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REVIEW

Nursing Care Strategies for Varicose Veins: A Narrative Review

Chenzhong Wang[1–4,*], Hongxin Sun[1–4,*], Fei Wang[4–6], Si Shen[2,3,7,8], Jing Li[4,6,9,10]

[1]Department of Neurosurgery, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [2]Day Surgery Center, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [3]Department of Pain, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [4]Department of General Surgery, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [5]Department of Acute Abdomen, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [6]Department of Digestion, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [7]Department of Gynecology, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [8]Department of Urogenital Tumors, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [9]Department of Urology, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China; [10]Department of Gastrointestinal Endoscopy, The Second Affiliated Hospital of Dalian Medical University, Dalian, Liaoning, 116027, People's Republic of China

*These authors contributed equally to this work

Correspondence: Jing Li; Si Shen, Email dominglijing@126.com; 350441077@qq.com

Abstract: Varicose veins are a common vascular condition with diverse types, including great saphenous vein varices, varicocele, pelvic varices, and rectal varices, each presenting distinct clinical challenges. In this study, we present a narrative review based on a structured literature search to compare the nursing strategies for these varicose vein types, highlighting their effectiveness, limitations, and implications for clinical practice.Relevant literature was systematically reviewed to evaluate current nursing approaches for different varicose vein types. The review focused on common interventions such as compression therapy, postoperative care, psychological support, and lifestyle modifications, as well as specific challenges associated with each type.Compression therapy is highly effective for great saphenous vein varices, while postoperative care is critical for varicocele, particularly in preventing recurrence and preserving fertility. Multidisciplinary approaches are essential for managing pelvic varices and alleviating chronic pelvic pain. Rectal varices benefit from dietary adjustments and wound care to reduce bleeding risks. Differences in patient compliance, psychological burden, and cost-effectiveness were also observed, influencing the success of nursing strategies.Tailored nursing strategies based on the specific characteristics of each varicose vein type are essential for optimizing patient outcomes. Further research is needed to refine these strategies and develop innovative nursing solutions to address current gaps in care. Thus, nurses should adopt evidence-based, patient-centered approaches that enhance care quality and promote long-term recovery.

Keywords: varicose veins, nursing strategies, great saphenous vein varices, varicocele, pelvic varices, individualized care

Introduction

Varicose veins are a common vascular disorder characterized by abnormal dilation and tortuosity of veins, most often occurring in areas where venous valves are insufficient or the vein walls are weakened.[1,2] The major types include great saphenous varicose veins, varicocele, pelvic varicose veins, and rectal varicose veins.[3] These conditions differ in pathogenesis and clinical presentation due to variations in anatomical location. Great saphenous varicose veins usually develop in the lower limbs and are often accompanied by pain, edema, and chronic ulcers.[4] Varicocele predominantly affects men and is commonly associated with infertility.[5] Pelvic varicose veins occur more frequently in women of reproductive age, typically presenting with chronic pelvic pain.[6] Rectal varicose veins are related to constipation and rectal bleeding and may progress to hemorrhoids in severe cases.[7] These variations increase the complexity of management and place higher demands on nursing care. Although these venous disorders differ anatomically, they share a common mechanism of venous valve insufficiency and hypertension,[8,9] leading to similar nursing challenges such as compression care, wound management, and patient education.

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Thus, these representative types were included to provide an integrated nursing-focused comparison that highlights shared principles and site-specific adaptations.

Against this shared pathophysiological backdrop, differences in anatomy and pathology nevertheless lead to distinct nursing requirements among these types. Nursing care for great saphenous varicose veins primarily emphasizes compression therapy and ulcer prevention, although compliance is often low due to discomfort from wearing elastic stockings, which affects treatment outcomes.[10] Care for varicocele mainly involves postoperative wound care and infection prevention, but limited attention has been given to preoperative psychological support and postoperative pain management, particularly in adolescents.[11] Pelvic varicose veins lack standardized nursing guidelines, and symptom complexity often results in inconsistent outcomes.[12] For rectal varicose veins, dietary management and constipation prevention are commonly advised, yet strategies for bleeding control and wound care remain insufficient.[13] Most existing nursing research focuses on a single type of varicose vein,[14] lacking comparative analyses that could enhance cross-referencing between care programs and provide systematic nursing guidance for clinical practice.

In recent years, although there have been studies on nursing programs for different types of varicose veins, there remains a lack of synthesized, evidence-based guidance specifically tailored for nursing professionals who manage patients with diverse varicose vein presentations. Existing research tends to focus on isolated disease types or single nursing techniques,[14] without integrating findings into a comprehensive framework that supports clinical decision-making in nursing practice. On the technical level, although pressure therapy is the main intervention measure for great saphenous varicose veins, the existing elastic stockings or pressure bandages cannot fully meet the needs of different patients in terms of comfort and durability, especially obese or high-activity patients.[15] In postoperative management, wound care and infection control after varicocele surgery can be considered mature, but care regarding psychological and pain management remains inadequate.[16] Moreover, nursing care of pelvic varicose veins still relies heavily on individual experience due to the absence of clear operational standards, which reduces consistency and effectiveness.[12] In addition, Standardization problems also persist, leading to uneven care quality, especially for complex cases such as pelvic or esophageal varices.[17] Moreover, high costs of compression materials and poor adherence to long-term care routines often hinder sustained nursing outcomes.

This review aims to compare nursing interventions for various types of varicose veins, analyze their advantages and limitations, and propose practical optimization strategies to enhance patient care quality by emphasizing nursing assessments and interventions within nursing practice, such as patient education, compression management, wound care, lifestyle counseling, and psychosocial support. Medical and surgical treatments, including procedures such as sclerotherapy or embolization, are discussed only insofar as they require nursing collaboration. Through this comparative analysis, the review provides evidence-based insights to guide personalized nursing programs, improve patient adherence, and promote better clinical outcomes and quality of life. The search strategy is shown in the Supplementary File.

Methods

This narrative review followed the PRISMA-ScR guidelines to ensure methodological transparency. A comprehensive search was conducted in PubMed, Embase, Web of Science, Scopus, CINAHL, and CNKI for studies published from January 2010 to June 2024. Search terms combined MeSH and free-text keywords related to varicose veins, nursing care, and specific subtypes (great saphenous, varicocele, pelvic, rectal, and esophageal varices). Eligible studies were peer-reviewed English or Chinese articles addressing nursing assessments, interventions, or outcomes in varicose-vein care. Surgical technique papers, conference abstracts, commentaries, and non-human studies were excluded. Two reviewers independently screened all records and extracted data on nursing interventions (eg, compression therapy, postoperative care, psychological support), effectiveness, and patient outcomes; discrepancies were resolved by consensus. Findings were narratively synthesized by varicose-vein type, focusing on shared nursing challenges and site-specific adaptations.

