Definition of a Venous Ulcer (VU)

A venous ulcer is a wound, usually on the medial maleolus, ankle or calf, that results from venous insufficiency or elevated venous pressure. It is considered chronic if it is unresponsive (reduces in area less than 40% in 3 weeks (Phillips et al., 2000)) to best evidence-based care The resulting local edema can progress to dermatitis and ulceration. It may result from incompetent venous valves in the superficial, perforator or deep vein systems and/or inadequate calf muscle pump function(American Society of Plastic Surgeons, 2007; Wound Ostomy Continence Nurses Society, 2005).

Strength of Evidence Ratings

A. Results of a meta-analysis or two or more venous ulcer (VU)-related randomized controlled trials (RCT) on humans provide support. For diagnostics or risk assessment screening: prospective cohort (CO) studies and/or controlled studies reporting recognized diagnostic (e.g. sensitivity or specificity) or screening (e.g. + or - predictive validity) measures.

B. Results of one VU-related RCT in humans plus one or more similar Historically Controlled Trials (HCT) or Convenience Controlled Trials (CCT) or one HCT and one CCT provide support or when appropriate, results of two or more RCT in animal model validated as clinically relevant to VU provide indirect support. For diagnostics or risk assessment one VU-related prospective cohort (CO) study and/or a controlled study reporting recognized diagnostic or predictive screening validity measures.

C. This rating requires one or more of the following:
- **C1: Results of one controlled VU trial, e.g. RCT, CCT or HCT (or for diagnostics or risk prediction one prospective CO study may be substituted for a controlled trial)**
- **C2: Results of at least two clinical VU case series (CS) or descriptive studies or a cohort study in humans**
- **C3: Expert opinion (EO)**

Abbreviations used in Evidence Table Below and Annotated Venous Ulcer Algorithm:
AAWC = Association for the Advancement of Wound Care
ABI = Ankle systolic blood pressure divided by brachial systolic blood pressure
AM = Animal Model
ASPS = American Society of Plastic Surgeons
BWAT = Bates-Jensen Wound Assessment Tool
CC = Case Controlled Epidemiology Study
CCT = Convenience-Assigned or Non-randomized Controlled Trial
CO = Cohort study *e.g.* of all consecutive patients admitted to a facility studied prospectively
CS = Case series or descriptive uncontrolled study of performance of one modality
CVI = Chronic Venous Insufficiency
DVT = Deep vein thrombosis
EO = Expert opinion, Content Validation Study or Consensus Statement
EVLT = Endovenous laser therapy
G = Guideline
GSV = Greater saphenous vein
HCT = Historically Controlled Trial with successive measure on a series of patients
HRCT = Historically baseline data comparisons included in a randomized controlled clinical trial.
HRQoL = Health-related quality of life
NS = Not statistically significant according to the criterion p< 0.05
PCT = Within-patient Controlled Trial
PTS = Post thrombotic syndrome
LR[n RCTs] = Literature Search: number of studies supporting the modality
MA = Meta-analysis: number of patients with data supporting the modality added if known
RCO = Retrospective cohort study
RCT = Randomized Controlled Trial: RCT = Human, ARCT = Animal
SR [n RCTs] = Systematic Reveiw [number of RCTs supporting recommendation]
SUR = Survey
$TCPO_2$ = Transcutaneous partial pressure of oxygen
VRT = Venous refill time
VU = Venous ulcer, also called venous insufficiency (or stasis or leg) ulcers or ulcus cruris

Sources of Guideline Recommandations

1. Alguire PC, Mathes BM. Chronic venous insufficiency and venous ulceration. *J Gen Internal Med* 1997; 12:374-383.
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3. American Society of Plastic Surgeons (ASPS). Evidence-based clinical practice guideline: chronic wounds of the lower extremity. Arlington Heights (IL): American Society of Plastic Surgeons; 2007 May. 21 p. accessed October 5, 2010, at www.guidelines.gov
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17. Registered Nurses Association of Ontario (RNAO). Assessment and management of venous leg ulcers. Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2004 Mar. Accessed October 1, 2010, www.guidelines.gov
18. Robson MC, Cooper DM, Aslam R, Gould LJ, Harding KG, Margolis DJ, Ochs DE, Serena TE, Snyder RJ, Steed DL, Thomas DR, Wiersema-Bryant L. uidelines for the prevention of venous ulcers.Wound Repair Regen. 2008;16(2):147-50.
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APPENDIX I. Reference Summary to Accompany AAWC VU Algorithms (References Are In Alphabetic Order)

Reference	Variables Studied (No. Subjects)	Study Design	Results (□<0.05 if not specified)
Abu-Own A, Scurr JH, Coleridge Smith PD. Effect of leg elevation on the skin microcirculation in chronic venous insufficiency. *J Vasc Surg*. 1994;20(5):705–710.	Venous insufficiency (VI)lipodermatosclerosis (15 patients) Normal volunteers (15)	Prospective CCT Laser Doppler (LD) blood flow velocity 8 cm above medial maleolus before and after foot elevation 30 cm above heart	During limb elevation, blood cell velocity rose 45% in VI patients, but not in controls (p<0.01). reflecting increased microcirculatory flow velocity
Adera HM, James K, Castronuovo JJ Jr, Byrne M, Deshmukh R, Lohr J. Prediction of amputation wound healing with skin perfusion pressure. J Vasc Surg. 1995; 21(5):823-8; discussion 828-9.	62 limbs on 52 patients	Prospective CO study predicting healing failure, healing, major and minor amputations using laser Doppler (LD) skin perfusion pressure (SPP)	LD-SPP < 30 predicted non-healing (75%; p<0.001) , major (NPvalue 100%; PPV 83%) and less significantly minor amputations.
Aharinejad S, Nedwed S, Michlits W, Dunn R, Abraham D, Vernadakis A, Marks SC Jr. Valvular density alone cannot account for sites of chronic venous insufficiency and ulceration in the lower extremity. *Microcirculation* 2001;8(5): 347-354.	Venous valves on 6 subjects with normal legs.	Case series. Anatomical examination of density of venous valves in lower leg.	Valvular density was higher over bones and tendons where VUs are common, than in muscular areas where VUs are rare. So valve quantity alone can't account for increased incidence of VUs.
Alexanderhouse Group Consensus Paper on Venous Leg Ulcers *Phlebology* 1992; 7:48-58	Literature search combined with expert opinion (EO)	LR with 203 references supporting aspects of VU diagnosis and care.	Best diagnostic tools: air and photo-plethysmography. Best microcirculation measure: $TCPO_2$. Recommends Compression, elevation and walking
Alguire PC et al. Chronic venous insufficiency and venous ulceration. *J Gen Internal Med* 1997; 12:374-383.	Review of venous ulcer literature.	Literature search and EO	Stasis dermititis is diagnostic for venous ulceration
Al-Kurdi D, Bell-Syer SE, Flemming K. Therapeutic ultrasound for venous leg ulcers. Cochrane Database Syst Rev. 2008 Jan 23;(1):CD001180.	5 RCT Ultrasound (US) vs Sham or placebo 3 RCT vs best practice	Pooled MA showed effect though no single RCT did	Greater % healed and faster rate of % area reduction with US therapy than controls.
Alvarez OM, Kalinski C, Nusbaum J, Luz Hernandez L, Pappous E, Kyriannis C, Parker R, Chrzanowski G, Comfort CP, Incorporating wound healing strategies to improve palliation (symptom management) in patients with chronic wounds. J Palliative Medicine, 2007 Oct;10(5) : 1161-89.	Consider S-P-E-C-I-A-L (below) for PU in palliative care : S-stabilizing wound, P-prevent new wounds, E-eliminate odor, C-control pain, I- infection prophylaxis, A-advanced, absorbent wound dressings, L-lessen dressing changes.	LR Level C3--EO	Using wound palliation (symptom management) with current wound healing practices can provide appropriate options for palliative care providers.
Amato L, Chiarini C, Berti S, Massi D, Fabbri P, Idiopathic atrophie blanche. Skinmed , 2006;5(3):151-154.	Case study	CS atrophie blanch.	Description of atrophie blanche noting that it is associated with venous insufficiency.
American Society of Plastic Surgeons.(ASPS) American Society of Plastic Surgeons (ASPS). Evidence-based clinical practice guideline: chronic wounds of the lower extremity. Arlington Heights (IL): American Society of Plastic Surgeons; 2007 May. 21 p. accessed October 5, 2010, at	Guideline	Guideline	

www.guidelines.gov			
Amsler F, Willenberg T, Blättler W. In search of optimal compression therapy for venous leg ulcers: a meta-analysis of studies comparing diverse [corrected] bandages with specifically designed stockings. J Vasc Surg. 2009 Sep;50(3):668-74.	8 RCT on VU patients comparing stocking compression with bandage compression 535 patients for heal time MA 7 studies 219 for pain MA in 3 studies	MA of VU healing, pain, nursing convenience	No trial showed better or faster healing with bandages than stockings. Greater proportion of VU healed with stockings than bandages (p= 0.00001) in less time (p=0.0002) with less pain, more nursing advantage
Andreozzi GM Effectiveness of mesoglycan in patients with previous deep venous thrombosis and chronic venous insufficiency. Minerva Cardioangiol. 2007;55(6):741-53.	1. 56 patients with first DVT 2. 27 patient recurrent DVT 3. 182 patients with CVI including primary (107) or secondary (75)	All patients given mean dose of 50 mg mesoglycan twice daily, followed up at 6 month intervals for up to 3 years.	18% PTS prevalence in first DVT group; 81% for recurrent DVTs, CVI patients: all venous dysfunction scores improved significantly during the follow-up, both in comparison with beginning of treatment and with immediately preceding control visit.
Angel D. Sieunarine K, Flexman J, Fraser D, Tibbett, P, Nyal L. Nurse practitoner management of lower leg ulcers in the adult population clinical protocol. Royal Perth Hospital and South Metropolitan Area Health Service, Department of Health, Government of Western Australia. 2007.		Guideline	
Argenta L, Morykwas MJ Vacuum-Assisted Closure: A new method for wound control and treatment: Clinical experience. *Ann Plas Surg* 1997; 38(8):563-576.	31 venous stasis or vasculitic ulcers among 300 wounds treated with VAC + split-thickness graft or allograft + pressure garment	CS with pressure garments applied ~10 days after grafting	90% of patients with "stasis" ulcers treated with VAC + graft + pressure garment "responded favorably" in unspecified time.
Armstrong SH, Ruckley CV. Use of a fibrous dressing in exuding leg ulcers. *J Wound Care* 1997; 6(7):322-324.	Venous ulcers Aquacel (21) Calcium alginate (23)	Prospective, multi-center, RCT measuring performance, comfort, safety, cost effectiveness as a function of primary dressing group.	Mean wear time in the Aquacel group was longer (mean difference 1.02 days, $p < 0.05$). Median decrease in ulcer area was 42% in Aquacel versus 26% in alginate group rendering Aquacel more cost effective. No significant differences in pain or adverse events were observed.
Arnold, TE, Stanley, JC, Fellows EP, Moncada GA, Allen R., Hutchinson JJ, Swartz WM, Bolton LL, Vickers CFH, Kerstein MD. Prospective, Multicenter study of managing lower extremity venous ulcers. *Annals of Vascular Surgery* 1994;9(4):356-362.	Wound Dressings: 1.DuoDERM CGF (35) 2.Xeroform® Gauze (35) Both under 2-layer gradient elastic compression: flexible zinc oxide paste next to skin, then gradient elastic layer.	Prospective, RCT, blind evaluation, 10 week comparison of dressings under compression on venous leg ulcers in US and European leg ulcer clinic settings	More pain relief with DuoDERM CGF ulcers, which healed 71% vs 43% for Xeroform during an average of 7.2 weeks for DuoDERM CGF vs. 9.2 weeks for Xeroform Gauze ($p>0.05$ for healing; $p<0.05$ for pain)
Aschwanden M, Jeanneret C, Koller MT, Thalhammer C, Bucher HC, Jaeger KA. Effect of prolonged treatment with compression stockings to prevent post-thrombotic sequelae: a randomized controlled trial. J Vasc Surg. 2008;47(5):1015-21.	900 PTS patients screened 169 with first or recurrent DVT after 6 mo of standard therapy assigned to receive compression stockings or not	Prospective RCT measuring C4-C6 (CEAP) skin changes as primary outcome and PTS symptoms as secondry outcome. No VU observed in either group. All analysis were ITT. Mean FU 3.2 y compression, 2.9 y control	Men had higher likelihood of C4-C6 skin changes. Compression reduced skin changes and PTS symptoms during year 1 post DVT but not after that. More research needed on effects on ulceration.
Baker S, Fletcher A, Glanville J, Press P, Sharp F, Sheldon T, Collum N, Semlyen A. Compression therapy for venous leg ulcers. *Effective Health Care* 1997; 3(4):2-12	Review of compression studies and questions addressed by Cullum et al. More studies and different information.	Systematic review with different interpretations of some studies than Cullum et al.	-compression > no compression -elastic high > low compression - and " > inelastic compression -NS difference between different multilayer high compression systems

			-multilayer high compression > 1-layer bandage systems -Insufficient evidence for *stockings vs bandages * intermittent or sequential pneumatic compression
Barron GS, Jacob SE, Kirsner RS. Dermatologic complications of chronic venous disease: medical management and beyond. Ann Vasc Surg. 2007;21(5):652-62.	Case studies.	LR of atrophie blanche	Description and case study evidence that atrophie blanche is associated with venous insufficiency.
Barwell JR, Davies CE, Deacon J, Harvey K, Minor J, Sassano A, Taylor M, Usher J, Wakely C, Earnshaw JJ, Heather BP, Mitchell, DC, Shyman MR, Poskitt KR. Comparison of Surgery and compression with compression alone in chronic venous ulceration (ESCHAR study): Random Control Trial. *Lancet.* 2004, June 5(363):1854-1858.	500 patients from three centers received venous color duplex imaging of ulcerated or recently healed wounds. These were used to guide surgical decisions.	RCT.Multilayer compression with or without superficial vein surgery or deep vein stripping, avulsion of varicosities or junction disconnection. Comparison of recurrence rates at 24 weeks and 12 months.	Surgery with compression vs. compression alone: at 24 weeks no difference (65% vs65% recurrence.At 12 months surgical: 12% vs 28% for compression alone.Surgical correction of venous reflux with compression reduces 12 month venous recurrence.
Beele H, de la Brassine M, Lambert J, Suys E, De Cuyper C, Decroix J, Boyden B, Tobback L, Hulstaert F, De Schepper S, Brissinck J, Delaey B, Draye JP, De Deene A, De Waele P, Verbeken G Prospective multicenter study of the efficacy and tolerability of cryopreserved allogenic human keratinocytes to treat venous leg ulcers. Int J Low Extrem Wounds. 2005;4(4):225-33.	CryoCeal 9 applications allogeneic human keratinocyte cultures (27 VU patients	CS of patients treated for up to 9 applications measuring healing in 24 weeks	11 patients (41%) healed.
Beitz J, van Rijswijk L. Using wound care algorithms: A content validation study. *JWOCN* 1999; 26:238-249.	42 registered nurse wound care experts	EO: Survey/interview at national wound care educational meetings. Reviewing and content validating each decision within *Solutions* ® algorithms of wound care	Content validity index was 0.86. On a scale of 1 to 4, the mean content validity score for the entire algorithm was 3.47 (SD 0.87).
Belcaro G, Cesarone MR, Nicolaides AN, Geroulakos G, Di Renzo A, Milani M, Ricci A, Brandolini R, Dugall M, Ruffini I, Cornelli U, Griffin M. Improvement of microcirculation and healing of venous hypertension and ulcers with Crystacide. Evaluation of free radicals, laser Doppler flux and PO2. A prospective-randomized-controlled study. Angiology. 2003;54(3):325-30. PMID: 12785025	20 patients with CVI and venous hypertension with a VU 10 Crystacide plus usual care and 10 control usual care	RCT applying Crystacide to VU surface for 10 days. Measures were $TCPO_2$, LDF to quantify venous perfusion and microcirculatory flow	Crystacide improved microcirculation LDF and decreased skin free radicals $P<0.05$

Bello M, Scriven M, Hartshorne T, Bell,PRF, Naylor AR, London NJM Role of superficial venous surgery in the treatment of venous ulceration. *British Journal of Surgery* 1999; 86:755-759.	122 legs with VU and normal deep veins underwent superficial venous surgery	Prospective case series Post op treatment :non-adherent gauze and Tubigrip (8mm) Ulcers assessed q 8 weeks	VU post-op healing rates: Median time to healing 18 weeks, Cumulative 12 month healing rate 82% No recurrence data
Benigni, J.P., Sadoun. S, Allaert FA, Vin F. , Comparative Study of the Effectiveness of Class 1 Compression Stockings on the Symptomatology of Early Chronic Venous Disease *Phlebologie* 2003; 56:117-125.	125 subjects- Comparison of class 1 compression stockings with identically looking, non-active stockings (pressure < 7mmHg) in patients with early stages of venous disease	Randomized, multi-center cross-over study	Statistically highly significant differences in favor of the class 1 stockings were found for pain, for all other parameters of discomfort except parasthesia and for the QOL dimensions for mood and every day work. The relief of symptoms with the class 1 stockings was 2x that of the control.
Bérard A, Abenhaim L, Platt R, Kahn SR, Steinmetz O.Risk factors for the first-time development of venous ulcers of the lower limbs: the influence of heredity and physical activity.Angiology, 2002;53(6):647-57.	Clinical history risk factors 1. Previous phlebitis 2. Multiple pregnancy 3. Vigorous exercise 4. Family history	Prospective Cohort predictive validity study.	Significant predictors of VU are: 1. Family history of maternal VU 2. Vigorous exercise 3. History of DVT 4. Multiple pregnancy
Bergan, J and Sparks, S., Non-Elastic Compression: An Alternative in Management of Chronic Venous Insufficiency *JWOCN* 2000; 27:83-90.	Review of comparative efficacy of elastic stockings, short stretch bandages, Unna's Boot or Circaid inelastic compressoin	Retrospective literature review.	In patients with sufficient ankle flexibility for calf muscle pump function, inelastic compression reduces venous ulcer edema preparing legs for elastic stocking use.
Bergemann R, Lauterbach KW, Vanscheidt W, Neander KD, Engst R. Economic evaluation of the treatment of chronic wounds: hydroactive wound dressings in combination with enzymatic ointment versus gauze dressings in patients with pressure ulcer and venous leg ulcer in Germany. Pharmacoeconomics. 1999;16(4):367-77	Wound Dressings 4 hospitals and 120 patients * Gauze * Impregnated gauze * Calcium alginate * Hydroactive wound dressing with enzymatic ointment	Prospective, CCT, outcome distributions were calculated using the Monte Carlo method 4 hospitals and 120 patients	The costs for treatment with gauze were the highest, whereas the costs for treatment with hydroactive wound dressings and enzymatic ointment were the lowest. Despite the higher material costs of the hydroactive wound dressings in combination with enzymatic wound cleaning compared with other wound dressings. Significantly lower total hospital costs due to lower personnel costs and shorter duration of treatment.
Berliner E, Ozbilgin B, Zarin DA. A systematic review of pneumatic compression for treatment of chronic venous insufficiency and venous ulcers. J Vasc Surg. 2003 Mar;37(3):539-44.	Pneumatic compression and pneumatic sequential compression.	Systematic review	Insufficient evidence to inform decisions at this time.
Biland L, Hurlimann F, Goor W, Korner WF, Kundig A, Madar G.. Treatment of venous ulcers: A multiple-center randomized double blind study.*VASA* 1985 (4):383-389	210 subjects (197 evaluable) 1: Placebo (PBO) IV + PBO ointment; (Oint) 2: PBO IV, Socoseryl (S)Oint; 3:S IV +PBO Oint; 4 : S IV, S Oint	RCT. Measuring % healing at 4 and 6 weeks	. Greater healing took place with Group 4 solcoseryl i.v. and solcoseryl ointment.
Bjellerup M. Does dorsal pedal pulse palpation predict hand-held Doppler measurement of Ankle-Brachial Index in leg ulcer patients?	510 venous ulcer patients: 337 with palpable pedal pulse 137 without palpable pedal pulse	Prospective cohort study calculating predictive validity of pedal pulse versus ABI in predicting arterial disease	Palpable pedal pulse delivered a 40% false negative rate in predicting arterial disease as defined by ABI < 0.9. ABI was

Wounds 2003; 15(7):237-240.			deemed mandatory in ruling out arterial disease.
Black SR Venous stasis ulcers: A review. *Ostomy/Wound Management,* 1995; 41(8):20-29.		Review	
Blair SD, Wright DDI, Backhouse CM, Riddle E, McCollum CN. Sustained compression and healing of chronic venous ulcers. *BMJ* 1988; 297:1159-1161.	1. Adhesive plaster (AP) control compression (20) 2. 4-layer elastic compression bandage (4LB) (20) 126 consecutive pts whose ulcers had not healed in a mean of 27.2 (StdErr 8) months were subsequently managed with 4LB for 12 weeks.	Compression was measured every 2 hours up to 8 hours after application, at 24 and 7 days after application as well as healing and recurrence. Correlated compression to ankle circumference reduction. % healed was measured after 12 weeks on 4LB	Initially applied ankle—knee compression: 4LB 43—17 mmHg, maintained at ankle >35 mmHg for 7 days versus AP 30—6 mmHg on AP application declining to <20 mmHg after 8 hours. 4LB applied more consistent compression across appliers. 4LB reduced edema more and healed 74% of ulcers on 110 patients (not patients) at 12 weeks
Blecken SR, Villavicencio JL, Kao TC. Comparison of elastic versus nonelastic compression in bilateral venous ulcers: a randomized trial. J Vasc Surg. 2005;42(6):1150-5.	12 patients with bilateral VUs randomly assigned to either: -Circaid™ (12 legs) -4-layer bandage (12 legs)	12-week RCT of same-subject different leg VUs. Measures: % healed, patient satisfaction every 4 weeks, duplex ultrasound, phlebography, air plethysmography documented nature and site of obstruction	Circaid™ group healed 4.14 cm^2/week; 4LB 1.22 cm^2/week (p=0.011. Cox proportional hazard ratio for healing greater for Circaid (p=0.017)
Blomgren L, *Johansson G, Siegbahn A, Bergqvist D.* Coagulation and fibrinolysis in chronic venous insufficiency, *Vasa,* 2001; 30(3):184-7.	20 patients with CVI 20 matched controls	Blood samples were analyzed to correlate plasma markers with ulcer development.	Increased levels of PAI-I and tPA in patients with CVI compared to controls
Bolivar-Flores, X.Y., Kuri-Harcuch, W. Frozen Allogeneic Human Epidermal Cultured Sheets for the Cure of Complicated Leg Ulcers *Dermatological Surgery* 1999 Aug: 25 (8):610-617.	Frozen human allogenic epidermal cultures (10 patients)	Open, non-randomized	All ulcers healed. Range of healing time1-31 weeks after first application.
Bolton l, McNees P, van Rijswijk L, de Leon J, Lyder C, Kobza L, Edman K, Scheurich A, Shannon R, Toth M, and the Wound Outcomes Study Group. Wound-healing outcomes using standardized assessment and care in clinical practice. *JWOCN* 2004; 31(2): 65-71.	767 wounds on 433 patients treated with mainly HCD D2 and less than 5% gauze: 373 Stage III-IV PU, 134 Stage II 124 Full-thickness VU, 30 partial-thickness. mainly HCD + compression protocol	Prospective CO study in 12 HHC agencies, 3 ILTC facilities a University hospital based Long Term Acute Care setting using Solutions® algorithms March-October 2001. Most were full-thickness (FT) VU professionals had been unable to heal.	77% of 30 partial-thickness (PT) VU and 61% of 134 PT PU healed in 12 weeks; mean healing times: 29 $\pm$ 7 days for PTVU and 31$\pm$ 7 days for PTPU. 44% of 124 full-thickness VU and 36% of 373 FTPU healed in 12 weeks; mean heal time = 57 $\pm$ 7 days for FTVU and 36 $\pm$ 7 days for FTPU
Bolton LL. Evidence-based Report Card: Operational definition of moist wound healing. *JWOCN* 2007; 34(1):23-29	4 RCTs and 1 meta-analysis (Kerstein et al, 2001 below is rigorous demonstration of the healing effect of low MVTR effect dressings on venous ulcers.)	Systematic review of studies comparing low, medium or high MVTR dressings on all major types of wounds. Uses low MVTR as operational definition of “occlusive”.	In every study the lower MVTR dressing was associated with faster healing than the higher MVTR dressing HCD or film > foam> gauze. Not always statistically significant differences.
Bonham PA, Flemister BG, Goldberg M, Crawford PE, Johnson JJ, Varnado MF. What's new in lower-extremity arterial disease? WOCN's 2008 clinical practice guideline. J Wound Ostomy Continence Nurs. 2009;36(1):37-44.		WOCN Guideline for arterial ulcers.	Reduced compression (23-30 mm Hg at the ankle) for VU patients with,edema and moderate arterial insufficiency (ABI 0.5 - 0.8). No sustained, high compression for patients with ABI <0.5mmHg *Expert Opinion*
Bouza C, Munoz A, Amate JM Efficacy of modern dressings in the treatment of leg ulcers: A systematic review. WOUND REP REG 2005;13:218–229	11 Studies for hydrocolloids Alginates, Foams, Other modern dressings	Systematic Review of studies comparing modern to traditional dressings	Insufficient evidence to detect a healing advantage of modern dressings compared to traditional dressings in treatment of leg ulcers.

