Huntsville Rounds

Amputation Prevention & Wound Healing: Increasing Access to Multidisciplinary Care

Faculty/Presenter Disclosure

- Faculty: Dr. Asem Saleh

Disclosure of Financial Support

- **Potential for conflict(s) of interest:**
  - Own Health

Mitigating Potential Bias

- Potential Biases are acknowledged and are mitigated by presenting data supported by national and international guidelines, and as follows:
    - Information presented is evidence-based
    - Recommendations made are evidence or guidelines-based rather than personal recommendations of the presenter
- Off-label uses of drugs will not be discussed

Objectives

- Scope of the problem
  - In-patient wound care
- Process of healing
  - Diabetes, edema and pressure
  - Chronic vs acute wound
- Current evidence
  - Dressings
  - Antibiotics
- Cases
  - Arterial
  - Venous
  - Offloading

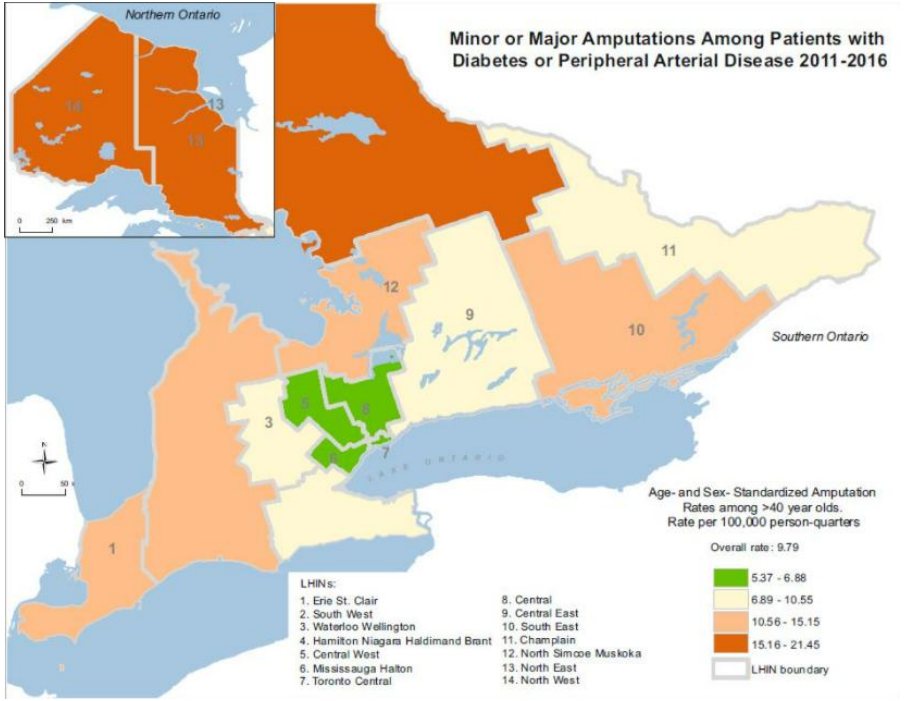
Lower limb preservation today

80%~ of leg amputations related to diabetes are preventable.

- 12M Canadians (30% of population) live with diabetes or are prediabetic.
  - 20% of diabetics will form a diabetic foot ulceration.
  - 50%+ → major amputation as a consequence.
  - 77,600 to 116,400 patients with DFUs at any time.

- Annual 7,720~ hospitalizations for lower limb amputations associated with diabetes.
  - 3,080 of those receive a leg amputation.
  - Patients who received a leg amputation spend about 19 days in hospital.

- There are also 23,500 diabetes-associated hospitalizations for treatment of ulcer and gangrene



NON-TRAUMATIC AMPUTATIONS ARE A DECADES-OLD, GLOBAL PROBLEM

Lower limb preservation today

SILOED

Fragmented system leads to lack of ownership of care pathways.

"80%+ of amputation prevention services are delivered in hospital settings."

INEQUITABLE

Restricted access to care based on geography, socio-economic status, and ethnicity.

"Indigenous Canadians are up to 4X more likely to undergo lower-limb amputations than other Canadians."

REACTIVE

Limited continuity in preventive care, leading to recurrence of conditions.