The detailed search strategy and PRISMA-ScR checklist are available in Supplementary File 1.

Classification and Care Needs of Varicose Veins

Varicose veins present in different anatomical locations, each with distinct causes, clinical features, and nursing care requirements. Therefore, understanding these differences may help nurses provide targeted care and improve patient

recovery. In this review, varicose veins are divided into the following main types: great saphenous varicose veins, varicocele, pelvic varicose veins, rectal varicose veins, and esophageal varices, as each type shows specific pathological changes and symptoms, requiring corresponding nursing measures. The main classifications, pathophysiological features, and nursing care needs are summarized in Table 1.

Great Saphenous Varicose Veins

Great saphenous varicose veins are the most common type of varicose vein disease, mainly resulting from valvular insufficiency or weakness of the venous wall in the lower limbs.[18,19] Venous valve dysfunction can cause blood to flow back under the action of gravity, thus forming local high venous pressure.[20] The high pressure state will gradually expand and thin the venous wall, while reducing the elasticity of the venous wall, further aggravating blood stasis.[21] This process is accompanied by tissue hypoxia and inflammatory response, which may eventually lead to edema, pain and the formation of chronic ulcers.[22]

From the nursing perspective, comprehensive care for these patients includes compression therapy, lifestyle regulation, and postoperative wound management. Compression therapy remains the central intervention in nursing practice. Through the application of medical-grade elastic stockings or multilayer compression bandages, nurses assist in improving venous return, reducing intraluminal pressure, and alleviating edema and discomfort. During clinical care, nurses are responsible for assessing limb appearance, degree of swelling, and skin integrity, and for instructing patients on the correct method of applying and maintaining compression devices to enhance comfort and adherence. Lifestyle interventions also play a vital role. Nurses educate patients to perform regular moderate exercise such as walking or ankle flexion to stimulate calf-muscle pumping, avoid prolonged standing or sitting, and maintain optimal body weight to reduce venous load. For individuals undergoing physician-directed procedures such as endovenous laser ablation or sclerotherapy, postoperative nursing focuses on assessing the wounds, aseptic dressing changes, infection prevention, and timely identification of recurrent varicosities. Continuous patient education and emotional support are integrated throughout the process to reinforce self-management and compliance with long-term compression use.

Varicocele

Varicocele is a common disease of the male reproductive system, caused by dysfunction of the varicocele valve or abnormal venous anatomy.[23] Valve dysfunction can cause venous blood to flow backward, which in turn causes increased intravenous pressure and venous dilation.[24] Sustained venous congestion increases scrotal temperature and disrupts the microenvironment necessary for spermatogenesis, which may ultimately contribute to oligospermia, asthenospermia, or infertility.[25] In addition, prolonged high pressure and blood stasis promote oxidative stress and the accumulation of oxygen-derived free radicals, aggravating testicular tissue injury and sperm dysfunction.

Table 1 The Classification of Varicose Vein Types, Pathophysiology, and Nursing Care Needs

Varicose Vein Type	Pathophysiology	Main Clinical Features	Primary Nursing Care Needs
Great Saphenous Varicose Veins	Venous valve insufficiency and wall weakness cause venous reflux and local pressure elevation.	Lower limb edema, pain, heaviness, and chronic ulcers.	Compression therapy, wound observation, limb elevation, patient education, and postoperative infection prevention.
Varicocele	Valve dysfunction and abnormal venous anatomy lead to reflux and scrotal congestion, impairing spermatogenesis.	Scrotal pain, testicular discomfort, and infertility.	Preoperative psychological counseling, postoperative wound care, pain control, fertility education, and emotional support (especially in adolescents).
Pelvic Varicose Veins	Pelvic venous reflux due to valve failure or anatomical compression (eg, retroverted uterus).	Chronic pelvic pain, heaviness, menstrual irregularities, infertility.	Postural adjustment, pain relief, mobility guidance, thrombosis prevention, and psychological support for chronic pain.
Rectal Varicose Veins	Elevated portal pressure and collateral circulation cause venous dilation and wall fragility.	Rectal bleeding, constipation, and discomfort.	Dietary guidance (high fiber), constipation prevention, wound observation, and follow-up for recurrent bleeding.
Esophageal Varices	Portal hypertension secondary to cirrhosis leads to collateral circulation and vessel dilation.	Hematemesis, melena, and risk of massive bleeding.	Bleeding risk monitoring, vital sign observation, postoperative nutritional support, and psychological reassurance.

Nurses play an important role in both preoperative and postoperative phases. Preoperatively, they assess psychological stress and anxiety related to fertility concerns and provide counseling to alleviate fears and improve cooperation. Postoperative nursing includes observation of wound healing, infection prevention, and education on avoiding heavy exertion. Nurses also instruct patients on scrotal support and lifestyle adjustment to promote recovery. In adolescent patients, special attention is given to emotional support and communication to reduce anxiety and improve adherence to follow-up care. Nurses collaborate with urologists to monitor postoperative outcomes and with psychologists to support mental well-being. Coordination with laboratory staff for semen analysis and endocrine evaluations ensures continuity of care and provides a holistic management approach. Microsurgical varicocelectomy and embolization are medical procedures directed by physicians. The nurse's responsibility includes preoperative preparation, intraoperative assistance, and postoperative observation to detect complications such as hematoma or infection early.

Pelvic Varicose Veins

Pelvic varicose veins are common in women of childbearing age and are usually caused by pelvic venous valve dysfunction or abnormal anatomical structure (such as retroverted uterus or pelvic venous compression).[26,27] Venous valve dysfunction leads to venous blood stasis, causing local high venous pressure, while inducing chronic inflammation and vascular wall remodeling.[28] Clinically, patients often experience chronic pelvic pain, a sensation of heaviness in the lower abdomen, and in some cases menstrual irregularities or subfertility. Because of the complex vascular interconnections within the pelvis, venous stasis may also impair circulation to nearby organs, further worsening symptoms.

