

VENOUS LEG ULCER

INTRODUCTION

- Venous leg ulcers are ulcerations of the skin on the lower legs which can be attributed to venous insufficiency. They are classically located proximal to the medial *malleolus*.



Venous leg ulcer

- Shallow with irregular borders, some may appear deeper
- Associated with large amounts of edema and wound *exudate*



Lymphodema

- Granulation tissue, yellow slough, or whitish *fibrinous* material present in the wound bed
- Peri-wound skin may have *dermatitis*, *hyperemia* or *maceration*, dark pigmentation (hemocidirin staining), atrophy blanche (white pigmentation) and/or fibrosis



Atrophy blanche



hemocidirin staining

- Feet are warm to touch and *pedal pulses* are generally palpable but edema and lipodermatosclerosis (woody fibrosis) may make pulses non-palpable



lipodermatosclerosis

ASSESSMENT/ DIAGNOSIS

- **Complete History**
- Medical history
- Assess for history of:
 - Swelling at the end of the day
 - Previous deep vein thrombosis (DVT)
 - Varicose veins/varicose vein stripping/pregnancy
 - Previous ulcerations/treatments
 - Lower leg trauma
 - *Cellulitis*
 - Obesity
 - Family history of venous leg ulcerations
 - Previous occupation involving long periods of standing or sitting
- **Pain Assessment**
 - Determine characteristics of pain including intensity and frequency. Venous leg pain can be described as:
 - Throbbing
 - Sharp
 - Itchy
 - Sore, tender
 - Annoying
 - Nagging
 - Tiring
 - Determine what causes and alleviates the pain

- Evaluate quality of life indicators such as functional status, sleep or involvement in activities
- Observe the cognitively impaired patient for non-verbal cues such as crying out, guarding body part, grimacing, wincing or increased irritability/aggression.
- **Gait Assessment**
 - Determine if patient has heel to toe gait (to ensure adequate ankle mobility and use of calf muscle pump).
 - Determine if patient can tolerate 3 minutes of walking
 - Refer to physiotherapist if concerns re: gait
- **Wound Assessment**
 - **Location:** classically located proximal to the medial *malleolus*
 - **Wound bed:** granulation tissue, yellow slough, or whitish *fibrinous* material in the wound bed
 - **Peri-wound skin:** brown stained pigmentation, macerated due to large amounts of *exudate*, *stasis eczema (dermatitis)*



Stasis dermatitis

- Edema in the absence of heart failure/other disease
- Refer to recommendations on care of wound bed
- **Vascular Assessment**
 - Assess perfusion by comparing both feet and lower legs. Check;
 - **pedal pulses** (pulses palpable)
 - warmth (feet are warm to touch)
 - capillary refill (normal < 3 seconds)
 - **dependent rubor** (absent)
 - edema (present)
 - pain (may have varying levels of pain from minimal to severe)
 - Arrange for **Ankle Brachial Index (ABI)** using a handheld Doppler Ultrasound through an Advanced Wound Care Clinician to rule out arterial disease and to confirm adequate arterial perfusion. If Doppler not available refer to a vascular lab. Note: **DO NOT** make treatment decisions on ABI results **alone**

- Ideally, if resources are available, it is recommended that ABIs be repeated every 3-12 months and/or when symptoms or disease presentation changes or if ulcers demonstrate delayed healing



Assessment of Ankle Brachial Index using hand held Doppler Ultrasound

CAUTION

- Compression is contraindicated if arterial disease is present and can result in necrosis or amputation. Consult an ***advanced wound clinician*** if ***ABI*** is between 0.6-0.8. Refer to a Vascular Lab for further investigation if ***ABI*** below 0.5
- Patients with calcified arteries may have elevated ***ABI*** (over 1.2) due to diabetes or other disease processes (refer to recommendations on diabetic foot ulcer). ***Toe pressures*** are recommended. Refer to Vascular Lab for further investigation
- Compression therapy is not for use in the presence of acute CHF or infection

- **Investigation**

- ***Pre-albumin*** in serial measurements is ideal to determine nutritional adequacy for healing (*where opportunity to improve nutritional status exists*). Involve dietitian as indicated
- **Albumin** (*if pre-albumin not available*)
- CBC
- ***ABI***
- Measure height, monitor weight at regularly scheduled intervals

PREVENTION AND TREATMENT

Patient and family education is an essential component of prevention and treatment of venous leg ulcers

Treat the Cause

- Prior to ulcers occurring, treat **venous hypertension** with compression therapy (TEDS are post surgical anti-embolic stockings and are **not** considered for compression therapy)
- When venous leg ulcers do occur, treat underlying cause with compression therapy (Refer to Appendix A on Therapeutic Compression)
- Elevate legs above the level of the heart
- Calf pump exercises.
 - Walking exercise for ambulatory clients (encouraging ankle mobility)
 - Ankle ROM exercises for non-ambulatory clients (consult physiotherapist if indicated)
- Discourage standing for long periods of time
- Maximize nutrition (consult dietitian for nutrition assessment +/- weight management if indicated)
- Perform and teach proper skin care: maintain clean, well lubricated skin, avoid trauma
- Once ulcers have healed, all patients will require compression stockings for life (Class II) (Refer to Appendix A on Therapeutic Compression)

Treat Patient Concerns

- Manage pain (refer to recommendations on care of the wound bed). Chronic pain that occurs over months may be accompanied by symptoms of depression, loss of appetite and sleep disturbances. **Note:** Pain may be reduced as edema decreases.
- **Dermatitis** - manage irritant or allergic dermatitis by decreasing mechanical irritation from bandages, minimize number of products used on these wounds and avoid common allergens such as topical antibiotics, lanolin, fragrances and preservatives in moisturizers and dressing products. If dermatitis continues, a dermatologist should be consulted
- Address and discuss options to alleviate quality of life concerns whenever possible
- Provide emotional support, assess and consider financial situation (consult social work if indicated),
- Provide patient and family education

GUIDELINES FOR PATIENT AND FAMILY EDUCATION

1. Determine treatment goals with patient, family and health care team
2. In simple terms describe the venous anatomy to patient and family and review the pathophysiology of the venous problem
3. Advise patient/family to check skin daily for redness, swelling, cracks, drainage, or changes in texture, temperature and colour
4. Encourage the patient to moisturize skin on legs and feet with non-allergenic preparation
5. Explain what edema is, how it is reduced and how the patient can maintain edema reduction

6. Advise the patient to exercise regularly, avoid standing or sitting for long periods, and elevate legs whenever possible

7. Instruct the patient to avoid wearing restricting clothing and to wear well fitting shoes. Walking barefoot should be discouraged even in the house.
8. Instruct the patient to avoid bumping or injuring the affected leg(s), to avoid extremes of heat and cold next to the skin and to protect against insect bites
9. Encourage patients who smoke to cease. Provide information about smoking cessation programs
10. If a topical wound dressing or compression therapy is being used to treat a venous leg ulcer, explain why, and how they work to heal the wound
11. Provide or assist with access to resources as needed
12. Emphasize the importance of following recommendations for the use of elastic compression stockings.