Bradley M, Cullum N, Sheldon T. The debridement of chronic wounds: a systematic review. Health Tech Assess 1999; 3(17 Part 1)			
Brassard, A. A Prospective, multi-centre, randomized, controlled clinical investigation of dermagraft in patients with venous leg ulcers: a feasibility study *Canadian Journal of Plastic Surgery* 2002;10: 17A-22A.	Dermagraft + multilayer compression bandage, 13 patients Multilayer compression bandage, 13 patients	Prospective, multicentre, pilot Randomized, Controlled, feasibility study (not sufficiently powered for statistical significance).	38% (5/13) healed with Dermagraft + compression, 38% healed with intermittent Dermagraft + compression, 15% (2/13) healed with compression alone (control group).
Brem, H, Balledux, J, Sukkarieh, T, Carson, P, Falanga, V. Healing of Venous Ulcers of Long Duration with a Bilayered Living Skin Substitute: *Results from a General Surgery and Dermatology Department J Foot Ankle Surgery*: 1999 Nov.-Dec: 38 (6): 388-93.	33 patients with 54 VU >1 year duration at a general surgery department of a major medical center and a dermatology department of a university-based hospital during the study were treated with fenestrated living skin equivalent (LSE)	CS Retrospective review of healing results. Repeated surgical debridement and treatment with LSE after 7 days was practiced.	74% of Vus completely healed in 6 months, after a median of 2 LSE applications. Mean healing time was 55 to 61 days. Vus treated in the surgery and dermatology departments were similar in wound size and duration and patient population.
Breuing KH, Bayer L, Neuwalder J, Orgill DP. Early experience using low-frequency ultrasound in chronic wounds. Ann Plast Surg. 2005;55(2):183-7.	Low Frequency Ultrasound Debridement (17 VU patients)	CS over 8 months debridement and bacterial biofilm destruction with minimum follow up of 3 months	20-30% reduction in wound area. No patient required antibiotics.
Briggs M, Nelson EA. Topical agents or dressings for pain in venous leg ulcers. Cochrane Database Syst Rev. 2010 Apr 14;(4):CD001177.	6 RCTs EMLA) lidocaine-prilocaine cream 2 RCT of Foam w/without ibubrofen (studied only on first evening of use.	MA of 6 RCTs measured debridement pain that 5% Eutetectic Mixture of Local Anesthetic (EMLA) lidocaine-prilocaine cream	Significant EMLA reduction in pain. Effect on healing is uncertain. No effect of Ibuprofen on VU pain first evening of use. (Both RCTs effective week 1)
Brizzio E, Amsler F, Lun B, Blättler W Comparison of low-strength compression stockings with bandages for the treatment of recalcitrant venous ulcers. J Vasc Surg. 2010;51(2):410-6	Medical compression stockings (28) Short Stretch bandages (27)	RCT of healing within 90 days	NS difference between the two groups in any healing, pain or QoL parameter, time to heal identical. Both alleviated pain promptly. QoL improved only in patients who healed.
Burton CS. Treatment of leg ulcers. *Dermatol Clinics* 1993; 11(2):315-323.	LR	LR and Expert opinion	Venous disease is associated with venous hypertension and responds poorly to diuretic therapy.
Burton C. Venous ulcers. *Amer J Surgery* 1994;167(1A Suppl): 37S-41S	Hydrocolloid Dressing DuoDERM® or DuoDERM® CGF (5 studies: 181 subjects) Hydrocolloid Dressing Comfeel® (1 study: 30 subjects) Gauze or Unna's boot (3 studies: 54 subjects)	Review of venous ulcer studies using compression and reporting healing times and/or % wound contraction per week and summary of protocol of care and infection rates experienced in Duke University ambulatory leg ulcer clinic.	Infections noted at 1% of weekly dressing changes despite heavy colonization. Healing review: HCD D family: 50% healed in 12 weeks to 82% healed in 50 days. HCD C: 43% healed in 12 weeks Gauze/Unna's boot: 23-43% healed in 12 weeks.
Canedo-Dorantes L, Garcia-cantu R, Barrera R, Mendez-Ramirez I, Navarro VH, Serrano G. Healing of chronic arterial and venous leg ulcers with systemic electromagnetic fields. *Arch Med Res* 2002, 33(3): 281-289.	Extremely low frequency electromagnetic fields (ELF) (26 patients with 42 chronic venous or arterial or mixed leg ulcers)	Prospective historically controlled case series on non-healing leg ulcers with a median duration of 639 days before ELF treatment	69% of ulcers healed. More than 50% healed in less than 4 months. Ulcers failed to heal if there was important arterial occlusion, uncontrolled arterial hypertension, severe lipodermatosclerosis, non-pitting edema, obesity or in patients with auto-immune disease.
Callam MJ, Harper DR, Dale JJ, Brown D, Gibson B, Prescott RJ, Ruckley CV. Lothian and forth	Compression: 1. Elastic: orthopaedic wool (Soffban), Tensopress +	Prospective RCT for 12 weeks in leg ulcer clinics in Scotland UK	% completely healed at 12 weeks was: 54% for elastic compression

valley leg ulcer healing trial .1. elastic versus nonelastic bandaging in the treatment of chronic leg ulceration. Phlebology 1992;7:136- 141.	Tensoshape (65) 2.Non-elastic: orthopaedic wool (Soffban), Elastocrepe + Tensoplus Forte; (67)		28% for non-elastic compression
Callam MJ, Ruckley CV, Dale JJ, Harper DR. Hazards of compression treatment of the leg: an estimate from Scottish surgeons. *BMJ* 1987;295:1382.	Review of safety of compression stockings and bandages	Literature review	High levels of compression in patients with arterial disease can lead to adverse effects and amputation.
Cameron J, Hoffman D, Wilson J, Cherry G. Comparison of two peri-wound skin protectants in venous leg ulcers: a randomised controlled trial. J Wound Care. 2005;14(5):233-6.	Cavilon No Sting Barrier Film (NSBF, n=35) or zinc paste bandage (35)	RCT measured healing, ease of application and removal during 12 weeks in hospital based VU clinic.	No significant difference in wound area decrease 5.11+/-8.39cm2 NSBF 4.59+/-5.83cm2 Zn. NSBF easier to apply, remove
Cardinal M, Eisenbud DE, Armstrong DG, Zelen C, Driver V, Attinger C, Phillips T, Harding K. Serial surgical debridement: a retrospective study on clinical outcomes in chronic lower extremity wounds. Wound Repair Regen. 2009;17(3):306-11.	366 VU 310 DU Both datasets from Advanced BioHealing prior RCTs	Retrospective cohort (RCO) analyses of % healed over 12 weeks and wound closure rate in week after debriding at clinic. Correlations calculated between frequency of surgical debridement and rates of wound closure. + Effect of serial debridement almost significant (p = 0.069)	Weekly VU areas decreased more following clinic visit with surgical debridement (p=0.019). Debridement frequency was NOT correlated to higher rates of wound closure within centers, but centers that debrided more frequently had higher closure rates. I.e. other practices than debridement may have been causing the effect.
Carpentier PH, Cornu-Thenard A, Uhl JF, Partsch H, antignani PL; Societe Francaise de Medicine Vasculaire; European Working Group on the Clinical Characterization of Venous Disorders. *J Vasc Surg* 2003; 37(4):827-833.	872 full records of unselected patients were evaluated for Clinical, Etiologic, Anatomic and Physiologic variables of the CEAP.	Retrospective chart review of an unselected cohort of 872 patients with vascular disease were abstracted to determine validity of ascending severity and additivity of CEAP clinical scores.	CEAP clinical classes showed good ascending severity, but poorer additivity, as measured with the Cronbach alpha coefficient. Additivity was satisfactory in highest clinical severity cases, but poorer in the lower 3 classes.
CDC. Steps to Prevent Antimicrobial Resistance. www.cdc.gov/drugresistance/healthcare/ha/12steps_HA.htm	Campaign to prevent antimicrobial resistance in healthcare settings Fact Sheet; general guidelines	EO	Target definitive antibiotic therapy to known pathogens identified through C&S. Treat infection, not contaminants or colonization. Monitor response to treatment & adjust or stop when indicated.
Chaby G, Senet P, Vaneau M, Martel P, Guillaume JC, Meaume S, Téot L, Debure C, Dompmartin A, Bachelet H, Carsin H, Matz V, Richard JL, Rochet JM, Sales-Aussias N, Zagnoli A, Denis C, Guillot B, Chosidow O. Dressings for acute and chronic wounds: a systematic review. Arch Dermatol. 2007;143(10):1297-304	Acute or chronic wounds All modern dressings including HCDs, alginates, films, hydrofiber or gauze	Review of MEDLINE, EMBASE and Cochrane databases 1990-2006 and derivative references for studies reporting wound healing, pain, infection or dressing exudate management, and trauma on removal or ease of use.	11 RCTs and 3 meta-analyses led to conclusion that HCD were only form of dressing with strong evidence of healing advantage over impregnated gauze
Chaby G. Management of leg ulcers. Rev Prat. 2010;20;60(7):970-978.		LR	VU cleansing does not require antiseptics. Debridement is an accepted practice but no RCTs tested efficacy on VU. No systemic treatment has any indication in treatment/ prevention of ulcers. Consider systemic antibiotics only if VU presents clinically significant infection
Chan CLH, Meyer FJ, Hay RJ, Burnand KG.Toe ulceration	Cohort of 194 patients with at least one VU, managed with	Prospective cohort study of patients with VU etiology	12 (6%) treated with the 4-layer bandage acquired toe and/or cleft

associated with compression bandaging: observational study. *BMJ* 2001;323:1099.	weekly changed 3-layer or 4-layer elastic compression bandages.	confirmed with duplex Doppler ultrasonography , ascending phlebography and, after healing, foot voume.	ulceration during treatment, despite confirmed absence of ischemia or vasculitis. One required amputation which then healed successfully.
Charles H. Compression healing of ulcers. Journal of District Nursing 1991;4:6-7.	Compression: 1.Short stretch bandage (Rosidal K) applied by project nurse (27) 2.'Usual treatment' applied by district nurse (26)	Prospective RCT, of 3 months duration in home care, London, UK	71% healed with Rosidal K 25% with usual treatment Ulcers increased in size 0% with Rosidal K versus 21% with usual treatment
Charles H. Venous leg ulcer pain and its characteristics. J. *Tissue Viability* 2002; 12(4):154-158.	Short-stretch bandage (67) + DuoDERM CGF (20) or + Cutinova Hydro (23) or + Comfeel (22)	Prospective RCT of VU pain using VAS or McGill Pain Questionnaire Present Pain Index over 12 weeks	VAS and Present Pain Index reduced from mean of 4.5 in 71% of patients on entry to 1.5 at 2 weeks then decreased to <1.
Charles H, Callicot C, Mathurin D, Ballard K, Hart J. Randomised, comparative study of three primary dressings for the treatment of venous ulcers. *Br J Community Nursing* 2002; 7(6):48-52.	Short-stretch bandage (91) randomized to 1 of 3 primary dressings: + DuoDERM CGF (31) or + Cutinova Foam (31) or + Comfeel (29)	Prospective RCT of VU pain and healing over 12 weeks. Small group sizes, may be underpowered for healing differences.	67% of VU patients initially reported mean 0-10 VAS pain of 4.1, dropping to 1.4 during first 2 weeks of all dressings. No differences between pain or healing among the dressing groups.
Cherry GW, Cameron J, Ryan TJ. Blueprint for the treatment of leg ulcers and the prevention of recurrence. *Wounds* 1993; 3:2-5.	Algorithm for VU management	EO	Stasis dermititis is diagnositc for VU and CVI
Chrisman CA. Care of chronic wounds in palliative care and end-of-life patients. Int Wound J. 2010;7(4):214-35	LR: early recognition of delayed healing, quality of life measurement tools related to chronic wounds, and comfort care strategies aligned with patient wishes	LR of practices for wound palliative care . Include realistic expectations for wound improvement	Wound related symptoms: pain, exudate, odour, infection, bleeding, dressing comfort, low psychological & social functioning. Closure may not be realistic.
Christiansen, J., Ek, L., Tegner, E. Pinch Grafting of Leg Ulcers. A Retrospective Study of 412 Treated Ulcers in 146 Patients *Acta Derm Venreol* 1997 Nov.; 77(6):471-473.	Pinch Grafts 412 leg ulcers in 146 patients	CS Retrospective uncontrolled study.	Overall healing rate was 38%. Mean duration of follow-up was 32 months. In ulcers stilled healed at the close of the study (27%), the remission time was > or = 26.6 months.
Choh CT, Wall ML, Brown MD, Nicolson AM, Simms MH Use of durometry in assessment of venous disease. Phlebology. 2010;25(2):94-9.	107 people with 203 lower limbs with or without venous insufficiency with CEAP score 0,1 or 2 or 4,5 or 6	A durometer probe resting perpendicular to the skin tested hardness of the skin to assess induration.4 measurements were averaged.	Age and CEAP classification correlated ($p<0.0001$) with durometry.
Clarke-Moloney M, Lyons GM, Breen P, Burke PE, Grace PA. Haemodynamic study examining the response of venous blood flow to electrical stimulation of the gastrocnemius muscle in patients with chronic venous disease. Eur J Vasc Endovasc Surg. 2006;31(3):300-5.	10 patients with a VU (CEAP = 6) under 6 conditions: 1. Standing 2. Voluntary calf muscle contraction 3. 1 + neuromuscular electrical stimulation (NMES) 4. 1. + compression bandage (CB) 5. 2 + CB and 6. NMES+CB	Prospective descriptive study completely counterbalanced design. Peak venous velocities were measured under all 6 conditions for all 10 patients. Visual Analog Scale (VAS) measured patient comfort.	Venous velocity increased with voluntary calf muscle contraction and with NMES, moreso with compression. 90% of patients reported NMES as comfortable.
Clarke-Moloney M, O'Brien JF, Grace PA, Burke PE. Health-related quality of life during four-layer compression bandaging for venous ulcer disease: a randomised controlled trial. Ir J Med Sci. 2005;174(2):21-5.	200 4 layer bandage 200 usual care	RCT measuring health-related quality of life (HRQoL)	Significantly better QoL with 4 layer bandage.
Coleridge-Smith P, Lok C, Ramelet AA. Venous leg ulcer: a meta-	Daflon 500 mg (micronized purified flavonoid fraction	MA 2 RCT vs Placebo + 4 RCT vs conventional Tx alone	32% greater likelihood of healing with adjunctive Daflon 500 mg

analysis of adjunctive therapy with micronized purified flavonoid fraction. Eur J Vasc Endovasc Surg. 2005;30(2):198-208.	[MPFF] 2 tablets/day with compression cf conv.+ placebo placebo(309 with >5 cm^2 >6 mo duration VU)	Primary: % healed at 6 months	compared to conventional therapy alone. No effect vs placebo stated. Shorter healing time 16 weeks vs 21 wks (p=0.0034)
Coleridge-Smith P, Sarin S, Hasty J, Scurr JH. Sequential gradient pneumatic compression enhances venous ulcer healing: A randomized trial. *Surgery* 1990;108:871-5.	Treatment w/wo sequential compression device (SCD): Control(24): debrided, non-adherent dressing, compression stockings SCD (21): as above + SCD 3-4 hours/day	RCT Weekly wound assessments until healed or 3 months	Healed: Control 1/24 vs SCD 10/21 (p<0.009) Median rate of healing: (area/week) Control 2.1% vs SCD 19.8% (p<0.05)
Colgan MP, Teevan M, McBride C, O'Sullivan L, Moore D, Shanik G. Cost comparisons in te management of venous ulceration. *Proc. 5th European Conf Adv Wound Management.* London: Macmillan Magazines, 1996. (as cited in Cullum 2001 Cochrane Review)	1. 4-layer elastic Unna's Boot (10) 2. 4-layer elastic Profore® (10) 3. Lyofoam primary dressing + Setopress™ elastic bandage (10)	RCT Dressing changes in clinic by nurse. Outcome measured was cost and % of patients healed at 12 weeks.	60% healed 4-layer elastic Unna's Boot; 70% healed in Profore group; 20% healed in Setopress group (which had 3 dropped due to poor patient compliance or inadequate application. Setopress protocol cost less. Significance of differences not reported for this study.
Collins L, Seraj S. Diagnosis and treatment of venous ulcers. Am Fam Physician. 2010;81(8):989-96.		LR with evidence base for each intervention	Compression 5 RCT A Level Elevation: 1 CCT: C Level Dressings beneficial: A Level Pentoxifylline (Trental) A Level Aspirin (1 RCT)
Combemale P, Bousquet M, Kanitakis J, Bernard P, Angiodermatology Group, French Society of Dermatology. Malignant transformation of leg ulcers: a retrospective study of 85 cases. J Eur Acad Dermatol Venereol, 2007; 21 (7): 935-941; PMID: 17659003	85 cases of malignant transformation of leg ulcers	Retrospective case series.	Description, many were long term VUs
ConvaTec. SOLUTIONS wound care algorithm. Princeton (NJ): ConvaTec; 2008. Accessed November 1, 2010 at www.guidelines.gov	All wound treatment	Content-validated evidence-based guideline for wound cleansing, debriding, dressing excess exudate management, hydrating dry wounds.	Care decision algorithms based on reliable, validated wound assessment. Re-evaluate care plan/ address etiology if the wound has not decreased in area during 2 to 4 weeks of care.
Cordts PR, Hanrahan LM, Rodriguez AA, Woodson J, LaMorte WW, Menzoian JO. A prospective, randomized trial of Unna's boot versus Duoderm CGF hydroactive dressing plus compression in the management of venous leg ulcers. Journal of Vascular Surgery 1992;15:480-6.	1. Duoderm CGF + Coban (16) 2. Unna's boot (14)	RCT Weekly assessments of VU healing rates until healed or 12 weeks. Patient ratings of comfort, adhesion, cosmesis and odor.	Healing rates faster with Duoderm + Coban than Unna's boot (p<0.002) when corrected for initial perimeter differences. 50% healed at 12 weeks in Group 1; 43% in Group 2 (p=0.18) Group 1 patients rated dressing higher. (p<0.05) in comfort, adhesion, cosmesis and with more odor
Cullum NA, Al-Kurdi D, Bell-Syer SE. Therapeutic ultrasound for venous leg ulcers. Cochrane Database Syst Rev. 2010;(6):CD001180	8 RCTon ultrasound for VU 6 RCT on High frequency 2 RCT on Low frequency	Systematic review	High frequency US healed more patients with VU at 7-8 weeks than no US (5 RCT). The effect did not last to 12 weeks. 2 RCT: NS effect of low frequency US
Cullum.N, Nelson EA, Fletcher AW The Cochrane library 2001, Compression for venous ulcers (Cochrane Review) In *The Cochrane Library*, Issue 3, 2002: Update Software	1. Compression vs dressings [Kitka, 1988; Rubin, 1990; Sikes, 1985] 2. Compression wraps vs noncompression wraps	Analyses of literature for each numbered question investigated.	1. Compression heals more VU than dressings alone 2. Compression wraps heal more VU than noncompression 3. Multi-layer elastic

	[Charles, 1991; Erikson, 1984; Taylor, 1998]		compression is better than non-elastic and than single layer elastic compression
Cushman M. Epidemiology and risk factors for venous thrombosis. Semin Hematol. 2007;44(2):62-9	Literature review of 79 references	LR: Venous thrombosis (DVT pulmonary embolism and post-thrombotic syndrome [PTS]) risk factors.	PTS occurs in 20-50% after 1st DVT (2 CO). Risk factors include older age, male gender, proximal (as compared to distal) DVT and higher D-dimer.
Cushman M, Callas PW, Denenberg JO, Bovill EG, Criqui MH. Risk factors for peripheral venous disease resemble those for venous thrombosis: the San Diego Population Study. Thromb Haemost. 2010;8(8):1730-5.	2404 men and women in the San Diego Population Study: 308 cases developing a DVT of graded severity compared to 346 controls with no venous abnormality, frequency case-matched in 10 yr age groups	Case-control study. Peripheral venous disease was evaluated using physical exam, symptom assessment and venous ultrasound. All had no prior DVT initially.	Risk factors for PTS are : Age, obesity, family history, elevated factor VIII, von Willebrand factor, D-dimer and factor V Leiden, all similar to those for DVT. PTS may result from previously unrecognized DVT. Prothrombin 20210A was unrelated to venous disease. DVT risk factors are associated with presence and severity of peripheral venous disease.
da Silva JL, Lopes MJ. [Health education for varicose ulcer patients through group activities] Rev Gaucha Enferm. 2006;27(2):240-50.	Not stated in abstract.	HCT in Portuguese	Leg Club model improved adherence to treatment, attitude of health care team.
Daniels S, Sibbald RG, Ennis W, Eager CA. Evaluation of a new composite dressing for the management of chronic leg ulcer wounds. J Wound Care. 2002;11(8):290-4.	75 dressing changes of 11 ulcers dressed with Versiva® (ConvaTec). Historic control data taken for each patient.	Prospective HCT, open-label, multicentre, phase II study assessed weartime, absorption, dressing integrity, ease of use and wound progression during up to 10 dressing changes within five-week study period of patients with venous leg ulcers	*Healing or marked improvement was observed in 82% of leg ulcers within the five-week study. *93%, the dressing was 'very easy' to remove, with no trauma to surrounding skin *Minimal to no leakage was observed in 81% of changes * Most dressing changes (77%) were painless
Danielsen L, Madsen SM, Henriksen L. Venous leg ulcer healing: a randomised prospective study of long-stretch versus short-stretch compression bandages. *Phleboloby* 1998; 13:59-63. In Cullum et al. 2002 Cochrane systematic review.	1. 2-layer long-stretch elastic high compression with gauze + Setopress® (21) 2. 2-layer short-stretch high compression with gauze + Comprilan non-adhesive bandage (19)	Prospective RCT with number of patients healed/total assessed at that time interval (%) and ulcer area reported at 1, 6 and 12 months. 5 Withdrew in Group 1; 9 withdrew in Group 2.	% healed at 1, 6, 12 months: Group 1: 27%, 50%, 71% Group 2: 5%, 36%, 30% % area remaining at 1,6,12 mo Group 1: 45%, 81%, 25% Group 2: 72% 60% 95% Cullum et al. report 9/21 Group 1 healed (43%) and 5/19 (26%) healed in Group 2. NS.
Davis J, Gray M. Is the Unna's boot bandage as effective as a four-layer wrap for managing venous leg ulcers? J Wound Ostomy Continence Nurs. 2005;32(3):152-6.			
Davis LB, McCulloch JM, Neal MB. The effectiveness of Unna Boot and semipermeable film vs. Unna Boot alone in the healing of venous ulcers. A pilot report. Ostomy Wound Manage. 1992;38(1):19-21.	11 patients with 12 VUs Unna's Boot Medicopaste Bandage covered with Tensoplast® wrap(6 ulcers) Above wrapping procedure + occlusive film dressing (6 ulcers)	RCT continued for 6 months or until the ulcer(s) were healed. Healing rate was measured as cm^2 per day reduction in wound area	With addition of the film dressing mean healing rate was 0.30 cm^2 per day compared with 0.12 cm^2 per day for ulcers dressed with Unna's boot without the film dressing.
DePalma, RG,Kowallek D, Spence RK, Caprini JA, Nehler MR, Jensen J, Goldman MP, Bundens WP. Comparison of costs and healing rates of two forms of compression	Compare healing rates and costs of Unna boots (19) and CircAid (19); 7 withdrawn (5 UB, 2 TB)	RCT: Multi-center, prospective, randomized, parallel-group study measured healing time, rate, area decrease, costs of labor,	Treatment of venous ulcers with CircAid Thera-Boots is significantly less costly than treatment with Unna's Boots. No significant difference in time to

in treating venous ulcers *Vascular Surgery* 1999;*33(6):*683-690.		materials and overhead	healing (weeks) 9.69+ 3.28, 7.98 + 4.41, p=0.41
Dimakakos E, Katsenis K, Kalemikerakis K, Arkadopoulos N, Mylonas S, Arapoglou V, Tsiganis T,Kotsis T. Infected venous leg ulcers: management with silver-releasing foam dressing. *WOUNDS* 2009;21(1): 4-8.	Contreet® Ag nonadhesive ionic silver foam dressing (21 patients with infected VU) Biatain® nonadhesive foam dressing (21 similar patients) These were all the infected VU that were exclusively VU + infected during 12 months	RCT measuring % healed after 9 weeks (primary) and pain evolution (secondary). Dressings were changed twice weekly and covered with short-stretch compression all wrapped by the same nurse. VU confirmed by duplex US. Added results: 6 highly exuding VU healed in Ag group and no highly exuding VU in non-Ag group healed.	Groups similar at baseline.12 in Ag group and 14 in non-Ag group had VU duration > 1 month on enrollment. 9-weeks: 17 (81%) healed in Ag group (4 deep>5mm; 13 ≤ 5mm) and 10 (48%; 1 deep; 9≤ 5mm) healed in non-Ag (p = 0.02). VU . All Ag patients pain-free by wk 8; 4 non-Ag patients still reported moderate pain through week 9. No difference between groups in bacterial load. No related adverse events.
Donati L, Magliano E, Colonna M et al. Surgical versus enzymatic debridement in: Westerhof W, Vanscheidt W. editors. Proteolytic enzymes and wound healing. New York: Springer Verlag; 1994. Pp:38-9	Surgical debridement, mechanical debridement and enzymatic debridement	LR: Advantages and disadvantages of each described	Expert opinion regarding value of each therapy.
Cameron J, Hoffman D, Wilson J, Cherry G. Comparison of two peri-wound skin protectants in venous leg ulcers: a randomised controlled trial. J Wound Care , 2005;14(5):233-6.	Cavilon No Sting Barrier Film (NSBF: ~half of 35 patients with VU) Zinc Paste bandage (ZP: ~half of 35 patients with VU) All patients had compression bandage too.	RCT applying the surrounding skin protectant at every dressing change for 12 weeks measuring decrease in wound area, % area reduction/week, time and convenience to apply	Both products were evvective barriers. NSPF was easy to apply and transparent. The zinc paste was messy to apply and difficult to remove, and thus took up considerably more nursing time than NSBF
Duby T, Cherry G, Hoffman D, Cameron J, Dobloff-Brown D, Ryan T. A randomized trial in the treatment of venous leg ulcers comparing short stretch banages, four layer bandage system, and a long stretch-paste bandage system.. *Wounds* 1993;5(6):276-9.	1. Short stretch: Comprilan+Tricofix net (20) 2. Zinc paste Icthopaste + Elastocrepe (long-stretch) + Tubigrip (24) 4-Layer compression bandage (23)	RCT comparing treatment for 1-12 weeks, Measurements: • % change in leg volume • % of legs changing volume • % of V.Ulcers healed • Mean % change in area	Reduction in leg volume (edema reduction) strongly correlated with % reduction in ulcer area and % of ulcers healed, with 4-Layer compression 44% of ulcers healed (mean area reduction 76%); short stretch 40% (60% mean area reduction) and zinc paste bandage 23% healed (43% mean area reduction.
Dumville JC, Worthy G, Soares MO, Bland JM, Cullum N, Dowson C, Iglesias C, McCaughan D, Mitchell JL, Nelson EA, Torgerson DJ; VenUS II team. VenUS II: a randomised controlled trial of larval therapy in the management of leg ulcers. Health Technol Assess. 2009;13(55):1-182, iii-iv.	267 subjects with VU or mixed AU-VU ulcer: ABI<0.6 and ≥ 25% covered with slough or necrotic material assigned randomly to 1 od 3 groups: 1.Loose larval therapy 2. Bagged larval therapy 3. hydrogel	Multicenter 3-arm RCT . Time to complete healing measures listed in results column.	Maggot debridement (larval therapy) was associated with faster debridement of VU, but more pain, equal healing time and costs of care. No differences in health-related quality of life or bacteriology.
Edwards H, Courtney M, Finlayson K, Lewis C, Lindsay E, Dumble J. Improved healing rates for chronic venous leg ulcers: pilot study results from a randomized controlled trial of a community nursing intervention. Int J Nurs Pract. 2005;11(4):169-76.	33 VU patients: half randomized to Leg Club and half to Home care with standardized compression and	RCT of care for 12 weeks by a team of wound care nurses following evidence-based assessment & treatment guidelines. Data collected at baseline and week 12 on healing, and PUSH score	More healing in Leg club group (p<0.05)
Edwards H, Courtney M, Finlayson K, Shuter P, Lindsay E. A randomised controlled trial of a community nursing intervention: improved quality of life and healing for clients with chronic leg ulcers. J	Nurse led Leg Club (34 VU patients) with peer support Nurse led home care (33) All patients had identical research protocols with short-stretch bandages	RCT HRQoL, healing, functional capacity collected at baseline, 12 and 24 weeks.	Leg club improved outcomes in quality of life (p = 0.014), morale (p < 0.001), self-esteem (p = 0.006), healing (p = 0.004), pain (p = 0.003) and functional ability (p = 0.044)