Nursing care for pelvic varicose veins primarily involves symptom relief, lifestyle modification, and postoperative guidance. Nurses assess pain location, duration, and aggravating factors, and provide instruction on postural changes, such as elevating the lower limbs or avoiding prolonged standing, to reduce pelvic congestion and discomfort.[29] Patients are encouraged to maintain regular exercise and healthy weight control to improve pelvic circulation. For individuals who undergo physician-performed interventional procedures such as ovarian vein embolization, postoperative nursing care focuses on the prevention of thrombosis, monitoring of puncture sites, and encouragement of gradual ambulation to promote venous return. Psychological support forms an integral component of care, as chronic pelvic pain often affects mood and marital relationships. Through empathetic communication and counseling, nurses help patients manage anxiety, improve adherence to treatment, and regain confidence in recovery.

Rectal Varicose Veins

Rectal varicose veins are one of the important manifestations of portal hypertension syndrome.[30] Their development is closely related to increased resistance within the portal venous system and the formation of collateral circulation.[31] When portal pressure remains persistently high, the blood flow through rectal veins rises markedly, resulting in venous dilatation, wall thinning, and a significant risk of rupture and hemorrhage. Chronic high pressure and recurrent inflammation further weaken the venous walls, rendering them fragile and prone to bleeding.[32] Nursing care emphasizes dietary management, bowel regulation, and postoperative wound observation. Patients are advised to maintain a diet rich in fiber and fluid intake to facilitate intestinal peristalsis, thereby reducing constipation and the associated straining that worsens venous pressure. Nurses play an important role in educating patients on proper toileting habits and the avoidance of irritant foods. For postoperative patients, continuous monitoring of wound healing and drainage is essential. Any signs of bleeding, infection, or delayed healing must be addressed promptly through physician consultation. Regular follow-up visits are encouraged to evaluate disease progression and reinforce dietary and hygiene compliance. Through patient education and close observation, nurses help prevent severe complications such as recurrent rectal bleeding or anemia.

Esophageal Varices

Esophageal varices are mainly seen in patients with portal hypertension, usually caused by liver cirrhosis.[33] Increased portal vein pressure leads to the opening of collateral circulation, and the veins of the gastric fundus and lower esophagus are forced to bear a large amount of blood flow, resulting in venous dilatation and stasis.[34] The dilated venous walls become extremely fragile due to lack of muscle support and may rupture with a slight stimulation, causing acute massive bleeding.

Nursing management focuses on bleeding risk assessment, early recognition of hemorrhage, and postoperative supportive care.[35] Nurses are responsible for close observation of clinical symptoms such as hematemesis and melena, monitoring of vital signs, and timely reporting of any signs suggestive of active bleeding. Patients are instructed to maintain a soft diet, avoid alcohol and spicy foods, and adhere to medication regimens prescribed by physicians to control portal pressure. Psychological support is equally important, as anxiety and fear of re-bleeding are common. Following endoscopic or surgical treatment, nurses provide nutritional support, ensure adequate hydration, and encourage gradual resumption of oral intake under supervision. Health education regarding self-monitoring and compliance with follow-up endoscopy enhances patient confidence and reduces recurrence. By combining vigilant observation with empathetic communication, nurses contribute significantly to improving both safety and quality of life for patients with esophageal varices.

Comprehensive Comparative Analysis of Different Nursing Plans

Different types of varicose veins require specific nursing approaches due to variations in their pathophysiology, symptom patterns, and treatment methods. Thus, a comparative analysis of existing nursing plans could help identify the strengths and limitations of current practices and provide direction for improvement. This section summarizes the effectiveness, patient compliance, and standardization of care across various varicose vein types, mentioning both independent nursing interventions and collaborative care (Table 2).

Effectiveness of Nursing Plan

Nursing strategies for different types of varicose veins vary in their effectiveness in alleviating symptoms and preventing complications (Figure 1). Compression therapy for great saphenous varicose veins is widely recognized as one of the most effective nursing interventions for improving venous return in the lower limbs and reducing edema and pain. However, long-term adherence remains low, particularly among younger and more physically active individuals, which can limit its overall therapeutic benefit.[36] In varicocele management, postoperative care effectively prevents infection and accelerates wound healing, yet preoperative psychological interventions are rarely implemented. This omission may lead to increased postoperative anxiety and reduced patient compliance.[37] For pelvic varicose veins, symptom-relief nursing, such as postural adjustment, provides noticeable improvement for many patients. Nevertheless, the absence of unified nursing standards results in considerable differences in care quality among medical institutions. Dietary management for rectal varices plays a positive role in minimizing constipation and bleeding risk, but standardized and systematic nursing programs for managing complex postoperative wounds remain insufficient. In contrast, nursing care for esophageal varices focuses on bleeding risk monitoring and postoperative supportive care, both of which are essential for improving patient prognosis and long-term survival.[38]

Table 2 Nursing Plans for Different Varicose Vein Types

Varicose Vein Type	Nursing Focus	Evidence-Based Interventions	Collaborative / Interprofessional Roles	Challenges Identified
Great Saphenous Varicose Veins	Promote venous return and prevent ulceration.	Compression therapy, skin monitoring, patient education on compliance.	Collaboration with vascular surgeons and physiotherapists for mobility guidance.	Low long-term compliance; discomfort with compression devices.
Varicocele	Prevent infection, promote wound healing, and address psychological distress.	Preoperative counseling, postoperative wound assessment, activity restriction, fertility guidance.	Coordination with urologists and psychologists for emotional and reproductive support.	Limited preoperative psychological care; inconsistent follow-up.
Pelvic Varicose Veins	Relieve pain and improve circulation.	Postural modification, graded activity, emotional support, thrombosis prevention.	Collaboration with gynecologists, interventional radiologists, and rehabilitation therapists.	Lack of standardized protocols; variable nursing quality across institutions.
Rectal Varicose Veins	Prevent constipation and reduce bleeding risk.	Dietary education, bowel habit regulation, postoperative wound observation.	Collaboration with gastroenterologists and dietitians for nutritional management.	Poor long-term dietary adherence; recurrence of symptoms.
Esophageal Varices	Reduce bleeding risk and improve recovery.	Bleeding monitoring, nutritional support, psychological reassurance, patient education.	Coordination with hepatologists, endoscopists, and dietitians.	Limited standardization of postoperative supportive nursing; resource imbalance.