"Canada annually has 2,000+ diabetes-related lower limb amputations: 40% of whom develop new ulcers within a year and up to 50% require repeat amputations in 5 years."

HOW MUCH DOES IT COST THE HEALTH CARE SYSTEM?

The economics of wound care

AMPUTATIONS

- Diabetes-associated amputations alone cost $750M annually
- The average cost of a major lower-limb amputation is $74K~ in the first year, including hospitalization and postoperative care
- The cost of a single diabetes-associated amputation-related hospitalization: $47K

WOUNDS

- Total cost of wound care in the Canada in 2023: $12.1B
- Total cost of wound care in Ontario in 2023: $4.6B

VENOUS ULCERS

- Diabetes costs in Ontario are for diabetic foot ulcers annually: $552M
- Average DFU in-patient cost for Toronto hospitals: $23K to $50K

CANADA'S LEADER IN VALUE-BASED LIMB PRESERVATION CARE

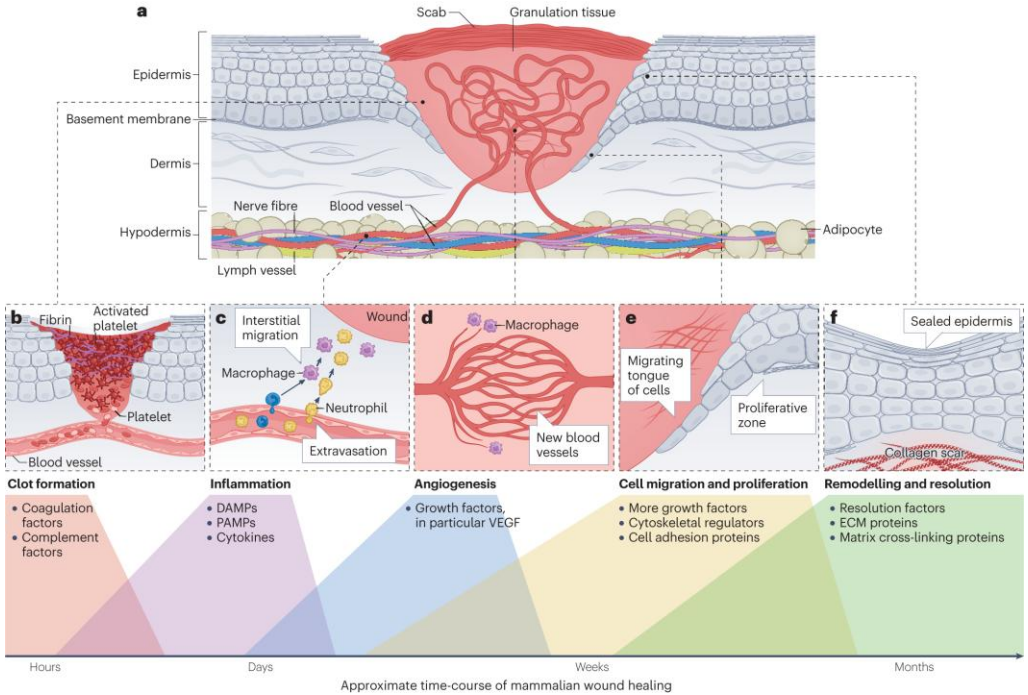
What is Own Health?

Own Health is a Canadian integrated care company, enabled by technology, specializing in value-based care focused on limb preservation

Own Health helps health systems achieve exceptional limb preservation outcomes by developing geography-specific care pathways and establishing proactive, patient-centered coordination. By leveraging local infrastructure, we facilitate in-person interventions, ensuring timely care and seamless integration to support a comprehensive, multidisciplinary patient journey.