Treat the Wound

- Refer to recommendations on care of wound bed
- Compression Therapy: **See above Caution and Appendix A**
 - ABI* above 1.2 may indicate calcified arteries and should not be compressed (see caution p. XX) (Do not compress until further vascular studies completed)
 - ABI* between 0.8 -1.2– full compression
 - ABI* between 0.6-0.8 – lower (mild to moderate) compression
 - ABI* lower than 0.5 – do not initiate compression, refer to Vascular Surgeon
- Maintain moisture balance
- Prevent and treat infection
- If no healing is evidenced within 6 weeks with optimal patient and wound management or if wound deteriorates, consult an *advanced wound clinician*

ARTERIAL ULCER

INTRODUCTION

- Arterial ulcers are ulcerations of the skin on the lower legs, feet and toes that can be attributed to arterial insufficiency. They are classically located on bony prominences of the legs and feet



Arterial ulcers

- “Punched out” appearance with well defined borders
- May involve deeper structures (ie. tendon, bone)
- Associated with little or no edema or wound *exudate*
- Ulcers often have yellow slough or black *eschar* in the wound bed and little granulation tissue
- Feet are cool to touch and *pedal pulses* are not palpable
- At risk of developing *osteomyelitis*

ASSESSMENT/ DIAGNOSIS

- Complete History
 - Medical history
- Assess for history of:
 - *Claudication*
 - *Nocturnal Pain*
 - Ulcer pain
 - Smoking
 - Cardiovascular disease
 - Hyperlipidemia
 - Hypercholesteremia
 - Diabetes

- **Wound Assessment**
 - **Location:** classically located on bony prominences of legs and feet
 - **Wound bed:** pale, “punched out” appearance with well defined borders. Yellow slough or black *eschar* and little granulation tissue present in the wound bed
 - **Peri-wound skin:** appears pale with no hair on legs/feet and grossly thickened nails
 - Ischemic areas may appear as dry gangrene
 - Associated with minimal edema and wound *exudate*
 - Feet are usually cool to touch and *pedal pulses* are not palpable

- **Vascular Assessment**
 - Assess perfusion by comparing both feet and lower legs. Check;
 - *pedal pulses* (absent or diminished)
 - warmth (feet are cool to touch)
 - capillary refill (delayed >3 seconds)
 - *dependent rubor* (present)
 - edema (little or no edema)
 - pain (*claudication, nocturnal pain*, ulcer pain)
 - elevation pallor
 - Arrange for *Ankle Brachial Index (ABI)* using a handheld Doppler Ultrasound through an Advanced Wound Care Clinician to rule out arterial disease and to confirm adequate arterial perfusion. If Doppler not available refer to a vascular lab. Note: **DO NOT** make treatment decisions on ABI results **alone**
 - Ideally, if resources are available, it is recommended that ABIs be repeated every 3-12 months and/or when symptoms or disease presentation changes or if ulcers demonstrate delayed healing

Differential Diagnosis

- Lower leg ulcers may not all be venous, arterial or mixed. Other differential diagnosis may include vasculitis, pyoderma gangrenosum, diabetes related (see section on Diabetic Foot Ulcers)

CAUTION

- Compression is contraindicated if arterial disease is present and can result in necrosis or amputation. Consult an **advanced wound clinician** if **ABI** is between 0.6-0.8. Refer to a Vascular Lab for further investigation if **ABI** below 0.5
- Patients with calcified arteries may have elevated **ABI** (over 1.2) due to diabetes or other disease processes (refer to recommendations on diabetic foot ulcer). **Toe pressures** are recommended. Refer to Vascular Lab for further investigation
- Compression therapy is not for use in the presence of acute CHF or infection

• Investigations

- Pre-albumin in serial measurements to determine nutritional adequacy for healing (*where opportunity to improve nutritional status exists*)
- CBC if indicated
- X-ray/**Erythrocyte Sedimentation Rate** (if *osteomyelitis* suspected); Bone scan (if X-ray/**ESR** inconclusive) Note: **ESR**, bonescan, and xray may be inconclusive as other inflammatory conditions may affect results
- Lipid profile, fasting blood sugar, +/- 2 hr pc, and **HgbA_{1c}** (for persons with diabetes *where appropriate*)
- Measure height, monitor weight at regularly scheduled intervals
- **ABI**

PREVENTION AND TREATMENT

Patient/ Family Education is an essential component of prevention and treatment of arterial ulcers

Treat the Cause

- Refer to vascular surgeon to determine if re-vascularization is possible
- Control underlying medical conditions
- Risk factor reduction
 - Encourage smoking cessation program
 - Maximize nutrition (consult dietitian if indicated)
- Monitor and teach medication compliance
- Encourage exercise regime (consult physiotherapist if indicated)
- Perform and teach proper skin care: maintain clean, well lubricated skin, avoid trauma

- Leg Elevation is contraindicated

Treat Patient Concerns

- Manage pain (refer to recommendations on care of wound bed)
- Provide psychological, emotional and financial support (consult social work if indicated)
- Provide patient and family education

Treat the Wound

- If re-vascularization is possible, the wound has potential to heal (see recommendations on care of wound bed)
- If re-vascularization is not possible, the wound does not have potential to heal
 - The goal is to PREVENT/ TREAT INFECTION AND AVOID/ DELAY AMPUTATION
 - **Keep the wound dry and do not debride**

Dry wounds

- This is the one situation where an antiseptic is appropriate for treatment
- DO NOT cleanse with normal saline first
- Use Povidone iodine to paint the wound



Dry gangrene

Wet Wounds

- If wound is wet, consider a topical antimicrobial (see recommendations on care of wound bed)
- DO NOT use Burrow's solution, Dakin's solution or Hydrogen peroxide.

If no healing is evidenced within *TWO* weeks with optimal patient and wound management, or if wound deteriorates, consult an *advanced wound clinician*

Mixed Venous Arterial Ulcers

A percentage of patients may appear to have characteristics of both venous and arterial disease. Ulcerations of mixed etiology are difficult to identify as they present with combinations of signs and symptoms of both venous and arterial ulcerations. With advancing age and duration of disease, the potential for mixed etiology increases. Ideally, if resources are available, it is recommended that ABIs be repeated every 3-12 months and/or when symptoms or disease presentation changes or if ulcers demonstrate delayed healing. Refer such patients to an *advanced wound clinician* for treatment decisions.