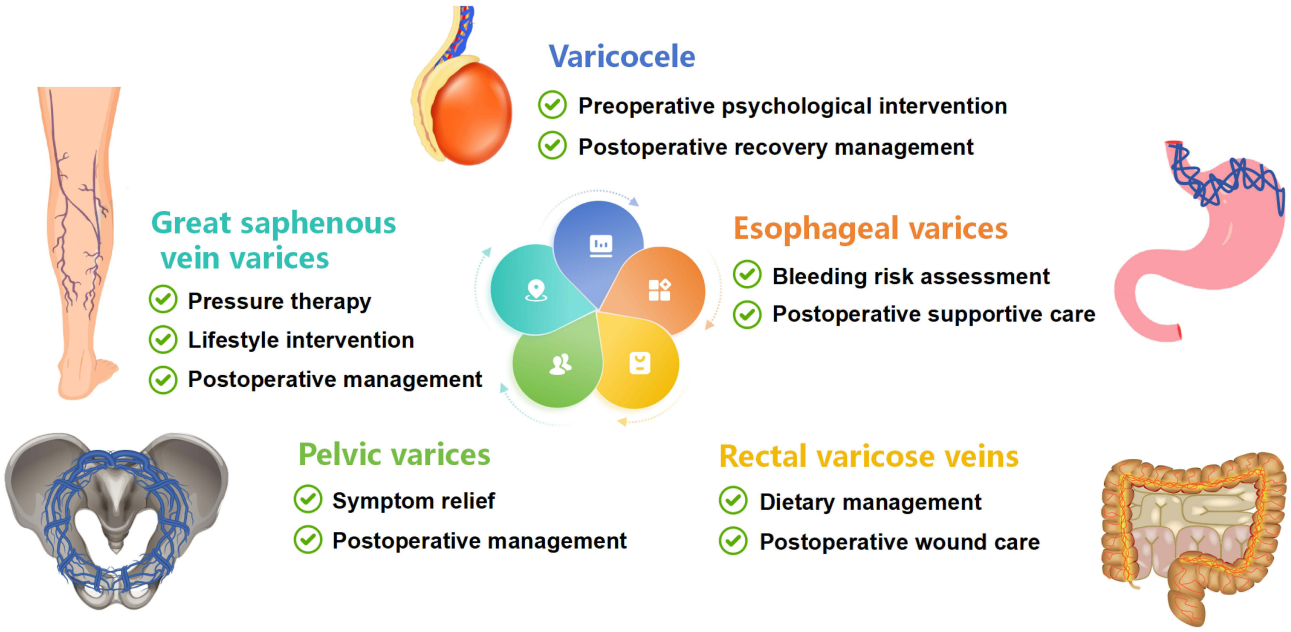

Figure 1 Classification and care needs of varicose veins.

Patient Compliance and Nursing Experience

Patient compliance and nursing experience have a direct impact on the effectiveness and sustainability of care interventions.[39,40] Compression therapy requires patients to wear elastic stockings or bandages for prolonged periods, yet many report discomfort, especially during warm seasons or when engaging in high-intensity physical activity. This often results in poor compliance and decreased therapeutic benefit. In patients with varicocele, compliance with postoperative lifestyle instructions, such as avoiding strenuous exercise and maintaining wound hygiene, is generally high. However, inadequate psychological preparation before surgery can diminish patient confidence in treatment outcomes. Patients with pelvic varicose veins usually cooperate well with nursing interventions focused on posture and activity adjustment. Nonetheless, due to the lack of standardized care processes, some patients question the consistency and reliability of nursing efficacy. For rectal varicose veins, adherence to dietary management largely depends on the patient's willingness to maintain long-term lifestyle changes, making compliance more variable. In contrast, postoperative wound care in this group is easier to implement under the supervision of nursing staff. Patients with esophageal varices are typically more compliant with postoperative nursing instructions, as their awareness of bleeding risk is high. However, despite good adherence, their overall quality of life after treatment still requires further attention and long-term nursing support.

Economic Costs and Nursing Resource Utilization

The economic cost and resource utilization of nursing care differ significantly across various types of varicose vein conditions.[41] For great saphenous varicose veins, compression therapy provides clear symptom relief but incurs relatively high material costs, particularly for medical-grade elastic stockings. This financial burden limits long-term adherence among patients with lower income levels. Postoperative care for varicocele mainly involves wound management and regular observation, resulting in a lighter financial load, although frequent follow-up visits and monitoring may increase overall medical expenditures. Nursing care for pelvic varicose veins is more complex and resource-intensive. The need for close postoperative observation, thrombosis prevention, and activity guidance contributes to higher costs, which may pose challenges for low-income groups. In patients with rectal varicose veins, the primary costs are associated with dietary counseling and management of postoperative complications, making the total nursing expenditure relatively low. In contrast, nursing care for esophageal varices involves emergency response, endoscopic cooperation, and intensive postoperative observation. Although direct cost data for uncomplicated varicose veins are scarce, studies of advanced chronic venous disease (eg, venous leg ulcers) report an annual per-patient cost of about £7,600, underscoring the considerable nursing

resource burden associated with chronic venous disorders.[42] These requirements lead to higher overall costs, emphasizing the importance of rational resource allocation to ensure both care quality and cost-effectiveness.

Balance Between Standardized and Personalized Care

The balance between standardized and individualized nursing care remains a key consideration in the management of varicose veins.[12,43] For common types such as great saphenous and rectal varicose veins, nursing practices—such as compression therapy and dietary regulation—are relatively well standardized, with established procedures guiding clinical implementation. However, individualization is still necessary to account for disease severity, lifestyle, and tolerance levels. In contrast, for conditions such as varicocele and pelvic varicose veins, where symptoms and psychological profiles vary widely among patients, individualized nursing approaches are more critical. In these cases, formulating a single standard of care is difficult due to differences in emotional responses, recovery expectations, and postoperative adaptation. For esophageal varices, where the clinical risk is high, nursing interventions must integrate standardized emergency and supportive protocols with personalized risk assessment. This approach ensures safety while addressing each patient's unique physiological condition and coping ability. Therefore, developing flexible nursing standards that combine evidence-based practice with individualized adjustment is essential to achieving both safety and efficacy in clinical nursing care.

Comparison of International Nursing Standards

Internationally, mature guidelines and standardized procedures have been well established for the nursing care of varicose veins. In the management of great saphenous varicose veins, for instance, clinical practice guidelines from European and American countries strongly recommend compression therapy and structured postoperative care based on evidence-based research. These guidelines provide clear instructions regarding the duration of use, recommended pressure levels, and the detailed steps for implementing compression techniques to ensure consistency and safety in nursing practice.[44]

In the nursing care of varicocele, some countries have expanded the standard nursing process to include preoperative psychological evaluation and postoperative monitoring of reproductive function. Incorporating these steps into routine nursing protocols not only enhances patient psychological readiness but also contributes to improved postoperative outcomes and quality of life. Similarly, in the management of esophageal varices, the American Association for the Study of Liver Diseases (AASLD) has established detailed recommendations outlining nursing responsibilities for patients with acute bleeding, including monitoring procedures, emergency response coordination, and nutritional support following intervention.[45,46] These guidelines emphasize the critical role of nurses in both acute management and long-term follow-up, ensuring patient stability and reducing recurrence rates.

