

## Coverings and topical agents and their effects on the treatment of venous lesions: integrative review

*Coberturas e agentes tópicos e seus efeitos no tratamento de lesões venosas: revisão integrativa*  
*Apósitos y agentes tópicos y sus efectos en el tratamiento de lesiones venosas: una revisión integradora*

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### Abstract

**Objective:** To identify in the literature the coverings and topical agents used in the treatment of venous lesions and describe the effects found. **Methods:** Integrative literature review carried out in national and international databases using the following descriptors in Portuguese and English: varicose ulcer, leg ulcer, occlusive dressings, therapy. Articles published between 2014 and 2022 were included, without language limitation. **Results:** Twenty-two topical agents/coverings were identified in the 24 selected articles, with a predominance of carboxymethylcellulose (n=4), papain gel (n=3) and polyhexamethylene biguanide (n=2), platelet gel (n=2) and technology such as lipid-colloid nano-oligosaccharide (n=2). **Conclusion:** The 22 topical agents/coverings found were able to accelerate healing, decrease exudate and devitalized tissues, control bacterial load, modulate inflammation, and reduce pain and odor. From the research it was also possible to identify the indications, results and recommendations of the agents/coverings. However, we emphasize the importance of conducting quality clinical research that contributes to planning and decision-making in nursing care for people with venous lesions.

**Descriptors:** Nursing; Varicose Ulcer; Leg Ulcer; Therapy; Occlusive Dressings.

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### Whats is already known on this?

The literature indicates separately the use of several topical agents/coverings used in the treatment of venous lesions.

### What this study adds?

The study brings together topical therapies and addresses their effects in the treatment of venous lesions, contributing to knowledge of the therapies used, and assists in the choice of treatments and nursing decisions.



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### Resumo

**Objetivo:** Identificar na literatura coberturas e agentes tópicos utilizados no tratamento de lesões venosas e descrever os efeitos encontrados. **Métodos:** Revisão integrativa da literatura, realizada em bases de dados nacionais e internacionais, com uso dos seguintes descritores: úlcera varicosa; úlcera da perna; curativos oclusivos; terapêutica e suas respectivas traduções em inglês. Incluíram-se artigos publicados no período entre 2014 e 2022, sem limitação de idioma. **Resultado:** Identificaram-se 22 agentes tópicos/coberturas nos 24 artigos selecionados, com predomínio da carboximetilcelulose (n=4), gel de papaína (n=3) e polihexametileno biguanida (n=2), gel de plaquetas (n=2) e tecnologia como lipido-coloide-nano oligossacarídeo (n=2). **Conclusão:** Os 22 agentes tópicos/coberturas encontrados foram capazes de acelerar a cicatrização, diminuir o exsudato e tecidos desvitalizados, controlar a carga bacteriana, modular a inflamação e reduzir a dor e o odor. A partir da pesquisa também se identificaram as indicações, os resultados e as recomendações dos agentes/coberturas. Entretanto, ressalta-se a importância da realização de pesquisas clínicas de qualidade que contribuam para o planejamento e a tomada de decisões na assistência de enfermagem às pessoas com lesões venosas.

**Descritores:** Enfermagem; Úlcera Varicosa; Úlcera da Perna; Terapêutica; Curativos Oclusivos.

### Resumen

**Objetivo:** Identificar los apósitos y agentes tópicos utilizados en el tratamiento de lesiones venosas en la literatura y describir los efectos encontrados. **Métodos:** Revisión integrativa de la literatura, realizada en bases de datos nacionales e internacionales, utilizando los siguientes descriptores en portugués e inglés: úlcera varicosa, úlcera en la pierna, vendajes oclusivos, terapia y sus respectivas traducciones al inglés. Se incluyeron artículos publicados entre 2014 y 2022, sin limitación de idioma. **Resultado:** Se identificaron 22 agentes/apósitos tópicos en los 24 artículos seleccionados, con predominio de carboximetilcelulosa (n=4), gel de papaína (n=3) y polihexametileno biguanida (n=2), gel de plaquetas (n=2) y tecnología como lípido-coloide-nano oligosacárido (n=2). **Conclusión:** Los 22 agentes/apósitos tópicos encontrados fueron capaces de acelerar la cicatrización, disminuir el exudado y los tejidos desvitalizados, controlar la carga bacteriana, modular la inflamación y reducir el dolor y el olor. A partir de la investigación también fue posible identificar las indicaciones, resultados y recomendaciones de los agentes/apósitos. Sin embargo, es importante realizar investigaciones clínicas de calidad que contribuyan a la planificación y toma de decisiones en el cuidado de enfermería a personas con lesiones venosas.

**Descritores:** Enfermería; Úlcera Varicosa; Úlcera en la Pierna; Terapia; Vendajes Oclusivos.

## INTRODUCTION

Venous Ulcer (VU) is characterized as a chronic skin lesion, because it is long-lasting and with frequent recurrences. Its main cause is the difficulty of venous return, which can cause skin changes, and thus cause injury. It is estimated that VU affects approximately 1 to 2% of the world population and due to the increase in incidence, venous ulcer is considered a public health problem, causing a socioeconomic impact on society, because it burdens spending on health systems.<sup>(1)</sup>

In addition, another problem is related to the gaps in health services, due to the difficulty in which professionals find care management. In particular, regarding the treatment of ulcers there is a diversity of products on the market, a considerable increase in new technologies used in coverings. This is a positive aspect, because it allows the possibility of therapeutic choice for the need of each wound. However, on the other hand, it makes it even more difficult for non-specialist professionals to make decisions.<sup>(2-3)</sup>

Thus, given the complexity involved in the care of venous ulcers requires professionals with specialized training, trained and updated, with constant search for scientific evidence to guide clinical practice in search of the evolution of wound healing.<sup>(2,4)</sup>

Evidence-Based Practice makes it possible to obtain better results, seeking to develop care with greater safety and quality,<sup>(2)</sup> since science changes daily and evidence allows professionals to update knowledge and training in order to promote the best care provided.<sup>(4)</sup> Thus, it is necessary for nurses to enjoy scientific knowledge, to know the existing therapies, their properties and purposes<sup>(5)</sup> so that they know how to properly conduct the treatment of people with venous ulcers.