Adjunct Therapies

A variety of adjunct therapies exist. Consult an Advanced Wound Clinician for discussion and direction

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APPENDIX A THERAPEUTIC COMPRESSION

LEVELS OF COMPRESSION:

Therapeutic compression must provide sufficient compression, be graduated and sustained (*La Place's Law*).

Compression Levels vary according to medical needs and bandage or stocking capabilities.

Compression capability is determined by:

- how far a bandage can be extended before it stops
- **the force** required for extension
- **the construction** of the components (elastic, crepe or lycra)
- **application technique** (spiral or figure 8), including number of bandage layers

For **compression** to be **sustained**, the pressure must be maintained at the same level(s) as when the product was applied

Some bandages sustain compression levels better than others

Correct **application** and **compliance** with wear determine outcome

TYPES OF COMPRESSION

Active Compression:	Functions continuously regardless of activity
Passive Compression:	Only provides compression when calf muscle pump is active
Compression Stockings:	Class of compression must be prescribed by physician (see table) Replacement time for compression stocking is six months, as gradual loss of elasticity causes decreased compression ability Custom fitting, the addition of a zipper, use of rubber gloves or special devices will facilitate application and promote compliance with use
Intermittent Pneumatic Compression	Pneumatically (air) operated full-length sleeves Mimics calf muscle pump Effective method to reduce gross edema/ lymphedema when unable to fit for a compression stocking

May be used as an adjunct for compression bandaging
Consult an *advanced wound clinician*

When healed, compression therapy for life

SPECIAL CONSIDERATIONS FOR COMPRESSION

- Contraindicated in ABI over 1.2 or less than 0.8 (until further vascular studies can be completed)
- Limb contour and diameter (**girth**) are critical factors in determining the correct application of compression bandages, especially at higher levels of compression (*La Place's Law*)
- Normally shaped legs (narrower at the ankle and wider at the calf) create a natural **graduation of compression**, i.e. the wider the girth, the less compression that will be exerted on it. If compression is not graduated, excess levels of pressure can occur in specific areas, and cause a tourniquet effect or potential necrosis
- Use padding to **re-contour irregularly** shaped legs to simulate a normal leg contour
- Pad exceptionally narrow ankles/Achilles with flannel or gauze to design a more "normal" contour and to prevent potential necrosis to bony prominences (malleoli, tibia crest). Pad the calf area of a wasted limb to create a calf contour. Ankle circumference must be more than or padded to equal 18 cm

These methods will also help to prevent slippage and stabilize the bandage

BANDAGING BASICS:

- Compression system bandaging application is a specialized skill that requires training and competency must be demonstrated and maintained
- Within first few days of initiation of compression, assess:
 - Compliance (provide support)
 - Need for reapplication due to decreased edema
 - Tolerance to therapy (discomfort)
- Instruct patient/family to remove compression bandage if toes turn blue/cold and or if they experience increased pain

- Wound contact layer (dressing) should assure non-adherence to wound base and have some absorption capability. The bandage may absorb excess *exudate*
- Apply bandages with a 50% overlap and 50% tension unless otherwise indicated by product instructions
- Bandages or stockings extend from the base of the toes to just below the knee and must include the heel
- Avoid tourniquet effect:
 - Do not wrap excess bandage below the knee. Cut off or re-apply bandage
 - Do not overstretch a short bandage. Use a second bandage
- Specifics of bandage application are determined by product design, or by the user if specific adjustments are desired
- Spiral bandage application involves wrapping in a continuous direction up the leg
- Figure of 8 application involves wrapping in an alternating directional turn behind the limb, with a crossover at the front of the limb. This increases the compression level of any bandage
- Frequency of bandage changes are determined by product specifications and volume of *exudate*
- Withhold high levels of compression during acute phase of *cellulitis*

TYPES OF COMPRESSION STOCKINGS and BANDAGES

The product examples listed are not all-inclusive and do not reflect an endorsement of products. Follow manufacturers' instructions for all products

Compression Type	Description/ Effectiveness	Change	Considerations
<p>Therapeutic Stockings:</p> <p>Sigvaris (standard and custom sizes)</p> <p>Jobst (standard and custom sizes) (Beirsdorf-Jobst)</p> <p>Juzo- Stockings + pantyhose (standard and custom) (Julius Zorn Inc.)</p> <p>Various other brand names available</p>	<ul style="list-style-type: none"> ▪ Required for life ▪ Assorted brands and sizes <p><u>FOR ALL BRANDS</u></p> <p>20-30 mm Hg Mild superficial effect</p> <p>30-40 mm Hg Moderate superficial effect</p> <p>40-50 mm Hg Superficial and deep effect</p> <p>50-60 mm Hg Strong deep effect</p>	<p>Apply daily (on in am off in pm)</p> <p>Replace q 6 months</p> <p>Stockings lose elasticity and effectiveness over time</p>	<ul style="list-style-type: none"> ▪ Prior to initiation of therapeutic stockings, patient must have a vascular assessment including ABIs ▪ Requires a physician's order for mm of Hg compression ▪ Must be pre-measured. For proper fit ensure patient is seen by a certified fitter. ▪ May be necessary to adjust as edema decreases ▪ Patient may require assistance to apply ▪ Devices are available to assist in application e.g. Easy Slide, Rubber Gloves ▪ Success heavily dependant on compliance ▪ Remove at hs, bathe and moisturize skin to allow to absorb prior to re-applying stocking next am (petroleum based products directly on stocking can cause breakdown and loss of elasticity) <p>Ensure manufacturer's instructions are followed for care and cleaning</p>