Wound Healing

1. Hemostasis (Stopping the Bleed)
2. Inflammation (Cleaning Up)
3. Proliferation (Rebuilding)
4. Maturation (Strengthening)



Approximate time-course of mammalian wound healing

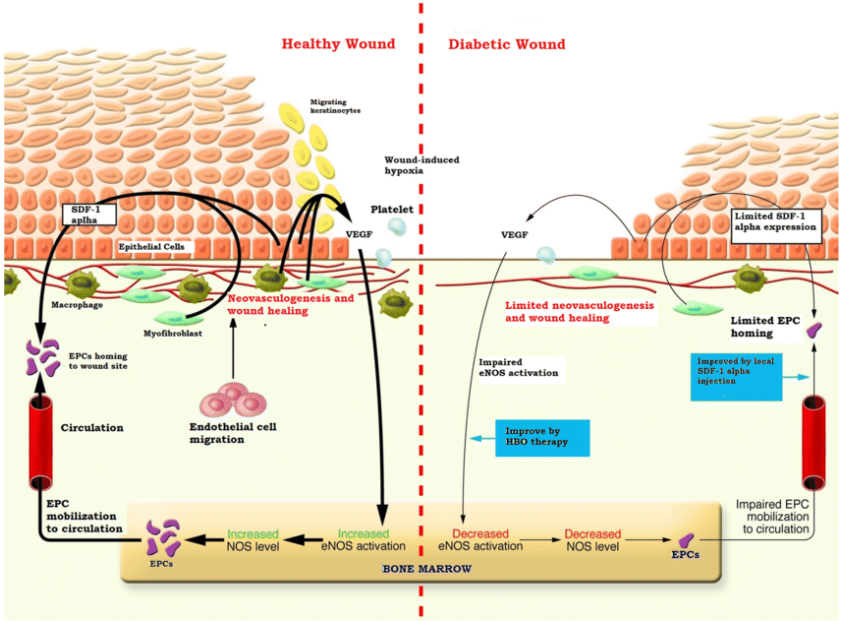
Wound Healing - Diabetes

1. Platelet dysfunction, arterial occlusion, delayed “sealing” of the wound

2. Hyperglycemia → Prolonged and less effective inflammation

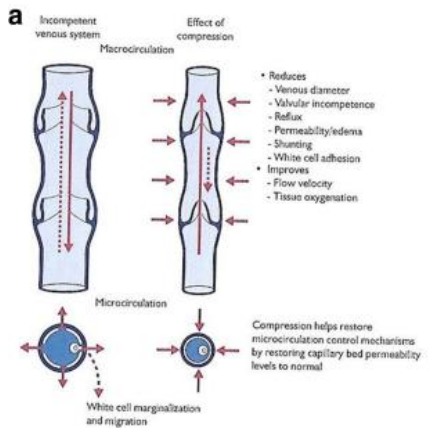
3. Fibroblast dysfunction → poor extracellular matrix, weak granulation

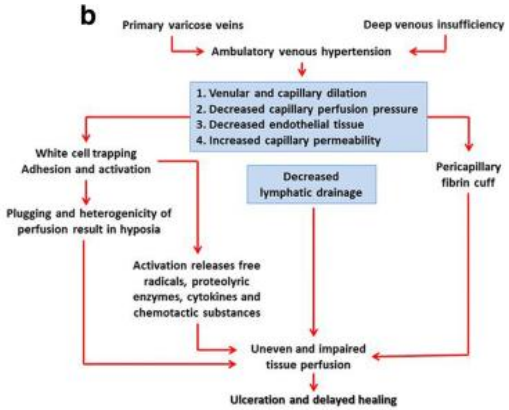
4. Collagen dysfunction → higher risk of reinjury



Wound Healing – Venous Hypertension

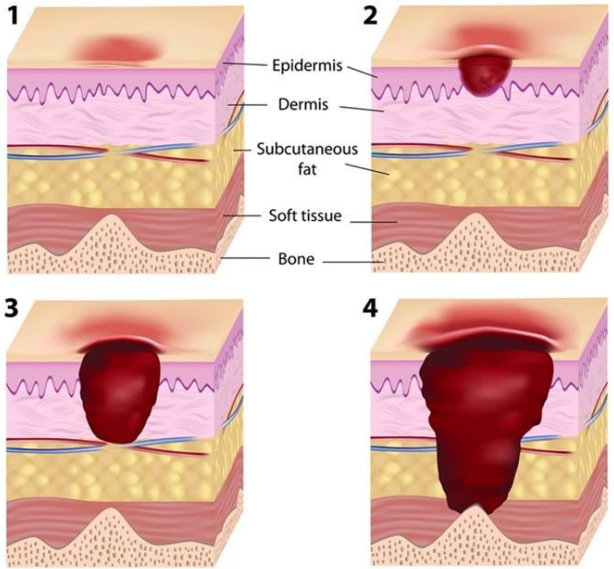
1. Increased venous pressure → prolonged bleeding, delayed sealing
2. Edema → ↑ ↑ ↑ inflammation and surrounding tissue damage
3. Venous HTN → impaired angiogenesis, fibroblasts
4. Venous HTN/Edema → impaired collagen, less elastic wounds and recurrences



