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REVISIONES

Compression therapy for venous leg ulcers: a systematic review of the literature

Terapia compressiva para o tratamento de úlceras venosas: uma revisão sistemática da literatura

Terapia compresiva para el tratamiento de úlceras venosas: una revisión sistemática de la literatura

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ABSTRACT

Aim: To identify indexed articles that deal with the use of elastic or inelastic compression therapy as a therapeutic approach for patients with venous leg ulcers.

Methods: Systematic review of literature search in the electronic databases Medline/Pubmed; Medline and Journal @Ovid / Ovid; CINAHL; Lilacs and Cochrane, the search strategies used the following descriptors and keywords: *leg ulcer; varicose ulcer; bandage; "Stockings, compression"; venous ulceration; venous ulcer; compressive therapy; compression therapy; stocking*.

Results: The search yielded 25 articles. The use of bandage compression was more effective than the bandage without compression. Bandages multilayer contribute to the healing of venous ulcers. The use of compression stockings and blood flow brokerage surgery are associated with the prevention of recurrence of ulcers.

Conclusion: The treatment of venous ulcers using some type of compression was effective in the healing process.

Keywords: varicose ulcer; nursing care; Evidence-based nursing

RESUMO

Objetivo: Identificar artigos indexados que tratam do uso da terapia compressiva elástica ou inelástica

como proposta terapêutica para pacientes com úlceras venosas.

Método: Revisão sistemática de literatura com busca nas bases de dados eletrônicas Medline/Pubmed; Medline e Journals@Ovid/Ovid; Cinahl; Lilacs e Cochrane, a estratégias de busca utilizou os seguintes descritores e palavras-chave: *leg ulcer; varicose ulcer; bandage; "stockings, compression"; venous ulceration; venous ulcer; compressive therapy; compression therapy; stocking.*

Resultados: A busca resultou em 25 artigos. O uso de bandagem com compressão mostrou-se mais eficaz que a bandagem sem compressão. Bandagens com multicamadas contribuem para a cicatrização das úlceras venosas. O uso da meia elástica e cirurgia corretora do fluxo sanguíneo estão associadas à prevenção da reincidência das úlceras.

Conclusão: O tratamento de úlceras venosas utilizando algum tipo de compressão mostrou-se eficiente no processo de cicatrização.

Palavras.chave: úlcera varicosa; cuidados de enfermagem; enfermagem baseada em evidências

RESUMEN

Objetivo: Identificar artículos indexados que tienen que ver con el uso de la terapia de compresión elástica o inelástica como propuesta terapéutica para los pacientes con úlceras venosas.

Métodos: Revisión sistemática de búsqueda bibliográfica en las bases de datos electrónicas Medline / Pubmed; Medline y Journals @ Ovid / Ovidio; CINAHL; Lilas y Cochrane, las estrategias de búsqueda utilizan los siguientes descriptores y palabras clave: *leg ulcer; varicose ulcer; bandage; "stockings, compression"; venous ulceration; venous ulcer; compressive therapy; compression therapy; stocking.*

Resultados: La búsqueda arrojó 25 artículos. El uso del vendaje con compresión fue más eficaz que el vendaje sin compresión. Los vendajes multicapa contribuyen a la curación de las úlceras venosas. El uso de medias de compresión y la cirugía correctora del flujo sanguíneo están asociados con la prevención de la recurrencia de las úlceras.

Conclusión: El tratamiento de las úlceras venosas utilizando algún tipo de compresión fue eficaz en el proceso de curación.

Palabras clave: úlcera varicosa; cuidados de enfermería; Enfermería basada en la evidencia

INTRODUCTION:

Chronic leg ulcers are a worldwide public health problem affecting many people and causing negative impacts on the lives of those affected. Among leg ulcers, venous ulcers correspond to 80 to 90% [(1)].

This type of ulcer is associated with Chronic Venous Insufficiency (CVI), caused by venous hypertension of the lower limbs, which can be caused by functional reduction of venous valves, with or without obstruction of venous flow in the lower limbs[(2)].

The therapeutic approach of patients with venous ulcers should be based on compression therapy in the topical treatment of ulcers and, in severe cases, it is added to treatment with systemic drugs and surgical approach to correct venous return[(3)]. Current studies suggest various types of materials to perform the compression therapy, making products suitable for different compression strengths, elastic or inelastic, to be used in accordance with the evaluation of each practitioner.

The objective of this systematic review is to identify articles indexed in major online databases that deal with the use of elastic or inelastic compression therapy as a therapeutic approach for patients with venous ulcers.

METHODS

This is a systematic review of literature, conducted in seven steps[4]. The first and second steps are: formulate the research question and build the research protocol. The research question was guided by the PICO strategy: The application of compression bandage on the lower limbs helps in the healing of venous ulcers?

During the third stage, there was defined eligibility criteria and search strategies. Inclusion criteria were randomized controlled trials (RCTs) addressing the compression therapy in the treatment of venous ulcers considering reduction of the ulcer size or complete healing as the primary outcomes. There were excluded: research protocols; articles with conflicts of interest; theses and dissertations not published. There was no time restriction; there were considered articles in English, Spanish and Portuguese.

The search was performed in electronic databases MEDLINE/PUBMED; MEDLINE and Journals @ Ovid/OVID; Cumulative Index to Nursing and Allied Health Literature (CINAHL) via EBSCO; Latin American and Caribbean Health Sciences (Lilacs) and the Cochrane Register of Controlled Trials - CENTRAL. The search was conducted on 15 January 2013. After consulting the Mesh (Medical Subject Headings), the following descriptors were used in the review process: leg ulcer; varicose ulcer; bandage; "Stockings, compression". These free terms were used: venous ulceration; venous ulcer; compressive therapy; compression therapy; stocking.

For the Medline search there was used the following search strategy of the Cochrane high sensitivity to identify randomized trials: *"Sensitivity-maximizing version (2008)* for Pubmed"[5]: *((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR "drug therapy"[Subheading] OR randomly[tiab] OR trial[tiab] OR groups[tiab]) NOT ("animals"[MeSH Terms] NOT "humans"[MeSH Terms])) AND ("leg ulcer"[MeSH Terms] OR "varicose ulcer"[MeSH Terms] OR venous ulceration[tw] OR venous ulcer[tiab]) AND (compressive therapy[tw] OR compression therapy[tiab] OR "bandages"[MeSH Terms] OR "Stockings, Compression"[Mh] OR (stocking[tw] OR stocking'[tw] OR stockinged[tw] OR stockinger[tw] OR stockingette[tw] OR stockinglike[tw] OR stockings[tw] OR stockings'[tw])).* Read: tw = text words, mh = medical headings, pt = publication type, tiab = title and abstract, sh = subheadings.

For search in other databases, with the exception of Cochrane were used adaptations of the above search strategy.

To identify items in the Cochrane Register of Controlled Trials - CENTRAL, there were used the descriptors: venous ulcers; compressive therapy and bandage, combined with AND, and then selecting the abstracts that met the eligibility criteria.

The fourth step was the exclusion of the duplicated articles and selection of studies by reading the titles and abstracts. All the pre-selected articles were read carefully in full text.