In this sense, due to the need to assist nurses in making decisions in the indication of topical therapy, according to the characteristics of the lesion, the study aimed to analyze scientific evidence on coverings and topical agents for the treatment of venous ulcers.

## METHODS

This is an integrative literature review, which followed the following stages: elaboration of the research question; construction of the investigation protocol; search and selection of primary studies; analysis and extraction of data; interpretation and presentation of results.<sup>(6)</sup>

The PICO strategy was used to identify the research question, being: P (population – person with venous ulcer), I (phenomenon of interest – topical covering for venous ulcer), Co (context of the study – available evidence (literature)). Given this strategy, the following guiding question was elaborated: What is the scientific evidence identified in the literature on topical coverings for treatment of venous ulcers?

Subsequently, the articles were selected from national and international databases, namely: Latin American and Caribbean Literature (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE) via PubMed Central, Nursing Database (BDENF), SCOPUS, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Web of Science.

For the elaboration of the search strategy in the databases, the controlled descriptors were used, extracted from the Health Sciences Descriptors (DeCS) and the Medical Subject Headings (MeSH). The crossings occurred through the Boolean operators AND and OR (Box 1).

**Box 1.** Search strategy in the databases. Natal, Rio Grande do Norte, Brazil, 2022.

Databases	Strategy
MEDLINE (via PUBMED)/LILACS/BDENF	1. (tw:(ulcera varicosa)) OR (tw:(ulcera da perna)) AND (tw:(curativos oclusivos)) 2. (tw:(ulcera varicosa)) OR (tw:(ulcera da perna)) AND (tw:(terapêutica))
WEB OF SCIENCE/SCOPUS/CINAHL/MEDLINE (via PUBMED)/LILACS/BDENF	1. (tw:(varicose ulcer)) OR (tw:(leg ulcer)) AND (tw:(occlusive dressings)) 2. (tw:(varicose ulcer)) OR (tw:(leg ulcers)) AND (tw:(therapeutics))

Source: Prepared by the authors (2022).

The searches were carried out in March 2022. The inclusion criteria were: complete articles that answered the research question, without language limitation, published in the period from 2014 to 2022. The temporal limitation was due to the search for current evidence, with covering and active principles used in recent years, considering that science evolves and many treatments previously used may no longer be prescribed. Articles that were not related to the theme of the study were excluded. The selection was carried out by two researchers and the disagreements were resolved by a third researcher.

The studies were classified according to the levels of evidence of the Agency for Healthcare Research and Quality (AHRQ), which are: level 1 – meta-analyses of multiple controlled and randomized clinical trials, level 2 – individual studies with experimental design, level 3 – quasi-experimental studies, level 4 – descriptive studies (non-experimental) or qualitative approach, level 5 – case or experience reports, level 6 – with expert opinions.<sup>(7)</sup> Studies that did not enter this classification were identified as unclassified (UC) studies.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to guide the study (Figure 1). Of the 16,850 studies, 184 were selected for abstract reading, the others were excluded after reading the title for being of a different theme or for being in duplicate; of the 184, 45 were chosen for thorough reading in full and 24 composed the sample after answering the research question. Table 1 shows the quantity found in each database.

**Table 1.** Quantitative found by databases. Natal, Rio Grande do Norte, Brazil, 2022.

Base de dados	Número de estudos encontrados
MEDLINE	8.258
LILACS	57
BDENF	15
CINAHL	5.213
WEB OF SCIENCE	2.363
SCOPUS	944