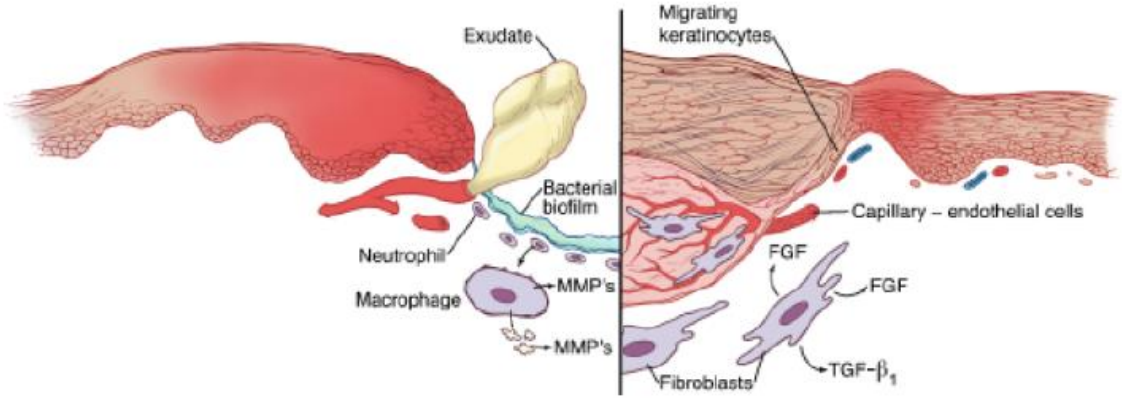


Wound Healing – Pressure

1. Pressure → damaged capillaries, poor sealing
2. Pressure → ↑ ↑ ↑ inflammation and impaired cell access to wound
3. Poor blood flow → absent granulation and new tissue growth
4. Pressure → disorganized collagen, uneven callous, increased pressure



Wound Healing – Acute vs Chronic



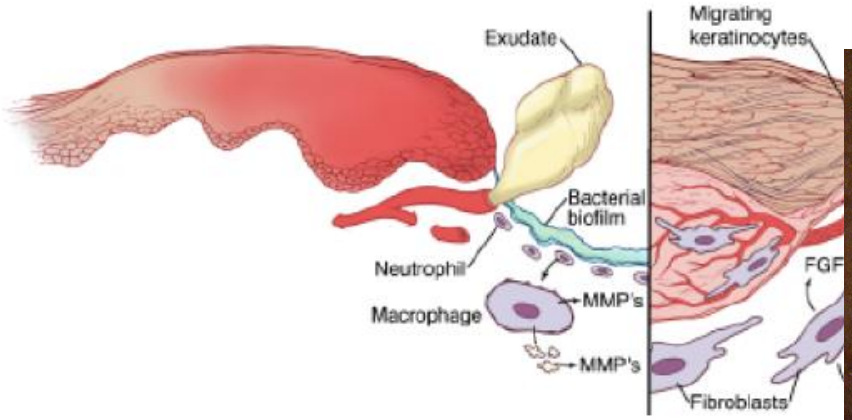
Chronic wound (arrested simultaneous repair)

No clot formation
Increased/excessive inflammation
Leaky capillaries and wound fluid formation
Extracellular matrix / granulation tissue defects
  Impaired/defective/degraded ECM
  Protease-inhibitor imbalance
Impaired cell-ECM interactions
Round fibrotic edges
Impaired keratinocyte migration
Excessive scar formation
Bacterial colonization/infection
Biofilm present

Acute wound (sequential orderly repair)

Clot formation
Minimal inflammation
Migrating capillaries
No/minimal ECM / granulation tissue defects
  Active ECM synthesis
  Protease-inhibitor balance
Active cell-ECM interactions
Flat edges
Active keratinocyte migration
Minimal scar formation
No/minimal bacteria
Biofilm absent