Clin Nurs. 2009;18(11):1541-9.			
Eklöf B, Rutherford RB, Bergan JJ, Carpentier PH, Gloviczki P, Kistner RL, Meissner MH, Moneta GL, Myers K, Padberg FT, Perrin M, Ruckley CV, Smith PC, Wakefield TW; American Venous Forum International Ad Hoc Committee for Revision of the CEAP Classification. Revision of the CEAP classification for chronic venous disorders: consensus statement. *J Vasc Surg*. 2004;40(6):1248-52.	Literature review	Consensus statement and literature review updating CEAP classification system.	CEAP is a descriptive classification only for documenting symptoms. For longitudinal outcomes measurements use venous severity score and quality of life instruments.
Ennis WJ, Meneses P. Leg ulcers: a practical approach to the leg ulcer patient. *Ostomy/Wound Mgmt* 1995; 41(Suppl 7A):52S-63S.	Compression plus moist wound healing.	Expert opinion validated by clinical healing outcomes.from a CO of successive VU patients.	VU associated with non-pitting, tender, tight edema of lower extremity.
Eriksson G. Comparison of two occlusive bandages in the treatment of venous leg ulceration. *British Journal of Dermatology*. 1986 (II4): 227-230.	34 patients with venous ulcers. 17 patients treated with 1-layer compression + hydrocolloid dressing and 17 patients treated with double layered elastic compression bandage.	RCT. Objective evaluation with stereophotogrammetric measurement of ulcer area and volume and bacterial count. 8 week study.	No significant difference in 8-week healing between DuoDERM + one-layer elastic bandage (9/17 healed) or double layer bandage (7 /17 healed).Both provided compression and a moist wound environment.
Eriksson G. Comparative study of hydrocolloid dressing and double layer bandage in treatment of venous stasis ulceration. In: Ryan TJ (ed) An environment for healing: The role of occlusion. London: Royal Society of Medicine International Congress and Symposium Series, Number 88: 111-113, 1984.	1. 2-layer elastic compression (ACO Salvstrumpa® zinc paste stocking + Tensoplast® elastic bandage (Smith & Nephew) changed every 1-2 weeks (17) 2. 1-layer elastic bandage removed nightly, reapplied am, + DuoDERM (ConvaTec) changed 1-2 / week (17)	8-week RCT same as in Br J Dermatol 1986. Objective evaluation with stereophotogrammetric measurement of ulcer area and volume and bacterial count.	No significant difference in 8-week healing between DuoDERM + 1-layer elastic bandage and double layer bandage. (Note: same study as Erikkson BrJ Dermatol, 1986)
Eriksson G, Eklund AE, Liden S, Zetterquist S. Comparison of different treatments of venous leg ulcers: a controlled study using stereophotogrammetry. *Current Therapeutic Research* 1984;35: 4:678-684.	1. Metallina aluminium foil dressing (20) 2. Two layer bandage: ACO paste bandage +Tensoplast (13)	Multicenter 8-week study in Sweden, setting unclear. A third group crossed over during study from porcine skin dressing to 2-layer compression (not included)	% Area reduction at 8 weeks: 10% with aluminum foil 80% with 2-layer bandage % volume reduction 8 weeks: 0% with aluminum foil 90% with 2-layer bandage
European Wound Management Association (EWMA) Position document: understanding compression therapy. MEP Ltd, London, 2003.	Model of costs per patient year with compression with 4Layer compression or usual care based on LR	LR of pathophysiology of venous disease, lymphedema and role and outcomes of various forms of compression therapy, factors to consider before applying compression	Cost effectiveness, efficacy and safety evidence of compression therapy is reviewed. Mean cost /y of care with 4L Bandage € 1,205 or € 2,135 with usual care.
Falanga V. Venous ulceration: Assessment, classification and management. Chapter 20 in Krasner D, Kane D. *Chronic Wound Care, Second Edition.* Health Management Publications, Inc. Wayne PA, 1997, pp165-171.		Literature Review.	
Falanga V. Brem H. Ennis WJ. Wolcott R. Gould LJ. Ayello EA. Maintenance debridement in the treatment of difficult-to-heal chronic wounds. Recommendations of an expert panel. Ostomy/Wound		Consensus Development Conference protocol of care	Debridement recommendations

Management. Suppl:2-13; quiz 14-5, 2008 Jun.			
Falanga V, Fujitani RM, Diaz C, Hunter G, Jorizzo J, Lawrence PF, Lee BY, Menzoian JO, Tretbar LL,. Holloway GA, Hoballah J, Seabrook GR, McMillan DE, Wolf W. Systemic treatment of venous leg ulcers with high doses of pentoxifylline: efficacy in a randomized, placebo-controlled trial. Wound Repair & Regeneration. 1999; 7(4):208-13,	Pentoxifylline 400 mg t.i.d. (41) Pentoxifylline 800 mg t.i.d. (43) 3 times per day Placebo (45)	RCT of pentoxifylline doses systemically given measuring % of VU healed every 4 weeks until week 24. Time to complete healing	Authors conclude more VU healed with highest pentoxifylline dose, and they healed 4 weeks faster. Only subjects in the 800 mg pentoxifylline 3 x daily group healed faster than placebo subjects (p = 0.043)
Falanga, V. Margolis D,Alvarez O, Auletta M, Maggiacomo F, Altman M, Jensen J, Sabolinski M, Hardin-Young J, and the Human Skin Equivalent Investigators Group. Rapid healing of venous ulcers and lack of clinical rejection with an allogeneic cultured human skin equivalent. *Arch Dermatol, 1998; 134:293-300.*	Unna's Boot + Coban + Apligraf (n=146) Unna's Boot + Coban alone (n = 129)	Prospective, randomized, multi-center study of wounds to healing or for a 6-month period using 1-5 (median 3.3) applications of Apligraft	In hard-to-heal wounds (>1 year's duration), Apligraf was more effective than compression alone in achieving wound closure at 6 months (63% vs. 48.8%, p=.02 Apligraf-treated wounds healed in a mean of 181 days vs 231 days for large ulcers (p=.02); 56 days for Apligraf vs 98 days control for small ulcers (p=.04)
Falanga V, Saap LJ, Ozonoff A. Wound bed score and its correlation with healing of chronic wounds. Dermatol Ther. 2006 ;19(6):383-90.	Analysis of predictors of healing from bioengineered skin RCT database (177 VU) to develop Wound Bed Score (WBS)	Wound edges presence of eschar, greatest wound depth/ granulation tissue, amount of exudate amount, edema, peri-wound dermatitis, peri-wound callus/ fibrosis, pink/red bed	Validated predictor of healing is score 0-2 for each parameter: worst score 0 best possible score 16. Wounds that closed had higher WBS than those that did not (p=0.0012).
Feben K. How effective is training in compression bandaging techniques? Br J Community Nurs. 2003 Feb;8(2):80-4.	3 RCTs	Review of literature on trainig.	Training for compression application improves compression, but effect wanes without re-training.
Ferrara F, Meli F, Raimondi F, Amato C, Bonura F, Mulè G, Novo G, Novo S S. The treatment of venous leg ulcers: a new therapeutic use of iloprost. Ann Surg. 2007;246(5):860-5.	Iloprost (48) simple VU patients injected IV Saline (50) control injected	RCT evaluating % healed at 90 days	100% of iloprost group healed and 50% of control (p<0.05)
Fierheller M, Sibbald RG. A clinical investigation into the relationship between increased periwound skin temperature and local wound infection in patients with chronic leg ulcers. *Advances in Skin & Wound Care,* 2010; 23(8):369-378.	20 non-wound volunteers 18 non-infected leg ulcer patients 22 infected leg ulcer patients (confirmed by quantitative swab >10^5	Prospective CCT reliability of and correlation of $\geq$ 2 degree F increase in skin temperature surrounding VU with wound infection diagnosed as semi-quantitative surface swabs and STONEES	Elevated temperature was significantly related (p<0.0001) to wound infection presence as identified with combination of STONEES and semi-quantitative swabs
Fink AM, Kottas-Heldenberg A, Mayer W, Partsch H, Bayer PM, Bednar R, Steiner A. Lupus anticoagulant and venous leg ulceration. *B J Dermatol* 2002; 146(2): 308-310.	27 patients with VU 27 matched controls	Measured presence of lupus anticoagulant in patients with and without Vus	Significant difference (more?) in presence of lupus anticoagulant in patients with Vu than controls
Finlayson K, Edwards H, Courtney M. The impact of psychosocial factors on adherence to compression therapy to prevent recurrence of venous leg ulcers. J Clin Nurs. 2010 ;19(9-10):1289-97.	122 VU patients	RCO of factors that deter compliance with compression therapy. Adjusted for covariates and confounders in multiple regression model	Main self-care activities related to VU were application of topical skin treatments, wearing compression hosiery, covering legs to prevent trauma. Depression decreased compliance, education or knowledge about condition and self-efficacy increased compliance
Finlayson K, Edwards H, Courtney	80 patients with VU healed	Prospective longitudinal CO	At least 1 h/day of elevation, $\geq$6 d/

M. Relationships between preventive activities, psychosocial factors and recurrence of venous leg ulcers: a prospective study. J Adv Nurs. 2011;67(10):2180-2190	with 35 recurrences from 2006-2009, recurreing in a median time of 27 weeks	study of factors affecting VU recurrence. Cox proportional hazards regression adjusted for confounders determined effects of preventive factors	week spent wearing class2 (20-25 mmHg) or 3 (30-40 mmHg) compression hosiery, higher social support scale and higher General Self-Efficacy scores predicted lower recurrence p<0.05
Flemming K, Cullum N. Therapeutic ultrasound for venous leg lcers.) *The Cochrane Library*, Issue 2, 2002, Oxford: Update Sottware Ltd. Accessed 3 July 2002.(a)	Of 7 small RCTs found, 4 compared ultrasound (US) with sham US and 3 compared US with standard therapy.	Healing rates of VU were compared at various time points.	While no single study reached statistical significance, "available evidence does suggest a possible benefit of US therapy in the healing of venous leg ulcers."
Flemming K, Cullum N. Laser therapy for venous leg ulcers (Cochrane Review) *The Cochrane Library*, Issue 2, 2002, Oxford: Update Sottware Ltd. Accessed 3 July 2002.(b)	2 RCTs compared laser with sham therapy (88). 1 RCT compared laser with ultraviolet therapy (45) and one with non-coherent unpolarized light (6)	Three trials were pooled for a meta analysis. The fourth trial compared laser and UV light.	The three-arm analysis found more ulcers completely healed in the laser + IR group compared with non-coherent unpolarized light. No differences were significant in the fourth trial. Reviewer conclusion: no evidence of laser light efficacy by itself.
Forssgren A, Fransson I, Nelzén O. Leg ulcer point prevalence can be decreased by broad-scale intervention: a follow-up cross-sectional study of a defined geographical population. Acta Derm Venereol. 2008;88(3):252-6.	621 in- or out-patients in hospitals primary care or home care in Skaraborg Sweden.	Update of 1988 epidemiology cross-sectional study (Nelzen et al. 1991) after implementing multidisciplinary protocol using Doppler –aided diagnosis, increased surgery, hospital-based outpatient and nurse-led community clinics, compression with wraps or stockings, multidisciplinary team care.	82% > 64 years old. District and community nurses provided care for 88.5%. Point prevalence of 2.4/1000 population in 2002 vs 3.1/1000 in 1988, a 23% decrease in leg ulcer prevalence. Venous insufficiency was still the main cause, patients with VU reduced by 46%. Arterial ulcers decreased by 23%, while patients with ulcers of diabetic and multiple causes increased
Franek A, Polak A, Kucharzewski M Modern application of high voltage stimulation for enhanced healing of venous crural ulceration. . Med Eng Phys. 2000;22(9):647-55.	Group A (HV 33 Vu pts) High voltage electrical stimulation Group B (topical medication n=32) Group C (14: Unnas Boot)	RCT of 100 V HV measuring pus and granulation tissue on the wound surface after 2 weeks of stimulation	More granulation, less pus inGroup A after 2 weeks (p<0.003)
Franks PJ, Moffatt CJ. Do clinical and social factors predict quality of life in leg ulceration? Int J Low Extrem Wounds. 2006;5(4):236-43.	758 patients (mean age = 74.6 years, 64% women) had leg ulceration present for a median of 10.5 months	CO cross sectional study of health-related quality of life (HRQoL)	Large, long-duration VU leads to poorer HRQoL. Patients treated in nurse-led leg ulcer clinics had better HRQoL than did patients treated elsewhere.
Franks PJ, Moody M, Moffatt CJ, Hiskett G, Gatto P, Davies C, Furlong WT, Barrow E, Thomas H; Wound Healing Nursing Research Group. Randomized trial of two foam dressings in the management of chronic venous ulceration. Wound Repair Regen. 2007;15(2):197-202.	Allevyn Biatain	RCT comparing exudate management in VU	Both dressings manage exudate.
Franks PJ, Moody M, Moffatt CJ, Martin R, Blewett R, Seymour E, Hildreth A, Hourican C, Collins J, Heron A; Wound Healing Nursing Research Group. Randomized trial of cohesive short-stretch versus four-layer bandaging in the management of venous ulceration. *Wound Repair Regen* 2004;12:157–162	1. Cohesive 2-layer short-stretch system (Actico, Activa Healthcare) (82) 2. 4-layer bandage (74) both randomized to 1 of 2 foam dressings	Prospective multicenter RCT measuring % healed at 24 weeks	No significant difference in VU healing: 4-layer 69%; Short-stretch 73% p=0.79

Gallenkemper G,Rabe E, BauerR. Contact sensitization in chronic venous insufficiency: modern wound dressings. Contact Dermatitis 1998; 38: 274–8		LR	Be alert for sensitization reactions in VU patients skin surrounding VU
Garcia-Rinaldi R, Soltero E, Gaviria J, Sosa J, Tucker P. Implantation of cryopreserved allograft pulmonary monocusp patch to treat nonthrombotic femoral vein incompetence. *Texas Heart Inst J* 2002; 29:92-99.	38 patients with 40 >3 year duration VU resulting from non-thrombotic venous insufficiency of common femoral vein received patch	CS: Ulcer healing and competence of monocusp patches implanted using Duplex scans at 30 days, 6 months and 1 yr post-op	23 ulcers still healed at the end of 1 year with competent valves at patch sites. 27 of 36 evaluable ulcers eventually healed. 9 had monocusp insufficiency.
Gethin G, Cowman S. Bacteriological changes in sloughy venous leg ulcers treated with manuka honey or hydrogel: an RCT. J Wound Care. 2008;17(6):241-4, 246-7.	54 patients with VU<100 cm^2 in each group: Manuka Honey (MH) Hydrogel (HG) All treated with compression.	Open label RCT of VU covered with >50% slough. Wound swabs taken at baseline and after 4 weeks of topical treatment. Different from Gethin & Cowman 09.	16 patients had MRSA at baseline eradicated in 8 / 10 of MH group by week 4 and increased from 6 at baseline to 7 at week 4 for HG group. Pain decreased more with MH than HG. (P<0.05)
Gethin G, Cowman S. Manuka honey vs. hydrogel--a prospective, open label, multicentre, randomised controlled trial to compare desloughing efficacy and healing outcomes in venous ulcers. J Clin Nurs. 2009;18(3):466-74.	VU patients >18 years of age with ABI ≥ 0.8 and a VU of area < 100 cm^2 with ulcer bed ≥ 50%covered with slough. Manukah honey (MH) 5 g/ 20 cm^2 (54) Hydrogel (HG) 3 g/ 20 cm^2 (54) Both covered with hydrocellular foam, mostly 4-layer bandage	Open label RCT. All patients treated once weekly for at least 4 weeks. Primary outcomes % slough week 1-4 and % healed at 12 weeks. Secondary outcomes: decrease in wound size; percent epithelized; safety was measured as adverse events	Baseline mean duration:MH: 39.5 wk, HG 29.9 wk; area MH 10.5 cm^2, HG 9.9 cm^2 At 4 weeks MH had 67% slough decrease, HG 53% (p=0.05) At 12 weeks, 44% of MH and 33% of HG patients healed (p=0.037). Epithelization was visible earlier for MH (p=0.042). Median wound size decreased from baseline to week 4 by 34% for MH or 13% for HG (p=0.001). At 4 weeks ≥ 50% slough reduction associated with a higher 12-wk healing probability-all patients (p =0.029)
Geyer MJ, Brienza DM, Chib V, Wang J. Quantifying fibrosis in venous disease: mechanical properties of lipodermatosclerotic and healthy tissue. Adv Skin Wound Care. 2004;17(3):131-42.	9 healthy volunteers 9 venous insufficiency individuals	CCT quantifying fibrosis and lipodermatosclerotic tissue compared to healthy tissue using ultrasound indentometry and computerized tomography.	Significant differences between groups on CT and quasi-liniear viscoelastic tissue parameters and ultrasound indentometry—all measures proved accurate, reliable and valid.
Ghauri ASK, Nyamekye I, Grabs AJ, Frandon JR, Whyman MR, Poskitt,KR. Influence of a specialized leg ulcer service and venous surgery on the outcome of venous leg ulcers. *Eur J Vasc Endovasc Surg* 1998;16:238-244	VU outcome: Community (149)= home care nurses 1994 compared to Specialized Clinics (200) Includes duplex scanning ultrasound, ABPI, surgery 1996	CS Retrospective chart review before and after study Description of VU outcome treated in community (before) and specialized clinics (after) . Random selection of records during 3 months each group	In specialized vascular clinics, patients received improved diagnostics, surgical correction and specialized care. 12 week % healed increased from 12 to 53% 6 mos. recurrence rate decreased from 43 to 21% (p<0.01)
Gloviczki P, Gloviczki ML Evidence on efficacy of treatments of venous ulcers and on prevention of ulcer recurrence. Perspect Vasc Surg Endovasc Ther. 2009;21(4):259-68.	LR of minimally invasive SEPS or endoscopic laser surgery or radiofrequency ablation, vs open deep vein stripping	LR of RCTs healing, prevention of recurrence of VU outcomes	>2 RCTs confirm SEPS reduces VU recurrence and improves healing. Evidence mounting for RFA and laser., but is insufficient for open deep vein (saphenous) surgery less E-B
Goedkoop R, Juliet R, You PH, Daroczy J, de Roos KP, Lijnen R, Rolland E, Hunziker T.Wound stimulation by growth-arrested human keratinocytes and fibroblasts: HP802-247, a new-generation allogeneic tissue engineering product. Dermatology. 2010;220(2):114-20.	HP802: Allogeneic growth arrested keratinocytes and fibroblasts sprayed on in fibrin matrix administered once/week for 12 weeks (6 doses) Vs Placebo	RCT Multicenter	40% rate of area reduction for all patients on HP802 vs 33% for placebo.
Gohel MS, Barwell JR, Taylor M,	500 VU patients half each:	RCT measuring 3 yr healing	Healing rates similar 93% SEPS,

Chant T, Foy C, Earnshaw JJ, Heather BP, Mitchell DC, Whyman MR, Poskitt KR. Long term results of compression therapy alone versus compression plus surgery in chronic venous ulceration (ESCHAR): randomised controlled trial. BMJ. 2007;14;335(7610):83.	SEPS correction of superficial V reflux + compression (~250 VU patients, 1 leg each) Compression alone (~250 same)	and recurrence rate	89% compression alone. Less recurrence 31% for SEPS + compression vs 56% compression only
Gohel MS, Barwell JR, Heather BP, Earnshaw JJ, Mitchell DC, Whyman MR, Poskitt KR.The predictive value of haemodynamic assessment in chronic venous leg ulceration. Eur J Vasc Endovasc Surg. 2007;33(6):742-6.	383 VU patients undertoing superficial vein surgery	Retrospective CO measuring Venous Refill Time (VRT) with photoplethysmography to predict healing and VU recurrence	Significant healing and recurrence prediction only with below knee tourniquet
Golinko MS, Clark S, Rennert R, Flattau A, Boulton AJ, Brem H Wound emergencies: the importance of assessment, documentation, and early treatment using a wound electronic medical record. Ostomy Wound Manage. 2009;55(5):54-61.	139 patients with chronic wounds (29%) with a VU	Cohort treated with sharp debridement and biopsy with pathology	New or increasing pain, cellulitis and/or nonpurulent drainage or presence of significant undermining may indicate invasive infection and warrant hospital admission
Gottrup F, Holstein P, Jorgensen B, Lohmann M, Karlsmar T. A new concept of a multidisciplinary wound healing center and a national expert function of wound healing. *Arch Surg*. 2001;136:765-772.	23806 patient cohort with a variety of chronic wounds	HCT after multidisciplinary team implemented. Outcomes measured included healing , prevention and amputation ratesfor a variety of chronic wounds.	Leg ulcers healing rates and amputation rates improved compared to pre-team levels
Gottrup F, Jørgensen B, Karlsmark T, Sibbald RG, Rimdeika R, Harding K, Price P, Venning V, Vowden P, Jünger M, Wortmann S, Sulcaite R, Vilkevicius G, Ahokas TL, Ettler K, Arenbergerova M. Reducing wound pain in venous leg ulcers with Biatain Ibu: a randomized, controlled double-blind clinical investigation on the performance and safety. Wound Repair Regen. 2008;16(5):615-25.	Biatain foam (60) Biatain foam + ibuprofen (60)	RCT measuring pain and tolerability	No significant difference healing, pain or tolerability on day 1, but 30% reduction in wound pain intensity days 1-5 after application with Biatain, ($p<0.001$), more when ibuprofen was added ($p<0.001$)
Gould DJ, Campbell S, Newton H, Duffelen P, Griffin M, Hardig EF. Setopress vs Elastocrepe in chronic venous ulceration. *Br J Nursing* 1998; 7(2):66-73.	Elastic compression: Setopress+ elastic (20) Non-elastic Elastocrepe (20) Both with medicated paste + elastic viscose stockinette	RCT of patients in a UK outpatient clinic with venous ulcers less than 2 months duration	11/19 (58%) Setopress patients completely healed in 15 weeks versus 7/20 (35%) healed with Elastocrepe. No significant difference.
Greguric S, Budimicic, Soldo-Belic A, Tudoric M, Baricevic B, Cajkovac V, Dobric I. Hydrocolloid dressing versus a conventional dressing using magnesium sulphate paste in the management of venous leg ulcers. *Acta Dermatovenerol. Croat.* 1994;2(2):65-71	Hydrocolloid dressing (HCD) DuoDERM® CGF® + two layers of tubular compression bandages (55) Conventional magnesium sulfate paste with gauze + double layer elastic compression bandage (55)	Open label controlled, prospective parallel group study of venous ulcers for 10 dressing changes at 2 dermatology hospital clinics.	HCD-dressed ulcers healed 32 sq mm/day; 21 sq mm/day for gauze. 50% epithelization was achieved in 6 visits for HCD or in 10 visits for gauze. 3 healed in HCD group, 0 in gauze group. HCD had less ($p<0.05$) discomfort and longer intervals between dressing changes.
Grey JE, Enoch S, Harding KG. Venous and arterial leg ulcers. In Enoch Grey and Keith Harding (Eds.) *ABC of Wound Healing* BMJ 2006; 332(7537):347-350.	Educational text article with minimal references..	EO	Differential diagnosis of arterial and venous ulcers includes reduced hair follicles and sweat glands in legs with arterial disease.

Guarnera G, DeRosa A, Camerini R; 8 European sites. The effect of thymosin treatment of venous ulcers. Ann N Y Acad Sci. 2010;1194:207-12.	0.01% thymosinß4 (TB4) 0.03% TB4 0.10% TB4 Total 55 for TB4 groups 17 Placebo	RCT 2 blind Phase 2 study in Italy (5 centers) Poland (3 centers) 12 week safety and healing results from clinicaltrials.gov	Healed at 12 weeks: 4/17 Placebo 12/55 TB4 (NS) No safety differences.
Gupta AK, Filonenko N, Salansky N, Sauder DN. The use of low energy photon therapy (LEPT) in venous leg ulcers: a double-blind, placebo-controlled study. Dermatol Surg. 1998;24(12):1383-6.	9 VU patients assigned to either monochromatic light from 2 sources one infrared Or to sham	Double blind RCT measuring healing rate of VU	Faster healing of VU treated with the active light sources
Hamel-Desnos CM, Guias BJ, Desnos PR, Mesgard A. Foam sclerotherapy of the saphenous veins: randomised controlled trial with or without compression. Eur J Vasc Endovasc Surg. 2010;39(4):500-7	Ultrasound guided foam sclerotherapy with (29) vs without (31) compression stockings	RCT measuring symptoms, patient satisfaction an side effects and duplex Ultrasound evaluation of vein occlusion on days 14 and 28 post sclerotherapy	100 % occlusion for all patients, high patient satisfaction in both groups, similar improved QoL NS differences on all measures .
Hammarlund C. Sundberg T. Hyperbaric oxygen reduced size of chronic leg ulcers: a randomized double-blind study. *Plast Reconst. Surg* 1994;93:829-833.	HBO (9) Control (8)	RCT measuring wound surface area decreased during 6 weeks of care.	HBO mean 35.7% reduction in wound surface area ± 17% versus control 2.7% mean reduction in wound surface area ± 11%. ($p<0.001$)
Hammond CE, Nixon MA. The reliability of a handheld wound measurement and documentation device in clinical practice. J Wound Ostomy Continence Nurs. 2011;38(3):260-4.	5 wounds measured 5 times eachby 3 raters : an MD, Nurse and one unfamiliar with wound care: total of 75 measurements of are a and depth	Prospective case series reporting reliability of wound area and depth measurement with SilhouetteMobile device	Inter- and intrarater precision for area was 3.2% and 2.6%, respectively, and depth 13.5% and 5.5%,intraclass correlation coefficients for area and depth were 99.76% and 98.95%,
Hansson,C and the Cadexomer Iodine study group. The effects of cadexomer iodine paste in the treatment of venous leg ulcers compared with hydrocolloid dressing and paraffin gauze dressing. International J of Derm 1998;37:390-396	153 VU patients randomized to: Iodosorb paste (56) Hydrocolloid (48) Parrafin gauze (49) + Comprilan short stretch compression bandage for all	RCT,(multicenter, multinational) parallel group design. 12 weeks	% mean reduction in ulcer size (NS): Iodosorb 61% Hydrocolloid 41% Paraffin gauze 24% Days to stop exudate (NS): Iodosorb 55 Hydrocolloid 63 Paraffin gauze 85 Reduction in slough($p<0.05$) at 4 weeks: Iodosorb and Hydrocolloid > Paraffin gauze
Harding KG, Price P, Robinson B, Thomas S, Hofman D. Cost and dressing evaluation of hydrofiber and alginate dressings in the management of community-based patients with chronic leg ulceration. *Wounds,* 2001; 13(6):229-236.	Leg ulcers--moderately to heavily exuding; various etiologies Aquacel (66) Sorbsan (65)	Prospective, 12-week multi-center, randomized, controlled--wear time, cost effectiveness, time to healing, reduction in ulcer size, ease of application and removal, exudate management, pain on dressing removal	Wear time for AQUACEL was 3.63 days, for Sorbsan 3.27 days (□<0.001). 17 AQUACEL-dressed wounds healed in a mean of 42 days vs 57 days for the 17 dressed with Sorbsan (□=0.053), with superior ease of removal (p=0.006), exudate management (p=0.002), and less pain (p=0.001) and adhesion to the wound bed (□=□=0.001) for AQUACEL. Though costs were less for healing outcomes with AQUACEL, these differences were not significant.