Compression Type	Description/ Effectiveness	Change	Considerations
<p>High 35-40 mm Hg Sustained <u>ABI</u></p> <ul style="list-style-type: none"> • 0.8-1.2 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>Profore (Smith & Nephew)</p>	<ul style="list-style-type: none"> ▪ Active Graduated ▪ Varied bandage applications 	<p>Minimum 3-4 days up to 7 days</p> <ul style="list-style-type: none"> ▪ Four layer bandage system ▪ Level of compression is increased by each layer of bandage applied ▪ See package instructions ▪ Bandage is highly absorbent and comfortable ▪ Bandage is bulky, requiring modification to footwear ▪ Cannot be re-used ▪ During initial two weeks, large amounts of <i>exudate</i> may necessitate bandage replacement before one week
<p>High 35-40 mm Hg <u>ABI</u></p> <ul style="list-style-type: none"> • 0.8-1.2 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>Comprilan (Beirsdorf-Jobst)</p>	<ul style="list-style-type: none"> ▪ Passive Graduated ▪ Spiral application ▪ Short stretch 	<p>Re-wrap daily</p> <ul style="list-style-type: none"> ▪ Not recommended for non ambulatory patients. Requires calf muscle pump. ▪ Various methods to wrap available ▪ Absorbent dressing necessary for highly exudative wounds ▪ Can be washed 20 times
<p>High 30-40 mm Hg sustained <u>ABI</u></p> <ul style="list-style-type: none"> • 0.8-1.2 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>SurePress (Convatec)</p>	<ul style="list-style-type: none"> ▪ Active Graduated ▪ Spiral application 	<p>3-7 days</p> <ul style="list-style-type: none"> ▪ Two layers of bandage ▪ Inner flannel wrap provides absorption, comfort, protection (friction/shear) and complements compression ▪ Identify the rectangle appropriate for limb girth (large or small). These markings ensure correct tension and overlap ▪ Outer bandage can be washed and re-used up to 20 times with no loss of compression ability ▪ Minimally bulky. Regular footwear can usually be worn

The product examples listed are not all-inclusive and do not reflect an endorsement of products. Follow manufacturers' instructions for all products

Compression Type	Description/ Effectiveness	Change	Considerations
<p>High 30 mm Hg Sustained <u>ABI</u></p> <ul style="list-style-type: none"> • 0.8-1.2 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>Duke Boot: Viscopaste with overlay of Coban (3M) or Rolflex (Smith & Nephew)</p>	<ul style="list-style-type: none"> ▪ Passive Graduated ▪ Fan fold (Viscopaste) ▪ Spiral (Coban/Rolflex) 	<p>Up to 1 week</p> <ul style="list-style-type: none"> ▪ Initial layer maintains a rigid shape ▪ The addition of the Coban or Rolflex overlay increases compression from moderate to high ▪ See following box for further information on viscopaste
<p>Moderate 23mm Hg Sustained <u>ABI</u></p> <ul style="list-style-type: none"> • 0.6-0.8 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>Profore Light (Smith & Nephew)</p>	<ul style="list-style-type: none"> ▪ Active Graduated ▪ Spiral application 	<p>Up to 1 week</p> <ul style="list-style-type: none"> ▪ Can be purchased or made by removing Layer 3 (figure 8 layer) from Profore
<p>Moderate 15 mm Hg Not sustained <u>ABI</u></p> <ul style="list-style-type: none"> • 0.6-0.8 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>Viscopaste (Smith & Nephew)</p>	<ul style="list-style-type: none"> ▪ Passive Graduated, if limb contour is normal ▪ Fan fold application 	<p>2-7 days</p> <ul style="list-style-type: none"> ▪ Zinc impregnated paste bandage, applied with no tension, dries to a rigid shape. Requires outer wrap to protect clothing from moist dressing. For increased compression see Duke Boot (above) ▪ Not recommended for non ambulatory patients. Requires calf muscle pump. ▪ Wear time determined by the amount of drainage (additional ABD pads may be added on the outside to absorb increased <i>exudate</i>). Change prn ▪ Sensitivities may occur ▪ Consider for stasis dermatitis when compression needed

Compression Type	Description/ Effectiveness	Change	Considerations
Moderate 15-20 mm Hg Not sustained	Tensor/ ACE bandage NOTE: Level of compression may vary due to application technique and brand of product (see caution below)	<ul style="list-style-type: none"> ▪ Active ▪ Graduated ▪ Figure of 8 ▪ Application 	<p>1-2 days. Rewrap prn</p> <ul style="list-style-type: none"> ▪ Apply from toes to knee including heel ▪ Avoid excess pressure to tibial crest ▪ Alert: shear and friction is possible. Protective padding may be necessary
Mild 10-12 mm Hg Not sustained	Tensor/ ACE bandage NOTE: Level of compression may vary due to application technique and brand of product (see caution below)	<ul style="list-style-type: none"> ▪ Active ▪ Graduated ▪ Spiral application 	<p>1 day. Rewrap prn</p> <ul style="list-style-type: none"> ▪ Apply from toes to knee including heel ▪ Thin materials are less effective ▪ Replace frequently, as worn bandages lose compression ▪ Alert: shear and friction is possible. Protective padding may be necessary
Mild 10-12 mm Hg	Elastogrip (Smith & Nephew) Tubigrip (Convatec) (see caution below)	<ul style="list-style-type: none"> ▪ Active ▪ Not graduated 	<p>1 day. On in am. Off in pm</p> <p>Replace q 3-4 weeks</p> <ul style="list-style-type: none"> ▪ May be used initially to decrease edema prior to introducing higher levels of compression ▪ Multiple layers (tripled directly over the ulcer) will increase compression to moderate ▪ One layer- can be used while awaiting ABI/ Vascular Studies if NO clinical signs of arterial disease. Apply from toes to knee ▪ Two layers- ABI required. Apply only under direction of an advanced wound care clinician ▪ Three layers- ABI required. Can be used to determine tolerance to higher levels of compression. Apply only under

Compression Type	Description/ Effectiveness	Change	Considerations
			<ul style="list-style-type: none"> ▪ direction of an advanced wound care clinician

CAUTION:

Be aware that the following can **significantly** affect the amount of compression applied:

- Width of bandage
- Percentage stretch applied
- Amount of layering

The product examples listed are not all-inclusive and do not reflect an endorsement of products by the Winnipeg Regional Health Authority. Follow manufacturers' instructions for all wound dressings

VENOUS/ ARTERIAL ULCER ASSESSMENT AND MANAGEMENT ALGORITHM

ASSESSMENT/ DIAGNOSIS

- Complete history
- Wound Assessment
- Vascular Assessment
- Investigations

VENOUS LEG ULCER

- Located proximal to the medial malleolus
- Shallow with irregular borders
- Large amounts of edema and wound *exudate*
- Granulation tissue, yellow slough or whitish fibrinous material present in the wound bed
- Peri-wound skin may have dermatitis, hyperemia or maceration
- Feet are warm to touch and pedal pulses are palpable

ARTERIAL ULCER

- Located on bony prominences of the legs and feet
- “Punched out” appearance with well defined borders
- Little/no edema or wound *exudate*
- Yellow slough or black eschar in the wound bed with little granulation tissue
- Feet are cool to touch and pedal pulses are not palpable

PREVENTION AND TREATMENT

Treat the Cause

- Compression therapy (refer to Appendix A)
- Elevate legs
- Calf pump exercises, regular exercise or ROM
- Weight management
- Skin care

Treat Patient Concerns

- Manage pain
- Provide emotional support, assess and consider financial situation
- Provide patient and family education