The fifth step was carried out critical evaluation of studies. For this, was used an evaluation form suggested by the Cochrane Collaboration Group that classified the studies into four categories: A, B, C and D. Where A: indicates that there was proper randomization; B: The article mentions that participants were randomized, but do not

describe the randomization process. C: inadequate randomization. D: study was not randomized [6]. For this review the studies were eligible only if classified in categories A and B. Also, evaluating the quality of the studies, were used the classification by level of scientific evidence by study type (Treatment / Prevention - Etiology) - "Oxford Centre for Evidence- based Medicine "- last update 2009. Where, Grade of recommendation A: systematic reviews of RCTs and RCTs with quality; Recommendation B: Systematic Review of Cohort Studies; Cohort studies, Outcome Research, Ecological studies and case-control studies; Recommendation C: Case Series; D: expert opinion[7].

The sixth step refers to data collection. The data for each article were organized in a form containing the name of the journal in which it is published and in what area, training of authors, study type, sample size, evaluated technologies, major results and conclusions of the authors.

The seventh step refers to the synthesis of data and construction of the final report of this review.

For better organizing the data to be analyzed, the items included were divided into four categories: Category 1: Inelastic bandage versus elastic bandage; Category 2: Studies that compare two or more types of elastic bandages; Category 3: The use of multilayers compressive bandage versus simple compression more surgery and Category 4: 4 layers elastic bandage versus simple bandage.

RESULTS

Among the twenty-five articles analyzed, 13 (52%) were published in the United Kingdom; followed by Serbia, United States, Germany and Ireland with two articles each (8%); Argentina, Turkey, Italy and Poland, an article each (4%). Thirteen studies (52%) were published by doctors; six (24%) by nurses and six (24%) were in partnership between doctors and nurses.

No gender distinction was exhibited for the inclusion of participants. Moreover, these were adult patients and/or elderly, with an average age of 61 years old. All participants had a venous ulcer confirmed by Doppler and/or clinical evaluation. The ankle/brachial index (ABI) was >0.8 mmHg (17 studies), >0.9 (6 studies) and >1.0 (in one study), only one article did not mention the value of the ABI. Fourteen studies (56%) were placed in Category 1: Bandages inelastic versus elastic bandage; seven studies (28%) in Category 2: Studies comparing two or more types of elastic bandages; two (8%) in Category 3: The use of multilayers compressive bandage versus simple compression more surgery; and two (8%) in Category 4: 4 layers elastic bandage versus simple bandage.

Category 1: Inelastic bandage versus elastic bandage

Table 1: Articles that compare inelastic and elastic bandages; Brazil, 2015**.**

N	Title	Authors	Evaluated Technologies	Main results	Category *	Grade of recommendation **
1	Management of statis leg ulcers with Unna' boots versus elastic support stockings[8]	HENDRICKS et al, 1985	Unna (10 patients) X Compressive stocking (11 patients)	There was no blinding. Participants: 21 patients. Follow up: 78 weeks. Confidence interval used: 95%. Inclusion criteria: patients with venous ulcers. Exclusion not informed. ABI not informed. RESULTS: 70% of ulcers healed in a mean time of 7.3 weeks in the group treated with Unna's Boot. In the compressive stocking group 71% healing in 18.4 weeks period (p = 0.9394). The ankle circumference reduced on average 1,35cm with Unna's boot and 1.75cm to compressive stocking during the healing period. Conclusion: Both treatments were effective in healing and reduction of edema, however the treatment with compression stockings is longer.	B	A
2	Setopress vs Elastocrepe in chronic venous ulceration[9]	GOULD et al, 1998	High-elasticity bandage (19 ulcers) X Inelastic bandage (20 ulcers)	There was blinded observer. Participants: 39 patients / 46 ulcers. Follow up: 16 weeks. Confidence interval: 95%. Inclusion criteria: Patients with venous ulcers, ABI> 0.8. Exclusion: ulcers of other etiology than venous, Diabetes Mellitus, heart disease, kidney or liver disease, infected ulcer, ankle circumference <18cm or >25cm, ulcer duration <2meses. Results: Number of patients with complete healing at 16 weeks: Group 1 (elastic bandage): 11/19 (58%), Group 2 (inelastic). 07/20 (35%), P = 0.24. There was no significant difference. 6 ulcers of the elastic bandage group and 4 in the inelastic bandage group reduced the size (p=0.34). There was also no significant difference. In the group of elastic bandage there were 2 ulcers those remained with the same characteristics. In the inelastic bandage group was 9 (P=0.03). There was a significant difference. CONCLUSION: The elastic bandage has advantages over the inelastic in the healing process.	A	A
3	A prospective randomized trial of four-layer versus short stretch compression bandages for the treatment of venous leg ulcers[10]	SCRIVEN et al, 1998	4 Layers Bandage (4LB) (32 ulcers) X Inelastic bandage (32 ulcers)	There was no blinding. Participants: 53 patients with 64 ulcers. Follow up: 12 weeks. Confidence interval: 95%. Inclusion criteria: patients with venous ulcer, ABI> 0.8. Exclusion not informed. RESULTS: healing percentage for inelastic bandage was 57% after 1 year of treatment; and 55% for healing bandage with four layers (p=1.0). CONCLUSION: Statistically there is no difference in efficacy between the two treatments.	A	A

4	Comparison of Rosidal K and SurePress in the treatment of venous leg ulcers[11]	MOODY et al, 1999	Inelastic bandage Rosidal k -26 patients X Simple elastic bandage (SurePress) -26 patients	There was no blinding. Participants: 52 patients. Follow up: 12 weeks. Confidence interval not informed. Inclusion criteria: ≥18 years old,ABI ≥0,8, ulcer≥ 2cm. Exclusion not mentioned. RESULTS: In Rosidal group there was 73% reduction of the lesion area; for the elastic bandage group the reduction was 52%. 8 ulcers in each group healed completely. There was no difference between the average healing times between the two groups (9.1 and 9.3 weeks, respectively). There was a greater reduction of edema in the group with elastic bandage: 15,3cm (3,9cm per week), while in inelastic bandage group the reduction was 9,32cm (2.3 cm per week). CONCLUSION: Both therapies are effective in reducing wound venous area.	B	B
5	Randomizes clinical trial comparing the eficacy of two bandaging regimens in the treatment of venous leg ulcer[12]	MEYER[a] et al, 2002	Elastic bandage (55 patients) X Inelastic bandage (57 patients)	There was no blinding. Participants: 112 patients. Follow up: 26 weeks. Study with 80% power to detect a 20% difference 95% confidence interval. Inclusion criteria: patients with venous ulcers. Exclusion: ABI <0.8, Diabetes Mellitus, rheumatoid arthritis, lupus, ulcers <0.25 and >100cm², allergic to the treatment. Results: 58% healed in the group treated with elastic bandage. In the group treated with inelastic bandage that number was higher, 62% in the same period. The average healing time was 9, and 9.5 weeks respectively. Conclusion: Both compression systems were able to heal ulcers without statistical differences, however, large ulcers are more likely to take more time to heal than smaller ulcers (p <0.001).	A	A
6	Randomized trial of cohesive short-stretch versus four-layer bandaging in the management of venous ulceration[13]	FRANKS et al, 2004	4 layers bandage (4 LB)-74 patients- X Inelastic bandage patients – 82 patients -	There was no blinding. Participants: 156 patients. Follow up: 52 weeks. 81% study power, 95% confidence interval. Inclusion criteria: be at least 18 years and venous ulcer diagnosed. Exclusion: ABI ≥0,8. Results: 51/74 (68.9%) healed in the group of elastic bandage. In the short elasticity bandage group, 60/82 (73.2%) healed. The healing rate was approximately 56% in both groups. After 24 weeks, the healing rate arise up to 85% in the 4LB group and 83% in the inelastic bandage group. The use of 4 layer bandaging has 1,08X more chance to heal the ulcer than inelastic bandage (P = 0.79). However, statistically there are no advantages in using the bandage of 4 layers, compared with inelastic. Patients report improved quality of life (through a questionnaire answered as improved quality of sleep - p=0.0051; more social interaction - p=0.024 Pain - p=0.008 when in use 4LB). Conclusion: The therapies are equivalent with respect to effectiveness and reduction in lesion area.	A	A
	Combination of hydrocolloid dressing and medical	KOKSA	Unna"s boot (30 patients)	There was no blinding. Participants: 60 patients. Follow up: 16 weeks. confidence interval: 95%. Inclusion criteria: patients with venous ulcers with an area of 5 to 8cm². Exclusion: pregnancy, ulcer of other etiologies,		