Wound Healing – Acute vs Chronic



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Extracellular matrix / granulation tissue defects
  Impaired/defective/degraded ECM
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Acute wound

Clot formation
Minimal inflam
Migrating capil
No/minimal EC
  Active ECM s
  Protease-inhi
Active cell-ECI
Flat edges
Active keratinc
Minimal scar fo
No/minimal bacteria
Biofilm absent

Case:

70-yo male, severe arterial disease, long standing history of bilateral DFUs

- Bilateral wounds since 2016
- Repeat serial debridement and home care supports

Service Authorization
Service Type: Outcome-Based Wound
Service Delivery Type: Outcome-Based Wound
Initial Authorization Date: 2016-04-06
Required First Visit Date: 2016-04-07

Case:

- Darco shoes
- Right foot wound responded well to debridement and offloading

- Patient in Darco and Rocker-Bottom shoes

Case:

- Left foot, no good progress
  - Debridement
  - Darco shoes

- Assess arterial status
- Offloading not sufficient

7. Edges (directly touching and within 0.5cm of wound edge)	0 = Wound is closed (skin intact) or nearly closed (<0.3cm^2) or edges are indistinct, diffuse, not clearly visible because of re-epithelialization 1 = majority (>50%) of edges are attached with an advancing border of epithelium 2 = majority of edges are attached even with wound base (not advancing) 3 = majority of edges are unattached and/or undermined 4 = majority of edges are rolled, thickened or fibrotic (do not include callus formation)

Case:

- Left foot, no good progress
  - Wound Care
  - Darco shoes

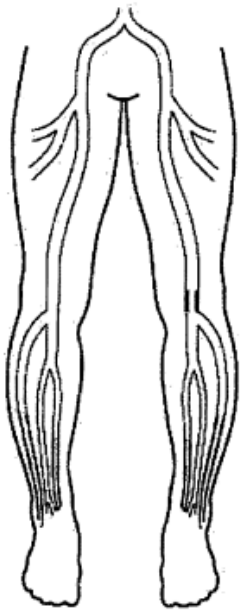
- Assess arterial status
- Offloading not sufficient
- Footy deformity too extreme

RESULTS

	Size (cm)	Velocity (cm/s)	Stenosis
Aorta:			

Right	Velocity (cm/s)	Flow	Stenosis
Dist EIA:			
CFA:	130	Triphasic	
Prox PFA:	229	Triphasic	
Prox SFA	112	Triphasic	
Mid SFA	143	Triphasic	
Dist SFA	140	Triphasic	
Pop AK:	59	Triphasic	
Popliteal:			
Pop BK:	57	Triphasic	
Post.Tibial:	23	Monophasic	
Peroneal:			
Ant. Tibial:	78	Monophasic	
Dors. Pedis:			

	Pressure (mmHg)	ABI
Brachial:	118	
Ant. Tibial:	101	0.79
Post.Tibial:	112	0.88
Toe:	66	0.52



Left	Velocity (cm/s)	Flow	Stenosis
Dist EIA:			
CFA:	120	Triphasic	
Prox PFA:	132	Triphasic	
Prox SFA	99	Triphasic	
Mid SFA	144	Biphasic	
Dist SFA	130	Biphasic	
Pop AK:	59	Biphasic	Enlarged
Popliteal:			
Pop BK:	334	Biphasic	50-75%
Post.Tibial:	48	Monophasic	
Peroneal:			
Ant. Tibial:	52	Monophasic	
Dors. Pedis:			

	Pressure (mmHg)	ABI
Brachial:	128	
Ant. Tibial:	113	0.88
Post.Tibial:	76	0.59
Toe:	AMP	

Ankle Brachial Index:

Equipment Needed:

- Blood pressure cuff
- Doppler ultrasound probe

Patient Preparation:

1. Have the patient lie supine for at least **5 minutes**.

Measure Brachial

Measure Ankle Pressures

1. Place **BP cuff** just above the ankle.
2. Use **Doppler** to locate the **dorsalis pedis** and **posterior tibial arteries**.
3. Measure systolic pressure in **both arteries**