Treat the Wound

- Compression therapy
- Maintain moisture balance/manage *exudate*
- Prevent/treat infection
- Refer to recommendations on care of wound bed

Treat the Cause

- Refer to Vascular Surgeon
- Risk reduction ie. smoking, lipids
- Maximize nutrition
- Control underlying medical conditions
- Exercise as tolerated
- Proper foot care
- Medication compliance

Treat Patient Concerns

- Manage pain
- Provide emotional support, assess and consider financial situation
- Provide patient and family education

Treat the Wound

- Potential to heal– refer to recommendations on care of wound bed
- No potential to heal – refer to recommendations on arterial ulcer

MIXED ETIOLOGY

- Characteristics of both venous and arterial disease/ulcerations
- Consult an *advanced wound clinician* for treatment decisions

VENOUS LEG ULCER

INTRODUCTION

- Venous leg ulcers are ulcerations of the skin on the lower legs which can be attributed to venous insufficiency. They are classically located proximal to the medial *malleolus*.



Venous leg ulcer

- Shallow with irregular borders, some may appear deeper
- Associated with large amounts of edema and wound *exudate*



Lymphodema

- Granulation tissue, yellow slough, or whitish *fibrinous* material present in the wound bed
- Peri-wound skin may have *dermatitis*, *hyperemia* or *maceration*, dark pigmentation (hemocidirin staining), atrophy blanche (white pigmentation) and/or fibrosis



Atrophy blanche



hemocidirin staining

- Feet are warm to touch and **pedal pulses** are generally palpable but edema and lipodermatosclerosis (woody fibrosis) may make pulses non-palpable



lipodermatosclerosis

ASSESSMENT/ DIAGNOSIS

- **Complete History**
- Medical history
- Assess for history of:
 - Swelling at the end of the day
 - Previous deep vein thrombosis (DVT)
 - Varicose veins/varicose vein stripping/pregnancy
 - Previous ulcerations/treatments
 - Lower leg trauma
 - ***Cellulitis***
 - Obesity
 - Family history of venous leg ulcerations
 - Previous occupation involving long periods of standing or sitting
- **Pain Assessment**
 - Determine characteristics of pain including intensity and frequency. Venous leg pain can be described as:
 - Throbbing
 - Sharp
 - Itchy
 - Sore, tender
 - Annoying
 - Nagging
 - Tiring
 - Determine what causes and alleviates the pain

- Evaluate quality of life indicators such as functional status, sleep or involvement in activities
- Observe the cognitively impaired patient for non-verbal cues such as crying out, guarding body part, grimacing, wincing or increased irritability/aggression.
- **Gait Assessment**
 - Determine if patient has heel to toe gait (to ensure adequate ankle mobility and use of calf muscle pump).
 - Determine if patient can tolerate 3 minutes of walking
 - Refer to physiotherapist if concerns re: gait
- **Wound Assessment**
 - **Location:** classically located proximal to the medial *malleolus*
 - **Wound bed:** granulation tissue, yellow slough, or whitish *fibrinous* material in the wound bed
 - **Peri-wound skin:** brown stained pigmentation, macerated due to large amounts of *exudate*, *stasis eczema (dermatitis)*



Stasis dermatitis

- Edema in the absence of heart failure/other disease
- Refer to recommendations on care of wound bed
- **Vascular Assessment**
 - Assess perfusion by comparing both feet and lower legs. Check;
 - **pedal pulses** (pulses palpable)
 - warmth (feet are warm to touch)
 - capillary refill (normal < 3 seconds)
 - **dependent rubor** (absent)
 - edema (present)
 - pain (may have varying levels of pain from minimal to severe)
 - Arrange for **Ankle Brachial Index (ABI)** using a handheld Doppler Ultrasound through an Advanced Wound Care Clinician to rule out arterial disease and to confirm adequate arterial perfusion. If Doppler not available refer to a vascular lab. Note: **DO NOT** make treatment decisions on ABI results **alone**

- Ideally, if resources are available, it is recommended that ABIs be repeated every 3-12 months and/or when symptoms or disease presentation changes or if ulcers demonstrate delayed healing



Assessment of Ankle Brachial Index using hand held Doppler Ultrasound

CAUTION

- Compression is contraindicated if arterial disease is present and can result in necrosis or amputation. Consult an *advanced wound clinician* if **ABI** is between 0.6-0.8. Refer to a Vascular Lab for further investigation if **ABI** below 0.5
- Patients with calcified arteries may have elevated **ABI** (over 1.2) due to diabetes or other disease processes (refer to recommendations on diabetic foot ulcer). **Toe pressures** are recommended. Refer to Vascular Lab for further investigation
- Compression therapy is not for use in the presence of acute CHF or infection

- **Investigation**

- ***Pre-albumin*** in serial measurements is ideal to determine nutritional adequacy for healing (*where opportunity to improve nutritional status exists*). Involve dietitian as indicated
- **Albumin** (*if pre-albumin not available*)
- CBC
- **ABI**
- Measure height, monitor weight at regularly scheduled intervals

PREVENTION AND TREATMENT

Patient and family education is an essential component of prevention and treatment of venous leg ulcers

Treat the Cause

- Prior to ulcers occurring, treat **venous hypertension** with compression therapy (TEDS are post surgical anti-embolic stockings and are **not** considered for compression therapy)
- When venous leg ulcers do occur, treat underlying cause with compression therapy (Refer to Appendix A on Therapeutic Compression)
- Elevate legs above the level of the heart
- Calf pump exercises.
 - Walking exercise for ambulatory clients (encouraging ankle mobility)
 - Ankle ROM exercises for non-ambulatory clients (consult physiotherapist if indicated)
- Discourage standing for long periods of time
- Maximize nutrition (consult dietitian for nutrition assessment +/- weight management if indicated)
- Perform and teach proper skin care: maintain clean, well lubricated skin, avoid trauma
- Once ulcers have healed, all patients will require compression stockings for life (Class II) (Refer to Appendix A on Therapeutic Compression)

Treat Patient Concerns

- Manage pain (refer to recommendations on care of the wound bed). Chronic pain that occurs over months may be accompanied by symptoms of depression, loss of appetite and sleep disturbances. **Note:** Pain may be reduced as edema decreases.
- **Dermatitis** - manage irritant or allergic dermatitis by decreasing mechanical irritation from bandages, minimize number of products used on these wounds and avoid common allergens such as topical antibiotics, lanolin, fragrances and preservatives in moisturizers and dressing products. If dermatitis continues, a dermatologist should be consulted
- Address and discuss options to alleviate quality of life concerns whenever possible
- Provide emotional support, assess and consider financial situation (consult social work if indicated),
- Provide patient and family education

