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ABSTRACT—

Venous thromboembolism (VTE) is a major health concern affecting over 900,000 individuals in the U.S. annually.¹ Numerous studies have demonstrated the benefit of graduated compression stockings, alone or in combination with pneumatic devices or pharmacological prophylaxis for VTE. VTE prophylaxis is ranked as the number one intervention resulting in safer healthcare practices.² Anti-Embolism Stockings (AES) that have graduated compression achieve maximum femoral venous blood flow, subsequently preventing venous stasis.

INTRODUCTION—

Venous thromboembolism (VTE) is the collective term for Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE). Pulmonary Embolism (PE) is believed to be one of the most common causes of preventable death in hospitalized individuals.³ Approximately 10–80% of hospitalized patients that are not receiving prophylaxis are at risk for developing DVT's and subsequently at risk for PE.⁴ Today a range of prophylaxes is available in the forms of mechanical and pharmacological interventions. Studies have shown that the use of mechanical thromboprophylaxis, such as AES, have reduced the incidence of DVT by 40% which is doubled to 80% when AES is used in combination with pharmaceutical thromboprophylaxis.⁴

This paper will explore the correlation of the effectiveness of graduated compression AES in VTE thromboprophylaxis, the importance of proper application, and the clinical benefits of Encompass Group's Albahealth AES.

GRADUATED COMPRESSION—

AES with graduated compression exert graded pressure from distal to proximal regions of the leg. They are designed to decrease the risk of VTE by increasing the velocity of blood flow, reducing the risk of dilation of the venous wall, reducing stasis, improving venous valve function and reducing coagulation in the legs. In 1975 Bernard Sigel et al. identified an optimal stocking compression profile with five points of compression ranging from 18mmHg compression at the ankle to 8mmHg compression at the mid-thigh. The Sigel profile is the standard against which all AES performance is compared.² Encompass AES go

beyond this standard, offering seven points of compression in all thigh-length Class II AES manufactured in the past 40 years. This expanded profile includes the mid-calf and mid-thigh as additional markers to ensure quality control of the stocking. Additionally, the compression delivered decreases steadily and consistently throughout the patient's limb (refer to figure 1).



Figure 1: 7-Point Compression Profile

QUALITY CONTROL—

Compression standards for compression hosiery are based on the British Standard BS 6612, a long standing industry standard. It defines a reduction in circumferential compression beginning at the ankle and progressing up the leg to a mid-thigh point on the patient. Compression is in-bound force, so the term for this application is 'graduated compression'. Based on the claims of the manufacturer, a compression stocking can be classified with the FDA as Class I (for tired, achy legs; general purposes) or Class II (to prevent venous stasis). Class I does not require Physician supervision or a script however, Class II does. Class II stockings have ankle compression of 18mmHG or higher. These stockings are further classified as 8-30mmHg; 30-40mmHg; and 40-50mmHg. Stockings that are 18-30mmHg are prescribed for general prevention of venous stasis, while higher compressions are diagnosis-specific. Encompass AES are registered with the FDA as a Class II device at 18-30mmHg.

A force gage tester and the British Standard BS 6612 are utilized in daily quality control processes to provide accurate and consistent methods of compression measurement and verification of the degree of graduated compression in Encompass AES.

PROPER FIT AND APPLICATION—

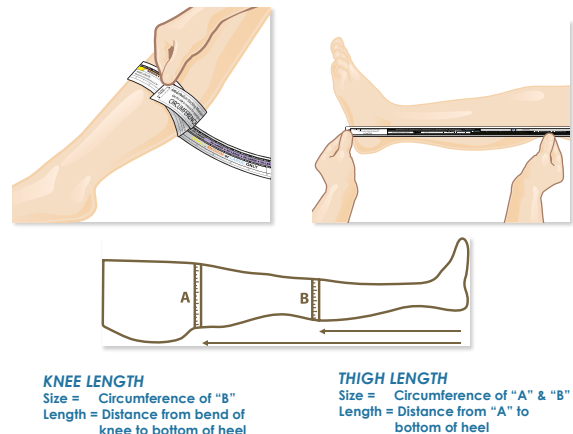
It is important to understand that AES compression ratings are standardized and regulated throughout the industry but sizes are not. Proper fit of AES is a critical factor in effective use, safety, comfort and patient compliance. When used correctly, graduated compression stockings have been shown to significantly reduce the risk of DVT in patients. Using an incorrect size of AES could result in ischemia and an increased risk of thrombosis development. Complications associated with AES include improper fit (too tight or too loose), failure to remove the stocking for circulation and skin checks, and rolling or bunching, which can cause a tourniquet effect. Winslow et al., evaluated the use of AES in eight hospitals in the United Kingdom by making unannounced visits to Orthopedic units. They evaluated 79 patients with thigh length stockings and 52 with knee length stockings. They found the widespread failure to use stockings properly suggest a complacency in practice which might cause complications and prevent an adequate response to the therapy.⁵ To assist nursing with ensuring a proper fit, Encompass provides written instructions, in-service education programs, videos, measuring tools such as color-coded measuring tapes (one side is used to measure leg circumference, the other side is used to measure leg length) and sizing wall charts (see Figure 2).