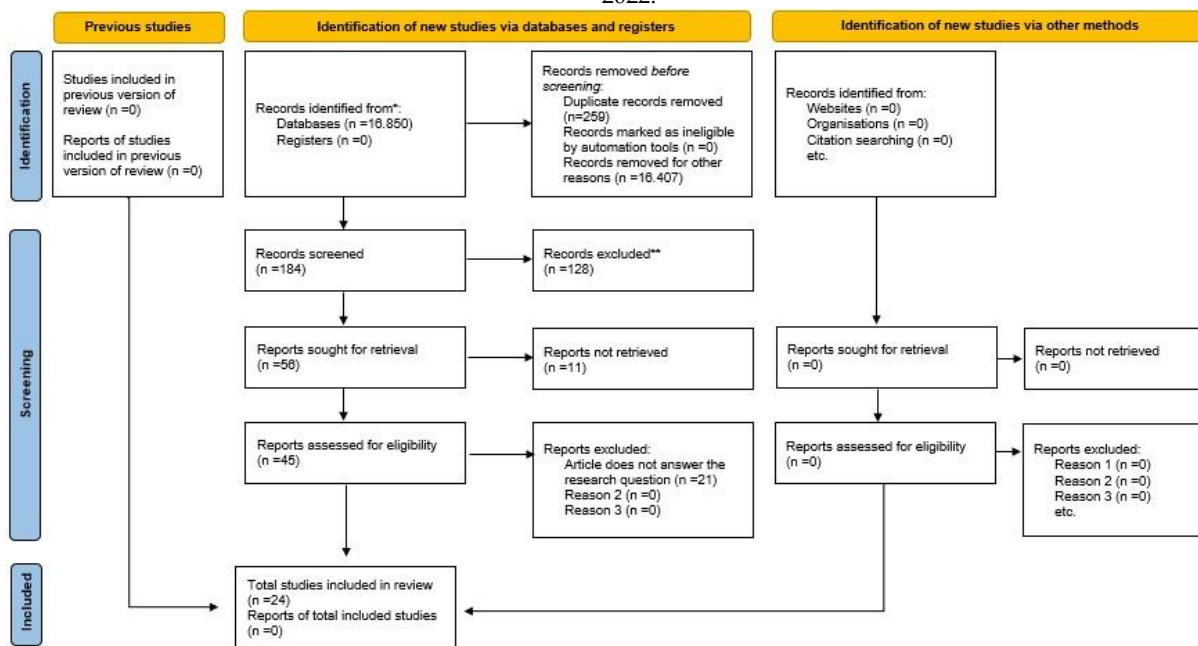
Source: Prepared by the authors (2022).

The research protocol developed and used by the researchers was an instrument to collect the information from the articles: database in which it was located, researcher responsible for the analysis, identification of the article (title, authors, year, country of the study, language), level of evidence according to AHRQ, objective, main results, main conclusions and recommendations, inclusion or exclusion in the final sample and reason for exclusion.

## RESULTS

Figure 1 below presents the PRISMA flowchart containing the researched bases, the quantities found and the exclusion criteria in each phase and the final sample number.

**Figure 1.** Flowchart of the integrative literature review regarding the covering. Natal, Rio Grande do Norte, Brazil, 2022.



Source: Prepared by the authors (2022).

The studies have Brazilian, English, American, Italian, Spanish, Chinese, Mexican, Portuguese, Chilean, Israeli, Singaporean, Indian, Slovenian and Egyptian origins. The studies were published between 2014 and 2022. Twenty-two topical agents and/or coverings were identified; these are shown in Box 2, in the 24 articles found in national and international databases. The studies showed a predominance of level of evidence 2 (41.66%).

**Box 2.** Summary of articles identified in the integrative literature review. Natal, Rio Grande do Norte, Brazil, 2022.

Author (year)	Level of evidence	Topical Agents	Results	Conclusions and recommendations
Atias <i>et al.</i> , 2020 <sup>(8)</sup>	2	Membrane natural matrix biopolymer (NMBN), used compressive therapy.	In this study, NMBN was a safe treatment for venous ulcer, and reduced pain and ulcer size.	The study suggests that NMBN can be safely used to promote ulcer healing. However, a larger scale of study is needed.
Barrett; Rippon; Rogers, 2020 <sup>(9)</sup>	2	Superabsorbent dressing (SAP), did not indicate use of compression.	SAP improved wound edge and perilesional area conditions (29% and 36% of patients). The dressing changes of the patients were every three days or more.	The SAP dressing provided positive benefits when used in the treatment of patients with moderate and excessive exudate.
Boey; Tang; Galea, 2020 <sup>(10)</sup>	5	Polyacrylate fiber with silver, under compression.	Reduction of excessive exudate and fibrin occurred, stimulating the growth of granulation tissue.	Covering has been shown to be effective in just 3 months of treatment. They recommend further studies to ensure effectiveness.
Dissemond <i>et al.</i> , 2020 <sup>(11)</sup>	NC	Technology such as lipid-colloid nano-oligosaccharide (TLC-NOSF), under compression.	Reduction of the size of the wound and its healing.	Treatment of wounds with TLC-NOSF is highly recommended. However, they recommend more high-quality and long-term studies.