7	compression stocking versus Unna's boot for the treatment of venous leg ulcers[14]	l et al, 2003	X Hydrocolloid + stocking (30 patients)	ABI <0.8, infection and diabetes mellitus. RESULTS: healing rates found: 74.07% in group A (Unna's Boot) and 80.76% in group B (hydrocolloid + elastic stockings) - p≥ 0.05. Pain assessed during the application of therapies: Group of inelastic bandage: 3.69 ± 1:35; Group Compressive stocking: 1.88 ± 1:48, p<0.0001. Pain assessed at home: Group inelastic bandage: 03.27 ± 01.08; Group Compressive stocking: 1.88 ± 1.11, p <0.0001. CONCLUSION: There was no significant difference between the healing rates of the groups, however, Unna's Boot was more painful for patients during the dressing change and at home, this difference was statistically significant.	B	A
8	Efficacy of a Ready-Made Tubular Compression Device Versus Short-Stretch Compression Bandages in the Treatment of Venous Leg Ulcer[15]	JÜNGER[a] et al, 2004	Tubular compression (compressive stocking) – 88 patients- X Inelastic Bandage - 90 patients	Blinding not informed. Participants: 178 patients. Follow up: 12 weeks. 80% power to detect a 15% difference using a 95% confidence interval. Inclusion criteria: ≥18 and ≥80 years; ulcer over 3 months and diameter of ≥5cm; ABI>0.9, able to walk at least 1 hour per day. Exclusion: infected ulcer, no venous ulcers, Diabetes Mellitus, heart disease, autoimmune diseases. Results: Number of patients with completes healing: Group 1 (stocking). 51 (58%), Group 2 (short elasticity: 51 (56.7%) Average healing time: the compressive stocking group: 13-84 weeks; Group of inelastic bandage: 13-85 weeks There was no statistical difference between groups reduced rate of ulcer area among those not healed: group elastic stockings: 25/37 (67.6%) group of inelastic bandage: 23/39 (59%), p=0.002 CONCLUSION: there was a greater reduction in ulcer area with a statistically significant difference in favor of elastic stockings. Furthermore, the stocking may be changed by any person, does not require experience.	A	A
9	Economics analysis of venous I, a randomized trial or two bandages for treating venous leg ulcers[16]	IGLESIAS et al, 2004	Inelastic bandage (192 patients) X 4 Layer bandage (4LB) – 195 patients -	There was blinding for participants and nurses who provided care. Participants: 387 patients. The study had 80% power to detect a 15% difference in the rate of healing of ulcers, confidence interval: 95%. Inclusion criteria: ≥18; ≥1cm diameter of the ulcer, ABI ≥0,8. Exclusion: Diabetes Mellitus, have already used the tested bandages. RESULTS: The mean healing time in the group treated with bandaging of 4 layers was about 10.9 days less than the of inelastic bandage group. However, this difference was not statistically significant (p = 0.117). The bandage 4 layer costs about £ 227.32 / year less per patient than the inelastic bandage. CONCLUSION: The use of bandage 4 layers is more advantageous than the inelastic bandage on clinical point of view (reduction of ulcer area) and economic.	A	A
	Randomized clinical trial of four-layer and short-	NELS	4 layer bandage (4LB) – 195	There was blinding for participants and nurses who provided care. Participants: 387 patients. The study had 80% power to detect a 15% difference in the rate of healing of ulcers,		

10	stretch compression bandages for venous leg ulcers (Venous I)[17]	ON[a] et al, 2004	patients- X Inelastic bandage of 4 layers - 192 patients -	confidence interval: 95%. Inclusion criteria: ≥18; ≥1cm diameter of the ulcer, ABI≥0,8. Exclusion: Diabetes Mellitus, have already used the tested bandages. Loss of follow up: 112 patients (46 in the 4LB and 66 group in inelastic bandage). The main reasons were the will of the patient, adverse effects, change in diagnosis of ulcer and death. RESULTS: Mean time to healing: 4LB group: 92 days; inelastic bandage group: 126 days - p=0.117. Adverse effects found in the 4LB group: infection in 32 ulcers; in the inelastic bandage group: 46, p=0.084. CONCLUSION: The healing time in the group treated with 4LB was 32 days less than the group treated with inelastic bandage. There are more advantages over the use of bracing 4 layers over the use of inelastic bandaging.	A	A
11	Comparison of elastic versus nonelastic compression in bilateral venous ulcers: A randomized trial[18]	BLECKEN et al, 2005	Inelastic bandage with adjustable velcro X 4 layers bandage (4LB)	Blinding not informed. Participants: 12 patients, 24 ulcers. Follow up: 12 weeks. 95% confidence interval. Inclusion criteria: patients with bilateral venous ulcers, ABI≥1.00. Exclusion: have chronic diseases or ulcers of other etiologies. RESULTS: 4 healed ulcers in each group after 12 weeks (33%). The healing rate was higher in group 1 - inelastic bandage: 2.9cm² - p = 0.017. CONCLUSION: The healing rate was higher when in use inelastic bandage. Although the number of participants is small, the results are considerable, as the two therapies could be tested in hemodynamically same patients, each one had two ulcers on the legs, so the patient was his own control.	B	A
12	Randomized trial of medical compression stockings versus two-layer short-stretch bandaging in the management of venous leg ulcers[19]	TARADAJ et al, 2009	Compressive stocking MORE Diosmin® X Inelastic Bandage MORE Diosmin®	Blinding not informed. Participants: 80 patients. Follow up: two months. Adopted confidence interval: 95%. Inclusion criteria: having venous ulcers. Exclusion: ABI<0.9, diabetes mellitus, arthritis, arrhythmia, pregnancy, use of steroids and skin infection. Both groups received Diosmin® throughout treatment. RESULTS: 15 healed ulcers in the group treated with compressive stocking (37.5%), against only 5 healed ulcers in the inelastic bandage group (12.5%) – p≤0,001. More granulation tissue was found in the group treated with compressive stocking than in the group treated with inelastic bandage p≤0,01. CONCLUSION: the use of compressive stocking is more efficient in healing of ulcers than inelastic bandage.	A	A
13	Comparison of low-strength compression stockings with bandages for the treatment of recalcitrant venous ulcers[20]	BRIZZIO et al, 2	Inelastic stocking (28 patients) X Elastic bandages (27 patients)	Blinding not informed. Participants: 60 patients. Follow up: 180 days. Adopted confidence interval: 95%. Inclusion criteria: having venous ulcers>3cm² and <50cm², duration of ulcer ≥2meses. Exclusion: heart disease, hepathopaties respiratory diseases, kidney, mental, diabetes mellitus, ABI <0.8. RESULTS: 36% of ulcers treated with inelastic stocking healed in 90 days, the rate rose to 50% in 180 days. In the group of elastic bandage, the healing rate was 48% in 90 days and 67% in 180 days. (P = 0.019 and p = 0.210	A	A