Harding KG, Krieg T, Eming SA, Flour ML, Jawien A, Cencora A, Kaszuba A, Noszcyk W, Willems P, De Deene A, Joos E, De Waele P, Delaey B. Efficacy and safety of the freeze-dried cultured human keratinocyte lysate, LyphoDerm 0.9%, in the treatment of hard-to-heal venous leg ulcers. Wound Repair Regen. 2005;13(2):138-47.	Std HCD +compression (43) Std + Vehicle (56) Std + Lyphoderm® (95) (XCELLentis, Belgium) dried cultured human keratinocyte lysate applied 10 weeks (a total of 8 Tx) Wk 1-4 weekly: 5 applications, followed by 3 apps @ 2 week intervals	RCT on hard-to-heal VU duration >6 weeks (mean 43 weeks) measured % healed within 24 weeks. Subgroup analysis of enlarging ulcers (17 Std; 18 Std+V; 40 Std + L) with and without the 2 control groups combined. ITT analyses.	NS effect on primary 24 week % healed (38% healed in Std+L group; 27% in Std groups pooled) in overall analysis (p = 0.114). Significantly more healed in Std+L group of enlarging VU (30% vs 11% for pooled ITT controls: p = 0.024)
He Q, Wu G, Yu B, Zhang T, Wang W, Gu Q. [A prospective study on wound-healing hydrogel in treating chronic venous ulcer of lower extremities] [Article in Chinese: abstract reviewed] Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi. 2008;22(3):311-3.	Hydrogel (30 VU patients mean VU duration 2.9 years mean area 3.4 cm^2) Saline (30 VU patients mean VU duration 3.3 years, mean area 3.1 cm^2) Not different at baseline.	Prospective RCT measuring % area reduction after 7 and 14 days of treatment. And days to heal.	Faster healing : 12 days mean heal time for hydrogel and 31 for saline (p<0.01)Significantly more healing in hydrogel group after 14, but not 7 days (p<0.05).
Heit JA *et al.* Trends in the incidence of venous stasis syndrome and venous ulcer:: a 25 year population-based study: *J Vasc Surgery 2001; 33(5):* 1022-7	25-year study of medical records of a county in Minnesota	RCO: Retrospective review of all medical records to describe incidence of venous stasis (now called insufficiency) and venous ulcers	Venous stasis 76/100,000 person years, VU 18/100,000 person years, with no change in 25 years.Incidence higher in women than men and increases with age for both.
Hendricks WM. Swallow RT, Managemtnt of stasis leg ulcers with Unna's boot versus elastic support stockings *J Amer Acad Dermatol* 1985; 12:90-98.	1. Unna's boot (10) 2. Open-toe, below knee graduated compression sock 24 mmHg at ankle (10) self-care between 1-2 weekly visits	RCT measuring time to heal, % healed in 78-week trial. Note: 3 Group 1 patients were transferred after not healing to Group 2 where they healed.	% complete healing on trial: Group 1: 70% Group 2: 71%
Hilstrom L. Iodosorb compared to standard treatment in chronic venous leg ulcers—a multicenter study. Acta Chir Scand Suppl 1988; 544:53-56.	Iodosorb cadexomer iodine Standard treatment	RCT Percent decrease in ulcer size was measured	Iodosorb-dressed wounds decreased in size 34% while Standard treatment resulted iin an increase in wound size.
Hjerppe A, Saarinen JP, Venermo MA, Huhtala HS, Vaalasti A. Prolonged healing of venous leg ulcers: the role of venous reflux, ulcer characteristics and mobility. J Wound Care. 2010;19(11):474, 476, 478 passim	90 successive VU patients managed with standardized care + compression. 62 healed, 22 non-healing subjects with open VU after 12 weeks compared with 28 healed controls	RCT comparing features of patients and ulcers that healed with those that did not heal. Superficial, deep and popliteal venous reflux was greater in nonhealers.	NS difference in age, gender, smoking or oral meds or venous disease severity. Healed VU duration 7 mo; 26 mo nonhealed. Healed 5 cm^2 nonhealed 11cm^2 Walking aid device use more frequent in nonhealers
Holloway GA, Johansen KH, Barnes RW, Pierce GE. Multicenter trial of cadexomer iodine to treat venous stasis ulcers. West J Med. 1989;151:35-38.	Cadexomer iodine Standard care control group	RCT Rate of healing was measured	Twice the rate of healing with cadexomer iodine than with the control group.
Horakova M, Partsch H Venous leg ulcers are compression bandages indicated? *Phleologie* 1994; 47:53-57	Short-stretch compression (25) Elastic high compression stockings (25)	CCT of 3 month duration. Note: groups not initially comparable in ulcer duration and size (S-s larger longer)	In the elastic high compression stocking group, 94% healed versus 52% in the short stretch bandage group.
Houghton PE, Kincaid CB, Lovell M, Campbell KE, Keast DH, Woodbury MG, Harris KA. Effect of electrical stimulation on chronic leg ulcer size and appearance. *Physical Therapy* 2003; 83(1):17-28.	High voltage pulsed current (HVPC) 100 us, 150 V, 100 Hz (n = 14) 3 times per week versus Sham (n = 13) All patients had chronic leg ulcers, not all of venous insufficiency origin some arterial or diabetes.	RCT prospective, double-blind measured healing with EZ-Graph, wound appearance with modified PSST (PWAT) 4 weeks stimulation after 2 weeks with conventional therapy. 7 patients had bilateral VU compared.	Wound appearance and % decrease in wound area improved (p<0.05) during treatment, but difference disappeared at 4 week follow up.
Hu D, Phan TT, Cherry GW, Ryan	12 venous ulcer patients with 13 VU compared to	Matched control study using high frequency ultrasound to	Edema was localized in the dermis.

TJ. Dermal oedema assessed by high frequency ultrasound in venous leg ulcers. Br J Dermatol. 1998;138(5):815-20.	contralateral normal leg	localize edema	
Hutchinson, J.J. A prospective clinical trial of wound dressings to investigate the rate of infection under occlusion. Proceedings, Advances in Wound Management, Harrogate, UK, Macmillan, London, 1994:93-96.	DuoDERM® CGF (HCD) (34 burns;37 donor sites;37 venous ulcers) Impregnated gauze (39 burns;46 donor sites;41 venous ulcers) Sivadene + HCD (29 burns;13 donor sites;16 venous ulcers)	Prospective randomized blind evaluated study of microorganisms and infections in donor sites, burns and venous ulcers (41 dressed with conventional gauze and 37 dressed with HCD alone).	Significantly fewer clinical infections in the groups dressed with HCD alone (1.9%) vs 5.38% in conventionally dressed wounds. ($p<0.05$)
Hutchinson JJ, McGuckin M. Occlusive dressings: A microbiologic and clinical review. *Amer J Infec Control* 1990; 18(4):257-268.	Controlled studies only: Occlusive dressings (1421) Non-0cclusive dressings (1013). Included 5 studies on 114 VU with impregnated gauze primary dressings and 14 studies on 504 VU with film or hydrocolloid primary dressings	Retrospective review of published literature from 1962 to 1990 on occlusive dressings (hydrocolloids, foams, films, gel dressings) compared to non-occlusive dressings (gauze or impregnated gauze dressings)	7.3% infection rate for non-occlusively dressed wounds. 3.2% for occlusively dressed ($p<0.001$). This trend was parallel for ulcers, burns, donor sites and surgical/other, though not statistically significant for burns.
Ieran M, Zaffuto S, Bagnacani M, Annovi M, Moratti A. Cadossi R. Effect of low frequency pulsing electromagnetic fields on skin ulcers of venous origin in humans: a double-blind study. *J Orthop Res* 1990; 8(2):276-282.	Electromagnetic Low Frequency Pulsed Stim. (ELF) Active (22) Placebo (22)	Double-blind RCT studying healing at 90 days and recurrence.	Significantly more healed in the active group than in the placebo group (< 0.02). 25% recurred during 90 days in the active group; 50% in the placebo group.
Janković A, Binić I. Frequency rhythmic electrical modulation system in the treatment of chronic painful leg ulcers. Arch Dermatol Res. 2008;300(7):377-83. PMID: 18629524	Frequency modulated Electrical Stimulation (~1/2 of 35 VU patients) Control (remaining subjects)	RCT measuring healing, pain (VAS), ulcer fibrin, exudate, granulation and epithelization at weeks 0,1,2,3 and after 1 or 2 months post E-stim	Ulcer healing, pain and surrounding skin all improved ($p<0.05$) in electrical stimulation group.
Jankūnas V, Rimdeika R, Pilipaityte L.Treatment of the leg ulcers by skin grafting. Medicina (Kaunas). 2004;40(5):429-33.	54 Lithuania VU patients with VU of 6 months or longer duration $\geq$ 50 cm^2 area, treated Jan 2001-Jan 2004	CS of 0.2-0.3 mm autografting + Granuflex hydrocolloid dressing to prepare the wound	Grafts took totally in 35 (65%) of cases; partial take in 19 (35%). Complete healing in 2-3 weeks in 64% of patients.
Jessup G, Lane RL. Repair of incompetent venous valves: A new technique. *J Vasc Surg* 1988; 8:569-575.	VU patients	Description of technique in venous insufficiency patients	Repairing incompetent venous valves using cuff support or constriction at the site of the valves is effective
Johnson Jr. G, Kupper C, Farrar DJ, Swallow RT. Graded compression stockings. Custom vs noncustom. *Arch Surg* 1982; 117(1):69-72.	5 VU patients	Prospective, convenience sample, femoral venous velocity tested with custom and non-custom gradient elastic stockings	Venous velocity reduced by 24% after removal of custom versus 22% after removal of non-custom gradient elastic stockings, with no difference in effects on venous velocity.
Jones JE, Nelson EA. Skin grafting for venous leg ulcers. [update of Cochrane Database Systematic Review. 2005;(1):CD001737; PMID: 15674883]. [Review] [70 refs]. *Cochrane Database of Systematic Reviews* 2007:CD001737. [PubMed]	15 RCTS of skin grafts (579) VU patients. 8 RCT also had compression. 2 RCT (98) split thickness autografts. 4 RCT (119) cultured keratinocyte graft (3 RCT allograft, 1 autograft). 2 RCT (345) two-layer artificial skin	Systematic review of RCT reporting effects of various forms of grafting on VU healing.	Higher proportion of VU healed with artificial skin compared to no dressing under Unna Boot + Coban compression. 2RCT (345 VU patients). No other grafting technique had A level evidence. Cultured autologous keratinocytes had 1 RCT and 3 CCT: B level.
Jones V., Comparison of the new composite dressing Versiva® with Tielle® Plus for managing venous	Moderate to high compression plus : Versiva foam composite (53)	Prospective multicenter RCT comparint dressing performance, patient-reported	Composite foam was easier to apply ($p=0.027$) and remove ($p<0.0001$), with less trauma

leg ulcers: Results of an international multi-centre randomised trial. Proceedings European Wound Management Association; 2003; Pisa, Italy; 2003	Tielle Plus (48)	pain and healing of venous ulcers during 12 weeks of care.	(p=0.0074) and was less sensitizing (p = 0.0036) All other differences were not statistically significant.
Jørgensen B, Friis GJ, Gottrup F.Pain and quality of life for patients with venous leg ulcers: proof of concept of the efficacy of Biatain-Ibu, a new pain reducing wound dressing. Wound Repair Regen. 2006;14(3):233-9.	10 VU patients	Prospective non-randomized cross-over study: 2 Biatain dressings-5 Biatain-Ibu dressings-2 Biatain dressing 3 weeks in all measuring pain & QoL	The pain levels of the Biatain-post treatment were higher than the levels of the Biatains-Ibu treatment (p <0.005).
Jørgensen B, Price P, Andersen KF, Gottrup F, Bech-Thomson N, Scanlon E, Kirsner R, Rheinen H, Roed-Petersen J, Romanelli M, Jemer G, Leaper DJ, Neumann MH, Veraart J, Coerper S, Agerslev RH, Bendz SH, Larsen JR, Sibbald RG. The silver-releasing foam dressing, Contreet Foam , promotes faster healing of critically colonized venous leg ulcers: a randomized, controlled trial. *International Wound J* 2005; 2(1):64-73.	Allevyn® (64 patients with a critically colonized venous ulcer) Contreet® Foam with Silver (65 similar patients)	Prospective RCT studied for 4 weeks, measuring % of ulcers healed, odor and leakage at each week, 4-week area reduction; adverse events, systemic antimicrobial use,	No effect on % of wounds healed, but Contreet® reduced mean relative area after 4 weeks and odor weeks 1 – 4. No effect on adverse events or systemic antimicrobial use.
Joseph E, Hamori CA, Bergman S, Roaf E, Swann NF, Anastasi G. A prospective randomized trial of vacuum-assisted closure versus standard therapy of chronic nonhealing wounds. WOUNDS 2000; 12(3): 60–67	VAC (18 chronic wounds) Wet to moist gauze secured with occlusive covering (18 chronic wounds) Only 2 patients had venous ulcers. Patient and provider were not blind to treatment.	RCT of VAC with open-cell foam dressing with continuous suction (125mmHg) changed every 48 hours. W/m gauze changed 3 times per day. Blind evaluated change in depth, length, width, volume	78% volume reduction with VAC vs 30% reduction with saline gauze dressings at 6 weeks (p=0.038). Depth reduction significant at p< 0.0001
Jull AB, Waters J, Arroll B. Pentoxifylline for treating venous leg ulcers. In: The Cochrane Library, Issue 2, 2006	9 trials; 572 adults 8 pentoxifylline Vs placebo; 5 with compression therapy 1 pentoxifylline Vs defibrotide; with compression	LR: 9 RCT both drugs orally administered	Pentoxifylline more effective than placebo r/t heal/significant improve in 8 trials. Pentoxifyliine + compression more effective then placebo + compression No healing variance between pentoxifylline Vs defibrotide.
Jull A, Walker N, Parag V, Molan P, Rodgers A; Honey as Adjuvant Leg Ulcer Therapy trial collaborators. Randomized clinical trial of honey-impregnated dressings for venous leg ulcers. Br J Surg 2008;95(2):175-82.	Manukah honey (187 ulcers) Usual care (104 ulcers) Ulcers were small and short duration—would have been classified as easy to heal by Margolis criteria.	12 week RCT measuring % healed, rate of healing, adverse events	Honey did not improve VU healing at 12 weeks compared to usual care.
Jünger M, Ladwig A, Bohbot S, Haase H. Comparison of interface pressures of three compression bandaging systems used on healthy volunteers. J Wound Care. 2009;18(11):474, 476-80.	24 volunteers bandaged with 2-layer system (8) 4-layer system (8) Short-stretch system (8) on both legs for 1 week	RCT measured interface pressures, comfort and tolerability at days 1,3,7 after bandage application to both legs sitting, standing and supine	2 layer partially better than short stretch, with similar sub-bandage pressure to 4-layer for 1 week. Volunteers reported 2-layer more comfortable and tolerable than either 4-layer or short stretch.
Jünger M, Ladwig A, Bohbot S, Haase H. Comparison of interface pressures of three compression bandaging systems used on healthy volunteers. J Wound Care. 2009;18(11):474, 476-80.	24 healthy volunteers	RCT comparison of 2-L 4-L or SS compression interface pressure, comfort and tolerability on days 1,3, 7 after application.	2-layer improves comfort and tolerability more than 4 layer or Short Stretch compression bandages while maintaining similar sub-bandage pressures.
Junger M, Partsch H, Ramelet A, et al. Efficacy of a ready-made tubular	1.Heelless open-toed tubular compression (Tubulcus® 88)	Prospective open international multicenter parallel-group	58% of tubular group healed in 12 weeks and 56.7% of short-stretch

compression device versus short-stretch compression bandages in the treatment of venous leg ulcers *Wounds* 2004;16:313–320.	2. Short-stretch (cotton, 90% extension) Rosidal® K (90) Patients walking >1 h/day with VU < 3 months duration	RCT. Primary outcome was % healed during the 12 week study. Secondary: Kaplan-Meier healing time.	group (NS) . No significant difference in mean healing time: 43.0 days for 51 healed in tubular group; 43.6 days for 51 healed in short-stretch group. (p = 0.80)
Junger M, Wollina U, Kohnen R, et al. Efficacy and tolerability of an ulcer compression stocking for therapy of chronic venous ulcer compared with a below-knee compression bandage: results from a prospective, randomized, multicentre trial. *Curr Med Res Opin* 2004;20:1613–1623.	1. Multi-layer Venotrain Ulcertec stocking (61) 2. Compression bandages (60) Both were applied for at least 8 hours per day.	Prospective open label 12-week multicenter RCT measuring % of patients healed, mean days to healing, application time and adverse events	Group 1: 47.5% healed versus 31.7% in Group 2,(p=0.0129) Both healed in a mean of 46 days. Time to apply: 5.4 minutes for stocking, 8.5 minutes for compression bandage (p=0.0001)
Kahn SR, Kearon C, Julian JA, Mackinnon B, Kovacs MJ, Wells P, et al. Predictors of the post-thrombotic syndrome during long-term treatment of proximal deep vein thrombosis. J Thromb Haemost 2005;3:718–723.	145 patients with unprovoked DVT. All subjects were on conventional intensity warfarin for 3 months on enrollment than assigned INR 2.5 or INR 1.7 warfarin long term therapy	Prospective CO study to identify risk factors for PTS assessed using a validated clinical scale. Generic and venous disease specific QoL was compared in subjects with and without PTS	Mean follow-up: 2.2 years. Prevalence of PTS = 37%; severe PTS=4%. Having PTS lowered QoL. Factor V Leiden or pro-thrombin gene mutation predicted lower PTS risk and severity. Warfarin level did not affect PTS risk
Kalodiki E, Nicolaides AN. Out of a recent CVI consensus: some features of a basic statement. *Int Angiol* 2002 21(Suppl 1):2-11.	Description of application of the CEAP	Description of the method based on the consensus statement published in Circulation, Nov 2000	A uniform method of rating clinical, etiologic, anatomic and physiologic correlates of venous disease is provided.
Kantor J. Margolis DJ. A multicentre study of percentage change in venous ulcer area as a prognostic index of healing at 24 weeks. British J Dermatol. 2000: 142: 960-964.	104 VU patients	CO study measuring PPV and NPV and area under ROC curve for predictive validity of % area change based on computer assisted planimetry	Percentage change in area during the first 2,3,or 4 weeks of care significantly predicts healing within 24 weeks.
Kantor J, Margolis DJ. Efficacy and prognostic value of simple wound measurements. Arch Dermatol. 1998;134:1571–1574.	260 consecutive VU patients	CO study: measured L, W, LxW, Perimeter, Elipse area. Best correlation if wound area < 40 cm^2	Simple longest length x longest perpendicular width correlated most strongly with planimetric area & predicted healing.
Kazmers A, Koski MF, Groehn H, Outs G, Meeker C et al. Assessment of noninvasive lower extremity arterial testing versus pulse exam. *Amer Surgeon* 1996; 62:315-319	100 consecutive patients referred to vascular lab for Doppler lower extremity evaluation:	Right *doraslis pedis* pulse and Doppler pressure ABI assessed in all patients	Range of ankle pressures with non-palpable pulse was 42-300 mmHg versus 64-220 mmHg with palpable pulse. Nonnvasive Doppler is a more accurate assessment of vascular status of the leg.
Keast DH, Bowering CK, Evans AW, Mackean GL, Burrows C, D'Souza L. MEASURE: A proposed assessment framework for developing best practice recommendations for wound assessment. Wound Repair Regen. 2004;12(3 Suppl):S1-17.	Literature review (2 RCT)	Literature review of evidence supporting wound assessment measures using MEASURE as the mneumonic for what to measure.	Wound parameters should include length, width, depth, area, exudate quantity and quality, amount and type of wound bed tissue, suffering: pain type and level, undermining (Y/N), re-evaluate regularly and edge including surrounding skin
Kenkre JE, Hobbs FD, Carter YH, Holder RL, Holmes EP. A randomized controlled trial of electromagnetic therapy in the primary care management of venous leg ulceration *Jam Pract* 1996; 13(3):236-241.	Electromagnetic stimulation (EM) 30 minutes/day on weekdays for 30 days Total of 19 patients 800 Hz Active (5 patients) 600 Hz Active (5 patients) Placebo (9 patients)	Prospective RCT measuring effects of EM on VU healing, patient-reported pain, quality of life and side effects during a 50 day study time (30 days stim + 4 weeks follow up..	4 of the 5 healed using 800 Hz stimulation. By day 50 the 800 Hz treated ulcers had healed more (p<0.05) and had less pain than those treated with placebo or 600 Hz therapy.
Kerstein MD, Gemmen E, vanRijswijk L, Lyder CH, Phillips T, Xakellis G, Golden K, Harrington C. Cost and cost effectiveness of	Hydrocolloid (HCD = DuoDERM: 12 studies: 530 ulcers) Human skin construct (Apligraf 1 study; 130 ulcers)	SLR and MA of healing times and costs to heal VU studied to healing or treatment failure. Healing % MA excluded	All studies 12-week healing: 51% of HCD-dressed and 39% of gauze-dressed VU healed. MA of homogeneous studies: P<0.05 at

venous and pressure ulcer protocols of care. *Disease Management and Health Outcomes, 2001,* 9(11):651-636.	Impregnated gauze (5 studies; 223 ulcers)	studies not meeting homogeneity criteria, which occurred mainly at later time frames, reducing likelihood of statistical significance at 10 or 12 weeks.	8 weeks only for: 34.7% of HCD vs 25.5% of gauze-dressed VU healed. Lower cost to heal each VU with HCD. (p<0.05) Human skin construct had intermediate healing time and higher costs compared to HCD
Kerstein MD. The non-healing leg ulcer: Peripheral vascular disease, chronic venous insufficiency and ischemic vasculitis. *Ostomy/Wound Management*; 1996; 42(10A Suppl): 19S-35S.	Literature Review with algorithms.	Referenced review of the literature on diagnosing and treating venous and ischemic leg ulcers.	Algorithms for diagnosis and treatment of venous or ischemic ulcers and those arising from arteritis or suspected blood dyscrasias are presented.
Kikta MJ Schuler JJ, Meyer *JP et al*;a prospective randomized trial of Unna's boots vs hydroactive dressings in the treatment of venous stasis ulcers. .J.Vasc.Surg 1988;7;478-83	Inelastic Unna Boot (42) DuoDERM (45) (compared dressings to compression alone)	Prospective, RCT 6 month comparison of VU healing in a US vascular surgery clinic.	70% healed withUnna's Boot 38% healed with DuoDERM dressing without compression (p = 0.01). A dressing could not compensate for the lack of compression in VU patients..
Kirsner, R, Fastenau, J, Falabella, A, Valencia, Isabel, Long, Rachel, Eaglstein, W. Clinical and Economic Outcomes with Graftskin for Hard-to-Heal Venous Leg Ulcers: A Single-Center Experience *Dermatological Surgery* January 2002: 28:81-82.	Graftskin (Apligraf)-16 patients with 24 VUs of a mean duration of 42 months	Retrospective, open, non-randomized	A mean number of 2.25 graftskins applied per patient. All 16 patients responded to the device, with 8 patients (13 of 24 ulcers) completely healed over a mean of 13 weeks. Mean closure rate: 9.5%/week for the post graftskin group.There was an increase in ulcer size of 5.9% per week in the pregraftskin period.
Kirsner RS et al. The clinical spectrum of lipodermatosclerosis. *J Amer Acad of Dermatol* 1993; 28(4):723-727.	Diagnosis of venous ulcers	EO, LR	Description of the clinical spectrum of lipodermatosclerosis.
Kjaer ML, Mainz J, Soerensen LT et al. Clinical quality indicators of venous leg ulcers: development, feasibility, and reliability. Ostomy/Wound Manage 2005; 51: 64–74	100 VU consecutive patients tested by 1 MD for feasibility of implementation. (quality indicators based on multidisciplinary panel group nominal consensus.	Multidisciplinary team generated VU Q of care indicators and feasibility of implementing with inter-rater and intra-rater reliability CO 73% healed in 12 months.	Validated, reliable quality of care indicators include VU healing, recurrence, pain, VU diagnosis with ABI and Duplex ultrasound scan recurrence, (inter-rater kappa = 0.79, P < 0.01 and intra-rater kappa = 0.89, P < 0.1).
Kobza L, Scheurich A. The impact of telemedicine on outcomes of chronic wounds in the home-care setting. *Ostomy/Wound Management* 2000; 45(10):48-53.	76 chronic wounds, 52% of them VU managed by the standardized Solutions© wound care algorithm 125 matched wounds	Prospective cohort compared to retrospective matched patients on % healed, healing time, home care visits and costs of care	The standardized evidence-based VU care resulted in more VU patients healed in less time with fewer visits at lower cost than matched controls. (p< 0.05)
Koksal C, Bozkurt AK. Combination of hydrocolloid dressing and medical compression stocking versus Unna's boot for the treatment of venous leg ulcers. *Swiss Med Wkly* 2003; 133:364-368.	Unna's boot (30 VU patients) Comfeel Ulcer Dressing plus 30-40 mmHg Class II elastic compression stockings (30 VU patients)	Prospective RCT measuring healing of VU ulcers duration 16 .6 weeks and ease of use and patient reported pain	VU healing rates, times & recurrence not different for the two groups, but hydrocolloid plus stocking was easier to use (p < 0.0001). More pain with Unna's boot (p< 0.0001) both during application and wear. 150 min to apply Unna's Boot vs 134 to apply hydrocolloid plus elastic stocking (p >0,05).
Korn P, Patel, S., Heller, JA et al. Why insurers should reimburse for compression stockings in patients with chronic venous stasis. *J Vasc Surg.* 2002; 35:950-7.	Hypothetical 55-yr-old patients with prior VU receiving vs not receiving compression stockings and education (CS+Ed),	Markov decision tree analysis was conducted based on published probabilities of venous ulcer recurrence, 4.6 mo heal time, 12% chance of hospitalization and 0.4% chance of amputation after	With CS+Ed the mean time to VU recurrence was 53 months vs 18.7 mo to recurrence without CS+Ed.. CS+Ed saved costs of $5094 while saving 0.37 QALY. If considering only medical treatments, CS+Ed would save