Murray; Norrie, 2020 <sup>(12)</sup>	2	Technology such as lipid-colloid nano-oligosaccharide (TLC-NOSF), under compression.	Study with 13 participants, getting to close the lesion in 12; decreasing the area of the lesion and healing barriers.	They were able to close most of the lesions in 12 weeks, with the treatment in question.
Zhao <i>et al.</i> , 2020 <sup>(13)</sup>	1	Silver ion, under compression.	The primary outcome was complete wound healing, and the secondary outcomes included absolute changes in wound size.	Dressings containing silver can speed up the healing rate in a short period of time. However, they recommend long-term studies.
Oropallo <i>et al.</i> , 2019 <sup>(14)</sup>	4	Native type I collagen matrix with PHMB. They don't mention compression.	There was a reduction in the wound area and complete healing.	Treatment positively impacted healing.
Barret <i>et al.</i> , 2018 <sup>(15)</sup>	4	Superabsorbent polymer dressing (SAP), under compression.	Promotion of healing, reduction of pain and improvement of the skin near the lesion.	The dressing was effective in the management of moderate to high exudate.
Mataro <i>et al.</i> , 2018 <sup>(16)</sup>	2	Proteolytic enzyme concentrate enriched with bromelain. They don't mention compression.	Complete debridement of necrotic tissue in all cases within 24 hours.	The results are preliminary observations and controlled studies are needed.
Morilla-Herrera <i>et al.</i> , 2018 <sup>(17)</sup>	2	Silver dressing with CMC and hydrophobic dressing, under compression.	The study was able to evaluate the impact on health-related quality in aspects such as decreased pain, exudate and odor of lesions.	Hydrophobic dressings improve the treatment of venous ulcers to prevent antimicrobial resistance and limit the use of chemical agents.
Pinheiro; Duarte; Cabete, 2018 <sup>(18)</sup>	3	80% trichloroacetic acid (TCA) solution <i>versus</i> mechanical debridement, under compression.	Significant pain reduction and not statistically significant fibrin reduction in the TCA group.	80% TCA solution can be a cheap, simple and less painful chemical debridement method.
Semenic <i>et al.</i> , 2018 <sup>(19)</sup>	2	Platelet <i>versus</i> hydrogel gel, both uncompressed.	The platelet gel obtained significantly greater reduction in area and circumference of the lesions.	Platelet gel has been considered a good option for chronic wounds that are difficult to heal.
Mancini <i>et al.</i> , 2017 <sup>(20)</sup>	4	Super absorbent hydroactive dressing with polyhexamethylene biguanide (PHMB). They don't mention compression.	Replacement of shredding by granulation in up to 67.8% of the wound.	The dressing was effective and rapid in autolytic debridement and able to handle the bacterial load.
Oliveira <i>et al.</i> , 2017 <sup>(21)</sup>	2	Homologous platelet gel <i>versus</i> hydrocolloid. Both under compression.	Both treatments reduced the ulcer areas in 90 days.	Homologous platelet gel is a safe alternative. It recommends clinical trials.
Araújo <i>et al.</i> , 2016 <sup>(22)</sup>	3	Fibrin gel <i>versus</i> papain gel 2 to 8% <i>versus</i> carbopol gel.	The ulcer areas, exudation and contamination were similarly reduced, regardless of the gel used.	Neither fibrin gel nor papain gel was able to improve healing when compared to carbopol gel.
Caridi <i>et al.</i> , 2016 <sup>(23)</sup>	4	Polynucleotide gel and hyaluronic acid (PNAH) <i>versus</i> hyaluronic acid, both without compression.	The PNAH gel was faster at complete healing, reduction of injury, perilesional inflammation, and increased contraction and epithelialization.	The PNAH gel is able to modulate inflammation and accelerate healing.
Januário <i>et al.</i> , 2016 <sup>(24)</sup>	3	Carboxymethylcellulose (CMC) paste 20%, under compression.	CMC 20% promoted good healing and regular healing.	CMC 20% is effective and low cost. Controlled studies are needed.



Murphy, 2016 <sup>(25)</sup>	4	Dressing of activated carbon tissue, under compression.	In all cases the signs of infection reduced significantly in 4 weeks.	The dressing improved the appearance of the wound bed, reduced pain, exudate and signs of infection.
Serena <i>et al.</i> , 2016 <sup>(26)</sup>	4	Ointment of mineral complex and benzethonium chloride 0.2%, under compression.	There was a reduction in the size of the ulcers in 23 days.	The ointment was effective in controlling bacterial bio-burden and keeps medium moist. It needs clinical trials.
Moreno-Eutimio <i>et al.</i> , 2015 <sup>(27)</sup>	2	Carbohydrate polymer with zinc oxide, under compression.	There was a significant reduction in the area of ulcers and inflammatory markers.	The zinc oxide carbohydrate polymer, along with compression, improved healing and quality of life.
Ribeiro <i>et al.</i> , 2015 <sup>(28)</sup>	3	Papain gel 2% and 4%. They do not mention compression.	50% reduction in ulcer size in 90 days, increased epithelialization, reduction of shredding and edema, improvement in depth, type and amount of exudate.	The two gels were effective and safe for use in granulation and VU shredding.
Rodrigues <i>et al.</i> , 2015 <sup>(5)</sup>	3	2% Carboxymethylcellulose (CMC) gel. They do not mention compression.	The wounds had area, edema, pain and maceration reduced, increased granulation and epithelialization.	CMC 2% promoted healing, reducing treatment time and costs.
Rodrigues <i>et al.</i> , 2015 <sup>(29)</sup>	2	Papain gel 2% <i>versus</i> CMC 2%. They do not mention compression.	Papain gel 2% was more effective in reducing the lesion area, but similar to CMC gel 2% in reducing exudate and devitalized tissue.	The study can contribute to the elaboration of wound assessment protocols. Multicenter research is recommended.
Ghatnekar <i>et al.</i> , 2014 <sup>(30)</sup>	2	25 amino acid synthetic peptide gel (Alfa-connexin carboxyl terminal 1-ACT1), under compression.	Significantly greater reduction in lesion area and re-epithelialization time.	The ACT1 gel is well tolerated, effective and accelerates the healing of the venous ulcer.

\*NC: studies that did not enter this classification were identified as unclassified studies.

Source: Prepared by the authors (2022).

