour+')	350 718
S24	(MH 'Behaviour Therapy+')	84 892
S25	Treatment nonadherence	377
S26	Compliance-enhancing interventions	17
S27	Complian*	198 019
S28	Concordance	54 252
S29	Concord*	93 616
S30	Adheren*	220 640
S31	S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30	2 408 941
S32	(MH 'Exercise+')	229 499
S33	(MH 'Exercise Therapy+')	59 173
S34	(MH 'Walking+')	62 968
S35	(MH 'Compression Bandages+')	2830
S36	(MH 'Stockings, Compression')	1686
S37	Muscle pump activat*	15
S38	Leg exercise	2288
S39	Leg elevation	286
S40	Emollient	3905
S41	Moisturiser	1407
S42	Physical activity	204 427
S43	Group exercise	11 358
S44	S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43	389 754
S45	(MH 'Patient Education as Topic+')	88 288
S46	(MH 'Health Education+')	257 736
S47	(MH 'Program Development')	30 187
S48	(MH 'Program Evaluation+')	81 736
S49	(MH 'Behaviour Therapy+')	84 892
S50	Community program*	18 552
S51	Program implementation	5764
S52	Behavioural changes	20 072
S53	Educat* program*	68 085
S54	Therapeutic educat*	2126
S55	(MH 'Self Care+')	59 833
S56	(MH 'Self-Management')	4459
S57	(MH 'Self Efficacy')	23 135
S58	Self*	994 916
S59	Leg club	108
S60	Leg group	1411
S61	(MH 'Self-Help Groups+')	10 576
S62	Support group	17 072
S63	Self-care program*	390
S64	Self* program	6042
S65	S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64	1 437 823
S66	(MH 'Nursing+')	260 559
S67	(MH 'Nursing Care+')	139 940
S68	(MH 'Nurse Clinicians')	8445
S69	(MH 'Nurse Practitioners+')	18 772
S70	(MH 'Nurse Practitioners+')	18 772
S71	Nursing protocols	520
S72	Nursing outcomes	2269
S73	Nurs*	1 083 638
S74	Nurse led interventions	832
S75	S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74	1 091 354
S76	S12 AND S16	166
S77	S31 OR S44 OR S65 OR S75	4 408 486
S78	S76 AND S77	70
S79	S76 AND S77	22

(Continues)

(Continues)

S80	S16 OR S31 OR S44 OR S65 OR S75	5 606 659
S81	S12 AND S80	529
S82	S12 AND S80	152
S83	RCT	64 379
S84	Controlled clinical trials	75 310
S85	Randomised controlled trials	333 214
S86	S83 OR S84 OR S85	402 299
S87	S82 AND S86	34
S88	S82 AND S86	21*

* Publication date: 2016.01.01–2022.12.31; Full text.

- Search Strategy for SCOPUS

Search	Results
(TITLE-ABS-KEY ((venous AND leg AND ulcer OR varicose AND leg AND ulcer OR valu OR venous AND ulcer*OR varicose AND ulcer*OR venous AND insufficiency) AND (recurrence OR recurr*OR relapse)) AND TITLE-ABS-KEY ((prevention OR prevent*OR control) OR (patient AND compliance OR compliance OR treatment AND adherence AND compliance OR guideline AND adherence OR advance AND directive AND adherence OR behaviour OR health AND behaviour OR behaviour AND therapy OR treatment AND nonadherence OR compliance-enhancing AND interventions OR complian*OR concordance OR concord*OR adheren*) OR (exercise OR exercise AND therapy OR walking OR compression AND bandages OR compression AND stockings OR muscle AND pump AND activat*OR leg AND exercise OR leg AND elevation OR emollient OR moisturizer OR physical AND activity OR group AND exercise) OR (patient AND education OR health AND education OR program AND development OR program AND evaluation OR behaviour AND therapy OR community AND program*OR program AND implementation OR behavioural AND changes OR educat*AND program*OR therapeutic AND educat*OR self AND care OR self-management OR self AND efficacy OR self*AND leg AND club OR leg AND group OR self-help AND groups OR support AND group OR self-care AND program*OR self* AND program) OR (nursing OR nursing AND care OR nurse AND clinicians OR nurse AND practitioners OR nurse AND practitioners OR nursing AND protocols OR nursing OR outcomes AND nurs* OR nurse AND led AND interventions))) AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016))	40
	16*

Note: *Open acess e english.