		0 1 0		respectively). Pain was reported by patients inelastic stocking group as intensity 44 (scale that goes up to 100). At the end of the treatment, the pain intensity was reported as 20 ($p<0.001$). In the group of elastic bandage, the pain was 46 to 28 - $p<0.01$. Differences in the quality of life in both groups were found. CONCLUSION: Both showed similar results, however, patients reported an improvement in pain when in use inelastic stocking.		
14	Comparison Between a New, Two-component Compression System With Zinc Paste Bandages for Leg Ulcer Healing: A Prospective, Multicenter, Randomized, Controlled Trial Monitoring Sub-bandage Pressures[21]	M O S T I et al 2 0 1 1	Coban™ 2-layer bandage 3 M™ (50 patients) X Modified Unna's Boot (4 layers-zinc oxide, cotton, more zinc oxide and adherent bandage)	Blinding not informed. Participants: 100. Follow up 3 months. Inclusion criteria: Venous Ulcer, ABI>0.8, the area of the ulcer between 2-100m^2, not infected, evolution time less than 1 year. Exclusion: ABI <0.8, be greater than 100cm^2 or evolution for more than one year, patients insulin-dependent, pregnant, nursing or immunesupressed. RESULTS: 47/50 patients (94%) in 2 layers bandage group and 45/49 patients (91.8%) of Unna's boot group healed in 3 months. The average days to healing was 49.5 days for the group who used Coban and 48 days in the Unna's boot group. Both groups reported improvement in pain in 50% in the first week and the absence of pain after 2, 8 weeks. CONCLUSION: Both bandages proven effective in healing and pain reduction. Coban was easier to apply and remove.	A	A

Legend:* Category: correct randomization; Category B: randomized, but no description of the process. **Grade of recommendation: systematic reviews of RCTs and RCTs with quality; Grade of recommendation: a systematic review of cohort studies, cohort studies, RCTS with inferior quality; outcome research, ecological studies and case-control studies.

Category 2: Studies that compare two or more types of elastic bandages

Table 2: Articles that compare different elastic bandages; Brazil, 2015.

N	Title	Authors	Evaluated Technologies	Main results	Category *	Grade of recommendation **
1	Randomized clinical trial of three-layer paste and four-layer bandages for venous leg ulcers[22]	M E Y E R[b] et al, 2 0 0 3	3-layers bandage (3LB)-64 patients- X 4 layers bandage (4LB)-69 patients -	Blinding not informed. Participants: 133 patients. Follow up: 52 weeks. Study with 50% power to detect up to 20% difference in a confidence interval of 95%. Inclusion Criteria: having venous ulcers. Exclusion: ABI<0.9, diabetes mellitus, arthritis, ulcers of other causes, infection, ulcer <0.25 or >100cm². RESULTS: 80% of the ulcers had healed in 3LB, while 65% of the ulcers healed in the 4LB group within the same period (P = 0.031). The average healing time in the 3 layers bandage group was 12 weeks compared to 16 weeks at 4 layers group (P = 0.040). The average time of application of 3-layer bandage was 4,6min. Against 5,5min in the 4LB group, p=0.008. There was no difference in reducing the circumference of the ankle. CONCLUSION: 3LB bandage was more efficient in healing of ulcers than 4LB, besides having a cost / effectiveness better than 4LB.	A	A

2	Randomized trial of four-layer and two-layer bandage systems in the management of chronic venous ulceration[23]	MOFFAT[a] et al, 2003	4 layers bandage (4LB)-57 patients- X 2-layers bandage (2 LB.)-52 patients -	Blinding not informed. Participants: 112 patients. Follow up: 24 weeks. The study has 74% power to detect 25%difference in healing rates at 5% significance level. Inclusion criteria: having venous ulcers , more the 2 months of duration, aged >18 years. Exclusion: ABI≤0, 8, pregnancy. RESULTS: 28 (54%) of those using 2 layers bandage swapped treatment for 4 layers bandage. Only 7 (12%) of the other group changed their treatment, p <0.001. 70% of ulcers healed in the 4LB group within 12 weeks, compared to 58% with the 2LB (p=0.02). Weekly changes: 4LB: 1.1; 2LB: 1.5 - p=0.0002. Cost per week: 4LB: $125.34; 2LB: $119.87. However, after 24 weeks it is expected that the cost of 2LB be more expensive than $ 61.5 4LB (p = 0.0002). CONCLUSION: The treatment using the bandage of 4 layers is better tolerated than 2 layers bandage, besides having a lower final cost of treatment.	A	A
3	Efficacy and tolerability of an ulcer compression stocking for therapy of chronic venous ulcer compared with a below-knee compression bandage: results from a prospective, randomized, multicenter trial[24]	JÜNGER[b] et al, 2004	2 bandages without compression MORE compressive Stocking (U-stocking)-66 patients- X Simple elastic bandage-68 patients -	Blinding the investigator who analyzed the data. Participants: 134 patients. Follow up: 12 weeks. Used 95% confidence interval. Inclusion criteria: venous ulcer, >1 and <10 cm of area, with <12months, ABI>0.9, >18 and <80. Exclusion criteria: Patients who walk unless 1h per day, other etiologies ulcers, diabetes mellitus, obesity. RESULTS: After 12 weeks 47.5% of the ulcers in the compressive stocking (U-stocking) healed against 31.7% of the simple elastic bandage group (p=0.0129). The average healing time was 70 days for compressive stocking and 83 days for the elastic bandage, p=0.8165. CONCLUSION: The use of compressive stocking was more effective than the use of elastic bandages. Both treatments have proven to be safe for the patient.	A	A
4	A factorial, randomized trial of pentoxifylline or placebo, four-layer or single-layer compression, and knitted viscose or hydrocolloid dressings for venous ulcers[25]	NELSON[b] et al, 2007	Pentoxifylline or placebo MORE mesh or Hydrocolloid in addition of the 4 layers bandage (4LB) X Pentoxifylline or placebo MORE mesh or Hydrocolloid in addition of	There was no blinding. Participants: 245 patients. Follow up: 24 weeks. The study had 80% power to detect a 20% difference in healing rates with 95% confidence interval. Inclusion criteria: having venous ulcers >1 cm and over 8 months of duration, >18 years. Exclusion criteria: ABI <0.8, diabetes mellitus, pregnancy, heart disease or kidney disease. RESULTS: Pentoxifylline assisted the healing of ulcers in 62 patients who received the medication, p=0.21. 58% of the ulcers healed in the hydrocolloid group, compared to 57% on the other group, p=0.88. Regarding bandages, 67% of ulcers treated with 4LB healed in 24 weeks against 49% healing with simple bandage (P = 0.009). 97 patients reported some type of adverse events in the group receiving pentoxifylline and 90 in the placebo group (wound aspect of worsening, stomach pains and infection), but 90 patients also reported adverse events in the placebo group, the most serious adverse effects are related to medication. CONCLUSION:	A	A