## DISCUSSION

There is a diversity of active agents and coverings used in venous lesions, capable of accelerating tissue healing, in studies conducted in several countries. The diversity of therapies requires from the nurses a set of specific knowledge and, today, it is one of the focuses of nursing specialization in stomatherapy.<sup>(31)</sup>

The knowledge about coverings based on scientific evidence used in several countries, provide the nurses with recommendations that help in the construction of guidelines and enable the proper management of the injury, as well as contributes to support professionals in decision-making in the face of a clinical situation.<sup>(31)</sup>

Among the recommendations for topical therapy, carboxymethylcellulose (CMC) has been pointed out in three Brazilian studies, in different concentrations.<sup>(5,23-24)</sup> Said active ingredient is one of the components of several coverings on the market, such as hydrofiber, hydrogel, among others.<sup>(32)</sup>

CMC is able to keep the medium moist and promote autolytic debridement, reduce healing time and infections.<sup>(5)</sup> Depending on its presentation, it may has greater or lesser ability and viscosity, which may suit the filling of cavities or the cover of the wound bed, without flow to edges.<sup>(5,24)</sup>

When compared to papain gel, CMC was similar in relation to the reduction of exudate and devitalized tissue. This is relevant information, since both substances are considered low-cost on the market, and due to the chronicity of venous ulcer, treatments are usually long, and consequently costly.<sup>(29)</sup>

Papain is an enzymatic debridement agent that has been used over the years in various presentations, such as powder, cream or gel. There is no consensus on the appropriate concentration (2%, 4% or more) for each tissue type or healing phase.<sup>(19)</sup> Gel presentation has been more used, because in addition to the enzymatic action, it keeps the moist medium also favoring autolytic debridement. Although it is a debridement agent, intended for devitalized tissues, it has also been used in granulation, with good results in studies with venous ulcers in its sample.<sup>(19,28)</sup>

The concentrate of proteolytic enzymes enriched with bromelain is also a selective enzymatic debridement agent found by Americans, in a study in this review. Bromelain has been extensively studied and applied in burns, but research on other types of wounds is still scarce, although promising in the rapid debridement of devitalized tissue (within 24 hours), further controlled studies are needed.<sup>(17-22)</sup>

Trichloroacetic acid (TCA) solution is used for various dermatological purposes (stretch marks, xanthelasma, peeling), but not exploited as a chemical debridement agent for leg ulcers. It has been shown to be effective, selective, simple, fast, inexpensive and less painful than classical mechanical debridement.<sup>(30)</sup> There are reports of use of TCA in hypergranulation and stimulant of cartilage regeneration of the ear. However, in chronic ulcers further investigations are needed.<sup>(11)</sup>

Two gels used topically in VU were fibrin and carbopol, with no statistical difference compared to papain gel 2 to 8%. However, the use of carbopol is widely used combined with other agents and with elastic compression. Elastic compression associated with the use of a topical substance in the treatment of venous ulcers can potentiate and minimize the healing time.<sup>(28)</sup>

Fibrin gel is produced at the end of the blood clotting cascade, in addition to its hemostatic function, it is also a reservoir of growth factors and is directly linked to the healing process.<sup>(8)</sup> Another natural gel found was that of platelets, which obtained results similar to the hydrocolloid, but superior to the hydrogel. It is a product derived from platelet concentrate, which releases growth factors in the lesion. It has been studied in other types of wounds, but little in VU.<sup>(21,27)</sup> It is noteworthy that the study that compared platelet gel with hydrocolloid associated compressive therapy in all patients, which may have influenced the result of this study.<sup>(21)</sup>

In England, a study with superabsorbent dressing showed good management of ulcer exudate (moderate and intense), with improvement in healing, reduction of perilesional skin damage and pain.<sup>(29,33)</sup> Similar results were explained at a conference at the Wound Healing Congress in 2019, held in Budapest. Researchers have reported on the benefits of people with venous lesions with a high level of exudation using absorbent dressings that adapt well for use under compression in order to keep the lesion bed wet but not soaking wet.<sup>(34)</sup>

In this way, laboratories have added to the superabsorbent dressings other substances, such as silver or PHMB. Silver was approached with polyacrylate fiber in a study carried out in Singapore that highlights the fibers as a dressing of good absorption for having action of management of excessive exudate and fibrin.<sup>(18)</sup>

PHMB is effective against biofilm, with few contraindications. The study that applied the superabsorbent dressing with PHMB obtained great results in the autolytic debridement of the lesions.<sup>(26)</sup> PHMB was also used in native type I collagen matrix dressing. Bioactive dressings with collagen are considered growth factors because they act in all phases of healing, serving as a structure for fibroblast migration and sequestering proteolytic enzymes that delay healing. This is also indicated for other types of injuries such as diabetic ulcers, pressure injuries, and surgical wounds.<sup>(20)</sup>

However, another study brought the use of activated charcoal in patients with treatment refractory to PHMB and iodine as antiseptics.<sup>(14)</sup> Activated charcoal is widely used to filter odors, however, its property of having attractive forces (Van-der-Waals forces) also makes it capable of filtering exudate and, consequently, microorganisms. In VU, the significant reduction in signs of infection was rapid (four weeks). In surgical dehiscences, there are reports of an average complete healing time of 51 days.<sup>(35)</sup>

A study conducted in China evaluated whether dressings containing silver were superior to other types of dressings in VU treatment. This would require long-term studies. However, they observed that such a substance can accelerate the rate of healing due to its anti-inflammatory effect, becoming able to inhibit the activity of metalloproteins and promote the apoptosis of senescent cells.<sup>(12)</sup> It also has relative antimicrobial effects, reduces wound size, pain, exudate and increases granulation tissue.<sup>(10,12)</sup>

In Spain, another study was carried out with silver dressing, but associated with carboxymethylcellulose, understood as a product that eliminates excess exudate from the wound, bacteria and biofilm. However, its effectiveness was compared with hydrophobic dressings, composed of acetate

tissue impregnated with Dialkyl Carbamoyl Chloride (DACC), a substance that promotes the removal of microorganisms from contaminated, colonized or infected exudative wounds, being used in all types of chronic wounds.<sup>(10)</sup>