When compared with international standards, the current nursing practices for varicose veins in China still show several gaps. For example, there remains a lack of unified operating specifications for the clinical use of compression therapy equipment, particularly in terms of adaptive designs suitable for different patient groups such as those who are obese or physically active. In addition, within postoperative nursing for varicocele, psychological care and fertility monitoring have not yet been systematically incorporated into standard nursing procedures, leading to inconsistencies in care delivery. Moreover, for more complex conditions such as esophageal varices, the standardization of acute bleeding management, emergency coordination, and postoperative supportive nursing care still requires further improvement.

Varicose Vein Nursing Optimization Strategy

Layered Nursing Strategy

A layered nursing strategy should be developed based on both the type and the clinical severity of varicose veins.[47] For patients with mild disease, such as early-stage great saphenous or rectal varicose veins, nursing care should focus primarily on lifestyle guidance and health education. Nurses play a leading role in encouraging moderate exercise, adjusting diet, and introducing early compression therapy—such as the correct use of elastic stockings—to prevent further disease progression and alleviate symptoms (Figure 2). Regular assessment of lower limb appearance, edema, and patient comfort helps to determine the effectiveness of these interventions.

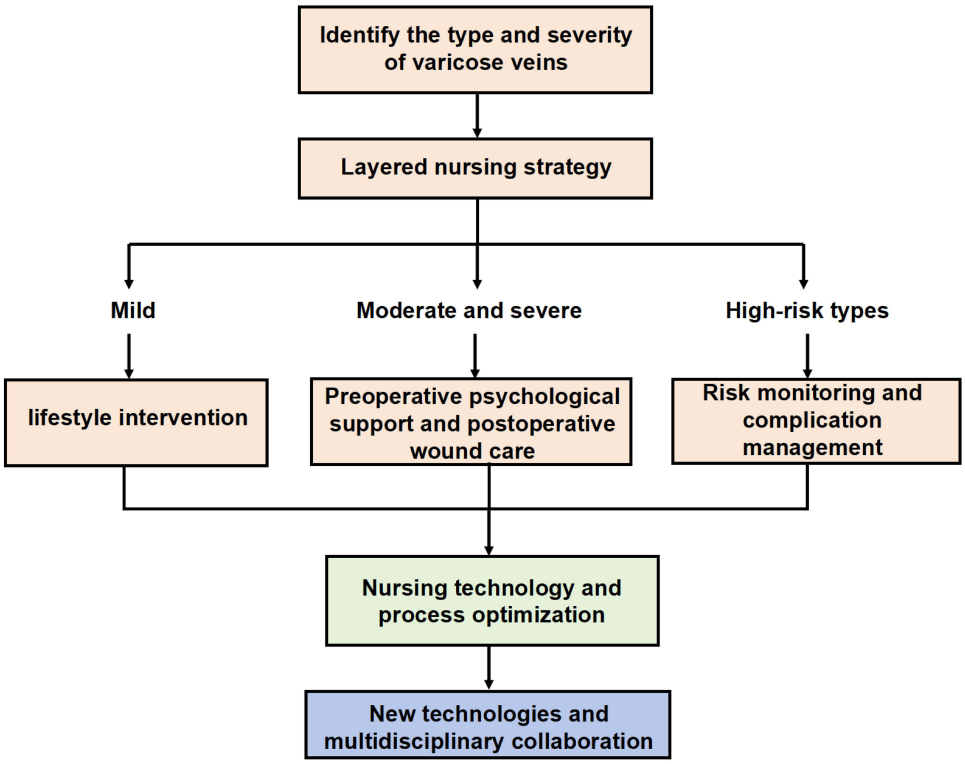

Figure 2 Varicose vein nursing optimization strategy.

For patients with moderate or severe disease, such as recurrent varicocele or complex pelvic varicose veins, a more comprehensive nursing plan is required. Nurses should provide individualized preoperative psychological support to reduce anxiety and enhance confidence in treatment, while ensuring postoperative wound observation, infection prevention, and rehabilitation guidance. Continuous follow-up and patient education are essential to promote adherence to postoperative instructions and prevent complications.

For high-risk patients, including those with esophageal varices or severe rectal varices, nursing priorities shift toward intensive monitoring and complication prevention. Nurses are responsible for observing early signs of bleeding, maintaining detailed records of vital indicators, and providing nutritional support according to the patient's condition. In addition, a close coordination with physicians could facilitate prompt medical response when acute complications arise. Through this stratified approach, nursing intensity and focus are adjusted according to disease stage and patient risk, allowing for more targeted and effective care.[11]

Nursing Technology and Process Optimization

The improvement of nursing technology and the establishment of standard processes are important links to improve nursing effects. For pressure therapy, optimize the design of pressure equipment, such as developing smart elastic stockings that dynamically adjust pressure to improve patient comfort and compliance.[48] In terms of postoperative care, a standardized wound management process is formulated, including daily inspection of wound healing, infection prevention, and phased recovery guidance. For complex cases (such as esophageal varices), a nursing process that combines nutritional support and phased monitoring can be used to ensure the systematic and effective postoperative recovery.[49] By promoting standardized nursing manuals and flexibly adjusting personalized intervention measures, the consistency and flexibility of the nursing process can be combined.

Potential of New Technologies and Multidisciplinary Collaboration

The introduction of emerging technologies has created new opportunities for advancing nursing care in varicose vein management. Remote monitoring devices and intelligent nursing systems are gradually being integrated into clinical workflows, allowing nurses to track real-time physiological data and adjust care strategies accordingly. For instance, sensor-based compression devices can detect fluctuations in venous pressure and automatically regulate compression levels to optimize therapeutic outcomes. Nurses oversee the use of such technologies, interpret the data collected, and provide feedback to both patients and physicians to refine care plans. The incorporation of artificial intelligence (AI) into nursing practice further enhances precision and efficiency. AI-assisted nursing systems can analyze patient information—including symptom patterns, treatment history, and lifestyle factors—to generate evidence-based nursing recommendations.[50] Nurses remain at the center of this process, interpreting AI outputs, ensuring individualized care application, and maintaining human oversight and empathy that technology alone cannot replace.