			the simple bandage	Patients treated with 4 layers bandage is more likely healing than with the use of simple bandage.		
5	A randomized trial of the Tubulcus multilayer bandaging system in the treatment of extensive venous ulcers[26]	MILIC[b] et al, 2007	2 layers of cotton bandage MORE stocking (Tubulcus) -75 patients- X 2 layers of cotton bandage MORE medium compression bandage-75 patients	Blinding uninformed. Participants: 150 patients. Follow up: 250 days. This study has 80% power to detect up to 20% using a 95% confidence interval. Inclusion criteria: had venous ulcer, >18 years. Exclusion: ABI<0.8, Diabetes mellitus, pregnancy, cancer. RESULTS: the average healing time in test group (stocking) was 133 days, against 211 days for the control group (medium compression). The largest ulcer in the stocking group was 210cm^2 and healed in 280 days. Was used a program that estimates the rate of wound healing after 500 days: Group 1 (Tubulcus): 93%, Group 2 (bandages): 51%, (p <0.001). CONCLUSION: multilayer compression therapy with the stocking Tubulcus assists healing and sustained 35 mmHg compression, as well as assist in the prevention of recurrence.	A	A
6	A randomized controlled 8-week crossover clinical evaluation of the 3M Coban 2 Layer Compression System versus Profore to evaluate the product performance in patients with venous leg ulcers[27]	MOFFAT[b] et al, 2008	2-layers bandage (2LB) X 4 layers bandage (4LB)	Blinding for the researcher who analyzed the data. Participants: 81 patients. Follow up: 8 weeks. Confidence interval: 95%. Inclusion criteria: having venous ulcers, have >18 (Europe) and >21 years old (in the US), be treated with compression therapy for at least 2 weeks. Exclusion: ABI<0.8, infected ulcer. After four weeks, patients were exchanging treatments, who was receiving 2LB bandage going to receive 4LB bandage and vice versa, for another 4 weeks for a total of 8-week study. RESULTS: 2LB Group: 6 ulcers healed before the exchange, there was a loss of 3 patients, and so were only 30 ulcers in this group. 4LB group: 3 healed ulcers before the exchange, getting 39 ulcers. After the exchange, the 39 now received the 2LB bandage, 3 were withdrawn from the study due to adverse effects and 10 healed. Already in the 30 ulcers were now receiving 4LB bandage, only 4 healed. There was no significant difference between the bandages after the first 4 weeks (p = 0.47), there was also no difference when analyzing scarred area (p = 0.87). Also the quality of life of patients was evaluated, 72% preferred the bandage 2 layers. The main reasons were why she slips less, enabling the use of normal and more comfortable clothes, and they find it more comfortable. CONCLUSION: There was no superiority between the therapies on the healing, but the bandage 2 layer was identified as a factor in improving quality of life.	A	A
	The influence of different sub-bandage pressure values on venous leg	MILLIC[c]	Stocking (A) – 42 patients- X Stocking	Blinding not informed. Participants: 131 patients. Follow up: 26 weeks. The 95% confidence interval was used. Inclusion criteria: having venous ulcers, have> 18 years. Exclusion: ABI <0.8, heart disease, pregnancy, cancer and diabetes. RESULTS: The mean healing time in group A was 12		

7	ulcers healing when treated with compression therapy[28]	et al, 2010	MORE 1 elastic bandage (B) – 46 patients- X Stocking MORE 2 elastic bandage (C) – 43 patients -	weeks in group B was 11 weeks and in group C was 14 weeks. (P>0.05). In general, the ulcers healed according to the circumference of the calf and size of the ulcers. As > circumference and > ulcer area > time to heal. The results of group A (75% healed) and B (86%) were better than in group C (31% and 30% respectively). However, the ulcers of patients with > 38 cm in calf circumference healed better in group C (92% - p=0.01) than in others. CONCLUSION: The pressure chosen for treatment should be determined individually taking into account the calf circumference (edema) and ulcer size.	A	A

Legend:* Category: correct randomization; Category B: randomized, but no description of the process. **Grade of recommendation: systematic reviews of RCTs and RCTs with quality; Grade of recommendation: a systematic review of cohort studies, cohort studies, RCTS with inferior quality; outcome research, ecological studies and case-control studies.

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Category 3: Use of the compressive bandage multilayers *versus* multilayers compression plus surgery

Table 3: Articles that compare multilayer bandages with simple bandages associated with surgery; Brazil, 2015.

N	Title	Authors	Evaluated Technologies	Main Results	Category*	Grade of Recommendation**
1	Comparison of surgery and compression with compression alone in chronic venous ulceration (ESCHAR study): randomized controlled trial[29]	BARWELL et al, 2004	Multi-layer bandage MORE surgery (242 patients) X Multilayer Bandage (258 patients)	Blinding not informed. Participants: 500 patients, 341 with venous ulcers and 159 with newly healed ulcers. Segment time: 24 weeks. Confidence interval used: 95%. Inclusion criteria: having venous ulcers. Exclusion: ABI <0.85, have no reflux evaluated in the doppler or only have deep reflux. RESULTS: Among the 341 ulcers, 156 were allocated to the compression group + surgery and only 185 compressions. 40 patients did not complete treatment. Results after 12 weeks: 128 (from 156-82%) ulcers healed at 12 weeks in the banding group + surgery; 141 (among 185-76%) in the group that received only compression. After 24 weeks, the healing rate was 65% in the two groups (p = 0.85). When evaluating the group had recently healed ulcers after 14 months, it was observed that 15% of the ulcers had recurrences in the group that did the surgery, compared to 34% of recurrences in the group that was not treated with compression - p <0.0001 . CONCLUSION: There is no statistical difference between the two groups regarding the healing. But when it comes to assessing relapse, the group that did the surgery benefited.	A	A
	Long term results of compression therapy alone versus compression plus surgery in chronic	GOHEL[b] et al,	Multilayer bandage (258 patients) X Multilayer	Blinding not informed. Participants: 500 patients. Segment time: 3 years. Confidence interval: 95%. Inclusion criteria: having venous ulcers. Exclusion: ABI <0.85, does not have superficial blood reflux, have deep vein occlusion. RESULTS: The group that made the MOST compression surgery had 93% of ulcers healed within three years, compared to 89% of healed	A	A

2	venous ulceration (ESCHAR): randomized controlled trial[30]	2007	Bandage MORE surgery (242 patients)	ulcers in compression therapy group multilayer (p = 0.73) were not statistically significant difference. The recurrence of ulcer after 4 years was 56% in the multilayer compression group and 31% in the further compression surgery group (p <0.01). CONCLUSION: no more surgery compression increases the healing rate, but decreases the recurrence of ulcer.		

Legend:* Category: correct randomization; Category B: randomized, but no description of the process
** Grade of recommendation: systematic reviews of ECR and ECR with quality; Grade of recommendation: a systematic review of cohort studies, cohort studies, RCTS with inferior quality; outcome research, ecological studies and case-control studies.

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Category 4: 4 layers elastic bandage *versus* simple bandage

Table 4: Articles that compare compression therapy and simple bandage; Brazil, 2015.