GUIDELINES FOR PATIENT AND FAMILY EDUCATION

1. Determine treatment goals with patient, family and health care team
2. In simple terms describe the venous anatomy to patient and family and review the pathophysiology of the venous problem
3. Advise patient/family to check skin daily for redness, swelling, cracks, drainage, or changes in texture, temperature and colour
4. Encourage the patient to moisturize skin on legs and feet with non-allergenic preparation
5. Explain what edema is, how it is reduced and how the patient can maintain edema reduction

6. Advise the patient to exercise regularly, avoid standing or sitting for long periods, and elevate legs whenever possible

7. Instruct the patient to avoid wearing restricting clothing and to wear well fitting shoes. Walking barefoot should be discouraged even in the house.
8. Instruct the patient to avoid bumping or injuring the affected leg(s), to avoid extremes of heat and cold next to the skin and to protect against insect bites
9. Encourage patients who smoke to cease. Provide information about smoking cessation programs
10. If a topical wound dressing or compression therapy is being used to treat a venous leg ulcer, explain why, and how they work to heal the wound
11. Provide or assist with access to resources as needed
12. Emphasize the importance of following recommendations for the use of elastic compression stockings.

Treat the Wound

- Refer to recommendations on care of wound bed
- Compression Therapy: **See above Caution and Appendix A**
 - ABI* above 1.2 may indicate calcified arteries and should not be compressed (see caution p. XX) (Do not compress until further vascular studies completed)
 - ABI* between 0.8 -1.2– full compression
 - ABI* between 0.6-0.8 – lower (mild to moderate) compression
 - ABI* lower than 0.5 – do not initiate compression, refer to Vascular Surgeon
- Maintain moisture balance
- Prevent and treat infection
- If no healing is evidenced within 6 weeks with optimal patient and wound management or if wound deteriorates, consult an *advanced wound clinician*

ARTERIAL ULCER

INTRODUCTION

- Arterial ulcers are ulcerations of the skin on the lower legs, feet and toes that can be attributed to arterial insufficiency. They are classically located on bony prominences of the legs and feet



Arterial ulcers

- “Punched out” appearance with well defined borders
- May involve deeper structures (ie. tendon, bone)
- Associated with little or no edema or wound *exudate*
- Ulcers often have yellow slough or black *eschar* in the wound bed and little granulation tissue
- Feet are cool to touch and *pedal pulses* are not palpable
- At risk of developing *osteomyelitis*

ASSESSMENT/ DIAGNOSIS

- Complete History
 - Medical history
- Assess for history of:
 - *Claudication*
 - *Nocturnal Pain*
 - Ulcer pain
 - Smoking
 - Cardiovascular disease
 - Hyperlipidemia
 - Hypercholesteremia
 - Diabetes

- **Wound Assessment**
 - **Location:** classically located on bony prominences of legs and feet
 - **Wound bed:** pale, “punched out” appearance with well defined borders. Yellow slough or black *eschar* and little granulation tissue present in the wound bed
 - **Peri-wound skin:** appears pale with no hair on legs/feet and grossly thickened nails
 - Ischemic areas may appear as dry gangrene
 - Associated with minimal edema and wound *exudate*
 - Feet are usually cool to touch and *pedal pulses* are not palpable

- **Vascular Assessment**
 - Assess perfusion by comparing both feet and lower legs. Check;
 - *pedal pulses* (absent or diminished)
 - warmth (feet are cool to touch)
 - capillary refill (delayed >3 seconds)
 - *dependent rubor* (present)
 - edema (little or no edema)
 - pain (*claudication, nocturnal pain*, ulcer pain)
 - elevation pallor
 - Arrange for *Ankle Brachial Index (ABI)* using a handheld Doppler Ultrasound through an Advanced Wound Care Clinician to rule out arterial disease and to confirm adequate arterial perfusion. If Doppler not available refer to a vascular lab. Note: **DO NOT** make treatment decisions on ABI results **alone**
 - Ideally, if resources are available, it is recommended that ABIs be repeated every 3-12 months and/or when symptoms or disease presentation changes or if ulcers demonstrate delayed healing

Differential Diagnosis

- Lower leg ulcers may not all be venous, arterial or mixed. Other differential diagnosis may include vasculitis, pyoderma gangrenosum, diabetes related (see section on Diabetic Foot Ulcers)

CAUTION

- Compression is contraindicated if arterial disease is present and can result in necrosis or amputation. Consult an **advanced wound clinician** if **ABI** is between 0.6-0.8. Refer to a Vascular Lab for further investigation if **ABI** below 0.5
- Patients with calcified arteries may have elevated **ABI** (over 1.2) due to diabetes or other disease processes (refer to recommendations on diabetic foot ulcer). **Toe pressures** are recommended. Refer to Vascular Lab for further investigation
- Compression therapy is not for use in the presence of acute CHF or infection

• Investigations

- Pre-albumin in serial measurements to determine nutritional adequacy for healing (*where opportunity to improve nutritional status exists*)
- CBC if indicated
- X-ray/**Erythrocyte Sedimentation Rate** (if *osteomyelitis* suspected); Bone scan (if X-ray/**ESR** inconclusive) Note: **ESR**, bonescan, and xray may be inconclusive as other inflammatory conditions may affect results
- Lipid profile, fasting blood sugar, +/- 2 hr pc, and **HgbA_{1c}** (for persons with diabetes *where appropriate*)
- Measure height, monitor weight at regularly scheduled intervals
- **ABI**

PREVENTION AND TREATMENT

Patient/ Family Education is an essential component of prevention and treatment of arterial ulcers

Treat the Cause

- Refer to vascular surgeon to determine if re-vascularization is possible
- Control underlying medical conditions
- Risk factor reduction
 - Encourage smoking cessation program
 - Maximize nutrition (consult dietitian if indicated)
- Monitor and teach medication compliance
- Encourage exercise regime (consult physiotherapist if indicated)
- Perform and teach proper skin care: maintain clean, well lubricated skin, avoid trauma

- Leg Elevation is contraindicated

Treat Patient Concerns

- Manage pain (refer to recommendations on care of wound bed)
- Provide psychological, emotional and financial support (consult social work if indicated)
- Provide patient and family education

Treat the Wound

- If re-vascularization is possible, the wound has potential to heal (see recommendations on care of wound bed)
- If re-vascularization is not possible, the wound does not have potential to heal
 - The goal is to PREVENT/ TREAT INFECTION AND AVOID/ DELAY AMPUTATION
 - **Keep the wound dry and do not debride**

Dry wounds

- This is the one situation where an antiseptic is appropriate for treatment
- DO NOT cleanse with normal saline first
- Use Povidone iodine to paint the wound



Dry gangrene

Wet Wounds

- If wound is wet, consider a topical antimicrobial (see recommendations on care of wound bed)
- DO NOT use Burrow's solution, Dakin's solution or Hydrogen peroxide.