		VU development.	$6326 during the lifetime of each patient.
Kralj B, Kosicek MA. A randomised comparative trial of single-layer and multi-layer bandages in the treatment of venous leg ulcers. In Leaper Dj, Cherry GW, Dealey C, Lawrence JC, Turner TD (Eds) *Proc 6th European Conf on Adv Wound Management.* London: Macmillan Magazines Ltd., 1996:158-160. As cited in Cullum et al. Cochrane review, 2002.	1. 4-layer elastic compression bandage Profore® (20) 2. 1-layer elastic compression bandage Porelast® over primary hydrocolloid dressing Tegasorb (20)	Prospective RCT measuring % completely healed and time to healing.	At time of reporting, 7/20 (35%) healed in the Profore® group and 8/20 (40%) healed in 1-layer + hydrocolloid group. Cullum meta-analysis reports 44% healed in both groups (7/16 and 8/18). Profore® group healed in (mean 58 days) and 1-layer group healed in mean 85 days. No statistically significant differences were reported.
Kranke P, Bennett M, Roeckl-Wiedmann I, Debus S. Hyperbaric oxygen therapy for chronic wounds. Cochrane Database Syst Rev. 2004;(2):CD004123	1 VU RCT of 16 patients managed with hyperbaric oxygen therapy 4 RCT on 147 patients with Diabetic foot ulcers	SR. 6 and 18 week VU size reduction	More early reduction in VU area only at 6 weeks (WMD 33%, 95%CI 19% to 47%, P<0.00001 Improved healing lower amputation rates for DFU.
Kulkarni SR, Barwell JR, Gohel MS, Bulbulia RA, Whyman MR, Poskitt KR. Residual venous reflux after superficial venous surgery does not predict ulcer recurrence. Eur J Vasc Endovasc Surg. 2007;34(1):107-11.	144 of 185 consecutive VU patients following saphenous vein surgery with 25 having VU recurrence	CO study followed for 3 years Cox regression identified if residual venous reflux and change in reflux pattern were risk factors for ulcer recurrence.	Only increase in venous reflux time predicted non-recurrence of VU.
Kulkarni SR, Gohel MS, Wakely C, Minor J, Poskitt KR, Whyman MR. The Ulcerated Leg Severity Assessment score for prediction of venous leg ulcer healing. Br J Surg. 2007;94(2):189-93.	229 VU patients in UI 1999-2001	CO with Cox regression to predict VU healing in patients treated with compression	Patient age over 50 years, ulcer chronicity (in years) and venous refill time (VRT) of 20 s or less were identified as risk factors for non-healing
Kurd SK, Hoffstad OJ, Bilker WB, Margolis DJ. Evaluation of the use of prognostic information for the care of individuals with venous leg ulcers or diabetic neuropathic foot ulcers. Wound Repair Regen. 2009;17(3):318–325.		Prospective RCT	Feedback to caregivers about non-healing of ulcers in their care e.g. % area reduction at 4 weeks , improved VU and diabetic foot ulcer outcomes.
Labropoulos N, Landon P, Jay T. The impact of duplex scanning in phlebology. *Dermatologic Surg* 2002; 28(1): 1-5	Case series of venous ulcer patients with clinical symptoms including pigmentation: hemosiderin	Literature review and case series illustrating how duplex scanning ultrasound diagnoses venous reflux	Duplex scanning ultrasonography has become the gold standard for diagnosing the location and extent of venous insufficiency.
Lanzara S, Tacconi G, Gianesini S, Menegatti E, Frederici F, Liboni A, Zamboni P. A pilot randomized trial to determine the effects of a new active dressing on wound healing of venous ulcers. Oral presentation #114, Proceedings EWMA, May 14-16, 2008, Lisbon, Portugal.	Collagen/ORC + silver (15) applied once/week Standard of care (SOC: 15)	RCT measuring % healed at 12 weeks and reduction in ulcer area, Margolis Index (MI)=% with >50% healing at 4 weeks, and % developing an infection	More Collagen/ORC+silver dresses VU healed at 12 weeks than SOC (p<0.04) and there was greater reduction in ulcer size at 12 weeks. Effects NS at 4 weeks or on infection rates. Median VU area was 9 cm^2.
Layton,AM, Ibbotson SH, Davies JA, Goodfield,MJD. Randomised trial of oral aspirin for chronic venous leg ulcers. Lancet 1994;344:164-165.	20 subjects with VU : QD Oral enteric ASA300mg (10) or placebo(10) Standard compression bandage for both	HRCT ; double blinded 4 months duration	Healing rates at 4 months: ASA 38% vs Placebo 0%(p<0.007) Reduction in ulcer size at 4 months: ASA 52% vs 26% Placebo(p<0.007)
Leach MJ, Pincombe J, Foster G. Clinical efficacy of horsechestnut seed extract in the treatment of venous ulceration. J Wound Care	Oxerutins (Horsechestnut seed extract) Control	*RCT* measuring VU healing efficacy	NS effect on VU healing.

2006; 15: 159-67.			
Leach MJ. Making sense of the venous leg ulcer debate: a literature review. *J Wound Care* 2004;13(2):52-56.	Also reviews compression induced injury requiring amputation or arterial reconstruction.	Literature review including epidemiology, recurrence, financial and psychosocial implications	Prevalence: 0.11-0.63% approaching 1% if include healed VU Recurrence: 67%- 90%.
Lee YM, Ting AC, Cheng SW. Diagnosing deep vein thrombosis in the lower extremity: correlation of clinical and duplex scan findings. Hong Kong Med J. 2002;8(1):9-11.	313 post thrombotic patients with 345 duplex ultrasound scans (DUS) for deep vein thrombosis	Positive DUS were correlated with patients' demographic data (sex, age), medical history of malignancy, DVT and PE + clinical features (leg swelling, venous insufficiency, calf pain, and leg ulcer.	Clinical features did not predict DUS finding of DVT, but male sex (P=0.0102), history of malignancy (P=0.0040), history of DVT P=0.0001), and history of pulmonary embolism (P=0.0265) did predict DVT DUS finding.
Lee KF, Ennis WJ, Dunn GP. Surgical palliative care of advanced wounds. Am J Hosp Palliat Care. 2007;24(2):154-60.		LR surgical interventions for PU and VU	Discuss risks and benefits of surgery with patient and family patient's condition and goals and VU necrosis, infection potential and underlying pathogenesis.
Lindholm C. Leg ulcer treatment in hospital and primary care in Sweden: Cost effective care and quality of life. In: Proceedings of the International Committee on Wound Management Meeting. *Advances in Wound Care* 1995; 8:42-47	Std HCD D1 (changed when needed or once a week (15); or wet-to-dry saline gauze changed twice a day (15)	Prospective RCT comparing wound pain and all costs to reduce wound area by 1 percent for the two dressing groups during 6 weeks treatment (1234 dressing changes) in the primary care setting.	There was less pain ($p < .0.003$) at a lower total cost of care ($p<0.009$) and a lower cost to achieve each percent reduction of leg ulcer area in the HCD group ($p=0.026$) than in subjects dressed with gauze.
Lingren C, Marcusson JA, Toftgard R. Treatment of venous leg ulcers with cryopreserved cultured allogeneic keratinocytes: a prospective open controlled study. *Br J Dermatol* 1998; 139:271-275	Cryopreserved allogeneic keratinocyte sheets + compression bandages (CAK +C, 15 chronic VU patients Compression bandages alone (C, 12 chronic VU patients	Prospective open controlled study applying CAK + C or C alone, once weekly for 8 weeks	Mean 8-week reduction in VU area was 35 with CAK + C vs 14% with C alone (>0.05, not significant) attributed to cell-weakening by cryopreservation.
Lippman HI, Fishman LM, Farrar RH et al. Edema control in the management of disabling chronic venous insufficiency. Arch Phys Med Rehabil 1994;75:436-441	762 patients with 1-8 VU 4" Unna's boot weekly covered with tubular bandages or elastic bandages (similar to the "Duke Boot").	Retrospective survey	73.7% healing rate. Significant predictors of healing:1. # weeks to heal one VU predicts time to heal next VU 2. Age not correlated with weeks to healing; 3. Visit frequency strongest predictor of healing
Liu JY, Hafner J, Dragieva G, Seifert B, Burg G. Autologous cultured keratinocytes on porcine gelatin microbeads effectively heal chronic venous leg ulcers. Wound Repair Regen. 2004;12(2):148-56.	15 Patients with chronic VU Autologous keratinocytes delivered from: porcine gelatin microbeads or porcine collagen pads or as a simple monolayer.	CCT comparing effects of autologous keratinocytes on VU healing. No healing measure	Porcine gelatin microbeads were best.
Lo T. Sample R, Moore P, Gold P. Prediction of wound healing outcome using skin perfusion pressure & transcutaneous oximetry. WOUNDS 2009; 21(11): 310-315.	100 subjects with chronic leg ulcers: CVI: 49; PAD 15; DB 35; unspecified etiology 1.	Prospective Comparison on CO: Skin perfusion pressure (SPP) inflated pressure cuff with embedded LDF sensor compared to TcPO2 to predict healing.	SPP higher efficiency of prediction ($p = 0.02$ vs $p=0.75$ for TcPO2) +Predictive value similar: >87% for both, but SPP more sensitive with 37% NPV compared to 14% for TcPO2. Cutoff: <30 mmHg
Lok C, Paul C, Amblard P, Bessis D, Debure C, Faivre B, Guillot B, Ortonne JP, Huledal G, Kalis B.EMLA cream as a topical anesthetic for the repeated mechanical debridement of venous leg ulcers: a double-blind, placebo-controlled study. J Am Acad	69 VU patients half received mechanical debridement with gauze half had EMLA cream added	RCT of pain and debridement time using or mechanical debridement with or without EMLA cream	EMLA cream decreased median number of debridements from 15 with gauze alone to 11.5 when EMLA cream was added ($p = 0.019$) and decreased pain by 50% ($p = 0.003$). Plasma levels of lidocaine, prilocaine, and their main metabolites were low with

Dermatol. 1999;40(2 Pt 1):208-13			no apparent accumulation
Lorimer KR, Harrison MB, Graham ID, Friedberg E, Davies B. Venous leg ulcer care: How evidence-based is nursing practice? JWOCN, 2003;30:132-142.	66 VU patients	CO study of adherence to EB protocols	Patients do not adhere if not educated on importance of compression elevation to tissue or if their concerns like pain etc are not addressed.
Luebke T, Brunkwall J. Meta-analysis of subfascial endoscopic perforator vein surgery (SEPS) for chronic venous insufficiency. Phlebology. 2009;24(1):8-16.	LR: 3 RCTs comparing SEPS to conventional Linton vein surgery	3 RCT reporting % infection, LOS (length of hospital stay) VU recurrence, VU healing time,DVTor hospital re-admission@ 6 mo, or death	SEPS patients had fewer infections, shorter LOS, and less recurrence during up to 21 months post op
Lyon RT, Veith FJ, Bolton L, Machado F and the Venous Ulcer Study Collaborators. Clinical Benchmark for healing of chronic venous ulcers. *Am. J. Surg.* 1998; 176:172-175.	Oral 250 mg/day Ifetroban TxA2 inhibitor (83) or Placebo (81) . Dressings: DuoDERM CGF + Unna Flex (boot) +elastic compression (CoFlex) + Kaltostat if high exudate	Multicenter, prospective blind RCT for 12 weeks of long duration (27 month average) venous ulcers in outpatient clinics	At 12 weeks 55% of Ifetroban and 54% of placebo patients healed. Median time to healing 9.6 weeks for Ifetroban patients, 11.0 weeks for placebo.
Maessen-Visch MB, Koedam MI, Hamulyák K, Neumann HA. Atrophie blanche: a review. *Int J Dermatol.*1999;38:161–172.		LR of atrophie blanche	Describes pathophysiology and notes it is associated with venous insufficiency.
Maleti O, Lugli M. Neovalve construction in postthrombotic syndrome. J Vasc Surg. 2006;43(4):794-9.	16 patients with severe chronic venous insufficiency with PTS	CS evaluating neovalve cusp reconstruction: Pre- and post-operative hemodynamic flow: duplex scanning, ascending and descending venography , air plethysmography- all patients. Median follow-up of 22 months for patency and hemodynamic flow	Surgical treatment recommended in nonhealing recurrent VU (CEAP = C6) . 16 VU (89%) healed in 4-25 weeks (median 12 w), with no recurrence. Post-op duplex scan and air plethysmograph showed significant improvement in hemodynamic flow ($p<0.001$) especially with good muscle pump
Mani R, Vowden M, Nelson EA. Intermittent Pneumatic Compression for treating venous leg ulcers. Cochrane Database Syst. Rev. 2001; (4): CD001899.	To determine if IPC increases the healing of venous leg ulcers and limb swelling due to lymphodema-) 4 trials-45, 75 for a combination of 2, 16	Randomized control study comparing IPC with control (sham IPC or no IPC	45 subjects in trial found increased ulcer healing with IPC plus compression than with compression alone 1.4, 95% CI 1.6 to82 2 small trials with 75 subjects found no evidence of a benefit for IPC plus compression compared with compression alone, another small trial found no difference
Mantoni M, Larsen L, Lund JO, Henriksen L, Karlsmark T, Strandberg C, Ogstrup J, Ribel-Madsen S, Gottrup F, Danielsen L. Evaluation of chronic venous disease in the lower limbs: comparison of five diagnostic methods. Br J Radiol. 2002;75(895):578-83.	39 V insufficiency patients, not necessarily with a VU	Triplex ultrasound (TUS) Ascending (AP) and Descending (DP) phlebography, continuous wave Doppler (CWD) and ambulatory strain gauge plethysmography evaluated on most patients	Agreement between TUS and the other methods in evaluating reflux in deep veins was not better than that expected to occur by chance, Cohen's kappa being less that 0.20. TUS identified location and presence of incompetent veins most reliably.
Margolis D, Berlin J, Strom B. Which venous leg ulcers will heal with limb compression bandages? *American J Medicine,* 2000; 109: 15-19.	British database	CO study of predictors of VU healing with compression during 20 weeks	Over 6 months duration adds 1 point to nonhealing score + 1 point if $\geq$ 5 cm^2 Add points for total score. Slough or non-vital tissue is also a risk factor.
Margolis D, Bilker W, Santanna J, Baumgarten M. Venous leg ulcer: Incidence and prevalence in the elderly. *J Am Acad Dermatol.* 2002;46(3):381-386	Incidence and prevalence determination in the General Practice Research Database	Literature review and calculation of incidence per 100 person years and annual prevalence in those 65 years of age or older	1.69% of persons $\geq$65 will have a VU on at least one visit during a given year. Incidence was 0.75% or men and 1.45% for women per 100 person yrs

Marshall JL, Mead P, Jones K, Kaba E, Roberts AP. The implementation of venous leg ulcer guidelines: process analysis of the intervention used in a multi-centre, pragmatic, randomized, controlled trial. J Clin Nurs. 2001;10(6):758-66.	13 Team intervention practices in Royal College of Nursing VU Guidelines were implemented in randomly selected centers in Northern and Yorkshire regions of the UK in 1997-1998	RCT audited Doppler assessment of VU; compression of confirmed VU and Support stocking worn to prevent recurrence of VU. Qualitative reporting of each pre- and post implementation	Supports team (District Nurse, Practice Nurse, and GP) approach, training, quality improvement in implementing VU guidelines. Improved healing occurred. Involve DN + PN and GP + Trust managers controlling resources to make it work.
Martinez MJ, Bonfill X, Moreno RM, Vargas E, Capella D. Phlebotonics for venous insufficiency. Cochrane Database Syst Rev 2005(3): CD003229.		SR of 8 RCT	Daflon effective in VU treatment Oxerutins ineffective in reducing recurrence or treating VU See Wright and Leach references.
Mayberry JC, Moneta GL, Taylor LM Jr, Porter JM. Fifteen-year results of ambulatory compression therapy for chronic venous ulcers. *Surgery* 1991; 109:575-581.	113 venous ulcer patients with class III severe chronic venous insufficiency and prescribed initial bed rest , ulcer cleansing, dressing changes + ambulatory elastic compression stocking therapy 30-40 mmHg stockings in 89% of the VU patients.	Prospective CCT of adherent vs non-adherent patients to high compression stocking use. 15-year study measuring complete ulcer healing and recurrence with logistic regression analysis of risk factors for non-healing: ulcer size, patient age, gender, diabetic status, smoking and PPG , Venous Refill Time	105 (93%) healed in a mean of 5.3 months. Of the 102 who adhered to the stocking therapy 97% healed vs 55% of the 11 non-adherent patients (p<.0001). Only adherence (p=.0001) and less pretreatment ulcer duration (p=0.02) predicted healing. In the 73 patients with post-healing follow-up (mean 30 months) 16% recurrence occurred in adherent patients (5-yr life table estimate of recurrence = 29%). Of non-adherent patients 100% recurred by 36 months.
Mayrovitz HN, Larsen PB Periwound skin microcirculation of venous leg ulcers. *Microvasc Res* 1994; 48: 114-123.	16 Consecutive venous ulcer patients	Prospective, same-patient non-ulcerated leg control. Measured peri-wound vascular perfusion, blood velocity, skin temperature and $TCPO_2$.	Peri-ulcer skin had elevated blood perfusion, blood velocity, but lower $TCPO_2$ than non-ulcerated leg on same patient.. Concludes peri-ulcer number of microvessels is reduced and each carries more blood.
McCollum CN, Ellison DA, Groarke L, Fielden S, Connolly M, Franks PH, Moffat C. Randomised trial comparing Profore and the original four-layer bandage. *Proc Conf European Wound Manage. Assoc.*, Milan, 1997: 30. London: Macmillan Magazines. In Cullum et al. 2002 Cochrane Review.	1. Charing Cross 4-layer compression bandage: wool, crepe, Elset, Coban(115) 2. Profore® 4-layer compression bandage: wool, crepe, Litepress, Co-Plus (117) Both groups had Tricotex knitted viscose primary dressing	Prospective RCT to healing or 24 weeks. Measure: % of patients healed at 24 weeks	Charing Cross: 71% healed at 24 weeks Profore: 74% healed at 24 weeks No significant difference.
McCulloch, JM, Marler KC, Neal MB, Phifer TJ. Intermittent pneumatic compression improves venous ulcer healing. Adv Wound Care. 1994;7(4):22-4, 26.	Intermittent pneumatic compression (single chamber) (11) + Unna's boot 1 hour twice weekly. Unna's boot (11)	Prospective RCT measuring cm^2 VU healing per day	IPC + Unna's boot: healed 0.15 cm^2/day, Unna's boot healed 0.08 cm^2/day (p<0.05)
McCulloch J., Boyd VB. The effects of whirlpool and the dependent position on lower extremity volume. JOBST 1992; 16(4):169-173	Whirlpool (40 Participants) All subjects were healthy PTs and PT students. NOT VU	Prospective HCT case-controlled study over a 3 week time period. All participants had LE volume assessed pre- and post-treatment in positions of supine, dependent position with extremity in tank and with 20 minute whirlpool treatment	Limb Volume Supine x = -16ml (+/- 15.2) Dependent x = 20.5 ml (+/- 32.5) Whirlpool x = 44ml (+/- 30.5) This does not support using whirlpool for subjects with venous insufficiency.
McGuckin M, Stineman MC, Goin JE, Williams SV. Venous Leg Ulcer Guideline. Trustees of the		Guideline that was subsequently validated in 2 RCTs one in US and one in	Includes gentle ulcer cleansing, peri-ulcer skin care, patient education, debridement and many

University of Pennsylvania, Philadelphia, Pennsylvania, 1997.		UK by McGuckin et al, 2002.	aspects of VU diagnosis, prevention and treatment.
McGuckin M, Waterman R, Brooks J, Cherry G, Porten L, Hurley S, Kerstein M. Validation of venous leg ulcer guidelines in the United States and United Kingdom. *Amer J Surgery* 2002; 183:132-137.	80 Retrospective pre-guideline(pre April, 1997) 80 Prospective with guideline Half from US Philadelphia Home Health Care Assns. Half from UK Oxfordshire general practice.	Outcomes and costs of venous ulcer care were compared pre-guideline via chart abstraction versus prospective diagnosis and treatment using the content-validated guideline The guideline included patient education as well as surrounding skin and VU care.	Ankle to brachial index was performed on 8-36% of patients in US-UK pre-guideline and 93-96% with the guideline. % healed in <12 weeks increased from 23% to 70% in the US and from 40% to 65% in UK, while median cost to heal an ulcer decreased from $825 to $113 in the US and from £136 to £78 in the UK.
Meaume S, Ourabah Z, Romanelli M, Manopulo R, De Vathaire F, Salomon D, Saurat JH. Efficacy and tolerance of a hydrocolloid dressing containing hyaluronic acid for the treatment of leg ulcers of venous or mixed origin. Curr Med Res Opin. 2008;24(10):2729-39.	125 VU or mixed origin leg ulcers randomized to Hyaluronic acit + hydrocolloid dressing (HA+HCD) or HCD alone	6 week study of reduction in wound area, debridement	NS difference in reduction in wound area. More marked reduction in fibrinous slough (p = .04) in the HA + HCD group.)
Mendonca DA, Papini R, Price PE. Negative-pressure wound therapy: a snapshot of the evidence. Int Wound J 2006;3:261–271.		LR	Insufficient data to support use of NPT on VU at this time
Meredith K, Gray E. Dressed to heal. *Journal of District Nursing*, September 1988	DuoDERM® + Tubigrip® (25) Jelonet® + Tubigrip® (25)	Prospective randomized, controlled study of venous ulcers dressed weekly for 6 weeks with healing measured every 2 weeks in a UK hospital clinic.	DuoDERM -dressed ulcers healed more than those dressed with Jelonet, even when groups were stratified to correct for initial size differences. DuoDERM had half the costs/day and 1/5 the costs to heal each square cm of ulcer area.
Meyer FJ, Burnand KG, Lagattolla NR, Eastham D. Randomized clinical trial comparing the efficacy of two bandaging regimens in the treatment of venous leg ulcers. Br J Surg. 2002;89(1):40-4.	1. Zinc paste bandage on ulcer, leg with Tensoplast elastic compression (55) 2. Zinc paste bandage on ulcer, leg with Elastoocrepe short stretch compression (55)	RCT measuring % healed at 26 weeks and healing time.	Tensoplast: 58% healed; 9 weeks median heal time Elastoplast 62% healed; 9.5 weeks median heal time No significant difference.
Meyer FJ. et al. Randomized clinical trial of 3-layer paste and four layer bandages for venous ulcers. *British Journal of Surgery*. 2003 (90): 934-940.	113 patients. 64 patients treated with 3 layered bandage and 69 treated with 4 layered bandage.	RCT. Comparing the efficiency of 3 layered bandage and 4 layered bandage in % healed at 12, 16 and 20 weeks.	3 layered bandage 80% of wounds healed completely at 12 weeks 4 layered bandage 65% healed completely at 16 weeks.
Meyers MB, Rithtor M, Cherry G. Relationship between edema and the healing rate of stasis ulcers of the leg. *American J Surg.* 1972; 124:686-688.	9 post phlebitic VU patients unresponsive to ligation and stripping were successively subjected to Adaptic wound dressing, Adaptic with elastic bandage, Adaptic with Unna's Boot or Adaptic + Unna's Boot + Elevation	Leg edema was measured as volume by immersion and healing rate was measured as percent contraction per week.	Healing progressed most rapidly in patients with edema reduction responses, with evidence suggesting that both ulcer and edema are due to the same cause.
Milic DJ, Zivic SS, Bogdanovic DC, Jovanovic MM, Jankovic RJ, Milosevic ZD, Stamenkovic DM, Trenkic MS. The influence of different sub-bandage pressure values on venous leg ulcers healing when treated with compression therapy. J Vasc Surg. 2010;51(3):655-61.	A – (42) open-toed, elastic, class III compression device knitted in tubular form (Tubulcus, Laboratoires Innothera, Arcueil, France); B – (46) Tubulcus + 1 elastic bandage (15 cm wide and 5 cm long with 200% stretch, Niva, Novi Sad,Serbia);	RCT measuring healing rates and median resting values in supine and standing positions of groups . Success in A group associated with smaller VU and calf circumference (CC)	Supine/standing: A -36.2 mm Hg / 43.9 mm Hg; B - 53.9 mm Hg / 68.2 mm Hg; C - 74.0 mm Hg / 87.4 mm Hg. Healing rate during 26-week treatment period was 25% (13/42) in group A, 67.4% (31/46) in group B, and 74.4% (32/43) in group C. Better results with multi component

