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NURSING INTERVENTIONS IN THE PREVENTION OF DEEP VEIN THROMBOSIS: A COMPREHENSIVE REVIEW

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ABSTRACT

Deep vein thrombosis remains one of the most preventable yet persistently under-recognized complications associated with hospitalization. Patients exposed to prolonged immobility, surgical stress, inflammatory states, and critical illness are particularly vulnerable to thrombus formation within the deep venous system. While pharmacological prophylaxis is an essential component of prevention, nursing-led interventions represent the most consistent and continuous defense against venous thromboembolism. This review critically examines nursing interventions aimed at preventing deep vein thrombosis across clinical settings. Emphasis is placed on nursing assessment, early mobilization, mechanical prophylaxis, hydration management, patient education, and monitoring of anticoagulant therapy. The review synthesizes current evidence to highlight the pivotal role of nurses in translating thromboprophylaxis guidelines into effective bedside practice. Strengthening nursing-driven prevention strategies has the potential to significantly reduce hospital-acquired deep vein thrombosis and improve patient safety outcomes.

INTRODUCTION

Deep vein thrombosis is a pathological condition characterized by the formation of blood clots within the deep venous circulation, most commonly affecting the lower extremities. It constitutes a major component of venous thromboembolism and is a leading cause of preventable morbidity and mortality in hospitalized patients [1]. The clinical importance of DVT lies not only in its acute presentation but also in its potential progression to pulmonary embolism, a life-threatening complication that often occurs without warning [2].

Hospitalization itself is a prothrombotic state. Reduced mobility, surgical trauma, vascular injury, dehydration, and systemic inflammation collectively increase thrombotic risk. Despite the availability of evidence-based prophylactic measures, studies continue to report suboptimal implementation in routine clinical practice [3]. In this context, nurses occupy a critical position in DVT prevention due to their sustained presence at the bedside and their responsibility for continuous patient assessment, intervention, and education.

PATHOPHYSIOLOGICAL BASIS FOR NURSING INTERVENTIONS

The development of DVT is traditionally explained through Virchow's triad, which describes three interrelated mechanisms: venous stasis, endothelial injury, and hypercoagulability [4]. These mechanisms are frequently encountered in hospitalized patients, making DVT prevention a fundamental nursing responsibility.

Venous stasis results primarily from immobility, sedation, paralysis, or postoperative bed rest. Endothelial injury may occur following surgery, trauma, or invasive vascular procedures. Hypercoagulability is commonly associated with malignancy, pregnancy, dehydration, infection, and systemic inflammatory responses [5]. Nursing interventions directly target these mechanisms by promoting circulation, preventing dehydration, and facilitating early detection of thrombotic changes.

NURSING RISK ASSESSMENT AND CLINICAL SURVEILLANCE

Systematic risk assessment forms the cornerstone of nursing-led DVT prevention. Nurses are often the first healthcare professionals to identify patients at increased risk through structured assessment tools and clinical judgment. Validated instruments such as the Caprini Risk Assessment Model and the Padua Prediction Score assist nurses in stratifying patients according to thrombotic risk [6].

Beyond formal tools, nurses continuously evaluate mobility status, hydration levels, comorbidities, medication use, and the presence of invasive devices. Risk assessment is not a one-time activity but an ongoing process that evolves with the patient's clinical condition. Accurate documentation and timely communication of risk status enable early initiation of preventive measures.

NURSING INTERVENTIONS IN THE PREVENTION OF DEEP VEIN THROMBOSIS

Promotion of Early Mobility

Encouraging early and progressive mobilization is one of the most effective nursing interventions for preventing venous stasis. Nurses assist patients to sit, stand, and ambulate as soon as clinically feasible, while also implementing active and passive limb exercises for those unable to mobilize independently [7].

In postoperative and critically ill patients, even minimal movement such as ankle pumps and leg elevation can significantly enhance venous return. Nurses integrate mobility interventions into routine care, balancing safety considerations with thromboprophylaxis goals.

Mechanical Thromboprophylaxis

Mechanical prophylactic devices, including graduated compression stockings and intermittent pneumatic compression systems, are frequently employed when pharmacological prophylaxis is contraindicated or used as adjunct therapy [8]. Nurses are responsible for selecting appropriate sizes, ensuring correct application, monitoring skin integrity, and promoting patient adherence.

Consistent nursing surveillance is essential to prevent complications such as skin breakdown, nerve compression, and reduced device efficacy due to improper use.

Hydration and Hemodynamic Stability

Maintaining adequate hydration is a critical yet often underestimated nursing intervention. Dehydration contributes to increased blood viscosity and promotes a hypercoagulable state [9]. Nurses monitor fluid balance, encourage oral intake when appropriate, and administer intravenous fluids as prescribed.

Elderly patients, febrile individuals, and those receiving diuretics require particular attention due to their heightened risk of dehydration-related thrombosis.

Patient and Family Education

Education is a core independent nursing function in DVT prevention. Nurses provide individualized education regarding the importance of mobility, use of prophylactic devices, medication adherence, and recognition of early symptoms such as unilateral leg swelling or pain [10].

Effective education enhances patient engagement, improves compliance, and supports continuity of preventive care after discharge.

Monitoring of Pharmacological Prophylaxis

Although anticoagulant therapy is prescribed by physicians, nurses play a central role in its safe administration and monitoring. Nursing responsibilities include assessment for bleeding, monitoring laboratory values when indicated, evaluating injection sites, and reinforcing safety precautions [11].

Early recognition of adverse effects and prompt reporting are essential components of nursing vigilance in thromboprophylaxis.

CONCLUSION

Deep vein thrombosis remains a largely preventable complication within healthcare institutions, and nursing interventions are fundamental to effective prevention strategies. Through comprehensive risk assessment, promotion of mobility, application of mechanical prophylaxis, maintenance of hydration, patient education, and vigilant monitoring of anticoagulant therapy, nurses directly influence thrombotic outcomes. Evidence consistently demonstrates that structured, nurse-led thromboprophylaxis programs reduce the incidence of hospital-acquired DVT and improve patient safety. Empowering nurses through education, leadership support, and evidence-based protocols is essential for sustaining high-quality preventive care. Integrating nursing expertise into institutional policies and clinical pathways will remain pivotal in minimizing the burden of venous thromboembolism.

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