If no healing is evidenced within *TWO* weeks with optimal patient and wound management, or if wound deteriorates, consult an *advanced wound clinician*

Mixed Venous Arterial Ulcers

A percentage of patients may appear to have characteristics of both venous and arterial disease. Ulcerations of mixed etiology are difficult to identify as they present with combinations of signs and symptoms of both venous and arterial ulcerations. With advancing age and duration of disease, the potential for mixed etiology increases. Ideally, if resources are available, it is recommended that ABIs be repeated every 3-12 months and/or when symptoms or disease presentation changes or if ulcers demonstrate delayed healing. Refer such patients to an *advanced wound clinician* for treatment decisions.

Adjunct Therapies

A variety of adjunct therapies exist. Consult an Advanced Wound Clinician for discussion and direction

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APPENDIX A THERAPEUTIC COMPRESSION

LEVELS OF COMPRESSION:

Therapeutic compression must provide sufficient compression, be graduated and sustained (*La Place's Law*).

Compression Levels vary according to medical needs and bandage or stocking capabilities.

Compression capability is determined by:

- how far a bandage can be extended before it stops
- **the force** required for extension
- **the construction** of the components (elastic, crepe or lycra)
- **application technique** (spiral or figure 8), including number of bandage layers

For **compression** to be **sustained**, the pressure must be maintained at the same level(s) as when the product was applied

Some bandages sustain compression levels better than others

Correct **application** and **compliance** with wear determine outcome

TYPES OF COMPRESSION

Active Compression:	Functions continuously regardless of activity
Passive Compression:	Only provides compression when calf muscle pump is active
Compression Stockings:	Class of compression must be prescribed by physician (see table) Replacement time for compression stocking is six months, as gradual loss of elasticity causes decreased compression ability Custom fitting, the addition of a zipper, use of rubber gloves or special devices will facilitate application and promote compliance with use
Intermittent Pneumatic Compression	Pneumatically (air) operated full-length sleeves Mimics calf muscle pump Effective method to reduce gross edema/ lymphedema when unable to fit for a compression stocking

May be used as an adjunct for compression bandaging
Consult an *advanced wound clinician*

When healed, compression therapy for life

SPECIAL CONSIDERATIONS FOR COMPRESSION

- Contraindicated in ABI over 1.2 or less than 0.8 (until further vascular studies can be completed)
- Limb contour and diameter (**girth**) are critical factors in determining the correct application of compression bandages, especially at higher levels of compression (*La Place's Law*)
- Normally shaped legs (narrower at the ankle and wider at the calf) create a natural **graduation of compression**, i.e. the wider the girth, the less compression that will be exerted on it. If compression is not graduated, excess levels of pressure can occur in specific areas, and cause a tourniquet effect or potential necrosis
- Use padding to **re-contour irregularly** shaped legs to simulate a normal leg contour
- Pad exceptionally narrow ankles/Achilles with flannel or gauze to design a more "normal" contour and to prevent potential necrosis to bony prominences (malleoli, tibia crest). Pad the calf area of a wasted limb to create a calf contour. Ankle circumference must be more than or padded to equal 18 cm

These methods will also help to prevent slippage and stabilize the bandage

BANDAGING BASICS:

- Compression system bandaging application is a specialized skill that requires training and competency must be demonstrated and maintained
- Within first few days of initiation of compression, assess:
 - Compliance (provide support)
 - Need for reapplication due to decreased edema
 - Tolerance to therapy (discomfort)
- Instruct patient/family to remove compression bandage if toes turn blue/cold and or if they experience increased pain

- Wound contact layer (dressing) should assure non-adherence to wound base and have some absorption capability. The bandage may absorb excess *exudate*
- Apply bandages with a 50% overlap and 50% tension unless otherwise indicated by product instructions
- Bandages or stockings extend from the base of the toes to just below the knee and must include the heel
- Avoid tourniquet effect:
 - Do not wrap excess bandage below the knee. Cut off or re-apply bandage
 - Do not overstretch a short bandage. Use a second bandage
- Specifics of bandage application are determined by product design, or by the user if specific adjustments are desired
- Spiral bandage application involves wrapping in a continuous direction up the leg
- Figure of 8 application involves wrapping in an alternating directional turn behind the limb, with a crossover at the front of the limb. This increases the compression level of any bandage
- Frequency of bandage changes are determined by product specifications and volume of *exudate*
- Withhold high levels of compression during acute phase of *cellulitis*

TYPES OF COMPRESSION STOCKINGS and BANDAGES

The product examples listed are not all-inclusive and do not reflect an endorsement of products. Follow manufacturers' instructions for all products

Compression Type	Description/ Effectiveness	Change	Considerations
<p>Therapeutic Stockings:</p> <p>Sigvaris (standard and custom sizes)</p> <p>Jobst (standard and custom sizes) (Beirsdorf-Jobst)</p> <p>Juzo- Stockings + pantyhose (standard and custom) (Julius Zorn Inc.)</p> <p>Various other brand names available</p>	<ul style="list-style-type: none"> ▪ Required for life ▪ Assorted brands and sizes <p><u>FOR ALL BRANDS</u></p> <p>20-30 mm Hg Mild superficial effect</p> <p>30-40 mm Hg Moderate superficial effect</p> <p>40-50 mm Hg Superficial and deep effect</p> <p>50-60 mm Hg Strong deep effect</p>	<p>Apply daily (on in am off in pm)</p> <p>Replace q 6 months</p> <p>Stockings lose elasticity and effectiveness over time</p>	<ul style="list-style-type: none"> ▪ Prior to initiation of therapeutic stockings, patient must have a vascular assessment including ABIs ▪ Requires a physician's order for mm of Hg compression ▪ Must be pre-measured. For proper fit ensure patient is seen by a certified fitter. ▪ May be necessary to adjust as edema decreases ▪ Patient may require assistance to apply ▪ Devices are available to assist in application e.g. Easy Slide, Rubber Gloves ▪ Success heavily dependant on compliance ▪ Remove at hs, bathe and moisturize skin to allow to absorb prior to re-applying stocking next am (petroleum based products directly on stocking can cause breakdown and loss of elasticity) <p>Ensure manufacturer's instructions are followed for care and cleaning</p>