	C – (43): Tubulcus and 2 elastic bandages		compression individualized to each patients VU & CC.
CJ, Franks PL, Oldroyd JM. Randomized trial of an occlusive dressing in the treatment of chronic, non-healing leg ulcers. *Phlebology* 1992; 7:105-107.	Comfeel ulcer dressing (30) Nonadherent gauze dressing (30)	Prospective RCT of chronic non-healing leg ulcers studied to healing or 12 weeks, whichever came first. Primary measure was % of patients healed in 12 weeks..	Comfeel: 43% healed in 12 weeks Gauze: 23% healed in 12 weeks
Moffatt CJ, Edwards L, Collier M, Treadwell T, Miller M, Shafer L, Sibbald G, Brassard A, McIntosh A, Reyzelman A, Price P, Kraus SM, Walters SA, Harding K. A randomised controlled 8-week crossover clinical evaluation of the 3M Coban 2 Layer Compression System versus Profore to evaluate the product performance in patients with venous leg ulcers. Int Wound J. 2008;5(2):267-79.	Coban® 2-layer compression compared in cross-over trial with 4-layer Profore (81 patients with VU	RCT 8-week cross-over trial measuring % healed and HRQoL	Less pain with 2-layer, better HRQoL and Activities of daily living ($p<0.03$), more patients preferred 2 Layer NS difference in % healed or healing parameters.
Moffatt CJ, Franks PJ. Implementation of a leg ulcer strategy. *British J Dermatology*. 2004;151:857-867	518 VU Home pts pre-implementation 437 same services post-implementation	Historic CT of implementing multidisciplinary team EB care on healing, treatment frequency HRQoL using Nottingham Health Profile	healing rates improved (14%to 37%) odds ratio =3·53, $P < 0·001$. Frequency of treatment visits reduced: pre-imp mean 24·0 over 12 weeks to 13·5, $P < 0·001$. HRQoL improved: energy, pain, sleep and mobility ($P < 0·01$).
Moffatt CJ, Franks PJ, Oldroyd M, Bosanquet N, Brown P, Greenhalgh RM, McCollum CN. Community clinics for leg ulcers and impact on healing. Br Med J 1992; 305: 1389-92	Subjects with leg ulcers	Case series exploring impact of nurse-led community clinics on leg ulcer healing outcomes.	The degree of compression must be modified when mixed venous/arterial disease is confirmed during the diagnostic work-up
Moisidis E, Heath T, Boorer C, Ho K, Deva AK. A prospective, blinded, randomized, controlled clinical trial of topical negative pressure use in skin grafting. Plast Reconstr Surg. 2004;114(4):917-22.	20 patients requiring skin grafting. Number of VU not specified. Half of each skin graft site dressed with standard bolster, other half topical negative pressure (NPWT)	RCT split half wound study. Quantity and quality of graft take was evaluated 2 weeks after graft by an observer blinded to treatment .	NS treatment effect of NPWT on quantity of graft take, but quality was better with the NPWT ($p<0.05$)
Mol MA, Nanninga PB, van Eendenburg JP, Westerhof W, Mekkes JR, van Ginkel CJ. Grafting of venous leg ulcers. An intraindividual comparison between cultured skin equivalents and full-thickness skin punch grafts. J Am Acad Dermatol. 1991;24(1):77-82.	noncontracted collagen gel populated with allogeneic fibroblasts and covered with autologous cultured keratinocytes were used for grafting venous leg ulcers (5) same patient punch graft controls	CCT measuring healing time and cosmetic appearance	Similar healing time: skin equivalents: 18 days, punch grafts: 15 days. The collagen gel "skin equivalents" had better cosmetic appearance.
Molski P, Ossowski R, Hagner W, Molski S. Patients with venous disease benefit from manual lymphatic drainage. Int Angiol. 2009;28(2):151-5.	Pre-surgical venous insufficiency patients receiving Manual Lymphatic Drainage (MLD) (20) or not before venous surgery(20)	RCT measuring Anxiety, depression, Venous Reflux Index and CEAP Clinical stage at baseline, post MLD, and post surgery	MLD improved VRI, CEAP clinical score, anxiety and depression states. Surgery improved them also.
Morrell CJ, Walters J, Dixon S, Collins KA, Brereton ML, Peters, J, Brooker CGD. Cost effectiveness of community leg ulcer clinics: randomized controlled trial. *BMJ* 1998; 316: 1487-1491.	233 patients with venous leg ulcers allocated at random to care with 4-layer bandage in one of 8 community leg ulcer clinics (n = 120) or to control care in the home (n = 113)	RCT: Measures included percent healed during 12 weeks and 12-month follow-up	During 12 weeks of care, 34% healed in community clinic versus 24% in home care ($p = 0.03$).
Morris EJ, Dowlen S, Cullen B. Early clinical experience with	1 female 82 year old with bilateral VU	CS after trying 4 years of cleansing with soap & water,	Cleansed with normal saline and dressed with hydrocolloid over

topical collagen in vascular wound care. J Wound Ostomy Continence Nurs. 1994;21(6):247-50.		SSD cream, h2O2, Neosporin, cleansed with normal saline, collagen	collagen healed rapidly with leg elevation.
Morykwas MJ Argenta L *et al.* Vacuum-assisted closure: A new method for wound control and treatment: Animal studies and basic foundation. *Ann Plas Surg* 1997; 38 (8):553-562.	5 swine partial-thickness excisions for each level of vacuum from 0.004 to 125 in 25 mmHg increments	Measured blood flow, granulation, bacterial clearance, and random-pattern flap survival	Blood flow increased four-fold at 125 mmHg. Granulation tissue increased with both continuous and intermittent application. Bacteria decreased after 4 days. Random pattern flap survival increased 21%.
Mudge M, Leinster SJ, Hughes LE. A prospective 10-year study of the post-thrombotic syndrome in a surgical population. Ann R Coll Surg Engl. 1988;70(4):249-52.	564 laparotomy patients	Prospective 10 yr study to determine effect of post-op DVT on PTS development	35 had PTS by end of yr 10 (26 of these with prior DVT or phlebitis. New VU developed in 6 (1%). All thrombotic episodes increased risk of PTS, but most PTS occurred in patients without DVT but with lesser venous problems prior to surgery. Prevention efforts for PTS and VU should go to those with pre-existing venous problems.
Mulder, G., Jones, R., Cederholm-Williams, S., Cherry, G., Ryan, T. Fibrin Cuff Lysis in Chronic Venous Ulcers Treated with a Hydrocolloid Dressing. *International Journal of Dermatology* 1993;32(4):304-306.	DuoDERM under Unna Boot + Compression with Coban (9) Unna Boot + Compression with Coban (10)	Randomized blind evaluated, prospective controlled study of venous ulcers evaluated before and after one dressing in place for one week, in an outpatient clinic	Reduction of deep and shallow pericapillary fibrin cuffs in 40% of the group without DuoDERM vs 89% of the group with DuoDERM; no other histological differences.
Munter KC, Beele H, Russell L, Crespi A, Grochenig E, Basse P, Aliksidic N, Fraulin F, Dahl C, Jemma AP. Effect of a sustained silver-releasing dressing on ulcers with delayed healing: the CONTOP study. J Wound Care 2006; 15(5):199-206.	Contreet® Foam (26) with Silver-zeolyte Local Best Practice (21) with gauze or other dressings	Prospective open-label parallel, block randomized 4-week study measuring healing, malodor and pain during or between dressing changes	At 4 weeks, 58.5% wound area reduction for silver foam or 33.3% for local best practice.
Navarro TP, Konstantinos TD, Ribeiro AP. Clinical and hemodynamic Significance of the greater saphenous vein diameter in chronic venous insuficiency. *Arch Surg. 2002; 137:1233-1237.*	85 consecutive patients with 112 lower limbs with compromised venous return were examined to test validity of CEAP and great saphenous vein diameter	Prospective cohort study investigating validity of CEAP and great sapenous vein diameter as measures of hemodynamic impairment	CEAP score and GSV diameter were well correlated with venous filling index, venous volume and residual volume fraction and with each other, validating both measures.
Neander KD, Hesse F. The protective effects of a new preparation on wound edges. J Wound Care. 2003;12(10):369-71.	227 VU patients, with half the perimeter of each VU treated with Cavilon non-sting barrier film (NSBF) or water	Double blind RCT assessing erythema daily for 4 days with a chromameter	On 88% of patients, erythema disappeared in 3 days and in 4 days for the rest on NSBF side. No observable effect of water.
Nelson EA, Bell-Syer SEM, Cullum NA. Compression for preventing recurrence of venous ulcers. *Cochrane Database Syst Rev. 2000;(4):CD002303*	Systematic review of the literature on venous ulcer recurrence.	No RCTs compared recurrence rates with vs without compression. Two prospective cohort studies, 1 comparing moderate to high compression hosiery and one (n=166) two types of moderate compression hose	5 yr follow up: relative risk of recurrence = 82% with both high and moderate compression hose More compliance with moderate. 74% recurrence with moderate. Not wearing compression hose was strongly associated with ulcer recurrence.
Nelson EA, Dale J. The management of leg ulcers. *J Wound Care* 1996; 5(2):73-76.		Algorithm	
Nelson EA, Harper DR, Ruckley CV, Prescott RJ, Gibson B, Dale JJ. A randomized trial of single-layer and multi-layer bandages in the treatment of chronic venous	1. 1-layer Granuflex® Adhesive Compression Bandage (100) 2. 4-layer: orthopedic wool, crepe, Elset ® (Seton-Scholl),	RCT. Single-layer versus multi-layer compression.	49 % healed in 6 months in group 1 and 69% in group 2.(P<0.05)

ulceration. *Phlebologie* 1995 (Suppl 1):915-916.	Coban (3M)		
Nelson EA, Iglesias CP, Cullum N, Torgerson DJ; VenUS I collaborators Randomized clinical trial of four-layer and short-stretch compression bandages for venous leg ulcers (VenUS I). Br J Surg. 2004; 91(10):1292-9.	1. 4-layer bandage (195) 2. Short-stretch bandage 3 layers applied in opposite directions (192) Includes Meta-analysis concluding NS difference in controlled literature to date between 1 and 2 above.	24-week RCT reporting primary outcome time to healing and secondary outcomes % healed at 12 and 24 weeks, rate of epithelization and cost of teatment.	NS difference in time to heal or proportions healed:80.5% 4LB, 76.5% SS. 4LB healed a median of 34 days faster (NS: p=0.12) Adjusted for effects of ulcer baseline area, duration, center, and other effects, found 4LB more clinically and cost effective than SSB.
Nelson EA, Jones J. Compression bandages and stockings versus no compression. *BMJ Clinical Evidence*; Web publication date: 01 May 2007 (based on July 2006 search.) Accessed July 2, 2007. http://www.clinicalevidence.com/.	Systematic review of VU compression vs no compression literature updated July 2006.	.Update of Cullum et al. systematic review adding one new RCT (O'Brien)	5 of 7 non-homogeneous RCTs and 1 CCT significantly favored compression, none favored usual care or no consistent compression
Nelson EA, Jones J.Venous leg ulcers. Clin Evid (Online). 2008 Sep 15;2008. pii: 1902		Systematic review of all modalities or interventions to treat or prevent VU recurring.	Table of GRADEd references with high, moderate and low support for each intervention.
Nelson EA, Mani R, Vowden K. Intermittent pneumatic compression for treating venous leg ulcers. Cochrane Database Syst Rev. 2008 Apr 16;(2):CD001899	7 RCT	SR of IPC RCT.	IPC better than no comprsssion for VU healing. IPC + compression may increase healing over compression alone (1 RCT) or not (3 RCT). Faster better than slower frequency.
Nelson EA, Prescott RJ, Harper DR, Gibson B, Brown D, Ruckley CV. A factorial, randomized trial of pentoxi-fylline or placebo, four-layer or single-layer compression, and knitted viscose or hydrocolloid dressings for venous ulcers. J Vasc Surg. 2007 Jan;45(1):134-41.	1. 1-layer Granuflex® Adhesive Compression Bandage (100) 2. 4-layer: orthopedic wool, crepe, Elset ® (Seton-Scholl), Coban (3M)	RCT using a 2 x 3 factorial design. Single-layer versus multi-layer compression combined with comparisons of hydrocolloid versus knitted viscose dressing and pentoxiifylline versus placebo. Healing was measured from tracings every 4 weeks, which may not have detected subtle healing differences.	49 % healed in 6 months in group 1 as compared to 67% in group 2 (p = 0.009). No interaction between drug, compression bandages and dressings. Viscose healed 58%; hydrocolloid dressing healed 57% (p = 0.88). Pentoxifylline healed 62% vs 53% for placebo. Significant only with Cox regression analysis: relative risk of healing 1.4 (CI =1.0- 2.0)
Nelzen O *et al.* Leg ulcer etiology: A cross-sectional population study. *J Vasc Surgery* 1999; 14(4): 555-64. Replaced by Forssgren	Populational epidemiology study	Retrospective cohort study	Venous stasis is an important diagnostic cue for VU.
Nelzén O, Fransson I. True long-term healing and recurrence of venous leg ulcers following SEPS combined with superficial venous surgery: a prospective study. Eur J Vasc Endovasc Surg. 2007;34(5):605-12.	90 Consecutive patients with active VU (C6) or healed VU (C5) on 97 legs	Prospective CO study of 5-year healing and recurrence rate following SEPs with Cox regrression analysis of risk factors for recurrence	All 97 legs treated with SEPS, 87% with added superficial vein surgery. 100% healed. Follow up for mean 77 months reported 8% recurrence at 3 yrs, 18% recurred at 5 years. Previous vein surgery was the most significant predictor of recurrence.
Nicolaides AN et al. Investigation of chronic venous insufficiency: A consensus statement. *Circulation*, 2000,Nov 14;102(20):E126-63.	Clinical history risk factors	Consensus document	Most frequent causes of CVI are abnormalities of venous wall and valves and secondary changes due to previous DVT
Nikolovska S, Arsovski A, Damevska K, Gocev G, Pavlova A. Evaluation of two different intermittent pneumatic compression cycle settings in the healing of venous ulcers: A randomized trial. *Med Sci Monit* 2005; 11(7):CR337-343.	-Sequential 7-chamber IPC 45 mmHg at ankle, rapid fill: 0.5 s fill, 6 s plateau, 12 s deflate time + thin HCD on VU (52) -Sequential 7-chamber IPC 45 mmHg at ankle 1 h daily, slow fill: 60 s fill, 30 s plateau,	IPC was for 1 h daily. Patients instructed to walk and elevate. Measures during 24-weeks were % healed; median heal days, cm^2 healing per day	Rapid-fill group healed 86%, in median 59 days, rate 0.09 cm^2/day; Slow-fill group healed 61% in median 100 days, rate 0.04 cm^2/ day. All p values <0.005.

	90 s deflate time + thin HCD on VU (52)		
Northeast ADR, Layer GT, Wilson NM, Browse NL, Burnand KG. Increased compression expedites venous ulcer healing. *Royal Society of Med Venous Forum* 1990 (Published + unpublished data cited in Cullum et al.)	3-layers including nonelastic Elastocrepe (54) same 3-layers replacing Elastocrepe with elastic Tensopress (52)	RCT of UK outpatients excluding arterials disease until 3 months or healing whichever came first.	51% healed in 3 months with non-elastic Elastocrepe. 64% healed in 3 months with Tensopress elastic layer replacing the Elastocrepe.
O'Brien JF, Grace PA, Perry IJ, et al. Randomized clinical trial and economic analysis of four-layer compression bandaging for venous ulcers. *Br J Surg* 2003;90:794–798.	1. 4-layer bandage (100) 2. No compression (100)	RCT measuring healing during 3 months and cost effectiveness. Follow up of 12 weeks for recurrence.	1. 54% healed in 3 months, with earlier healing throughout trial (p = 0.006). Lower median cost per leg healed (€ 210; p = 0.04) 2. 34% healed in 3 months; cost per leg healed € 234.
O'Donnell TF, Lau J. A systematic review of randomized controlled trials of wound dressings for chronic venous ulcer. *J Vasc Surg,* 2006; 44:1118-1125.	Systematic review of 20 RCTs: 8 on moisture retentive dressings (n=687); 7 on growth factors (n=686); 5 on human skin equivalents (n=447).	RCT differences in percent healed on study and time to healing were summarized. Meta-analysis was performed only on growth factors due to heterogeneity of data in other dressing modalities.	Tegasorb®, Zinc oxide paste bandages, peri-ulcer injection of granulocyte-macrophage colony-stimulating factor, Oasis®, and Apligraf® each improved healing compared to same-study controls.
O'Donnell TF. The role of perforators in chronic venous insufficiency. Phlebology. 2010;25(1):3-10.	2 RCTs compare Greater saphenous vein (GSV) Open surgery (Linton procedure) alone to compression alone.	SR of RCTs	GSV open surgery reduces VU recurrence compared to compression alone. SEPS works only for high-volume flow veins
Oein, RF, Hansen, B.U., Hakansson, A. Pinch Grafting of Leg Ulcers in Primary Care Acta Derm Venereol 1998 Nov.; 78 (6): 348-9.	Pinch Grafts (45 patients with 55 ulcerated limbs and 84 skin transplantations	CCT: Open, non-randomized	Healing rate after 12 weeks for venous ulcers was 45% and 44% for neuropathic ulcers. One year postoperatively, 47% (19/40) of examined ulcers remained healed. Venous ulcers represented of all ulcers.
O'Hare JL, Earnshaw JJ. Randomised clinical trial of foam sclerotherapy for patients with a venous leg ulcer. Eur J Vasc Endovasc Surg. 2010;39(4):495-9.	20 VU patients compression alone vs 18 Vu Patients compression + foam sclerotherapy	RCT of healing effects. 9 of 11 evaluable patients had foam. Too many withdrawals to analyze.	Too few to support efficacy: requires more data. Supports feasibility only. 12 of 13 with a second foam sclerotherapy (72%) healed.
Omar AA, Mavor AI, Jones AM, Homer-Vanniasinkam S. Treatment of venous leg ulcers with Dermagraft. Eur J Vasc Endovasc Surg. 2004;27(6):666-72.	Dermagraft® + compression (10) Compression alone (8)	CCT measuring healing at end of 12 weeks, total area and rate of healing as well as peri-ulcer skin perfusion	% healed:50% Dermagraft and 12.5% (NS). Healing rate /week faster with Dermagraft (p=0.001) control with more peri-ulcer skin perfusion.
O'Meara S, Al-Kurdi D, Ologun Y, Ovington LG. Antibiotics and antiseptics for venous leg ulcers. Cochrane Database Syst Rev. 2010 Jan 20;(1):CD003557	SR of 5 RCT on systemic AB. 25 RCTs on topical agents. Due to bacterial resistance authors recommend using AB topical only for infection, not bacterial colonization	Compared VU healing effects of systemic antibiotics (5 RCTs) or topical antimicrobial agents (20 RCTs)	Systemic: 1 small trial supported a positive effect of antihelminthic levamisole vs placebo on VU healing. Topical: only cadexomer iodine pooled analysis supported efficacy.
O'Meara S, Cullum NA, Nelson EA. Compression for venous leg ulcers. Cochrane Database Syst Rev. 2009 Jan 21;(1):CD000265.	39 RCT	SR of VU healing outcomes comparing various forms of compression	Compression > without ML > single layer ML with elastic layer >without 2-layer stockings >short stretch
Ortonne JP. A controlled study of the activity of hyaluronic acid in the treatment of venous leg ulcers. *J Dermatol Treatment* 1996; 7:75-81.	Hyaluronic acid as once daily 4 g of 0.05% sodium hyaluronate cream in a 10 cm x 10 cm gauze pad (27) Dextranomer as once daily sachet of 6.4 g dextranomer paste (24)	Prospective, RCT of patients with venous ulcers 3-12 cm diameter treated for 21 days with day 0 and weekly wound tracings and wound edge, bed, pain and oozing assessments	HA treated ulcers decreased in size as early as day 7 (p<0.001) and maintained that level of significance. Dextranomer-treated ulcers decrease in size was not significant. HA ulcers also significantly decreased in oozing by day 14, as

			the Dextranomer ulcers did by day 21
Padberg FT Jr, Johnston MV, Sisto SA. Structured exercise improves calf muscle pump function in chronic venous insufficiency: a randomized trial. J Vasc Surg. 2004;39(1):79-87.	Compression +structured exercise intervention (18) Compression control (13) All venous insufficiency patients CEAP 4,5,6	RCT comparing 6-month intervention to control on calf muscle pump functions, venous reflux and hemodynamics, quality of life and venous severity score	Improved calf muscle pump function and venous hemodynamics. NS effect on quality of life or venous severity score.
Palfreyman SJ, Nelson EA, Lochiel R, Michaels JA. Dressings for healing venous ulcers. *Cochrane Database Syst Rev*. 2006;(3):CD001103.	42 RCTs that reported…	MA of healing effects of dressings on venous leg ulcers.	No dressing was better than any other in terms of number of ulcers healed. Did not analyze any other healing outcome.
Pappas PJ, DeFouw DO, Venezio LM, Gorti R, Padberg FT Jr, Silva MB Jr, Goldberg MC, Durán WN, Hobson RW 2nd. Morphometric assessment of the dermal microcirculation in patients with chronic venous insufficiency. J Vasc Surg. 1997;26(5):784-95.	35 patients with venous insufficiency CEAP class 4 (n=11), class 5 (9) or class 6 (10) + 5 normal skin biopsies from normal patients without venous insufficiency.	4 mm punch biopsies from sites with stasis dermatitis were compared to normal sites were analyzed for endothelial cell thickness and evaluated for cell types and TGF-beta 1 and capillary cuffs	Mast cells play a role in pathogenesis of chronic venous insufficiency as do macrophages: both mediated in part by TGF-beta 1
Partsch H. [Compression stockings in treatment of lower leg venous ulcer (German)] *Wien Med Wochenschr.* 1994; 144(10-11):242-249.	Short stretch bandage (25) High compression elastic stockings (25)	RCT duration 3 months.	High compression stockings healed 84% in 3 months versus 52% in the short-stretch bandage group.
Patel GK, Llewellyn M, Melhuish J, Harding K. 3 Layer tubular pressure support bandages is an alternative and effective form of compression in the management of venous leg ulceration. *J Am Acad Dermatol.* 2004; 50(3): P169: 656.	50 successive venous leg ulcer patients entering Welsh clinic during one 12-month period with median ulcer duration 8 months. managed with tubular bandages.	Managed with 1 (n=2),2 (n=6) or 3 (n=29) layers of tubular (TubiPress) bandages or Pro-Fore 4-layer bandage (n=6)	19 of 29 (66%) of VU managed with 3 layers of tubular support bandages healed in a median of 4 months, results comparing "favourably" with those of the 4-layer bandage.
Pekanmaki K *et al.* Laser doppler vasomotion among patients with post-thrombotic venous insufficiency: effect of intermittent pneumatic compression. *Vasa* 1991; 20(4):394-7.	19 patients with venous insufficiency 8 healthy control subjects	CCT	Intermittent pneumatic compression increased skin blood flux and vasomotion in all venous patients
Pereira de Godoy JM, Braile DM, de Fátima Guerreiro Godoy M.Lymph drainage in patients with joint immobility due to chronic ulcerated lesions. Phlebology. 2008;23(1):32-4.	15 VU patients with lower limb immobility and dermato-fibrosis due to edema: 4-5 x /week Godoy 10 similar patients given simple massage 4-5 x/week	RCT comparing edema, ankle mobility using goniometry initially and after 30 days of treatment: control or Godoy manual lymphatic drainage	All patients receiving Godoy method improved more than controls who did not change in mobility.
Perrin M, Hiltbrand B Bayott J, Results of valvuloplasty in patients presnting deep venous insufficiency and recurring ulceration. *Ann Vasc Surg* 1999; 13:524-532.	33 lower extremities in 28 patients treated with valvuloplasty	Retrospective case series of patients with primary deep venous insufficiency confirmed by clinical observation and Duplex scan with PPT to 2-7.6 years	Results best for superficial vein insufficiency and ligation of perforators. Less consistent if post-thrombotic syndrome was involved.
Pessenhofer H, Stangl M. [The effect on wound healing of venous leg ulcers of a two-layered polyurethane foam wound dressing] Arzneimittelforschung. 1989 Sep;39(9):1173-7.	<u>Wound Dressings</u> 41 patients (24 treated with Lyofoam®, 17 standard of care controls)	Prospective, CCT comparative study of 41 patients (24 treated, 17 controls) Measure: relative change in % healing as an indicator	Wound healing ($p < 0.001$) promotion by the synthetic foam dressing and a significant ($p < 0.05$) increase in acceleration of healing.
Phillips T. Successful methods of treating leg ulcers. *Postgraduate Medicine* 1999; 105(5):1-13.	Review of causes, diagnosis, history and treatment of leg ulcers	Continuing Medical Education article . (EO)	Venous stasis (insufficiency) is a diagnostic cue for development of VU, and duplex ultrasound is helpful to confirm its site and extent. In patients with edema, a

			hand-held Doppler flowmeter can help measure the ABI if arterial pulses are not palpable due to the edema.
Phillips TJ, Machado F, Trout R, Porter J, Olin J, Falanga V, and The Venous Ulcer Study Group. Prognostic indicators of venous ulcers. J Am Acad Dermatol. 2000;43:627–630.		Prospective RCT	At least 40% healing by 3 weeks predicted ulcer healing in 12 weeks
Phillips T. Provan A, Lew R. A study of the impact of leg ulcers on quality of life: Financial, social and psychological implications. *J Amer Acad Dermatol* 1994; 31:49-53.	73 patients with leg ulcers of varying etiology.	Prospective cohort study of personal interview regarding effects of ulcer pain, itch, discharge, swelling, odor, cost on quality of life	Itch, discharge and swelling were mainly mild-moderate. Pain was mainly severe. 81% felt that mobility was adversely affected, with swelling a predictor ($p<0.001$) of discharge and immobility which reduced quality of life and financial security. ($p<0.01$)
Polignano R, Bonadeo P, Gasbarro S, Allegra C. A randomised controlled study of four-layer compression versus Unna's boot for venous ulcers. *J Wound Care* 2004; 13(1):21-24.	1. 4-layer compression bandage (Profore®) (39) 2. 2-layer Unna's boot of Viscopaste® zinc paste bandage + Tensoplast® (29)	24-week RCT studying % healed @ 24 weeks, median days to heal, % area reduction on study, pain, ease of application, adverse events.	Only significant differences were that Profore® was rated better by staff on smoothness of initial and final applications. % healed, heal time: Profore—74%, 53 days; UB—66%, 56 days
Polignano R, Guarnera G, Bonadeo P. Evaluation of SurePress Comfort™: A new compression system for the management of venous leg ulcers. *J Wound Care 2004;*13(1):21-24.	SurePress combined 2-layer high compression stocking (27) Comprilan short-stretch bandage (29) 1-layer	Prospective open-label RCT measuring healing, local pain and compliance to compression wear during 12 weeks, evaluated week 0, 4, 8 and 12.	Percent healed at 12 weeks: SurePress 44%, Comprilan 17% $p=0.027$. Mean days to healing SP: 72, C: 101; $p=0.0265$). Pain reduction greater for SP: $p=0.017$.
Powell G. Managing a patient's symptoms in bilateral arterial leg ulceration. Wounds UK, 2010; 6(3):93-98	1 arterial ulcer patient lists arterial symptoms: <u>Signs:</u> Intermittent claudication Ischaemic rest pain <u>Symptoms</u> Coldness of the foot Poor tissue perfusion — purple/pink on dependence pale on elevation Atrophic, shiny skin Loss of hair on the lower limb Muscle wasting Thickened toe nails Gangrene Unable to palpate pulses: absent or abnormal	CS: using Carolon multi-layer compression stockings in management of arterial ulcer Healing was not goal. Signs and symptoms are from Royal College of Nurses and British Community Health leg ulcer care pathway.	Pain and exudate were controlled and to patient's and nursing staff delight healing followed.
Prandoni P, Lensing AWA, Cogo A, Cuppini S, Villalta S, Carta M, Cattelan AM, Polistena P, Bernardi E, Prins MH. The long-term clinical course of acute deep venous thrombosis *Ann Intern Med.* 1996;125:1-7.	355 consecutive patients with a first episode of venography-confirmed DVT followed for up to 8years.	Outcomes were tracked and risk factors for ulceration included as a serious post DVT event. Follow up occurred for up to 8 years	78 had recurrent DVT, 15 were pulmonary emboli, fatal in 9 patients. 84 developed post-thrombotic syndrome (PTS). Of these 25 (30.2%) had severe PTS, listed as including a VU.
Prandoni P, Kahn SR. Post-thrombotic syndrome: prevalence, prognostication and need for progress. Br J Haematol. 2009;145(3):286-95	LR	Prompt adequate elastic stocking compression in DVT patients can halve frequency of PTS, and when carefully supervised and instructed to wear proper elastic stockings, > 50% of patients can remain stable or	Risk factors for PTS include older age, obesity, a history of previous ipsilateral DVT, iliac-femoral location of current DVT failure to promptly recover from acute symptoms and inadequate quality of oral anticoagulant therapy