- Search Strategy for Web of Science

Search	Results
TS = (((venous leg ulcer OR varicose leg ulcer OR vlu OR venous ulcer*OR varicose ulcer*OR venous insufficiency) AND (recurrence OR recurr* OR relapse)) AND ((prevention OR prevent* OR control) OR (patient compliance OR compliance OR treatment adherence compliance OR guideline adherence OR behaviour OR health behaviour OR behaviour therapy OR treatment non adherence OR compliance-enhancing interventions OR complian* OR concordance OR concord* OR adheren*) OR (exercise OR exercise therapy OR walking OR compression bandages OR compression stockings OR muscle pump activat*OR leg exercise OR leg elevation OR emollient OR moisturizer OR physical activity OR group exercise) OR (patient education OR health education OR program development OR program evaluation OR behaviour therapy OR community program*OR program implementation OR behavioural changes OR educat* program*OR therapeutic educat*OR self-care OR self-management OR self-efficacy OR self* OR leg club OR leg group OR self-help groups OR support group OR self-care program* OR self*program) OR (nursing OR nursing care OR nurse clinicians OR nurse	116

(Continues)

	practitioners OR nurse practitioners OR nursing protocols OR nursing OR outcomes nurs* OR nurse led interventions))) and 2022 or 2021 or 2019 or 2020 or 2018 or 2017 or 2016 (Publication Years) and Randomized Control Trial Or Randomized Or Rct Or Ensaio Clínico Aleatorizado (Search within all fields)	
		50*

Note: *search + open acess + english.

- Search Strategy for Cochrane Database of Systematic Reviews

	Search	Results
S1	(MH 'Varicose Ulcer')	
S2	Venous ulcer*	
S3	Varicose ulcer*	
S4	Venous leg ulcer*	
S5	VLU	
S6	Venous insufficiency	
S7	S1 OR S2 OR S3 OR S4 OR S5 OR S6	
S8	(MH 'Recurrence+')	
S9	Relapse	
S10	Recurren*	
S11	S8 OR S9 OR S10	
S12	S7 AND S11	
S13	Prevention	
S14	Prevent*	
S15	Control	
S16	S13 AND S14 AND S15	
S17	(MH 'Patient Compliance+')	
S18	(MH 'Compliance')	
S19	(MH 'Treatment Adherence and Compliance+')	
S20	(MH 'Guideline Adherence')	
S21	(MH 'Advance Directive Adherence')	
S22	(MH 'Behaviour+')	
S23	(MH 'Health Behaviour+')	
S24	(MH 'Behaviour Therapy+')	
S25	Treatment nonadherence	
S26	Compliance-enhancing interventions	
S27	Complian*	
S28	Concordance	
S29	Concord*	
S30	Adheren*	
S31	S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30	
S32	(MH 'Exercise+')	
S33	(MH 'Exercise Therapy+')	
S34	(MH 'Walking+')	

S35	(MH 'Compression Bandages+')
S36	(MH 'Stockings, Compression')
S37	Muscle pump activat*
S38	Leg exercise
S39	Leg elevation
S40	Emollient
S41	Moisturiser
S42	Physical activity
S43	Group exercise
S44	S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43
S45	(MH 'Patient Education as Topic+')
S46	(MH 'Health Education+')
S47	(MH 'Program Development')
S48	(MH 'Program Evaluation+')
S49	(MH 'Behaviour Therapy+')
S50	Community program*
S51	Program implementation
S52	Behavioural changes
S53	Educat* program*
S54	Therapeutic educat*
S55	(MH 'Self Care+')
S56	(MH 'Self-Management')
S57	(MH 'Self Efficacy')
S58	Self*
S59	Leg club
S60	Leg group
S61	(MH 'Self-Help Groups+')
S62	Support group
S63	Self-care program*
S64	Self* program
S65	S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64
S66	(MH 'Nursing+')
S67	(MH 'Nursing Care+')
S68	(MH 'Nurse Clinicians')
S69	(MH 'Nurse Practitioners+')
S70	(MH 'Nurse Practitioners+')
S71	Nursing protocols
S72	Nursing outcomes
S73	Nurs*
S74	Nurse led interventions
S75	S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74
S76	S12 AND S16

(Continues)

S77	S31 OR S44 OR S65 OR S75	
S78	S76 AND S77	
S79	S76 AND S77	
S80	S16 OR S31 OR S44 OR S65 OR S75	
S81	S12 AND S80	12
S82	S12 AND S80	3*

* Publication date: 2016.01.01–2022.12.31.

APPENDIX B: CHARACTERISTICS OF EXCLUDED STUDIES

Study	Reason for exclusion
Konschake, W; Valesky, E.; Stege, H.; Jünger, M. (2017)	German language
Klonizakis, M.; Tew, G.A.; Gumber, A.; Crank, H.; King, B.; Middleton, G.; Michaels, J.A. (2018)	Not focus on preventing recurrence but only on treatment.