At the same time, multidisciplinary collaboration plays an increasingly important role in comprehensive care. Effective nursing for varicose vein patients often requires coordination between vascular surgeons, rehabilitation specialists, psychologists, and nutritionists. Nurses act as the central coordinators of this team, ensuring smooth communication and continuity of care. In complex conditions such as pelvic or esophageal varices, multidisciplinary cooperation can shorten recovery time, lower complication rates, and improve overall well-being.[51] For example, psychological counseling teams help patients overcome anxiety and improve postoperative adherence, while nutrition management teams formulate individualized dietary plans that promote vascular health and enhance recovery.[52] Through active collaboration and effective communication, nurses not only implement care but also lead the coordination that underpins successful multidisciplinary management. However, implementing these innovations can be challenging due to limited resources, uneven infrastructure, and variations in staff training, especially in resource-limited settings. Thus, their promotion should be supported by appropriate policies, professional education, and investment in digital and institutional capacity to ensure sustainable and equitable care.

Problems and Prospects

Despite considerable progress, current nursing programs for varicose vein management still face multiple practical challenges. One of the main issues is the limited comfort and operational convenience of compression therapy devices, which directly affects patient compliance. Many patients experience discomfort from the tightness, heat retention, or inconvenience of long-term use, particularly in warm climates or during physical activity. This not only reduces adherence but also compromises the overall therapeutic effect. Another persistent problem is the lack of standardized nursing procedures, especially for complex cases such as pelvic and esophageal varicose veins. Variability in care protocols among institutions leads to uneven nursing quality and inconsistent clinical outcomes. Moreover, previous research has shown that these systemic limitations, such as nonstandardized nursing processes and inadequate staffing, are directly associated with increased nurse workload and delayed recovery outcomes in patients with chronic venous disorders.[53,54] Thus, incorporating structured, nursing-led outpatient clinics or advanced practice nursing roles may help reduce these disparities by enhancing continuity of care, patient education, and follow-up management within existing institutional frameworks.

The deficiency of psychological support also remains an area of concern. In particular, patients with fertility-related varicocele often experience significant emotional stress and anxiety, yet psychological nursing interventions are rarely integrated into their routine care. This gap limits the comprehensiveness of nursing practice and may affect recovery and patient satisfaction. In addition, the imbalance of nursing resources, especially between tertiary and community-level hospitals, which restricts access to high-quality nursing care for many patients. Some regions still lack specialized vascular nursing personnel and equipment, making it difficult to ensure equitable standards of care.

Looking forward, several directions are essential for improvement. Technical innovation should be prioritized, with emphasis on the development and clinical application of intelligent devices—such as dynamic pressure monitoring elastic stockings—that can automatically adjust compression levels to enhance both precision and comfort. At the same time, unified and evidence-based nursing standards need to be formulated to ensure consistency and improve nursing outcomes across institutions. For complex and high-risk cases, such as pelvic or esophageal varicose veins, nursing procedures should be refined to include individualized guidance based on patient-specific factors. Psychological intervention should be incorporated

as a regular component of nursing care to support emotional stability, treatment adherence, and recovery. Finally, strengthening patient education and promoting cost-effective nursing strategies can help improve both the accessibility and sustainability of care. Implementing these measures will provide a solid foundation for the continued life.

Conclusion

Due to the wide variability in pathogenesis and clinical features, different types of varicose veins require tailored nursing approaches. This review systematically analyzed the nursing priorities and existing limitations in the care of various varicose vein types, and proposed strategies for improvement through layered nursing, technological advancement, standardized processes, and multidisciplinary collaboration. The discussion emphasizes the integration of standardized nursing protocols with individualized patient management, aiming to achieve both clinical safety and personalized support. In the future, further validation of these optimization strategies through large-scale clinical and nursing studies is warranted. Particular attention should be given to evaluating the clinical impact of smart compression devices, digital monitoring tools, and structured psychological interventions on patient outcomes and long-term compliance. Nursing care should continue to serve as the central link connecting patient self-management, rehabilitation, and physician-directed therapy. By strengthening interprofessional cooperation and evidence-based practice, nursing can continue to evolve as a cornerstone in comprehensive varicose vein management. Overall, this review highlights nursing's central role in evidence-based, patient-centered vascular care and provides theoretical support for optimizing nursing practice.

Author Contributions

Chenzhong Wang and Hongxin Sun are the corresponding authors, conceived and designed this study, take full responsibility for all aspects of the work, and contributed equally to this work. All authors made substantial contributions to the study's design, data acquisition, analysis, and interpretation. All authors also participated in drafting or critically revising the manuscript for important intellectual content, approved the final version for publication, and agreed on the journal of submission.

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References

1. Gawas M, Bains A, Janghu S, Kamat P, Chawla P. A comprehensive review on varicose veins: preventive measures and different treatments. *J Am Nutr Assoc*. 2022;41(5):499–510. doi:10.1080/07315724.2021.1909510
2. Sassaki VS, Fukaya E. Varicose veins: approach, assessment, and management to the patient with chronic venous disease. *Med Clin North Am*. 2023;107(5):895–909. doi:10.1016/j.mcna.2023.05.002
3. Youn YJ, Lee J. Chronic venous insufficiency and varicose veins of the lower extremities. *Korean J Intern Med*. 2019;34(2):269–283. doi:10.3904/kjim.2018.230
4. Miranda LA, Do Carmo RC, Sathler-Melo CC, de Castro-Santos G. Bilateral foam polidocanol sclerotherapy of great saphenous veins and their tributaries in synchronous procedure. *J Vasc Bras*. 2021;20:e20200178. doi:10.1590/1677-5449.200178
5. Fallara G, Capogrosso P, Pozzi E, et al. The effect of varicocele treatment on fertility in adults: a systematic review and meta-analysis of published prospective trials. *Eur Urol Focus*. 2023;9(1):154–161. doi:10.1016/j.euf.2022.08.014
6. Salnikova LE, Khadzhieva MB, Kolobkov DS. Biological findings from the PheWAS catalog: focus on connective tissue-related disorders (pelvic floor dysfunction, abdominal hernia, varicose veins and hemorrhoids). *Hum Genet*. 2016;135(7):779–795. doi:10.1007/s00439-016-1672-8
7. Wiechowska-Kozlowska A, Bialek A, Milkiewicz P. Prevalence of 'deep' rectal varices in patients with cirrhosis: an EUS-based study. *Liver Int*. 2009;29(8):1202–1205. doi:10.1111/j.1478-3231.2009.02047.x
8. Raffetto JD. Pathophysiology of chronic venous disease and venous ulcers. *Surg Clin North Am*. 2018;98(2):337–347. doi:10.1016/j.suc.2017.11.002
9. Abrashev H, Abrasheva D, Nikolov N, Ananiev J, Georgieva E. A systematic review of endothelial dysfunction in chronic venous disease-inflammation, oxidative stress, and shear stress. *Int J Mol Sci*. 2025;26(8):3660. doi:10.3390/ijms26083660
10. Su F, Cheng L, Tong Q. Effectiveness of tumescent solution combined with negative pressure wound therapy in traditional high ligation and stripping of the great saphenous vein. *Medicine*. 2020;99(11):e19040. doi:10.1097/MD.0000000000019040
11. Gloviczki P, Lawrence PF, Wasan SM, et al. The 2023 society for vascular surgery, American venous forum, and American vein and lymphatic society clinical practice guidelines for the management of varicose veins of the lower extremities. part II: endorsed by the society of interventional radiology and the society for vascular medicine. *J Vasc Surg Venous Lymphat Disord*. 2024;12(1):101670.