Still in Spain researchers studied ulcers difficult to heal and evaluated the evidence of a technology of mmp inhibitors (matrix metalloproteinases), identified as lipid-colloid nano-oligosaccharide (TLC-NOSF), which favored reduction of wound size, complete closure of the wound, decreased healing time, maceration and the level of exudate.<sup>(9)</sup> These results corroborate a study carried out in the United Kingdom, which recommends the use of this technology in VU healing.<sup>(16)</sup>

In Italy, researchers evaluated the application of polynucleotide gel and hyaluronic acid compared only to hyaluronic acid, an extracellular polysaccharide that interferes with stages of healing. Its association with polynucleotides has already been shown to be effective in neoangiogenesis, also considered as growth factors in cell proliferation and collagen deposition in chronic ulcers in general.<sup>(25)</sup>

Mexican researchers who used the carbohydrate polymer with zinc oxide achieved improvement in lesion reduction and inflammatory markers (IL-6, IL-8, CD45+ and CD31+ cells).<sup>(29)</sup> More recent research has also demonstrated bactericidal effect of this product against biofilm of *Staphylococcus aureus* and *Pseudomonas aeruginosa*, which may have contributed to the positive results found.<sup>(36)</sup>

Another covering found, ACT1 (synthetic peptide of 25 amino acids) has already been shown to be effective in another type of leg ulcer, the diabetic foot, similarly reducing the area of the lesions, without complications. Its results are promising. Act1 is directed to connexin 43, present at the communication junction, which allows exchange and binding between cells, such as in the propagation of signals between them, in the coordination of inflammation, in the formation of granulation and in remodeling.<sup>(30)</sup>

The ointment of mineral complex and benzethonium chloride 0.2% showed antimicrobial effects. However, simultaneous treatments were used, including compression bandages and dressings, such as collagen and calcium alginate.<sup>(15)</sup> No further studies on the application of this product in VU have been found in the literature.

In Israel, researchers evaluated the therapeutic effect of the natural matrix biopolymer membrane (NMBM) on VU treatment of the leg, and proved its effectiveness as an analgesic in the treatment of wounds, as well as favoring healing and supporting autolytic debridement.<sup>(13)</sup>

It is important to note that some studies of the sample used associated compressive therapies, which may have influenced the positive result found, since this treatment is proven effective for VU. Thus, the results need to be interpreted with caution and evaluate the best conduct, according to the characteristics of the lesions found.

As a limitation, it is noteworthy the low level of evidence found in the treatment of venous ulcers, which demonstrates that with the technological advancement and the various dressings existing in the market, studies in clinical practice are needed to evidence the effectiveness of these substances and increase the amount of research with high levels of evidence, in the long term, in order to guide the practice of health professionals, bringing them support and safety during decision-making in the choice of topical therapy in the treatment of people with venous lesions.

The present study contributes to the organization, knowledge and dissemination of topical drug therapies that have been used in recent years. It is also expected that it can help in future research in the construction of protocols, choices of better treatments and, thus, favor planning and decision-making in nursing care conduct.

## CONCLUSION

Twenty-four articles were analyzed, with 22 topical agents/coverings used in the treatment of venous ulcers worldwide, predominantly carboxymethylcellulose, papain gel, polyhexamethylene biguanide, platelet gel and technology such as lipid-colloid nano-oligosaccharide, associated or not with compression. From the research it was also possible to identify the indication, results and recommendations of agents and coverings. In general, the effects were: acceleration of healing, reduction of exudate and devitalized tissues, control of bacterial load, modulation of inflammation, reduction of pain and odor.

Such information may contribute to early intervention with dressings and technologies based on scientific and standardized bases, enabling safety for professionals and patients, in addition to qualifying Nursing in the care of people with venous lesions.



## CONTRIBUTIONS

Contributed to the conception or design of the study/research: Mesquita SKC, Costa IKF. Contributed to data collection: Mesquita SKC, O' LB, Gonçalves AAC, Linhares JSO. Contributed to the analysis and/or interpretation of data: Mesquita SKC, Freitas LS, O' LB, Gonçalves AAC, Linhares JSO. Contributed to article writing or critical review: Mesquita SKC, Freitas LS, O' LB, Gonçalves AAC, Araújo RO. Final approval of the version to be published: Mesquita SKC, Freitas LS, Araújo RO, Costa IKF.