N	Title	Authors	Evaluated Technologies	Main results	Category*	Grade of Recommendation**
1	Randomized clinical trial and economics analysis of four-layer compression bandaging for venous ulcers[31]	O'BRIEN et al, 2003	4 layers bandage (4LB) – 100 X Usual Treatment– 100 patients -	Blinding not informed. Participants: 200 patients. Follow up: 12 weeks. This study had 80% power to detect a 20% difference in rate of healing with a 95% confidence interval. Inclusion criteria: having venous ulcers, ABI ≥0,9. Exclusion: Deep venous thrombosis, diabetes mellitus, rheumatoid arthritis. RESULTS: 54% of ulcers healed in three months in the test group (4LB); 34% in the control group (usual care) - (P <0.001). The use of 4 layers bandage healed 80% more than the usual treatment, that does not include compression therapy. The study showed that treatment with 4 layers bandage is effective in the treatment of venous ulcers (p=0.006). The cost was also evaluated, with 63% of participants who used the 4 layers bandage needed treatment at home, compared to 72% in the usual care group. Although the cost of 4LB be higher, this difference was not reflected in average when measured at the end of treatment (where the ulcer closes), it is statistically more advantageous to use the 4LB than usual treatment - p=0.040. CONCLUSION: The difference in healing time between the 2 groups influences the cost of treatment, reducing material costs and human (such as nursing visits) for participants who used the bandage 4 layers.	A	A
2	Health-related quality of life during four-layer compression bandaging for venous ulcer disease: a randomized controlled trial[32]	CLARKE-MOLONE	4 layers bandage (4LB) X Usual treatment	Blinding not informed. Participants: 200 patients. Follow up: 12 weeks. This study had 80% power to detect a 20% difference in rate of healing with a 95% confidence interval. Inclusion criteria: having venous ulcers, ABI≥0,9. Exclusion: deep venous thrombosis, diabetes mellitus, rheumatoid arthritis. RESULTS: At 6 weeks, 15 ulcers of the test group (4LB) had healed and 5 in the control group (usual care). At the end of the period, the 4LB group improved the ability to perform physical activity and social interaction (31.25% and 18.2% respectively (p=0.006) CONCLUSION: The ulcer healing improved patient relationship, complaints	A	A

		Y et al, 2005		of pain, depression and hostility. The 4 layers bandage assists in healing of ulcers and significantly improving the quality of life for patients during treatment.		

Legend:* Category: correct randomization; Category B: randomized, but no description of the process. ** Grade of recommendation: systematic reviews of RCTS and RCTs with quality; Grade of recommendation: a systematic review of cohort studies, cohort studies, RCTS with inferior quality; outcome research, ecological studies and case-control studies.

The tables 1, 2, 3 and 4 presented the main findings in the studies evaluated in this review, the category to which it was allocated and the degree of recommendation.

DISCUSSION

The systematic search for articles that relate the theme compression therapy and venous ulcer resulted initially in a range of European papers. The United Kingdom was the country with the highest prevalence studies, reflecting the advancement of research in relation to the assessed therapy. In all studies there was description of activities involving medical and nursing staff trained to apply the bandages; even though this fact it is not reflected in the authorship of the articles. Thus, the main objective of the professionals who care for wounds are healing, it therefore requires technical and scientific knowledge of the professional who will perform the indication and application of compression therapy, and patient follow-up[33].

Only randomized controlled trials were included in this review. When analyzing the classification of the articles included in the systematic review, it is noted that four were classified in category B, indicating that they were randomized controlled trials; however, did not describe how the allocation process was done. Yet, this fact does not alter the validity of the results, or the grade of recommendation of the study, according to an evaluation of the Oxford scale, received grade A recommendation, except for one study that received recommendation grade B (Moody [11]). This study failed to methodological description, despite reporting that it is a randomized study there is no detailed description of how the allocation was made, and does not inform the exclusion criteria and not use a confidence interval.

Category 1 - Analyzing the use of inelastic and elastic bandage

Studies of Hendricks[8] and Koksal[14] had opposite results in the first was better healing rate in a shorter time in the group treated with Unna's Boot. In the second, found improved healing rate in use of the compressive stocking, in addition, has reported increased pain using the Unna's Boot ($p < 0.001$), a finding with statistical relevance. However, two studies showed opposite results to the Koksal[14], where they found a pain improvement in patients in use of Unna's boot [21, 34]. The study of Blecken[18] found the opposite results of Iglesias[16] and Nelson-a[17], he found improvement in favor of the inelastic bandage. Although this study has a sample of only 12 patients, they had ulcers on both legs, thus enabling each ulcer were the control of the other.

The remainder of the studies (Scriven[10], Frank[13] and Mosti[21]) did not find statistical differences between the inelastic bandage and therapy using the multilayer. However, the study by Frank[13] assessed other variables regarding the quality of life and the results showed an improvement in quality of sleep and social interaction when patients were using the bandage of 4 layers. Recent studies point out that the use of multilayer bandage, as the bandage of 4 layers, provide comfort and convenience that inelastic bandages as they can stay up to seven days before the next exchange, corroborating the results of Frank[1,13]. These factors contribute to the improvement in the quality of life of patients living with these ulcers for a long time. In addition, a systematic review published in 2009 found that the use of bandage layers 4 is more advantageous than the cost/effectiveness of the inelastic bandage[35].

The inelastic bandage when compared to other bandages and/or compression stockings, as in studies of Gould[9], Moody[1], Meyer-a[12], Jünger-a[15], Taradaj[19] and Brizzio[20] are discrete advantages in favor of the use of stockings. The main results targeted by the authors were further reducing the surface of ulcers; does not require skilled practitioner, thus facilitating the daily life of the patients and improvement of pain. A review of literature brought as a result studies which claim that the use of inelastic bandage is only effective in the healing of venous ulcers if it is able to contain the irritation[36]. However this same review concluded that further study is needed to assess what are the ideal parameters for the best indication of elastic or inelastic bandage[36].

However, apparently there are more advantages when considering the use of elastic stockings over the inelastic bandage; however, the evidence is not very strong, as results were contradictory. The choice of treatment will depend on the evaluation and skill / knowledge of the nurse/practitioner involved in the process[35].

Category 2 - Analyzing the different types of elastic bandage

The Meyer-b study[22] compared the 4-layer bandage with 3LB. As a result, the authors obtained better healing rates when using 3-layer banding. Nelson-b study[25], however, obtained better healing with the use of 4-layer bandage compared to single bandage. Moffat-a[23] also found better healing rates with 4-layer banding compared to 2-layer banding, and offered a lower final cost of treatment. However, a few years later, the same author conducted another study comparing the same therapies, but found results favorable to the 2-layer bandage in relation to the patient's comfort. The 2-layer bandage is less slippery and contributes to the comfort and improvement of patients' quality of life.

The studies of Milic-b and c[26,28] and Junger-b[24] evaluate the effectiveness of compression stockings. As a result, the use of compression stockings helps to heal when compared to the use of simple bandages or medium compression bandages. However, the studies emphasize that when it comes to patients with calf circumference >38cm, the healing rate is better when using two compression bandages plus half compression. Another review has shown that the use of elastic stockings in the treatment of venous ulcers is more efficient in relation to healing rates and pain improvement than the use of bandages[37]. Others also concluded that the use of elastic stockings is better tolerated by the patient, besides reducing the cost with specialized labor, since it can be put by the person himself[37, 38]. However, the indication of the best elastic bandage/stocking should be made after careful

consideration by the professional, taking into account various aspects such as leg circumference, tolerability and patient comfort[37].