		improve during long-term follow-up.	
Prescott RJ, Callam MJ, Harper DR, Dale JJ, Ruckley CV. A controlled trial of weekly ultrasound therapy in chronic leg ulceration. The Lancet July 25, 1987; 204-206	Ultrasound (108 participants) Control Group (56) Treatment Group (52)	Prospective, RCT, VU for a two year period of time	Treatment group 100% closure in 61% o f the patients in a 12 week period of time Control group 100% closure in 41% of the patient s in a 12 week period of time
Price PE, Fagervik-Morton H, Mudge EJ, Beele H, Ruiz JC, Nystrøm TH, Lindholm C, Maume S, Melby-Østergaard B, Peter Y, Romanelli M, Seppänen S, Serena TE, Sibbald G, Soriano JV, White W, Wollina U, Woo KY, Wyndham-White C, Harding KG. Dressing-related pain in patients with chronic wounds: an international patient perspective. Int Wound J. 2008;5(2):159-71.	2018 wound patients mainly VU and mixed	Survey of wound pain.	36.6% reported wound related pain most or all the time. Wound was most painful location for all patients. 32% experienced dressing-related pain most or all the time mostly in VU or AU patients ($p<0.001$). Pain was experienced most when touching or handling wound , next during cleansing and dressing removal (n=1944)
Puggioni A, Kalra M, Carmo M, Mozes G, Gloviczki P. Endovenous laser therapy and radiofrequency ablation of the great saphenous vein: analysis of early efficacy and complications. J Vasc Surg. 2005 Sep;42(3):488-93.	Endovenous laser therapy to achieve greater saphenous vein occlusion (EVLT; n=130 limbs) and radiofrequency ablation (RFA; n=53 limbs)	Retrospective chart review evaluating efficacy and safety of endovenous saphenous ablation. EVLT compared to RFA. Duplex scanning measured thrombotic complications	20.8% complications with EVLT and 7.6% with RFA ($p= 0.049$). "Long-term follow-up and comparison with standard GSV stripping are required to confirm the durability of these endovenous procedures."
Puonti H, Asko-Seljavaara S. Excision and skin grafting of leg ulcers. *Annales Chirurgiae Et Gynacologiae* 1998: 87 (3): 219-23.	Split-ThicknessSkin Grafts SSG (65 pts with VU)	CS receiving excision and skin grafting and compression from 1993-5	90% of all ulcers healed in an average hospital stay of 11 days and with post-operative wound care of 4.5 months. Ulcers reoccurred in 17% of patients during follow-up. 15 Patients died.
Quintanal, Vigil-Escalera. Measurement of quality of life in patients with leg ulcers treated with a new hydrofiber dressing using the Nottingham Health Profile. *Proc. European Tissue Repair Society,* Bordeaux, 1999	Leg ulcers AQUACEL (111) Historical control	HCT Prospective multicenter 8 week study—wound or exudate improvement, pain and sleeplessness in Nottingham Health Profile to assess quality of life.	Improvements in wound status, reduced exudate, pain ($p<0.005$) and sleeplessness ($p<0.001$) improving quality of life during the first and second months of AQUACEL use.
Raad W. Lantis JC 2nd. Tyrie L. Gendics C. Todd G. Vacuum-assisted closure instill as a method of sterilizing massive venous stasis wounds prior to split thickness skin graft placement. International Wound Journal. 7(2):81-5, 2010	Case study	NPWT case illustrating how to sterilize a massive VU	Even though case study, is updated reference for NPWT
Raju S, Darcey R, Neglén P. Unexpected major role for venous stenting in deep reflux disease. J Vasc Surg. 2010;51(2):401-8.	504 patients 15-87 yrs old (528 limbs) with CVI with IV Ultrasound (IVUS) confirmed combined iliac vein obstruction and deep venous reflux (venography had poor diagnostic sensitivity to detect obstruction. Percutaneous stent technology was used on all patients with no deaths, and only minor morbidity. Conclusion: open correction of obstruction or reflux is now	Prospective CS of IVUS-guided iliac venous stenting alone in deep V reflux. Outcome measures were patency, QoL, pain, swelling. Etiology was nonthrombotic in 37% post-thrombotic in 54%, combined in 9 %. Deep V reflux present in all limbs. C3 44%, C4-5 27%, C6 25%. Iliac venous stenting alone can control symptoms in most patients w combined outflow	Cumulative 2ndary stent patency 88% at 5 years. no stent occlusions occurred in nonthrombotic limbs. Cumulative rates of limbs with healed active ulcers, ulcer non-recurrence in legs with healed ulcers (C5), and freedom from leg dermatitis at 5 years were 54%, 88%, and 81%, respectively. Cumulative rate of substantial improvement of 5 yr pain and swelling was 78% and 55%, respectively. QoL improved

	required only infrequently as a "last resort".	obstruction and deep reflux	significantly. Reflux parameters did not deteriorate after stenting
Raju S, Fredericks R. Valve reconstruction procedures for non-obstructive venous insufficiency: Rationale technique and results in 107 procedures with two to eight year follow up. *J Vasc Surg* 1988; 7:301-9.	107 venous insufficiency patients	CS with 2 to 8 yr follow up.	Surgical valve leaflet pliction/ tightening procedure works but has not been compared to compression in efficacy
Ricci MA, Emmerich J, Callas PW, Rosendaal FR, Stanley AC, Naud S, Vossen C, Bovill EG.Evaluating chronic venous disease with a new venous severity scoring system. J Vasc Surg. 2003;38(5):909-15.	210 patients with with protein C deficiency (420 limbs)	Venous Clinical Severity Score (VCSS) (0-3) clinically for pain, varicose veins, edema, skin pigmentation, inflammation, induration, ulcer duration and size, and compressive therapy	VCSS had sensitivity 89% and 76% spe cificity, + 37% predictive validity and 98% – predictive validity agains ultrasound as the standard. Though designed as a severity tool, VCSS may be a useful screening tool.
Registered Nurses Association of Ontario (RNAO). Assessment and management of venous leg ulcers. Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2004 Mar. Accessed October 1, 2010, www.guidelines.gov		Guideline	
Reich-Schupke S, Altmeyer P, Kreuter A, Stücker M. Development of spinocellular carcinoma in a long-lasting and therapy resistant venous ulcer - two case studies. J Dtsch Dermatol Ges. 2008;6(7):569-72	2 cases of long standing VU	Biopsies	Spinous cell carcinoma in both cases.
Rivera-Arce E, Chávez-Soto MA, Herrera-Arellano A, Arzate S, Agüero J, Feria-Romero IA, Cruz-Guzmán A, Lozoya X.Therapeutic effectiveness of a Mimosa tenuiflora cortex extract in venous leg ulceration treatment. J Ethnopharmacol. Feb 12,2007;109(3):523-8	5% crude extract of Mimosa tenuiflora bark gel () Same hydrogel without the Mimosa extract	RCT, with treatment for 8 weeks, follow up 13 weeks. Healing determined by digital area reduction as reduction in healing area and numbers of patients healed at 8 weeks	More patients healed by 8 weeks in Mimosa gel group.(p = 0.0001 chi square)
Robson MC, Cooper DM, Aslam R, Gould LJ, Harding KG, Margolis DJ, Ochs DE, Serena TE, Snyder RJ, Steed DL, Thomas DR, Wiersema-Bryant L. uidelines for the prevention of venous ulcers. Wound Repair Regen. 2008;16(2):147-50.		Wound Healing Society Guideline for prevention of venous ulcers	
Robinson C, Santill S. Warm-up Active Wound Therapy: A novel approach to the management of chronic venous stasis ulcers. *J Vasc Nurs* 1998; 16(2):38-42	Total of 13 VU patients assigned to either: Warm-up (8 ulcers) therapy for 1 hour 4 times daily or conventional gauze therapy (5 ulcers) followed by crossover to Warm-up	Pilot prospective RCT of inpatients for 2 weeks. Control wounds mean 64.4 cm^2 initial area. Warm-up wounds mean 29.4 cm^2 initial area.	32% decrease in wound size and 39% decrease in pain score for Warm-up patients. 25% decrease in wound size and 27% decrease in pain score for controls. Pain decreased over time for both treatments.
Romanelli M, Dini V, Barbanera S, Bertone MS. Evaluation of the efficacy and tolerability of a solution containing propyl betaine and polihexanide for wound irrigation. Skin Pharmacol Physiol. 2010;23 Suppl:41-4.	Solution containing propyl betaine and polihexanide Compared to saline	RCT measuring safety and wound bed pH using each cleanser for 4 weeks	Baseline pH was 8.9 After 4 weeks cleansing+ moist dressing,wound bed pH reduced to 7.0
Romanelli M, Dini V, Polignano R,	Biatain-Ibu foam (98)	RCT measuring pain relief	More patients in the ibuprofen

Bonadeo P, Maggio G. Ibuprofen slow-release foam dressing reduces wound pain in painful exuding wounds: preliminary findings from an international real-life study. J Dermatolog Treat. 2009;20(1):19-26.	Best practice (87)	over 7 days on 5 point verbal scale and 11-point numeric box scalr 0 = no pain, 10 worst	foam treatment group reported wound pain relief and lower wound pain intensity values after 7 days ($p < 0.0001$ for both variables
Romanelli M, Kaha E, Stege H, Wnorowski JW, Vowden P, Majamaa H, Lazaro JL. Effect of amelogenin extracellular matrix protein and compression on hard-to-heal venous leg ulcers: follow-up data. J Wound Care, 2008;17(1):17-8, 20-3.	high compression therapy plus amelogenin (n=42) or high compression therapy alone (n=41) hard-to-heal	Follow up on RCT of same subjects which had shown more healing and less pain at 12 weeks in amelogenin group.	Pain and healing benefits continued past 12 weeks
Romanelli M. Objective measurement of venous ulcer debridement and granulation with a skin color reflectance analyzer. *Wounds* 1997; 9(4): 122-126.	Film (Opsite) dressing + elastic compression covering: • Enzymatic debridement : *Elase* (16) • Autolytic debridement: DuoDERM Hydroactive Gel (16)	VU covered with fibrin were rated clinically for fibrin or granulation tissue, and red or yellow colorimetry assessed on days 3, 6, 9, 14 of treatment, using a Chroma Meter CR 200 Minolta camera	Both groups were similar initially in fibrin and granulation measures. Both decreased in fibrin and increased in red granulation tissue over time. The Hydroactive Gel-dressed VUs had more granulation tissue than enzyme debrided ones from days 6-14.
Royal College of Nursing. The management of patients with venous leg ulcers: Clinical Practice Guideline. 1998; The RCN Institute, Center for Evidence-based Nursing, University of York & School of Nursing, Midwifery and Health Visiting, University of Manchester. Accessed October 1, 2010 at http://www.rcn.org.uk/development/practice/clinicalguidelines/venous_leg_ulcers		Guideline	
Rubin JR, Alexander J, Plecha EJ, Marman C. Unna's boot vs polyurethane foam dressings for the treatment of venous ulceration. A randomized prospective study. Archives of Surgery 1990;125: 4:489-90.	Unna's Boot (19) SynthaDerm (17) foam dressing	Prospective, RCT unclear duration in US hospital setting	94.7% healed with Unna's Boot 41.2% healed with SynthaDerm Increase rate of healing with Unna's boot of .5 cm/day vs foam of .07 cm/day.
Rudolph D. Standards of care for venous leg ulcers: Compression therapy and moist wound healing. *J Vasc Nurs 2001; 19:20-27.*		Review	
Saedon M, Stansby G. Post-thrombotic syndrome: prevention is better than cure. Phlebology. 2010;25 Suppl 1:14-9.	LR	*Villalta* Scale is best for classifying PTS, including VU	Risk factors for PTS include obesity and prior varicose veins. Poor quality anticoagulation control may be a factor
Samson,RH. Compression stockings and non-continuous use of polyurethane foam dressings for the treatment of venous ulceraton: A pilot study. J.Derm Surg Oncol. 1993;19:68-72.	20 ambulatory patients with 30 lower extremity stasis ulcers over 24 months The study assessed * A hydrophilic polyurethane sponge covered by a hydrophobic membrane changed daily or every other day * A inner liner stocking that applies 10 mmHg pressure	*CS - Descriptive uncontrolled study* Prospective NRCT of 20 ambulatory patients with 30 lower extremity stasis ulcers over 24 months	*All ulcers healed after 2 to 30 weeks (mean 8.3 weeks) including 15 previously treated by Unna's boot or hydrocolloid dressings and 3 infected ulcers*

	and is worn 24 hours a day *A surgical stocking with a posterior zipper that applies 30 mmHg graduated pressure and is removed at night		
Samson RH, Showalter DP. Stockings and the prevention of recurrent venous ulcers. *Dermatol Surg* 1996; 22:373-376.	2-Layer compression stockings Jobst UlcerCare (56 VU patients with deep vein insufficiency)	CS After color venous duplex evaluation and PPT to determine venous reflux time healing & recurrence were measured	53 of 56 VU patients healed using the compression stockings. Recurrence occurred in 23 patients in a median of 12 months, primarily in patients who did not regularly use the stockings.
Sampaio Santos FA, de Melo RP, Lopes MV. Characterization of health status with regard to tissue integrity and tissue perfusion in patients with venous ulcers according to the nursing outcomes classification. J Vasc Nurs. 2010;28(1):14-20.	49 VU patients	CO to identify predictors of tissue integrity	Strongest predictors: hair loss and edema; tissue perfusion moderate. Increasing age and heart disease were also predictive of tissue breakdown.
Santilli SM, Valusek PA, Robinson C.Use of a non-contact radiant heat bandage for the treatment of chronic venous stasis ulcers. *Adv Wound Care; 1999;* 12(2):89-92.	Warm-up Therapy (17 patients with 31 wounds)	Prospective case series in a university-affiliated VA medical center, with 18-month follow up	8/17 (44%) healed completely after discharge; 14/17 (82%) improved. One recurrence in 18 months.
Sayag J. Semi-synthetic hydrocolloids in occlusive dressings for leg ulcers. In: T J Ryan (Ed) *Beyond occlusion: wound care proceedings*. Royal Society of Medicine Services Ltd., 1988;136:105-108	Hydrocolloid dressing (HCD) (626 total). Before applying dressing, wound was cleansed with 3% hydrogen peroxide for at least 1 minute, then rinsed with saline and dried with sterile gauze. Venous ulcers (356) Mixed arterio-venous (127) Arterial or diabetic (49) Trauma or burn (18) Neurotrophic foot ulcer (15) Pressure ulcer (7) Buerger's disease (1) Connective tissue disease (3); Lymphoedema (2); Sickle cell anemia (1)	Prospective HCT of HCD or other dressings on patients hospitalized with wounds (726 episodes) from 1981-1987 HCD was applied overlapping wound edges at least 3 cm and remained in place until detachment or up to 7 days. No other local treatment or form of debridement was used. No systemic antibiotics, corticosteroids, non-steroidal anti-inflammatory agents or hyperbaric oxygen was used. Prior prescribed anticoagulants or peripheral vasodilators were continued.	During the first 6 months of HCD use, complete healing occurred in 88% of wounds with initial diameter less than 2 cm and in 78% of those with diameter more than 4 cm. Total healing occurred in 89% of wounds enduring less than 6 months, 50% of those with longer duration. Healing was "shorter than that found with traditional dressings" and reduced length of hospital stays and costs of care.
Sayag J, Meaume S, Bohbot S. Healing properties of calcium alginate dressings. J Wound Care. 1996 Sep;5(8):357-62	*Calcium alginate *Established local treatment with dextranomer paste	Prospective RCT of 92 patients withfull thickness wounds	*Alginate Mean surface area reduction: 2.39 cm2 *Dextranimer paste Mean surface area reduction 0.27 cm2
Scottish Intercollegiate Guidelines Network (SIGN). Management of chronic venous leg ulcers. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2010 Aug. 44 p. (SIGN publication; no. 120). Accessed October 1, 2010,		Guideline	

www.guidelines.gov			
Schnirring-Judge M, Belpedio D. Malignant transformation of a chronic venous stasis ulcer to basal cell carcinoma in a diabetic patient: case study and review of the pathophysiology. J Foot Ankle Surg. 2010;49(1):75-9.	1 Case study patient with lower leg ulcer thought to be VU for 3 years	Biopsy confirmed malignant transformation.	Consider biopsy of long-standing venous ulcers to check for malignant transformation.
Scriven JM, Taylor LE, Wood AJ, Bell PRf, Naylor AR, London NJM. A prospective randomised trial of four-layer versus short stretch compression bandages for the treatment of venous leg ulcers. *Annals Royal College Surgeons* 1998; 80(3):215-220. In Cullum et al. 2002 Cochrane Review.	1. 4-layer elastic compression bandage (32 ulcers—not patients) 2. Short-stretch 3-layer compression bandage (32 ulcers—not patients)	Prospective RCT measuring complete healing at 3 months and 1 year and adverse events. (Note: 11 patients had bilateral ulcers which were randomized independently, possibly)	Healed at 3 months: 4-layer 34%; short-stretch 41% Healed at 1 year: 4-layer 53%; short-stretch 56%
Shebel ND An early intervention plan for identification and control of chronic lower extremity edema *J Vasc NursiingI 2002 20(2)*:45-50	Clinical experience with patients in practice.: CO	Evidence-based and expert opinion-based early intervention plan to identify and control lower extremity edema	Identification and control plan for chronic lower extremity edema reduces 70-90% recurrence rate for VU
Shelling ML, Federman, DG, Kirsner RS. Clinical approach to atypical wounds with a new model for understanding hypertensive ulcers ; Arch Dermatol, 2010;146 (9):1026-9.		Includes cases of VU malignant transformation	
Sibbald, GS, Browne, AC, Coutts, PC, Queen D. Screening evaluation of an ionized nanocrystalline silver dressing in chronic wound care. *Ostomy Wound Management* 2001; 47(10):38-43.	29 patients studied, 6 venous ulceration.	Uncontrolled, open label, prospective case study.	4/6 vu patients demonstrated decreased wound size and exudate.
Sigel B. Edelstein AL, Savitch L, Hasty JH, Felix R, Jr. Type of compression for reducing venous stasis.. *Arch Surg* 1975; 110:171-175	6 healthy volunteers and 1 volunteer with history of thrombophlebitis.	HCT. Common femoral vein flow was measured while subjecting supine volunteers to gradient or uniform compression.	Gradient compression descending centrally provided the greatest increment in venous flow.
Sikes E. Evaluation of a transparent dressing in the treatment of stasis ulcers of the lower limb. Journal of Enterostomal Therapy 1985;12:116-20.	Inelastic Unna's boot; (7) Opsite film dressing (6)	Convenience controlled trial for 1 year in a vascular clinic setting in the USA	81% healed with Unna's Boot 71% healed with Opsite
Silberzweig JE, Funaki BS, Ray CE Jr, Burke CT, Kinney TB, Kostelic JK, Loesberg A, Lorenz JM, Mansour MA, Millward SF, Nemcek AA Jr, Owens CA, Reinhart RD, Vatakencherry G, Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® treatment of lower-extremity venous insufficiency. [online publication]. Reston (VA): American College of Radiology (ACR); 2009. 7 p. [70 references] Accessed August 1, 2010,		Guideline of the American College of Radiology	Addresses laser and other radiologic therapy for venous insufficiency and venous ulcers.

www.guidelines.gov			
Singh A, Halder S, Menon GR, Chumber S, Misra MC, Sharma LK, Srivastava A. Meta-analysis of randomized controlled trials on hydrocolloid occlusive dressing versus conventional gauze dressing in the healing of chronic wounds. *Asian J Surg*. 2004;27(4):326-332.	Leg ulcer patients (693) with 819 wounds Hydrocolloid Dressings (HCD) compared to Saline gauze (SG) or (PG) Paraffin impregnated gauze	MA of 12 RCTs comparing healing effects of hydrocolloid	Complete healing, 51% (HCD) vs 31%, *P*=.02; Odds Ratio for healing =2.45 (95% CI, 1.18-5.12)
Spence, R, and Cahall, E Inelastic versus elastic leg compression in chronic venous insufficiency: A comparison of limb size and venous hemodynamics. *J Vasc Surg* 1996; 24:783-787.	10 patients and 18 limbs all with Class III chronic venous insufficiency and ankles of sufficient flexibility to exercise the calf muscle pump	CS Patients' limb size, venous filling rate and ejection fraction was measured with no compression, with a 30 to 40 mm Hg below knee stocking and with Circaid inelastic compression 2 and 6 hours after application. Therapies were compared with baseline and over time	Inelastic compression has a significant effect on deep venous hemodynamics by decreasing venous reflux and improving calf muscle pump function (ankle circumference-at 2 vs. 6 hours:baseline,24.7± 7 cm vs 26.1± 1.1 cm, stocking 23.9± 1.1cm vs 26.2± 1.2cm when compared with compression stockings
Stacey MC, Burnand,KG, Layer GT, Pattison M. Transcutaneous oxygen tensions in assessing the treatment of healed venous ulcers. British J. Surg 1990;77:1050-1054	TCPO2 as a reulceration predictor in healed VU patients. 2 groups: 1. Elastic stockings and stanozolol 5mg bid x 9 mos or 2. Elastic stockings and surgical ligation of superficial veins	RCT with reassessment of legs with measured TcPO2 compared for patients who refused surgery or stanozolol, who received elastic stockings with the other modality.	Confirms low *TcPO2* over lipodermatosclerotic skin and healed ulcers Improved *TcPO2* in both treatment groups over elastic stockings alone (p<0.5)
Stacey MC, Jopp-Mckay AG, Rashid P, Hoskin SE,Thompson PJ. The infuence of dressings on venous ulcer healing—a randomised trial. Eur J Vasc Endovasc Surg 1997;13: 174–9	*133 patients randomly assigned to either* *(1)* Viscopaste® zinc oxide paste-impregnated bandage *(2)* Calcium alginate dressing (3) Zinc-oxide impregnated stockinette	Prospective RCT measuring % healed during up to 9 months of care	9-month % healed: Viscopaste®: 79% healed Calcium alginate: 56% healed Zinc oxide stockinette: 59% healed
Stacey M, Falanga V, Marston W,Moffat C, Phillips T, Sibbald RG, Vanscheidt W, Lindholm C. The use of compression therapy in the treatment of venous leg ulcers: A recommended management pathway. *EWMA Journal* 2002; 2(1):3-7.	Algorithm developed by consensus	MEDLINE Literature Search 1966 to 2002 EMBASE Literature Search 1974-2002 on compression therapy/treatment of venous ulcers	Algorithm or pathway published for venous ulcer compression if ABPI > 0.8; 15-25 mm Hg compression for Mixed Arterial-Venous Ulcers if ABPI = 0.5 to 0.8; or referral to specialist with no compression if severe Arterial disease exists as defined by ABPI <0.5.
Stacy MC. Investigation and treatment of chronic venous ulcer disease. *ANZ J. Surg* 2001; 71:226-229.	Literature review of techniques of preventing ulcer recurrence.	Summary of effects of stockings in RCT or various surgeries to prevent ulcer recurrence	Class 3 stockings (35-45 mmHg at ankle) reduce ulcer recurrence. Primary source is ref#30 in this review. (ordered)
Steffe TJ, Caffee HH. Long-term results following free tissue transfer for venous stasis ulcers. Ann Plast Surg. 1998;41(2):131-7; discussion 138-9.	All 14 free-flap tissue reconstructions of VU between 1983 and 1993	CO measuring complication rates and flap failures	43% complications, and all VU recurred in mean 17.2 months. Complete flap failure in 2/14 patients. Microsurgical flap reconstruction does not cure VU
Stromberg HE, Agren MS. Topical	Arterial leg ulcer pts (19)	Double-blind, placebo-	Zinc oxide promoted healing and