Based on information contained in the Evidence-Based Practice Information Sheet (Joanna Briggs Institute), to ensure the maximum benefit of graduated compression and successfully prevent DVTs, it is essential the following recommendations are adhered to:

1. Measure and fit stockings per specific manufacturer's recommended guidelines and sizing chart.
2. Document leg measurements and stocking size at initial placement to serve as a baseline reference.
3. Remove the stockings every 12 hours to assess the skin and perform skin care.
4. Review leg measurements regularly to avoid any potential complications from leg swelling that causes excessive pressure from stockings. Check stockings regularly to ensure correct usage and verify there is no restriction of blood flow.
5. Check neurovascular status regularly using the inspection window in the toe area of the stockings.

6. Monitor patients when they are sitting up to ensure stockings are not acting as a tourniquet.
7. Educate the patient on purpose, correct application and fit of the stockings. Additionally, education must be provided for proper skin care.
8. Educate the healthcare worker on the above to ensure proper usage of graduated compression stockings.

Measure:



Apply:



Figure 2: Proper Fit and Application

CLINICAL BENEFITS—

All Encompass AES provide the compression profile required to be considered an FDA Class II medical device and have additional clinical benefits that are above the standard set by the Sigel Profile.

Two-way Stretch/True Graduated Compression – The fabric is constructed of a rib knit, with spandex and nylon in every stitch, which creates both vertical and horizontal stretch. This allows the stocking to conform to the shape of the limb and, since every stitch has compression, this creates true graduated compression throughout the length of the stocking, rather than blocks of compression at specific points.

Alignment Indicator – A visual alignment guide enables caregivers and patients to properly align the stocking with the center axis of the leg.

Outward Facing Seams – Skin may be easily compromised in vulnerable populations by adding pressure points and friction. Having outward facing seams eliminates the risk of skin breakdown or abrasion from pressure points or friction on the seams.

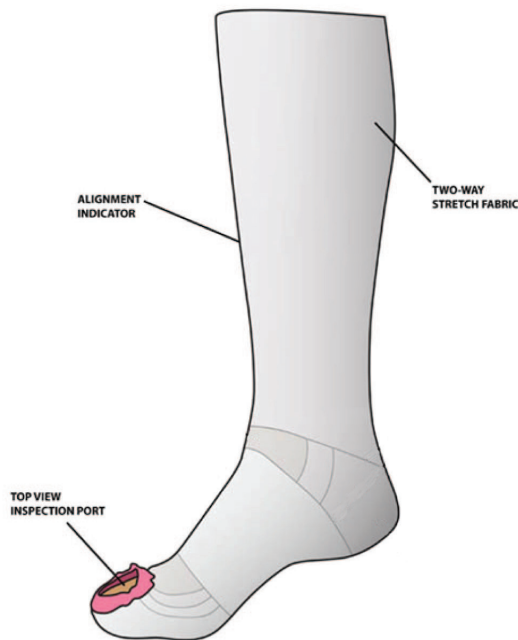


Figure 3: Stocking Features and Characteristics

Color-coded Toe Inspection Port – Color-coded toe inspection ports quickly facilitate identification of the proper stocking size. The toe port is placed at the top of the toes, rather than underneath, to allow for quick visualization and circulation checks, as well as reducing seams or wrinkles on the bottom of the foot.

Moisture Management – Too much moisture over-hydrates the skin, making it weak and sensitive to friction and shearing. Moisture also creates a climate that is optimal for bacteria growth. Encompass AES are manufactured from yarns which wick the moisture away from the skin to the surface speeding drying time.

Knee and Thigh Lengths – A variety of sizes across knee and thigh lengths allow physicians to prescribe based on individual patient need.

Latex-free – Both the stocking and packaging are free of natural rubber latex.

CONCLUSION—

While VTE is a significant health concern, it is also preventable. Mechanical prophylaxis with the use of graduated compression AES is evidence-based best demonstrated practice to reduce the risk of VTE. Encompass Group's Anti-Embolism Stockings provide specific therapeutic benefits that go above and beyond the accepted standard and result in better patient outcomes, comfort and safety.

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