12. Gloviczki P, Comerota AJ, Dalsing MC, et al. The care of patients with varicose veins and associated chronic venous diseases: clinical practice guidelines of the society for vascular surgery and the American venous forum. *J Vasc Surg*. 2011;53(5 Suppl):2S–48S. doi:10.1016/j.jvs.2011.01.079
13. Mejia-Quinones V, Alvarez-Saa T, Delgato-Argote HJ, Holguin-Holguin AJ, Toro-Gutierrez JS. Direct percutaneous embolization of superior rectal veins via an inferior mesenteric vein in a pediatric patient: a case report. *Radiol Case Rep*. 2023;18(11):4153–4156. doi:10.1016/j.radcr.2023.08.094
14. Dusin J, Melanson A, Mische-Lawson L. Evidence-based practice models and frameworks in the healthcare setting: a scoping review. *BMJ Open*. 2023;13(5):e071188. doi:10.1136/bmjopen-2022-071188
15. Ruperez AI, Gil A, Aguilera CM. Genetics of oxidative stress in obesity. *Int J Mol Sci*. 2014;15(2):3118–3144. doi:10.3390/ijms15023118
16. Pagani RL, Ohlander SJ, Niederberger CS. Microsurgical varicocele ligation: surgical methodology and associated outcomes. *Fertil Steril*. 2019;111(3):415–419. doi:10.1016/j.fertnstert.2019.01.002
17. Wound O, Continence Nurses S, Guideline Development Task F. WOCN society clinical guideline: management of the adult patient with a fecal or urinary ostomy-an executive summary. *J Wound Ostomy Continence Nurs*. 2018;45(1):50–58.
18. de Moraes Silva MA, Nakano LC, Cisneros LL, Miranda F. Balneotherapy for chronic venous insufficiency. *Cochrane Database Syst Rev*. 2023;1(1):CD013085. doi:10.1002/14651858.CD013085.pub3
19. Segiet OA, Brzozowa-Zasada M, Piecuch A, Dudek D, Reichman-Warmusz E, Wojnicz R. Biomolecular mechanisms in varicose veins development. *Ann Vasc Surg*. 2015;29(2):377–384. doi:10.1016/j.avsg.2014.10.009
20. Soria Jimenez CE, Papolos AI, Kenigsberg BB, et al. Management of mechanical prosthetic heart valve thrombosis: JACC review topic of the week. *J Am Coll Cardiol*. 2023;81(21):2115–2127. doi:10.1016/j.jacc.2023.03.412
21. Zheng Y, Li J, Yao W, Pan M, Fang Y. Network meta-analysis of oral blood-activating and stasis-removing Chinese patent medicines in treatment of hypertensive left ventricular hypertrophy. *China J Chinese Materia Medica*. 2022;47(5):1383–1391. doi:10.19540/j.cnki.cjcmm.20211214.501
22. Mansilha A, Sousa J. Pathophysiological mechanisms of chronic venous disease and implications for venoactive drug therapy. *Int J Mol Sci*. 2018;19(6):1669. doi:10.3390/ijms19061669
23. Fred HL. The tricuspid insufficiency-pulsating varicocele connection: a syndrome and its history. *Tex Heart Inst J*. 2017;44(5):302–305. doi:10.14503/THIJ-17-6501
24. Nakamata A, Yogi A, Harakuni T, Ishigami K, Murayama S. Symptomatic jugular venous reflux with dilatation of the superior ophthalmic vein mimicking cavernous dural arteriovenous fistula. *Radiol Case Rep*. 2019;14(9):1167–1170. doi:10.1016/j.radcr.2019.06.027
25. Garolla A, Torino M, Miola P, et al. Twenty-four-hour monitoring of scrotal temperature in obese men and men with a varicocele as a mirror of spermatogenic function. *Hum Reprod*. 2015;30(5):1006–1013. doi:10.1093/humrep/dev057
26. Salzer H, Schneider WH, Eppel W. Intrauterine contraception with copper-T 200 device- a retrospective analysis of 334 cases (author's transl). *Wien Klin Wochenschr*. 1981;93(11):354–358.
27. Faibushevich AG, Akulova AA, Shugushev ZK, et al. Diagnosis of arteriovenous compression in small pelvic varicose veins. *Angiol Sosud Khir*. 2021;27(3):68–76. doi:10.33529/ANGIO2021302
28. Chen Y, Peng W, Raffetto JD, Khalil RA. Matrix metalloproteinases in remodeling of lower extremity veins and chronic venous disease. *Prog Mol Biol Transl Sci*. 2017;147:267–299.
29. Miao LL, Zhou QM, Peng C, Liu ZH, Xiong L. Leonurus japonicus (Chinese motherwort), an excellent traditional medicine for obstetrical and gynecological diseases: a comprehensive overview. *Biomed Pharmacother*. 2019;117:109060. doi:10.1016/j.biopha.2019.109060
30. Yoshida H, Shimizu T, Yoshioka M, et al. The role of the spleen in portal hypertension. *J Nippon Med Sch*. 2023;90(1):20–25. doi:10.1272/jnms.JNMS.2023_90-104
31. Huang X, Ni L, Jiang S, et al. Impact of portal vein thrombosis on the efficacy of endoscopic treatment in preventing re-bleeding from ruptured gastroesophageal varices in hepatitis B-related liver cirrhosis. *Chin J Hepatol*. 2020;28(9):747–752. doi:10.3760/cma.j.cn501113-20200616-00326
32. Gao L, Zhang J, Yang T, et al. STING/ACSL4 axis-dependent ferroptosis and inflammation promote hypertension-associated chronic kidney disease. *Mol Ther*. 2023;31(10):3084–3103. doi:10.1016/j.ymthe.2023.07.026
33. Villanueva C, Sapena V, Lo GH, et al. Improving primary prophylaxis of variceal bleeding by adapting therapy to the clinical stage of cirrhosis. A competing-risk meta-analysis of individual participant data. *Aliment Pharmacol Ther*. 2024;59(3):306–321. doi:10.1111/apt.17824
34. Fukuda Y, Shiozaki E, Ogawa Y, et al. Orbital compartment syndrome perhaps secondary to intra-orbital fluid retention and orbital/palpebral emphysema following frontotemporal craniotomy for an unruptured cerebral aneurysm:a case report. *No Shinkei Geka*. 2020;48(12):1129–1138. doi:10.11477/mf.1436204336
35. Mendl J, Krivan F. Acute massive hemorrhage from the recanalized umbilical vein as a complication of portal hypertension. *Rozhl Chir*. 2007;86(6):303–305.
36. Coelho Rezende G, O'Flynn B, O'Mahony C. Smart compression therapy devices for treatment of venous leg ulcers: a review. *Adv Healthc Mater*. 2022;11(17):e2200710. doi:10.1002/adhm.202200710
37. He H, Li Q, Xu T, Zhang X. Construction of a predictive model for postoperative pain relief after microscopic spermatic cord surgery for spermatic cord pain. *J Peking University*. 2024;56(4):646–655.
38. Garcia-Tsao G, Abraldes JG, Berzigotti A, Bosch J. Portal hypertensive bleeding in cirrhosis: risk stratification, diagnosis, and management: 2016 practice guidance by the American Association for the study of liver diseases. *Hepatology*. 2017;65(1):310–335. doi:10.1002/hep.28906
39. Zhang L, Chen J, Ning N, et al. Measuring patient compliance with wearing graduated compression stockings. *J Vasc Surg Venous Lymphat Disord*. 2023;11(1):46–51e42. doi:10.1016/j.jvsv.2022.07.015
40. Luther B, Wilson RD, Kranz C, Krahulec M. Discharge processes: what evidence tells us is most effective. *Orthop Nurs*. 2019;38(5):328–333. doi:10.1097/NOR.0000000000000601
41. Epstein D, Bootun R, Diop M, Ortega-Ortega M, Lane TRA, Davies AH. Cost-effectiveness analysis of current varicose veins treatments. *J Vasc Surg Venous Lymphat Disord*. 2022;10(2):504–513e507. doi:10.1016/j.jvsv.2021.05.014
42. Guest JF, Fuller GW, Vowden P. Venous leg ulcer management in clinical practice in the UK: costs and outcomes. *Int Wound J*. 2018;15(1):29–37. doi:10.1111/iwj.12814
43. Kappa-Markovi K, Jalaie H, Ozhan-Hasan H, Deges M, Rass K. Intermittent pneumatic compression after varicose vein surgery. *J Vasc Surg Venous Lymphat Disord*. 2021;9(6):1526–1534e1522. doi:10.1016/j.jvsv.2021.02.011
44. Wright DD, Gibson KD, Barclay J, Razumovsky A, Rush J, McCollum CN. High prevalence of right-to-left shunt in patients with symptomatic great saphenous incompetence and varicose veins. *J Vasc Surg*. 2010;51(1):104–107. doi:10.1016/j.jvs.2009.08.008