Compression Type	Description/ Effectiveness	Change	Considerations
<p>High 35-40 mm Hg Sustained <u>ABI</u></p> <ul style="list-style-type: none"> • 0.8-1.2 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>Profore (Smith & Nephew)</p>	<ul style="list-style-type: none"> ▪ Active Graduated ▪ Varied bandage applications 	<p>Minimum 3-4 days up to 7 days</p> <ul style="list-style-type: none"> ▪ Four layer bandage system ▪ Level of compression is increased by each layer of bandage applied ▪ See package instructions ▪ Bandage is highly absorbent and comfortable ▪ Bandage is bulky, requiring modification to footwear ▪ Cannot be re-used ▪ During initial two weeks, large amounts of <i>exudate</i> may necessitate bandage replacement before one week
<p>High 35-40 mm Hg <u>ABI</u></p> <ul style="list-style-type: none"> • 0.8-1.2 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>Comprilan (Beirsdorf-Jobst)</p>	<ul style="list-style-type: none"> ▪ Passive Graduated ▪ Spiral application ▪ Short stretch 	<p>Re-wrap daily</p> <ul style="list-style-type: none"> ▪ Not recommended for non ambulatory patients. Requires calf muscle pump. ▪ Various methods to wrap available ▪ Absorbent dressing necessary for highly exudative wounds ▪ Can be washed 20 times
<p>High 30-40 mm Hg sustained <u>ABI</u></p> <ul style="list-style-type: none"> • 0.8-1.2 <p><u>Initiation</u></p> <ul style="list-style-type: none"> • Physicians order required <p><u>Application</u></p> <ul style="list-style-type: none"> • Demonstrated competency 	<p>SurePress (Convatec)</p>	<ul style="list-style-type: none"> ▪ Active Graduated ▪ Spiral application 	<p>3-7 days</p> <ul style="list-style-type: none"> ▪ Two layers of bandage ▪ Inner flannel wrap provides absorption, comfort, protection (friction/shear) and complements compression ▪ Identify the rectangle appropriate for limb girth (large or small). These markings ensure correct tension and overlap ▪ Outer bandage can be washed and re-used up to 20 times with no loss of compression ability ▪ Minimally bulky. Regular footwear can usually be worn

The product examples listed are not all-inclusive and do not reflect an endorsement of products. Follow manufacturers' instructions for all products

Compression Type	Description/ Effectiveness	Change	Considerations	
<p>High 30 mm Hg Sustained <u>ABI</u> • 0.8-1.2 <u>Initiation</u> • Physicians order required <u>Application</u> • Demonstrated competency</p>	<p>Duke Boot: Viscopaste with overlay of Coban (3M) or Rolflex (Smith & Nephew)</p>	<ul style="list-style-type: none"> ▪ Passive Graduated ▪ Fan fold (Viscopaste) ▪ Spiral (Coban/Rolflex) 	<p>Up to 1 week</p>	<ul style="list-style-type: none"> ▪ Initial layer maintains a rigid shape ▪ The addition of the Coban or Rolflex overlay increases compression from moderate to high ▪ See following box for further information on viscopaste
<p>Moderate 23mm Hg Sustained <u>ABI</u> • 0.6-0.8 <u>Initiation</u> • Physicians order required <u>Application</u> • Demonstrated competency</p>	<p>Profore Light (Smith &Nephew)</p>	<ul style="list-style-type: none"> ▪ Active Graduated ▪ Spiral application 	<p>Up to 1 week</p>	<ul style="list-style-type: none"> ▪ Can be purchased or made by removing Layer 3 (figure 8 layer) from Profore
<p>Moderate 15 mm Hg Not sustained <u>ABI</u> • 0.6-0.8 <u>Initiation</u> • Physicians order required <u>Application</u> • Demonstrated competency</p>	<p>Viscopaste (Smith & Nephew)</p>	<ul style="list-style-type: none"> ▪ Passive Graduated, if limb contour is normal ▪ Fan fold application 	<p>2-7 days</p>	<ul style="list-style-type: none"> ▪ Zinc impregnated paste bandage, applied with no tension, dries to a rigid shape. Requires outer wrap to protect clothing from moist dressing. For increased compression see Duke Boot (above) ▪ Not recommended for non ambulatory patients. Requires calf muscle pump. ▪ Wear time determined by the amount of drainage (additional ABD pads may be added on the outside to absorb increased <i>exudate</i>). Change prn ▪ Sensitivities may occur ▪ Consider for stasis dermatitis when compression needed

Compression Type	Description/ Effectiveness	Change	Considerations
Moderate 15-20 mm Hg Not sustained	Tensor/ ACE bandage NOTE: Level of compression may vary due to application technique and brand of product (see caution below)	<ul style="list-style-type: none"> ▪ Active Graduated ▪ Figure of 8 ▪ Application 	<p>1-2 days. Rewrap prn</p> <ul style="list-style-type: none"> ▪ Apply from toes to knee including heel ▪ Avoid excess pressure to tibial crest ▪ Alert: shear and friction is possible. Protective padding may be necessary
Mild 10-12 mm Hg Not sustained	Tensor/ ACE bandage NOTE: Level of compression may vary due to application technique and brand of product (see caution below)	<ul style="list-style-type: none"> ▪ Active Graduated ▪ Spiral application 	<p>1 day. Rewrap prn</p> <ul style="list-style-type: none"> ▪ Apply from toes to knee including heel ▪ Thin materials are less effective ▪ Replace frequently, as worn bandages lose compression ▪ Alert: shear and friction is possible. Protective padding may be necessary
Mild 10-12 mm Hg	Elastogrip (Smith & Nephew) Tubigrip (Convatec) (see caution below)	<ul style="list-style-type: none"> ▪ Active ▪ Not graduated 	<p>1 day. On in am. Off in pm</p> <p>Replace q 3-4 weeks</p> <ul style="list-style-type: none"> ▪ May be used initially to decrease edema prior to introducing higher levels of compression ▪ Multiple layers (tripled directly over the ulcer) will increase compression to moderate ▪ One layer- can be used while awaiting ABI/ Vascular Studies if NO clinical signs of arterial disease. Apply from toes to knee ▪ Two layers- ABI required. Apply only under direction of an advanced wound care clinician ▪ Three layers- ABI required. Can be used to determine tolerance to higher levels of compression. Apply only under

Compression Type	Description/ Effectiveness	Change	Considerations
			<ul style="list-style-type: none"> ▪ direction of an advanced wound care clinician

CAUTION:

Be aware that the following can **significantly** affect the amount of compression applied:

- Width of bandage
- Percentage stretch applied
- Amount of layering

The product examples listed are not all-inclusive and do not reflect an endorsement of products by the Winnipeg Regional Health Authority. Follow manufacturers' instructions for all wound dressings