ABI = Highest Ankle Systolic Pressure / Highest Brachial Systolic Pressure

Posterior tibial pulse

Dorsalis pedis pulse

Toe Brachial Index:

- https://hokansonvascular.com

- https://www.perimed-instruments.com

Case:

- Left foot, no good progress
  - Wound Care
  - Darco shoes

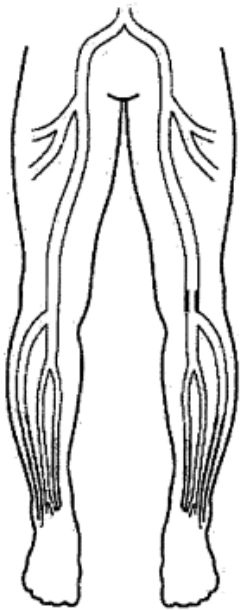
- Assess arterial status
- Offloading not sufficient
- Footy deformity too extreme

RESULTS

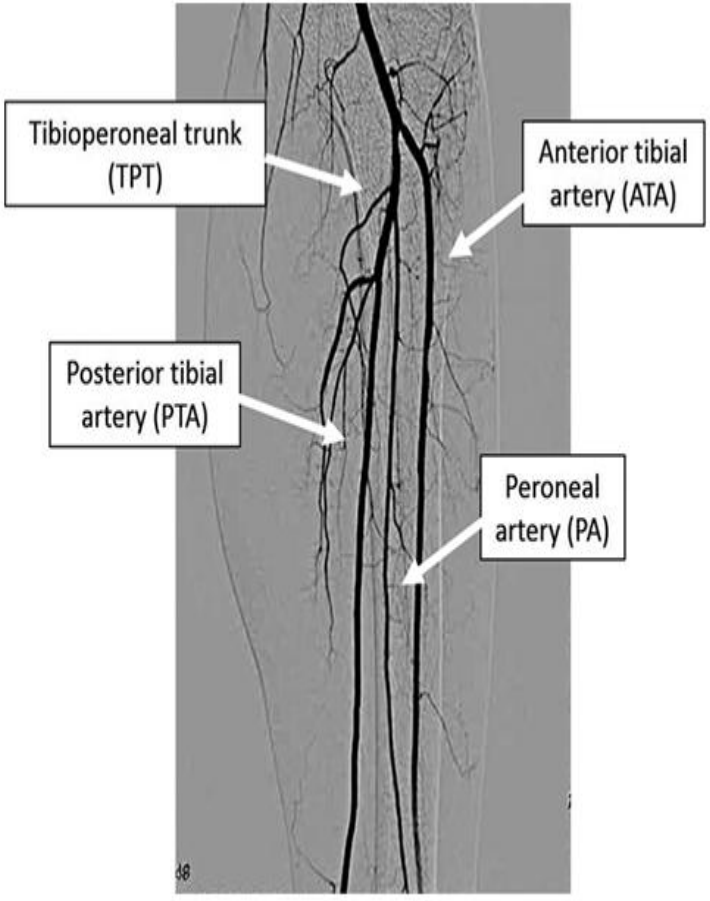
	Size (cm)	Velocity (cm/s)	Stenosis
Aorta:			