Category 3 - Analyzing the use of multilayer compression bandage versus multilayer compressive plus surgery

In this category, two articles were included (Barwell[29] and Gohel-b[30], which obtained similar results, there are no differences between the statistics in relation to healing therapies. However, there was a reduction of recurrence of ulcers in the group that underwent the surgery. The surgical treatment of venous ulcer can be directed to the correction of venous hypertension or the treatment itself of ulceration. Among surgical interventions for the cause of venous hypertension have sclerotherapy, ligation or removal of the affected vein. It was not confirmed that the venous interventions will result in acceleration of the healing process of injury, however it is known that in such patients there will be lower rate of recurrence of injury. Therefore, it seems that by the time the surgery for reflux and correction of the obstruction is essential only for the prevention of recurrence of ulcers[39,40].

Category 4 - Analyzing 4 layers elastic bandages versus usual treatment

Two studies were included in this category (O'Brien[31] and Clarke-Moloney[32]. Both had similar results, with the compression seems to be more effective than no compression when it comes to the treatment of venous ulcers, both in improved healing and in the improvement of quality of life. So corroborating with research, another systematic review concluded that the use of compression therapy is significantly more efficient than not using the same[35]. Treatment of venous ulcers is focused on the need to reverse the venous pressure at the level of the superficial veins of the lower extremities. The graduated compression therapy assists the fluids of the interstitial spaces back into the vascular and lymphatic system[2]. Therefore, the compression therapy improves the rate of healing of venous ulcers compared with treatments that do not include compression[35,41].

CONCLUSION

Venous ulcers are a growing problem in the world every day, taking the research to suggest new therapies to aid in the treatment of these ulcers. However, both preventive actions and therapies should be performed by a multidisciplinary team, in which the nurse has important role in the evaluation and decision-making regarding the choice of products for dressings and bandages for compression.

Were found favorable results for compression therapy in the two articles that evaluated the therapy with the usual treatment. Treatment of venous leg ulcers using some kind of compression is more effective than no compression when considering healing rates. However, it was not possible to recommend a specific type of compression therapy, this decision should be made individually, considering the aspects of the particular patient, respecting their needs and offering the best possible treatment. To better to base those choices, nursing practice is increasingly guided the precepts of clinical practice based on evidence, systematic review of studies guide this decision.

REFERÊNCES

1. Abbade, L.P.F.; Lastória, S. Abordagem de pacientes com úlcera da perna de etiologia venosa. Anais Bras Dermatol. 2006; 81(6):509-522.

2. Oliveira BGRB, Nogueira GA, Carvalho MR, et al. The characterization of patients with venous ulcer followed at the Outpatient Wound Repair Clinic. Rev Eletr Enf, 2012; 14(1):156-63.
3. Silva RCL, Figueiredo NMA, Meireles IB. Feridas: fundamentos e atualizações em enfermagem. 2ed. São Caetano do Sul: Yedis Editora, 2007. p.392.
4. Galvão TF, Pereira MG. Revisões sistemáticas da literatura: passos para sua elaboração. Epidemiol Serv Saude. 2014 jan-mar;23(1):183-4.
5. Higgins JPT, Green S. Cochrane handbook for systematic reviews of interventions. The Cochrane Library. 3ed. Chichester: John Wiley & Sons; 2005.
6. Guidugli F. Prevenção e tratamento da leptospirosis: revisão sistemática de ensaios clínicos aleatórios com metanálises. [Tese de Doutorado]. São Paulo: Escola Paulista de Medicina, Universidade Federal de São Paulo; 2000. Disponível em: http://www.metodologia.org/guidugli2000.pdf . Acesso em: 15/07/2013.
7. Oxford Centre for Evidence-based Medicine – Levels of Evidence (March 2009). Disponível em http://www.cebm.net/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/
8. Hendricks WM, Swallow RT. Management of stasis leg ulcers with Unna's boots versus elastic support stockings. J Am Acad Dermatol. 1985; 12(1):90-8. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/3980808 Acesso em: 08/08/2013.
9. Gould DJ, Campbell S, Newton H, Duffelen P, Riffin M, Harding EF. Setopress vs Elastocrepe in chronic venous ulceration. Br J Nurs. 1998; 7(2):70-73. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/9510680 Acesso em: 21/08/2013.
10. Scriven JM, Taylor LE, Wood AJ, Bell PR, Naylor AR, London NJ. A prospective randomised trial of four-layer versus short stretch compression bandages for the treatment of venous leg ulcers. Ann R Coll Surg Engl. 1998; 80(3):215-20.. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/9682649 Acesso em: 08/08/2013.
11. Moody M. Comparison of Rosidal K and SurePress in the treatment of venous leg ulcers. Br J Nurs. 1999; 8(6):345-55. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/10409957 Acesso em: 21/08/2013.
12. Meyer[a] FJ, Burnan, KG, Lagattolla NR, Eastham D. Randomized clinical trial comparing the efficacy of two bandaging regimens in the treatment of venous leg ulcers. Br J Surg. 2002; 89(1):40-4. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/11851661 Acesso sem: 08/08/2013.
13. Franks PJ, Moody M, Moffatt CJ, et al. Randomized trial of cohesive short-stretch versus four-layer bandaging in the management of venous ulceration. Wound Repair Regen 2004; 12:157-62. Disponível em: http://onlinelibrary.wiley.com/doi/10.1111/j.1067-1927.2004.012206.x/pdf Acesso em: 20/08/2013.
14. Koksal C, Bozkurt AK. Combination of hydrocolloid dressing and medical compression stockings versus Unna's boot for the treatment of venous leg ulcers. Swiss Med Wkly. 2003;133(25-26):364-5. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/12947533 Acesso em: 20/08/2013.
15. Jünger[a] M, Partsch H, Ramelet A, Zuccarelli F. Efficacy of a Ready-Made Tubular Compression Device Versus Short-Stretch Compression Bandages in the Treatment of Venous Leg Ulcers. Wounds. 2004; 16(10):313-320. Disponível em: http://www.woundsresearch.com/article/3232 Acesso em:20/08/2013.
16. Iglesias CP, Nelson EA, Cullum N, Torgerson DJ. Economic analysis of VenUS I, a randomized trial of two bandages for treating venous leg ulcers. British Journal of Surgery. 2004; 91(10):1300-6. Disponível em: http://onlinelibrary.wiley.com/doi/10.1002/bjs.4755/pdf Acesso em: 21/08/2013.
17. Nelson[a] EA, Iglesias CP, Cullum N, Torgerson DJ. Randomized clinical trial of four-layer and short-stretch compression bandages for venous leg ulcers (VenUS I). Br J