## REFERENCES

1. Sánchez-Nicolat NE, Guardado-Bermúdez F, Arriaga-Caballero JE, Torres-Martínez JA, Flores-Escartín M, Serrano-Lozano JA, et al. Revisión en úlceras venosas: Epidemiología, fisiopatología, diagnóstico y tratamiento actual. *Rev Mex Angiol* [Internet]. 2019; 47(1):26-38. Available from: <https://www.medigraphic.com/pdfs/revmexang/an-2019/an191d.pdf>
2. Sales FAAS, Siqueira MS, Specht AM, Treviso P. Úlceras varicosas: Revisão integrativa acerca de recomendações de cuidado de enfermagem. *Nursing (São Paulo)* [Internet]. 2022; 25(289):7904-17. Doi: <https://doi.org/10.36489/nursing.2022v25i289p7904-7917>
3. Sousa MBV, Bezerra AMFA, Costa CV, Gomes EB, Fonseca HTA, Quaresma OB, et al. Assistência de enfermagem no cuidado de feridas na atenção primária em saúde: revisão integrativa. *REAS* [Internet]. 2020; (48):e3303. Available from: <https://acervomais.com.br/index.php/saude/article/view/3303>
4. Joaquim FL, Silvino ZR, Souza DF, Souza CJ. Care management for people with venous ulcers from the perspective of health quality. *RSD* [Internet]. 2020; 9(5):e106953190. Available from: <https://rsdjournal.org/index.php/rsd/article/view/3190>
5. Rodrigues LM, Oliveira BGRB, Castilho SR, Futuro DO. Health technology assessment: use of carboxymethylcellulose 2% in treating leg ulcers. *Rev enferm UERJ* [Internet]. 2015;23(4):520-5. Doi: <http://dx.doi.org/10.12957/reuerj.2015.4110>
6. Arksey H, O'Malley L. Scoping Studies: Towards a Methodological Framework. *Int J Soc Res Methodol Theory Pract* [Internet]. 2005;8:19-32. Doi: <https://doi.org/10.1080/1364557032000119616>
7. Agencia para la Investigación y la Calidad de la Atención Médica (AHRQ). *Mejora y seguimiento de la calidad a su alcance*. Rockville: Agencia para la Investigación y la Calidad de la Atención Médica, 2016.
8. Atias Z, Pederson JM, Mishra HK, Greenberger S. The effect of natural matrix biopolymer membrane on hard-to-heal venous leg ulcers: a pilot randomised clinical trial. *J Wound Care* [Internet]. 2020; 29(5). Doi: <https://doi.org/10.12968/jowc.2020.29.5.295>
9. Barrett S, Rippon M, Rogers AA. Treatment of 52 patients with a self-adhesive siliconised superabsorbent dressing: a multicentre observational study. *J Wound Care* [Internet]. 2020;29(6):340-9. Doi: <https://doi.org/10.12968/jowc.2020.29.6.340>
10. Boey J, Tang TY, Galea E. Management of venous leg ulcers with a two-layer compression bandage and a polyacrylate fibre dressing. *Wound Practice & Research* [Internet]. 2020;28(3):127-32. Doi: <https://doi.org/10.33235/wpr.28.3.127-132>
11. Dissemond J, Augustin M, Dietlein M, Faust U, Keuthage W, Lobmann R, et al. Efficacy of MMP-inhibiting wound dressings in the treatment of chronic wounds: a systematic review. *J Wound Care* [Internet]. 2020;29(2):102-18. Doi: <https://doi.org/10.12968/jowc.2020.29.2.102>
12. Murray S, Norrie L. Reducing variation in care: Implementation of a leg ulcer pathway including treatment with UrgoStart Plus and UrgoKTwo compression system. *Wounds UK* [Internet]. 2020;16(1):106-13. Available from: <https://www.wounds-uk.com/journals/issue/608/article->

details/reducing-variation-care-implementation-leg-ulcer-pathway-including-treatment-urgostart-plus-and-urgoktwo-compression-system

13. Zhao M, Zhang D, Tan L, Huang H. Silver dressings for the healing of venous leg Ulcer A meta-analysis and systematic review. *Medicine (Baltimore)* [Internet]. 2020;99(37):e22164. Doi: <https://doi.org/10.1097/MD.00000000000022164>
14. Oropallo AR. Use of native type i collagen matrix plus polyhexamethylene biguanide for chronic wound treatment. *Plast Reconstr Surg Glob Open* [Internet]. 2019;7(1):1-6. Doi: <https://doi.org/10.1097/GOX.0000000000002047>
15. Barrett S, Callaghan R, Chadwick P, Haycocks S, Rippon M, Stephen-Haynes J, et al. An observational study of a superabsorbent polymer dressing evaluated by clinicians and patients. *J Wound Care* [Internet]. 2018;27(2):91-100. Doi: <https://doi.org/10.12968/jowc.2018.27.2.91>
16. Mataro I, Giudice G, D'Alessio R, Maggio G, Vestita M. The use of nexobrid™ in debriding chronic ulcers: A preliminary observational study. *Ann Burns Fire Disasters* [Internet]. 2018;31(2):109-12. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6199007/>
17. Morilla-Herrera JC, Morales-Asencio JM, Gómez-González AJ, Díez-De Los Ríos A, Lupiáñez-Pérez I, Acosta-Andrade C, et al. Effectiveness of a hydrophobic dressing for microorganisms' colonization of vascular ulcers: Protocol for a randomized controlled trial (CUCO-UV Study). *J Adv Nurs* [Internet]. 2020;76(8):2191-7. Doi: <https://doi.org/10.1111/jan.14412>
18. Pinheiro RR, Duarte B, Cabete J. Trichloroacetic acid (80%) as a chemical debridement method for chronic venous leg ulcers - A pilot study. *Int Wound J* [Internet]. 2018;15(3):438-40. Doi: <https://doi.org/10.1111/iwj.12884>
19. Semenič D, Cirman T, Rožman P, Smrke DM. Regeneration of chronic wounds with allogeneic platelet gel versus hydrogel treatment: A prospective study. *Acta Clin Croat* [Internet]. 2018;57(3):434-42. Doi: <https://doi.org/10.20471/acc.2018.57.03.05>
20. Mancini S, Cuomo R, Poggialini M, D'Aniello C, Botta G. Autolytic debridement and management of bacterial load with an occlusive hydroactive deressing impregnated with polyhexamethylene biguanide. *Acta Biomed* [Internet]. 2017;88(4):409-13. Doi: <https://doi.org/10.23750/abm.v88i4.5802>
21. Oliveira MG, Abbade LPF, Miot HA, Ferreira RR, Deffune E. Estudo piloto do gel de plaquetas homólogo no tratamento de úlceras venosas. *An Bras Dermatol* [Internet]. 2017;92(4):499-504. Doi: <http://dx.doi.org/10.1590/abd1806-4841.20175496>
22. Araújo ICF, Defune E, Abbade LPF, Miot HA, Bertanha M, Carvalho LR, et al. Fibrin gel versus papain gel in the healing of chronic venous ulcers: A double-blind randomized controlled trial. *Phlebology* [Internet]. 2017;32(7):488-95. Doi: <https://doi.org/10.1177/0268355516664808>
23. Caridi G, Massara M, Acri I, Zavettieri S, Grande R, Butrico L, et al. Trophic effects of polynucleotides and hyaluronic acid in the healing of venous ulcers of the lower limbs: A clinical study. *Int Wound J* [Internet]. 2016;13(5):754-8. Doi: <https://doi.org/10.1111/iwj.12368>
24. Januário V, Ávila DA, Penetra MA, Sampaio ALB, Noronha Neta MI, Cassia FF, et al. Evaluation of treatment with carboxymethylcellulose on chronic venous ulcers. *An Bras Dermatol* [Internet]. 2016;91(1):17-22. Doi: <https://doi.org/10.1590/abd1806-4841.20163789>
25. Murphy N. Reducing infection in chronic leg ulcers with an activated carbon cloth dressing. *Br J Nurs* [Internet]. 2016; 25(12):S38-44. Doi: <https://doi.org/10.12968/bjon.2016.25.12.S38>