zinc oxide treatment improves arterial and venous leg ulcers. Br J Dermatol 1984; 111: 461–8.	Venous leg ulcer pts (18) Randomized to receive: Zinc oxide paste in gauze or same gauze without zinc oxide	controlled trial. Measures during 8 weeks: ulcer size presence or absence of granulation and ulcer debridement	debridement of leg ulcers, but effect may be due to moisture barrier of zinc oxide paste versus gauze alone as these are both documented effects of occlusive dressings.
Stiller MJ, Pak GH, Shupack JL, Thaler S, Kenny C, Jondreau L. A portable pulsed electromagnetic field (PEMF) device to enhance healing of recalcitrant venous ulcers: a double-bline, placebo controlled clinical trial *Br J Dermatol* 1992; 127(2):147-154.	PEMF 3 hours daily at home Active (18) Placebo (13)	Prospective double-blind RCT measuring wound surface area, ulcer depth and pain intensity at weeks 0, 4, and 8	By week 8, active group had a 48% decrease in wound surface area vs an increase in area of 42% for placebo (□<0.0002). 50% of active ulcers healed by week 8 vs 0% in the placebo group. (□<0.01)
Szewczyk MT, Jawień A, Migdalski A, Piotrowicz R, Grzela T, Brazis P. Predicting time to healing by anatomical assessment of venous pathology. Med Sci Monit. 2009;15(2):CR74-81	2-layer compression (~1/2 of 112 VU patients) 4-layer comprssion the other half	RCT of compression effects during up to 48 weeks care. Measured healing times & predictors of healing including superficial vs deep venous insufficiency	Similar healing time for2 and 4-layer; longer if superficial, deep & perforating system involved than if only 2 involved. VU healed slower if located at back of calf (unusual location)
Taddeucci P, Pianigiani E, Colletta V, Torasso F, Andreassi L, Andreassi A.An evaluation of Hyalofill-F plus compression bandaging in the treatment of chronic venous ulcers. J Wound Care. 2004;13(5):202-4.	HA –F dressing + compression vs Nonadherent gauze + compression	CCT	Greater mean reduction in area with hyaluronan, speed of epithelization (p= 0.92
Taradaj J, Franek A, Brzezinska-Wcislo L, Cierpka L, Dolibog P, Chmielewska D, Blaszczak E, Kusz D. The use of therapeutic ultrasound in venous leg ulcers: a randomized, controlled clinical trial. Phlebology. 2008;23(4):178-83.	Ultrasound stim. 1 MHz, 0.5 W/cm(2)) once daily, six times a week for seven Weeks (~20 per group) Surgery + US Surgery – US Conservative + US Conservative -US	RCT Measured % healed at 7 weeks	Surgery and/or US increased % of VU completely healed.
Taylor AD, Taylor RJ, Marcuson RW. Prospective comparison of healing rates and therapy costs for conventional and four layer high compression bandaging treatments of venous leg ulcers Phlebology 1998;13:20-4.	4 layer bandage (orthopaedic wool, crepe, Elset, Coban); (18) Conventional treatment (range of preparations, possibly including some compression (18)	RCT for 12 weeks in a UK leg ulcer clinic	Healing of all ulcers on cared for limb in 12 weeks: 66.7% with 4-layer compression 22.2% with Conventional care
Tawes RL, Barron ML, Coello AA, Joyce DH, Kolvenbach R. Optimal therapy for advanced chronic venous insufficiency. *J Vasc Surg* 2003; 37:545-551.	Balloon dissection, subfascial endoscopic perforating vein surgery (SEPS) with routine posterior deep compartment fasciotomy, including ligation and stripping of the superficial system	Retrospective multicenter cohort study reviewing clinical efficacy and safety outcomes for 832 patients receiving the procedure for venous reflux documented at duplex ultrasound scanning and stratified by CEAP classification.	The technique interrupted 3-14 (mean 7) incompetent perforating veins per patient., with 55% of patients receiving SEPS plus ligation and stripping in the same operation. Ulcers healed or were improved in 4-14 weeks in 92% of patients. In the 4% with recurrent ulcers or skin breakdown at 6-24 months, repeat SEPS was successful in 25%. In a subset of 51 C4 patients consenting to ambulatory venous pressure (APV) measurement, the 25 with SEPS had significantly decreased AVP..
Tenbrook, J, et. al., Systemic review of outcomes after surgical management of venous disease incorporating subfascial	1140 treated limbs- 1 randomized trial and 19 case studies	LR. Retrospective analysis of 20 studies	Results suggest that surgical management of venous ulcers including SEPS, with or without saphenous ablation, leads to an

endoscopic perforator surgery. *J Vasc Surg* 2004; 39:583-589.			88% chance of ulcer healing and a 13% chance of recurrence over the short term
Turcynski. R., Tarpila, E. Treatment of Leg Ulcers with Split Skin Grafts: Early and Late Results *Scandinavian Journal Plastic and Reconstructive Hand Surgery* 1999:33:301-305. C1	Split Skin Grafts SSG (60)	Case series, four months follow-up	88 leg ulcers were treated in 60 patients. 82% healed after a mean of 15 days and 36% reoccurred after a mean of 6 months in the SSG group
Ubbink DT; Westerbos SJ; Evans D; Land L; Vermeulen H. Topical negative pressure for treating chronic wounds. Cochrane Database Syst Rev, 2008 (3). *Cochrane AN:* CD001898.		SR	Insufficient evidence to support use on VU at this time.
Ukat A, Konig M, Vanscheidt W, Münter KC. Short-stretch versus multilayer compression for venous leg ulcers: a comparison of healing rates. *J Wound Care* 2003;12:139–143	1. 4-layer elastic compression (Profore) (44) 2. Short-stretch (Comprilan) (45) Allevyn dressing both groups	Prospective RCT measuring healing time and likelihood of healing at any time.	4-layer healed faster than short-stretch (p = 0.03) and were 2.9 times more likely to heal at any given time.
van Gent WB, Hop WC, van Praag MC, Mackaay AJ, de Boer EM, Wittens CH. Conservative versus surgical treatment of venous leg ulcers: a prospective, randomized, multicenter trial. *J Vasc Surg* 2006;44(3):563–571	Surgery : SEPS (97) Conservative ambulatory compression (103) All CEAP Score 6 (VU)	RCT measuring time to healing (NS diff), recurrence rates (NS diff) At 29 months, more SEPS ulcer free 72% than conservative 53% NS (p = 0.11)	Patients with recurrent ulceration or medially located ulcers in the surgical group had a longer ulcer-free period than those treated in the conservative group (P = .02 for both).
Van Hecke A, Grypdonck M, Beele H, Vanderwee K, Defloor T. Adherence to leg ulcer lifestyle advice: qualitative and quantitative outcomes associated with a nurse-led intervention. J Clin Nurs. 2011;Feb 20(3-4):429-43	26 VU patients in the community	Pre-post CO or HCT study of effects of nurses educating patients on compression wearing, leg exercise and elevation, activity level, pain and ulcer size. Wilcoxon signed rank test for differences	Leg elevation and leg exercise increased in frequency and duration. Compression wearing did not. Nurse education of patient should be incorporated into practice.
Van Hecke A, Grypdonck M, Beele H, De Bacquer D, Defloor T. How evidence-based is venous leg ulcer care? A survey in community settings. J Adv Nurs. 2009;65(2):337-47.	789 VU patients managed in community health care and private practice	Survey on l llife-style advice Self-perceived as more educated on EB care, gave more advice: leg elevation (68.3%), physical activity (39.8%) nutrition (16.7%)	Nurses who perceived selves to have adequate VU knowledge & skills were 3.75 times more likely to provide lifestyle advice than those lacking such knowledge and skills: + find care more rewarding
Van Hecke A, Grypdonck M, Defloor T. Guidelines for the management of venous leg ulcers: a gap analysis. Eval Clin Pract. 2008;14(5):812-22.	LR and critical appraisal of 7 Evidence-based VU Guidelines	PubMED, Cinahl, Cochrane & Guideline websites	VU guidelines were E-Based, but often failed to address patient wishes, use multidisciplinary team
van Rijswijk, L.The multi-center Multi- Leg Ulcer Study Group. Full-Thickness Leg Ulcers: Patient Demographics and Predictors of Healing. *Journal of Family Practice* 1993; 36(6): 625-632.	DuoDERM CGF DuoDERM (total of 72 leg ulcers)	Retrospective analysis of ConvaTec data on 72 full-thickness leg ulcers of venous, diabetic, arterial or mixed etiology	54% healed in average of 56 days. Risk factors for non-healing included male gender or diabetes. >30% area reduction after 2 weeks of treatment predicted that the ulcer would progress to healing
Vanscheidt W, Ukat A, Horak V, Brüning H, Hunyadi J, Pavlicek R, Emter M, Hartmann A, Bende J, Zwingers T, Ermuth T, Eberhardt R. Treatment of recalcitrant venous leg ulcers with autologous keratinocytes in fibrin sealant: a	Bioseed® (116) Autologous keratinocytes in fibrin sealant Standard treatment (109) All VU > 3 mo duration	RCT: measuring time to complete 2007ing in 12 weeks and % healed. Both groups received compression therapy.	Faster median healing time with Bioseed (176 d) vs > 201 d for Std of care (p< 0.0001) 38% healed in Bioseed group compared to 24% healed with Std of care.

multinational randomized controlled clinical trial. Wound Repair Regen. 2007;15(3):308-15.			
Vanscheidt W, Sibbald G, Eager C. Management of venous leg ulcers: Versiva™: A new foam composite dressing, compared with a foam dressing. *Ostomy/Wound Management* 2004;	With moderate to high compression bandaging: Versiva™ composite foam (55) Allevyn Adhesive (52)	Prospective RCT of dressing performance, patient-reported pain and healing during 12 weeks of care.	Composite foam was more conformable (p=0.05), less sensitizing (p=0.02) and easier to apply (p=0.01). Other variables showed no statistically significant differences.
Vasquez, M, Rabe E, McLafferty RB, Shortell CK, Marston WA, Gillespie D, Meissner MH, Rutherford RB. Revision of the venous clinical severity score: Venous outcomes consensus statement: Special Communication of the American Venous Forum Ad Hoc Outcomes Working Group. J Vasc Surg 2010;52:1387-96.	American Venous Forum Working group consensus statement	Expert Opinoin consensus statement revising CEAP classification which responds poorly to change uses language of validated quality of life instruments.	VCSS based on international ad hoc working group opinions . It address issues of VU patients at lower end of venous disease spectrum. It should be more responsive to changes in disease severity over time in response to treatment.
Veraart JCJM, Neumann HAM, Effects of medical elastic compression stockings on interface pressure and edema prevention. *Dermatol Surg,* 1996; 22:867-871.	Part 1: 18 legs on 10 patients, of these, 14 legs on 8 recurrent VU patients confirmed with Doppler ultrasound. Part 2:11 legs on 6 recurrent VU patients	CCT: Part 1: Interface pressure measurements for 5 different low, medium or high compression stockings. Part 2: Leg volume measured lower leg edema	Part 1. Compression levels ranged from 18 mmHg to 40 mmHg at the ankle. Part 2. The higher > 30 mmHg compression stockings reduced edema more than those providing <30 mmHg compression.
Vermeulen H, van Hattem JM, Storm-Versloot MN, Ubbink DT. Topical silver for treating infected wounds. Cochrane Database Syst Rev.2008(1);CD005486			
Vesić S, Vuković J, Medenica LJ, Pavlović MD. Acute lipodermatosclerosis: an open clinical trial of stanozolol in patients unable to sustain compression therapy. Dermatol Online J. 2008 Feb 28;14(2):1.	17 patients with severe pain and acute lipodermatosclerosis resulting from venous insufficiency, all unable to sustain compression therapy.	Prospective HCT measuring pain and dermal thickness pre and post 8 week treatment with stanozolol	Mean pain scores reduced from 7 to 3 during the 8 week treatment ($p<0.001$) and dermal thickness reduced also ($p<0.01$) Side effects were not noted.
Viarengo LM, Potério-Filho J, Potério GM, Menezes FH, Meirelles GV. Endovenous laser treatment for varicose veins in patients with active ulcers: measurement of intravenous and perivenous temperatures during the procedure. Dermatol Surg. 2007;33(10):1234-42; discussion 1241-2.	Compression elastic or inelastic (25) Laser Endovenous Coagulation of great or small saphenous vein (27) 980 nm diode	Blinded RCT evaluating healing rate and recurrence of VU at 3,6, 12 mon	VU healed faster after Laser EVC. 44% of compression group recurred. None of Laser EV C group recurred.
Villavicencio, J.L. Prospective comparative trial between the conventional Four-layer elastic compression treatment and a semi-rigid orthotic compression treatment and a semi-rigid orthotic compression system in patients with bilateral venous leg ulcers. American Venous Forum 21st Annual Symposium: Current Critical Problems in Vascular Surgery VI, 6.1. 1994	Twelve patients with 24 contralateral paired extremities each with a venous ulcer, one each receiving 12 weeks treatment with: Circaid (12) (CA) Profore (12) (ECT)	Prospective, controlled, randomized 12-week study comparing CircAid to the Profore four layer elastic treatment, measuring mean ulcer healing rate Limb circumference reduction rate, microbial burden and patient satisfaction index	Ulcer area healing rate was greater with CA than ECT (4.65$\pm$ 1.36 versus 0.90 $\pm$ 0.44 cm^2/week; P= .0114.) Limb circumference reduction rate was more significant with CA than with ECT (0.32+0.14 versus 0.10$\pm$ 0.14 cm/week: P=0.0385) No significant difference in patient satisfaction index or other measures of healing.
Vin F, Teot L, Meaume S.	73 Patients	RCT clinical trial, multi-center	29 completed the 12 wk trial. 25

The Healing properties of Promogran in venous leg ulcers. J. Wound Care. 2002 Oct;11(9):335-41.	.37 Promogran .36 Adaptic	study, randomized controlled trial 12 wk comparison of dressings under short- stretch compression. France	healed before 12 weeks. 19 stopped for reason unrelated to healing. Significantly more pt in Adaptic group switched to another dressing 22.2% versus 5.4%. No other differences in healing were significant. -31% (11) Healed w/ Adaptic -41% (15) Healed w/ Promogran -42% (15) Ulcers Imp. w. Adaptic -62% (23) Ulcers imp. W/ Prom
Volikova AI, Edwards J, Stacey MC, Wallace HJ. High-frequency ultrasound measurement for assessing post-thrombotic syndrome and monitoring compression therapy in chronic venous disease. J Vasc Surg. 2009;50(4):820-5.	20 VU patients with prior DVT not receiving compression; 20 patients with prior DVT and no VU + symptoms of post-thrombotic syndrome; 31 age-matched healthy control subjects. Association of dermal thickness with Clinical component of CEAP class examined in cross sectional analysis (n=157) of patients $\geq$ 3 yr history of DVT	Prospective CCT to measure dermal thickness with 17 MHz Phillips iU22 ultrasound scanner or 20-MHz DermaScan-C medium-focus probe 7.5 cm above medial malleolus pre- and post 1,3,5 or 7 weeks of compression.	Dermal thickness (DT) of VU patients pre-compression was more than that of PTS patients without VU (p=0.002) and more for both these groups than for normal subjects (p = 0.001). Compression steadily decreased DT during first 5 weeks. DT increased with higher CEAP score $\geq$ 1.985 mm DT had + predictive value of 46.9%, - predictive value of 90.3% to predict severe PTS defined as C(4b),C(5) or C(6) i.e. lipodermatoscclerosis or leg ulceration
von Felbert V, Schumann H, Mercer JB, Strasser W, Daeschlein G, Hoffmann G. Therapy of chronic wounds with water-filtered infrared-A (wIRA). GMS Krankenhhyg Interdiszip 2007;2(2) Doc 52:1-12. PMID: 20204086	Water-filtered IR warming (20) 30 min 3x/ week (wIRA) Visible (VIS) light (20) All on same schedule. Clean-sing, compression, antibacterial gauze dressing the same for both groups.	RCT for 6 weeks measuring days to heal, residual area at 42 days and pain medication required.	wIRA group healed in mean of 18 days, compared to 42 days for VIS, wIRA had 0.4 cm^2 remaining mean area to heal at 42 days vs 2.8 cm^2 for VIS group ($p<0.001$), who required more pain medication.
Vowden KR, Mason A, Wilkinson D, Vowden P. Comparison of the healing rates and complications of three four-layer bandage regimens. *J Wound Care* 2000; 9(6): 269-272.	Charing Cross 4-layer bandage (n=50) Parema a4-layer bandage (n=50) Robinson 4-layer bandage (n=49)	Wound healing was measured at 12 and 20 weeks. Ulcers were mean of 4.9 to 6.76 cm^2 in area.	Overall healing rate of ulcers was 65% at 12 weeks, 80% at 20 weeks with no healing difference statistically significant among the 3 bandages.
Vu T, Harris A, Duncan G, Sussman G. Cost-effectiveness of multidisciplinary wound care in nursing homes: a pseudo-randomized pragmatic cluster trial. Family Practice 2007; 24: 372–379.	21 NH Multidisciplinary team (MT)care of 176 patients with VU or PU 23 NH assigned on random basis to control: usual care (UC) in Australia (all NH)	Stratified randomized assignment of each nursing home. Healing and costs of care were measured 1999-2000.Cox regression with shared frailty predicted chances of healing	More wounds healed in MT group (61.7%) than UC group 52.5%, P = 0.07). Healing chance increased 73% for MT wounds (P = 0.003]. Mean treatment cost was $A616.4 for MT and $A977.9 for UC patients (P = 0.006).
Vuerstaek, D.D.J., Vainas, T., Wuite, J. et al. State-ofthe-art treatment of chronic leg ulcers: a randomized controlled trial comparing vacuum assisted closure (VAC) with modern wound dressings. J Vasc Surg 2006; 44: 5, 1029-1037.	13 VU VAC to prepare until 100% granulation, then VAC for 4 days continuous 125 mmHg VAC pinch graft s took 13 VU Std of Care:Alginate, HCD etc to 100% granulation, then Atrauman 4 d post graft to take: alginate or hydrogel	RCT measuring days to wound preparation for grafting and days to healing	V.A.C. therapy resulted in a 7-day wound bed preparation time (*P* _ .005) vs 17 days in the control group. VAC also associated with faster time to heal and shorter hospital stay. ($p<0.05$) . NS difference in recurrence. First week VAC lowered QoL .
Warriner RA, Wilcox JR, Stewart D, Carter MJ. Influence of wound care center visit frequency on wound healing outcomes of diabetic foot and venous leg ulcers. 2010;Proc. Wound Healing Society, Poster # PT5.02. Orlando, FL.	206 DFU patients 215 VU patients	RCO study of visit frequency on healing outcomes	Visit frequency at least once/week healed 74.3% of VU in 4 weeks compared to 0% if visits were biweekly or less frequent.

Wayman J, Nirojogi V, Walker A, Sowinski A, Walker MA. The cost effectiveness of larval therapy in venous ulcers. J Tissue Viability. 2000;10(3):91-4.	Larval debridement therapy (LDT) 6 patients with sloughy VU; Hydrogel (secondary dressing not stated) 6 patients with similar wounds	RCT comparing number of applications to debride the VU, time and cost to debride for both groups. Unblinded evaluation.	1 LDT application debrided 6/6 VU . 4/6 patients in the hydrogel group required dressings at 1 month. Median cost of treatment 78.6 £ LDT or 136 £ hydrogel.
Weiss AR (Ed) *Bull North Amer Soc Phlebol Proc* 1995; 21:642-647.		EO	Varicose veins defined as dilated subcutaneous veins >4mm are common finding with VU
Westerhof W, Jansen FC, de Wit FS, Cormane RH. Controlled double-blind trial of fibrinolysin-desoxyribonuclease (Elase) solution in patients with chronic leg ulcers who are treated before autologous skin grafting. J Am Acad Dermatol. 1987 ;17(1):32-9.	34 VU Patients hospitalized Randomized to receive either ELASE® enzyme Or Saline To debride VU	RCT measuring debridement and granulation.	Elase was statistically significantly better in effect on debridement (p less than 0.05) and on enhancing of granulation (p less than 0.05) than saline. Effect not significant between treatments in complex ulcers.
Wieman TJ. Efficacy and safety of recombinant human Platelet-Derived Growth Factor-BB (Becaplermin) in patients with chronic venous ulcers: A pilot study. *Wounds* 2003; 15(8):257-264.	2 RCTs Dose: 100 ug/g PDGF-BB Study 1: PDGF-BB (35) Placebo Gel (36) Study 2: PDGF-BB (32) Placebo Gel (32)	RCTs measuring wound healing and adverse events during 16 weeks of treatment or until healing whichever came first.	In Study 1, 36% healed by 16 weeks when treated with PDGF-BB, 34% healed with Placebo Gel. In Study 2, the ulcers were smaller. 56% healed by 16 weeks with PDGF-BB and 44% healed with Placebo Gel. There were no significant differences in healing .
Wilkinson E, Buttfield S, Cooper S, Young E. Trial of two bandaging systems for chronic venous leg ulcers. *J Wound Care* 1997; 6:339-340.	1. Charing Cross 4-layer compression bandage i.e. wool, crepe, Elset, Coban (17 legs) 2. 4-layer lint, Tubifast, Setopress, Tubifast (18 legs) Both had Tricotex dressings.	RCT measuring % of patients with complete wound healing after 12 weeks in wounds stratified for < or > 10 sq cm.	Group 1: <10 sq cm: 75% > 10 sq cm 59% Group 2: <10 sq cm: 42% > 10 sq cm 33% Overall Group 1 healed 59% and Group 2 healed 39% in 12 weeks
Wilkinson L, Emery P, Palmer R. Immunological abnormalities in patients with leg ulcers. *Br J. Rheumatology* 1991; 29(6):490-1	Pilot study of 21 patients attending a leg ulcer clinic over a 6-week period, 10 with venous insufficiency.	Prospective case series exploring laboratory tests (CBC, ESR, C-reactive protein, rheumatoid factor, ANCA and Factor Viii diagnostic of leg ulcers	In 13 of 17 patients measured for Factor VIII related antigen it was elevated. 5 had ANCA (antinuclear antibody antineutrophil cytoplasmic antibody)
Williams D, Enoch S, Miller D, Harris K, Price P, Harding KG. Effect of sharp debridement using curette on recalcitrant nonhealing venous leg ulcers: a concurrently controlled, prospective cohort study. Wound Repair Regen. 2005;13(2):131-7.	26 VU completely covered with slough or necrosis were debrided 27 VU with 15-20% granulation tissue but no slough or fibrin were not debrided	CCT measuring area reduction 4 weeks post debridement and % healed weeks 8 & 20 post debridement	More area reduction in curette debrided VU at 4 weeks (p=0.02). NS difference in area reduction during study or ulcers healed on study (5 in each group).
Wilson CL, Cameron J, Powell SM, Cherry G, Ryan TJ. High incidence of contact dermatitis in leg-ulcer patients--implications for management. Clin Exp Dermatol, 1991 Jul;16(4):250-3.	81 VU patients; retrospective review of patch test results performed on all new VU patients in preceding 11 months	CS	67% positive for contact allergy inclusive of lanolin, topical antibiotics &/or cetearyl alcohol. Multiple allergies in 58%.
Wilson JM, Arseculeratne YM, Yang Y, Cherry GW. Healing venous ulcers with cycloidal multidirectional vibration therapy. *J Wound Care* 2002; 11(10):395-8	21 VU patients ABI >0/8 Setopress + Vibro-Pulse gentle cyclic vibration 3 x /d for 30 min each. 2x/ week NA gauze dressing changes.	Prospective CS for 12 weeks during which healing and pain were measured weekly	13 (62%) healed completely in mean of 7 weeks. Pain reduced in 17 of 18 patients completing the study, accompanied by mean 15% reduction in leg volume.
Wipke-Tevis, D. *et al.* Prevalence, incidence, management and predictors of venous ulcers in the long-term care population. *Adv Skin Wound Care* 2000, 13(5):218-224.	venous ulcer development in 32,221 patients in long term care in Missouri 1 Jan 96 to 30 Oct 98	Retrospective cohort study from Minimum Data Set	Venous ulcer development during first year post admission was associated with lower extremity edema, peripheral vascular disease or diabetes mellitus.

Woo KY, Sibbald RG. A cross-sectional validation study of using NERDS and STONEES to assess bacterial burden. Ostomy Wound Manage. 2009;55(8):40-8.	112 patients with chronic wounds: includes 44 with leg ulcers	Cohort study investigating clinical signs of critical colonization (NERDS) or infection (STONEES) compared to semiquantitative swab cultures.	wounds with elevated temperature 8 x more likely to have moderate or heavy bacterial growth. When combining any three clinical signs, sensitivity was 73.3% for scant or light and 90% for moderate and heavy bacterial growth. specificity was 80.5% and 69.4% for same
Wound Ostomy Continence Nurses Society. Clinical Practice Guideline #4. Management of Wounds in Patients with Lower-Extremity Venous Disease, 2005. http://www.guideline.gov Accessed Nov 10, 2010.		Guideline of the WOCN.	
Wright DD, Franks PJ, Blair SD, Backhouse CM, Moffatt C, McCollum CN. Oxerutins in the prevention of recurrence in chronic venous ulceration: randomized controlled trial. Br J Surg 1991; 78: 1269-70.	Oxerutin+ Compression Compression + dressing control	RCT for prevention of VU recurrence	NS difference from control
Wright DD. The ESCHAR trial: should it change practice? Perspect Vasc Surg Endovasc Ther. 2009;21(2):69-72.	~250 VU patients SEPS+compression ~250 VU patients compression alone	RCT measuring healing at 24 weeks only (no earlier time) and VU recurrence rate	No significant difference in % healed at 24 weeks, significantly less recurrence in SEPS group regardless of deep vein incompetence
Xia ZD, Hu D, Wilson JM, Cherry GW, Ryan TJ. How echographic image analysis of venous oedema reveals the benefits of leg elevation. J Wound Care. 2004;13(4):125-8.	10 patients with venous insufficiency and leg edema ages 44-89 years	HCT using high frequency B-mode US scanning and digital image analysis pre and post 3-4 hours of leg elevation to reduce edema. Compared low echogenic pixels (LEP) pre and post elevation.	Compared with pre-elevation, of lower leg volume decreased by 2.9% (138 cm3) after 3 to 4 hours elevation ($p < 0.05$). After elevation LEPs in upper, middle and lower sites of the limb decreased by 8.8%, 15.6% and 17.3% ($p < 0.05$) in the lower site
Yamada T, Ohta T, Ishibashi H, Sugimoto I, Iwata H, Takahashi M, Kawanishi J. Clinical reliability and utility of skin perfusion pressure measurement in ischemic limbs--comparison with other noninvasive diagnostic methods. J Vasc Surg. 2008;47(2):318-23.	211 subjects with ischemic limbs (arteriosclerosis obliterans) ~ half with diabetes and/or on dialysis.	Prospective cohort study Skin perfusion pressure (SPP) correlations measured with healing, toe blood pressure (TBP), ankle blood pressure (ABP) and great toe Transcutaneous oxygen pressure (tcPO2)	Sensitivity (72%) and specificity (88%) were greatest for SPP cut-off 40 mmHg and TBP > 30 mmHg as the two best predictors of healing and strongly correlated with each other. ($p<0.001$) for all pairs.
Yasodhara M, Walton J, Hofman D, Cherry G. A comparison of light reflection rheography and duplex scanning in the diagnosis of chronic venous insufficiency. *Wounds* 2003; 15(8):246-249.	42 patients with venous insufficiency who had light reflection rheography (LRR) and were subsequently given duplex scans (DS)	LRR was used to measure venous refilling time. DS was used to measure venous reflux subsequently on the same 42 patients in a historically controlled trial	All 42 patients had shortened venous refilling time of less than 25 seconds as measured using LRR. Of these, 41 had abnormal DS confirming venous reflux, and 1 had a normal DS: 2.3% false negatives with DS.
Zamboni P, Cisno C, Marchetti F, Mazza P, Fogato L, Carandina S, De Palma M, Liboni A. Minimally invasive surgical management of primary venous ulcers vs. compression treatment: a randomized clinical trial. Eur J Vasc Endovasc Surg. 2003 ;25(4):313-8.	(47 VU patients) assigned to Minimally invasive surgery or Compression	RCT measuring healing time and quality of life at 3 years	Mean healing time ($p<0.05$) 31 days for surgery group 63 days (100% healed) compression (96% healed) . QoL significantly improved for surgical group.