Surg. 2004; 91(10):1292-9. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/15382102 Acesso em: 08/08/2013.
18. Blecken SR, Villavicencio JL, Kao TC. Comparison of elastic versus nonelastic compression in bilateral venous ulcers: a randomized trial. J Vasc Surg. 2005; 42(6):1150-5. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/16376207 Acesso em: 08/08/2013.
19. Taradaj J, Franek A, Brzezinska-Wcislo L, Blaszczak E, Polak A. Randomized trial of medical compression stockings versus two- layer short-stretch bandaging in the management of venous leg ulcers. Phlebologie. 2009; 4:159-63.
20. Brizzio E, Amsler F, Lun B, Blättler W. Comparison of low-strength compression stockings with bandages for the treatment of recalcitrant venous ulcers. J Vasc Surg. 2010; 51(2):.410-6. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/19879713 Acesso em: 08/08/2013.
21. Mosti G, Crespi A, Mattaliano V. Comparison Between a New, Two-component Compression System With Zinc Paste Bandages for Leg Ulcer Healing: A Prospective, Multicenter, Randomized, Controlled Trial Monitoring Sub-bandage Pressures. Wounds. 2011 May;23(5):126-34. Disponível em: http://www.woundsresearch.com/article/comparison-between-new-two-component-compression-system-zinc-paste-bandages-leg-ulcer-healin Acesso em 20/02/2013
22. Meyer[b] FJ, Mcguinness CL, Lagattolla NR, Eastham D, Burnand KG. Randomized clinical trial of three-layer paste and four-layer bandages for venous leg ulcers. Br J Surg. 2003; 90(8):934-940. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/12905544 Acesso em: 08/08/2013.
23. Moffatt[a] CJ, Mccullagh L, O'connor T, Doherty DC, Hourican C, Stevens J, Mole T, Franks PJ. Randomized trial of four-layer and two-layer bandage systems in the management of chronic venous ulceration. Wound Repair Regen. 2003; 11(3):166-71.Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/12753596 Acesso em: 08/08/2013.
24. Jünger[b] M, Wollina U, Kohnen R, Rabe E. Efficacy and tolerability of an ulcer compression stocking for therapy of chronic venous ulcer compared with a below-knee compression bandage: results from a prospective, randomized, multicentre trial. Curr Med Res Opin. 2004 Oct;20(10):1613-23. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/15462694 Acesso em: 08/08/2013.
25. Nelson[b] EA, Prescott RJ, Harper DR., Gibson B, Brown D, Ruckley CV. A factorial, randomized trial of pentoxifylline or placebo, four-layer or single-layer compression, and knitted viscose or hydrocolloid dressings for venous ulcers. J Vasc Surg. 2007 Jan;45(1):134-41. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/17210398 Acesso em: 08/08/2013.
26. Milic[b] DJ, Zivic SS, Bogdanovic DC, Perisic ZD, Milosevic ZD, Jankovic RJ, Visnjic AM, Jovanovic BM. A randomized trial of the Tubulcus multilayer bandaging system in the treatment of extensive venous ulcers. J Vasc Surg. 2007 Oct;46(4):750-5. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/17764879 Acesso em: 08/08/2013.
27. Moffatt[b] CJ, Edwards L, Collier M, Treadwell T, Miller M, Shafer L, Sibbald G, Brassard A, Mcintosh A, Reyzelman A, Price P, Kraus SM, Walters SA, Harding K. A randomised controlled 8-week crossover clinical evaluation of the 3M Coban 2 Layer Compression System versus Profore to evaluate the product performance in patients with venous leg ulcers. Int Wound J. 2008; 5(2):267-79. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/18494632 Acesso em: 21/08/2013.
28. Milic[c] DJ, Zivic SS, Bogdanovic DC, Jovanovic MM, Jankovic RJ, Milosevic ZD, Stamenkovic DM, Trenkic MS. The influence of different sub-bandage pressure values on venous leg ulcers healing when treated with compression therapy. J Vasc Surg.

2010; 51(3):655-61. Dicponível em: http://www.ncbi.nlm.nih.gov/pubmed/20045611 Acesso em: 08/08/2013.
29. Barwell JR, Davies CE, Deacon J, Harvey K, Minor J, Sassano A, Taylor M, Usher J, Wakely C, Earnshaw JJ, Heather BP, Mitchell D, Whyman MR, Poskitt KR. Comparison of surgery and compression with compression alone in chronic venous ulceration (ESCHAR study): randomised controlled trial. Lancet. 2004; 363(9424):1857-59). Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/15183623 Acesso em: 08/08/2013.
30. Gohel[b] MS, Barwell JR, Taylor M, Chant T, Foy C, Earnshaw JJ, Heather BP, Mitchell DC, Whyman MR, Poskitt KR. Long term results of compression therapy alone versus compression plus surgery in chronic venous ulceration (ESCHAR): randomised controlled trial. BMJ. 2007; 335(7610):83. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/17545185 Acesso em: 08/08/2013.
31. O'brien JF, Grace PA, Perry IJ, Hannigan A, Clarke-Moloney M, Burke PE. Randomized clinical trial and economics analysis of four-layer compression bandaging for venous ulcers. Br J Surg. 2003; 90(7):794-8. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/12854102 Acesso em: 08/08/2013.
32. Clarke-Moloney M, O'brien JF, Grace PA, Burke PE. Health-related quality of life during four-layer compression bandaging for venous ulcer disease: a randomised controlled trial. Ir J Med Sci. 2005; 174(2):21-25. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/16094908 Acesso em: 08/08/2013.
33. Borges, Eline Lima. Tratamento tópico de úlceras venoso: proposta de uma diretriz baseada em evidências [tese de doutorado]. São Paulo: Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo; 2005. Disponível em: http://www.teses.usp.br/teses/disponiveis/22/22132/tde-12122005-110012/. Acesso em: 25/09/2013.
34. Leal SMC, Feller SF. Úlceras venosas: adesão ao tratamento. In: Anais de congresso. Revista HCPA. 2005; .25(Supl 1);07. Disponível em: http://www.hcpa.ufrgs.br/downloads/RevistaCientifica/2005/ANAIS_2005.pdf. Acesso em 02/10/2013.
35. O'meara S, Cullum NA, Nelson EA. Compression For Venous Leg Ulcers (Review). Cochrane Database of Systematic Reviews. 2009;1. art. n. CD000265. Disponível em: http://www2.cochrane.org/reviews/en/ab000265.html Acesso em: 07/08/2013.
36. Bolton, Laura. Compression in Venous Ulcer Management. Wound Ostomy Continence Nurs.2008; 35(1):40-49.
37. Amsler F, Willenberg T, Blättler W. In search of optimal compression therapy for venous leg ulcers: a meta-analysis of studies comparing diverse [corrected] bandages with specifically designed stockings. J Vasc Surg. 2009 Sep;50(3):668-74. Disponível em: http://dx.doi.org/10.1016/j.jvs.2009.05.018 Acesso em 15/05/2013
38. Amsler F, Blättler W. Compression therapy for occupational leg symptoms and chronic venous disorders - a meta-analysis of randomised controlled trials. Eur J Vasc Endovasc Surg. 2008 Mar;35(3):366-72. Disponível em: http://0-www.ncbi.nlm.nih.gov.library.ccf.org/pubmed/18063393
39. Macedo EAB. Custo-efetividade da terapia compressiva no processo de cicatrização de úlceras venosas. [dissertação de mestrado]. 2009. Natal: Escola de Enfermagem, Universidade Federal do Rio Grande do Norte. Disponível em: http://www.pgenf.ufrn.br/conteudo/publicacao.php?tx=YToyOntzOjI6ImlkIjtzOjM6IjEyMyI7czo0OiJ0aXBvIjtzOjE6IjIiO30= . Acesso em: 27/08/2013.
40. Carvalho, MR. Comparison of Outcomes in Patients With Venous Leg Ulcers Treated With Compression Therapy Alone Versus Combination of Surgery and Compression Therapy: A Systematic Review. Journal of Wound Ostomy & Continence Nursing. 2015; 42(1): 42-46.

41. Pina E, Furtado K, Albino AP. boas práticas no tratamento e prevenção das ulceras de perna de origem venosa. Portugal: Lousanense, 2007.

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