45. Northup PG, Garcia-Pagan JC, Garcia-Tsao G, et al. Vascular liver disorders, portal vein thrombosis, and procedural bleeding in patients with liver disease: 2020 practice guidance by the American association for the study of liver diseases. *Hepatology*. 2021;73(1):366–413. doi:10.1002/hep.31646
46. Wang Z, Han G. An excerpt from the 2023 AASLD practice guidelines: TIPS, variceal embolization, and retrograde transvenous embolization for the treatment of variceal hemorrhage. *Chin J Hepatol*. 2023;31(10):1030–1034. doi:10.3760/cma.j.cn501113-20230626-00275
47. Patton D, Avsar P, Sayeh A, et al. A meta-review of the impact of compression therapy on venous leg ulcer healing. *Int Wound J*. 2023;20 (2):430–447. doi:10.1111/iwj.13891
48. Moir ME, Klassen SA, Zamir M, Hamner JW, Tan CO, Shoemaker JK. Regulation of cerebrovascular compliance compared with forearm vascular compliance in humans: a pharmacological study. *Am J Physiol Heart Circ Physiol*. 2023;324(1):H100–H108. doi:10.1152/ajpheart.00377.2022
49. Pan J, Wang L, Gao F, et al. Epidemiology of portal vein thrombosis in liver cirrhosis: a systematic review and meta-analysis. *Eur J Intern Med*. 2022;104:21–32. doi:10.1016/j.ejim.2022.05.032
50. Manickam P, Mariappan SA, Murugesan SM, et al. Artificial intelligence (AI) and Internet of Medical Things (IoMT) assisted biomedical systems for intelligent healthcare. *Biosensors*. 2022;12(8). doi:10.3390/bios12080562
51. Levin MG, Huffman JE, Verma A, et al. Genetics of varicose veins reveals polygenic architecture and genetic overlap with arterial and venous disease. *Nat Cardiovasc Res*. 2023;2(1):44–57. doi:10.1038/s44161-022-00196-5
52. Adams MA, Andacoglu O, Crouch CE, et al. Does pre-operative counselling of the donor improve immediate and short-term outcomes after living liver donation? - A review of the literature and expert panel recommendations. *Clin Transplant*. 2022;36(10):e14636. doi:10.1111/ctr.14636
53. Dall'Ora C, Saville C, Rubbo B, Turner L, Jones J, Griffiths P. Nurse staffing levels and patient outcomes: a systematic review of longitudinal studies. *Int J Nurs Stud*. 2022;134:104311. doi:10.1016/j.ijnurstu.2022.104311
54. Pagnamenta F, Lhussier M, Rapley T. The (dis)organization of leg ulcer care: a realist synthesis. *J Adv Nurs*. 2024;80(12):4777–4804. doi:10.1111/jan.16210