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A Review of Evidence Based Practices for Intermittent Pneumatic Compression

ABSTRACT—

VTE (Venous Thromboembolism) is one of the most significant problems facing hospitalized patients today. The Agency for Healthcare Research and Quality (AHRQ) states that "pulmonary embolism occurring from deep vein thrombosis (DVT), collectively referred to as VTE, is the most common preventable cause of hospital death".¹ AHRQ further asserts that thromboprophylaxis, a pharmaceutical or mechanical measure that is taken to prevent the development of a thrombus, is the "number one patient safety practice".

This paper will review evidence-based practices for intermittent pneumatic compression (IPC) as an established and effective thromboprophylactic method in the prevention and treatment of DVT and subsequent VTE.

Intermittent pneumatic compression is delivered by a mechanical pump and cuff system applied to a lower extremity, which inflates and deflates sequentially or uniformly. The cuff may be applied to the foot, calf, or thigh.

INTRODUCTION—

Hospital-acquired venous thromboembolism (VTE), i.e. Deep Vein Thrombosis and Pulmonary Embolism, is one of the most significant problems facing hospitalized patients today. The Centers for Medicare and Medicaid Services (CMS) include Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE), associated with total knee replacement and hip replacement, among the fourteen hospital-acquired conditions with prospective payment implications.²

PREVALENCE—

VTE is a major health concern affecting over two million individuals in the United States annually. VTE is a serious life-threatening condition that requires immediate medical attention. Although highly preventable, VTE is responsible for approximately 100,000 deaths annually in the US. In 2009, the Surgeon General's call to action to prevent DVT and PE was released as a means of awareness, prevention and treatment. The call to action included proven medical practices that assess for risk, prevent, diagnose and treat.

PREVENTION—

The prevention of DVT and PE should be a priority of the entire health care system. It requires a systematic approach unique to each patient that considers risk factors, current diagnoses, and current treatment modalities. The Association of periOperative Registered Nurses (AORN) published "Recommended Practices for Prevention of Deep Vein Thrombosis" to guide perioperative RNs in establishing organization-wide protocols for DVT prevention. According to their findings, one to two people per 1,000 are affected by deep vein thrombosis or pulmonary embolism in the United States each year.³ The updated AORN guideline recommends that the perioperative RN implement interventions for safe and effective mechanical VTE prophylaxis. Mechanical prophylaxis includes early ambulation, foot and ankle exercises, and the use of graduated compression stockings and intermittent pneumatic compression devices. Mechanical prophylaxis is often recommended in addition to pharmacologic prophylaxis, or as a single therapy if pharmacologic methods are contraindicated due to bleeding risk or low risk for VTE.⁴

Additionally, the American College of Chest Physicians (ACCP) recommends that every hospital develop a formal strategy or protocol addressing the prevention of thromboembolic complications.⁵ Key healthcare professionals and stakeholders all recognize DVT as an essential patient care issue that needs to be addressed.

EVIDENCE BASED PRACTICES—

"Intermittent pneumatic compressions devices reduce stasis by regularly compressing the calf with an inflatable pneumatic sleeve." During and after major gynecologic surgery, the use of IPC devices was found to be as effective as low dose heparin and low molecular weight heparin in reducing the incidence of DVT.⁶

The recently published Practice Bulletin "Thromboembolism in Pregnancy" from the Journal of Obstetrics & Gynecology reviews risk factors, diagnosis, management and prevention of venous thromboembolism in pregnancy. Co-author, Andra H. James, MD states "VTE is a major contributor to maternal mortality in this country". Dr. James further states that caesarean delivery is an independent risk factor for thromboembolic events that nearly doubles a woman's

risk. "Fitting inflatable compression devices on a woman's legs before caesarean delivery is a safe, potentially cost effective preventive intervention. Inflatable compression sleeves should be left in place until a woman is able to walk after delivery - or in women who had been on blood thinners during pregnancy - until anticoagulant medication is resumed".⁷

The previously referenced, ACCP Evidence-Based Clinical Based Guidelines, states that mechanical prophylaxis has been shown to reduce the risk of DVT, may improve the effectiveness of pharmacological prophylaxis, may be used in patients with a high risk of bleeding, and may reduce leg swelling.⁸

While intermittent pneumatic compression is an established method of DVT prophylaxis, the variety of systems available can use very different compression techniques and sequences. All the major types of intermittent compression systems are successful in emptying deep veins of the lower limb and preventing stasis in a variety of subject groups. Rapid inflation, high pressures, and graded sequential

intermittent compression systems have particular augmentation profiles, however there is no evidence that such features improve the prophylactic ability of the system. Rather, in selecting a mechanical prophylaxis system, particularly during and after surgery, the appropriateness of the site of compression and patient compliance are the most important factors.⁹

CONCLUSION—

The use of Intermittent Pneumatic Compression (IPC) is an effective and recommended method in the prevention of Deep Vein Thrombosis (DVT) and subsequent Venous Thromboembolism (VTE). According to the Centers for Disease Control and Prevention (CDC), as many as 60,000 to 100,000 Americans die each year because of DVT or PE; one-third of persons who develop a DVT will have long-term complications, and one-third will have a recurrence within 10 years.³ Patient compliance and adherence to the therapy are essential to help ensure the best patient outcome.

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