26. Serena T, Connell H, McConnell S, Patel K, Doner B, Sabo M, et al. Novel Multivalent Wound-Healing Ointment Provides Bioburden Control and Moisture Management: A Retrospective Registry Data Analysis. *Adv Ski Wound Care* [Internet]. 2016;29(10):461–8. Doi: <https://doi.org/10.1097/01.ASW.0000490193.96840.9e>
27. Moreno-Eutimio MA, Espinosa-Monroy L, Orozco-Amaro T, Torres-Ramos Y, Montoya-Estrada A, Hicks JJ, et al. Enhanced healing and anti-inflammatory effects of a carbohydrate polymer with zinc oxide in patients with chronic venous leg ulcers: Preliminary results. *Arch Med Sci* [Internet]. 2018;14(2):336–44. Doi: <https://doi.org/10.5114/aoms.2016.59851>
28. Ribeiro APL, Oliveira BGRB, Soares MF, Barreto BMF, Futuro DO, Castilho SR. Effectiveness of 2% and 4% papain gels in the healing of venous ulcers. *Rev da Esc Enferm USP* [Internet]. 2015;49(3):394–400. Doi: <https://doi.org/10.1590/S0080-623420150000300006>
29. Rodrigues ALS, Oliveira BGRB, Futuro DO, Secoli SR. Effectiveness of papain gel in venous ulcer treatment: randomized clinical trial. *Rev Lat Am Enfermagem* [Internet]. 2015;23(3):458–65. Doi: <https://doi.org/10.1590/0104-1169.0381.2576>
30. Ghatnekar GS, Grek CL, Armstrong DG, Desai SC, Gourdie RG. The Effect of a Connexin43-Based Peptide on the Healing of Chronic Venous Leg Ulcers: A Multicenter, Randomized Trial. *J Invest Dermatol* [Internet]. 2015;135(1):289–98. Doi: <https://doi.org/10.1038/jid.2014.318>
31. Maria MS, Silva SPZ. Atuação da enfermagem no cuidado a feridas crônicas nos serviços de atenção básica: uma revisão integrativa. *Revista Estudos & Pesquisas*. 2020;1(1):1-11.
32. Almeida RG, Deutsch G, Nogueira TA. Evaluation of standardized dressings in a hospital: importance for dispensing and handling wounds. *InterSciencePlace –International Scientific Journal* [Internet]. 2022;16(4):123-47. Available from: <http://www.interscienceplace.org/index.php/isp/article/view/78/39>
33. Oliveira BGRB, Carvalho MR, Ribeiro APL. Cost and effectiveness of Platelet Rich Plasma in the healing of varicose ulcer: Meta-analysis. *Rev. Bras. enferm* [Internet]. 2020;73(4):e20180981. Doi: <http://dx.doi.org/10.1590/0034-7167-2018-0981>
34. Wu X, Liu R, Lao TT. Therapeutic compression materials and wound dressings for chronic venous insufficiency: A comprehensive review. *Journal of Biomedical Materials Research* [Internet]. 2019:1-18. Doi: <https://doi.org/10.1002/jbm.b.34443>
35. Kanikireddy V, Varaprasad K, Jayaramudu T, Karthikeyan C, Sadiku R. Carboxymethyl cellulose-based materials for infection control and wound healing: A review. *Int. J. Biol. Macromol* [Internet]. 2020;164:963–75. Doi: [10.1016/j.ijbiomac.2020.07.160](https://doi.org/10.1016/j.ijbiomac.2020.07.160)
36. Monteiro MSSB, Santos TM, Oliveira CA, Freitas ZMF, Santos EP. Desenvolvimento e avaliação de hidrogeis de carboximetilcelulose para o tratamento de feridas. *Infarma ciências farmacêuticas* [Internet]. 2019;32(1):41-55. Doi: <http://dx.doi.org/10.14450/2318-9312.v32.e1.a2020.pp41-55>

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