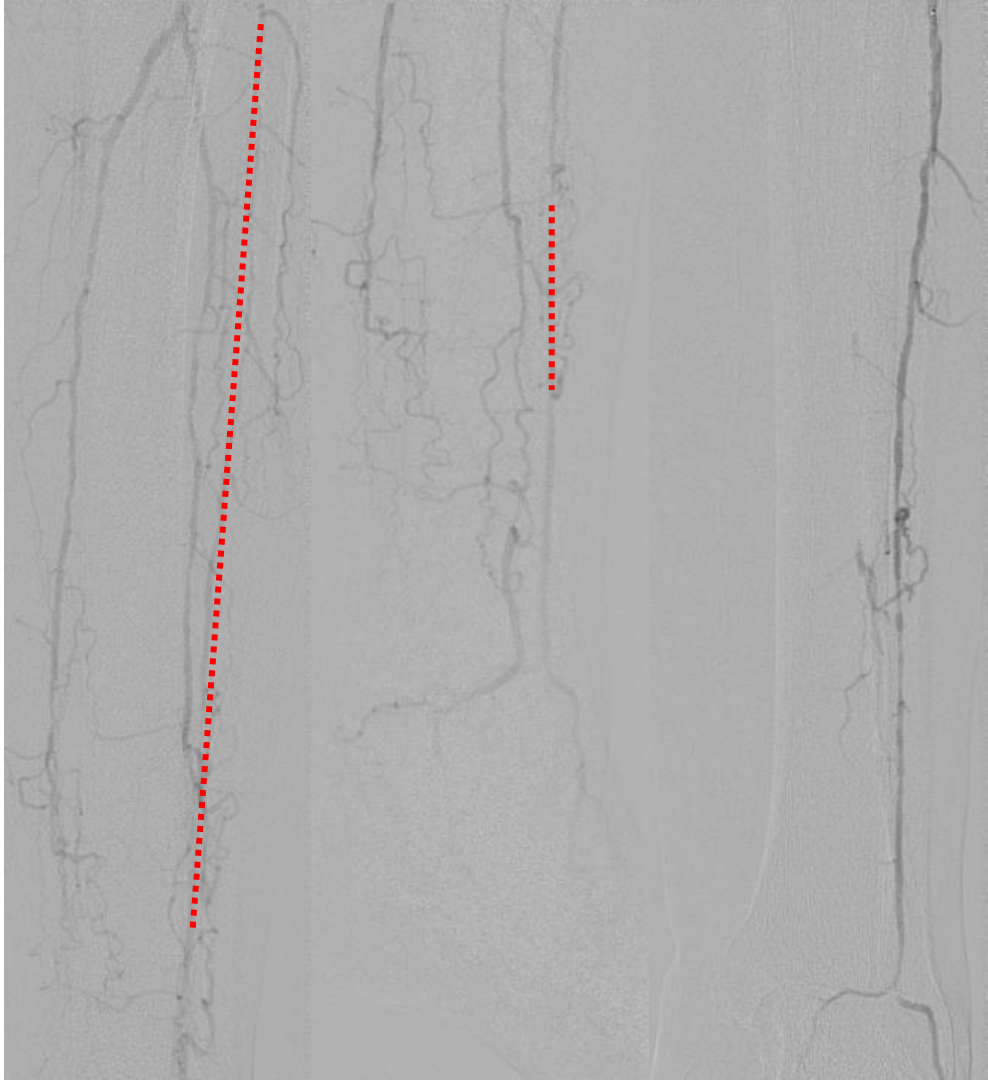
	Right			*Left*		
	Velocity (cm/s)	Flow	Stenosis	Velocity (cm/s)	Flow	Stenosis
Dist EIA:						
CFA:	130	Triphasic		120	Triphasic	
Prox PFA:	229	Triphasic		132	Triphasic	
Prox SFA	112	Triphasic		99	Triphasic	
Mid SFA	143	Triphasic		144	Biphasic	
Dist SFA	140	Triphasic		130	Biphasic	
Pop AK:	59	Triphasic		59	Biphasic	Enlarged
Popliteal:						
Pop BK:	57	Triphasic		334	Biphasic	50-75%
Post.Tibial:	23	Monophasic		48	Monophasic	
Peroneal:						
Ant. Tibial:	78	Monophasic		52	Monophasic	
Dors. Pedis:						

	Pressure (mmHg)	ABI	Pressure (mmHg)	ABI
Brachial:	118		128	
Ant. Tibial:	101	0.79	113	0.88
Post.Tibial:	112	0.88	76	0.59
Toe:	66	0.52	AMP	



Case:


Tibioperoneal trunk (TPT)
Anterior tibial artery (ATA)
Posterior tibial artery (PTA)
Peroneal artery (PA)



Case:

- Amputate toes → Transmetatarsal Amputation

- Healed……then not so healed

Case:

- Wound care
  - Dressings
  - Debridement
  - Infection control
- Arterial supply
- Offloading

7. Edges (directly touching and within 0.5cm of wound edge)	0 = Wound is closed (skin intact) or nearly closed (<0.3cm^2) or edges are indistinct, diffuse, not clearly visible because of re-epithelialization 1 = majority (>50%) of edges are attached with an advancing border of epithelium 2 = majority of edges are attached even with wound base (not advancing) 3 = majority of edges are unattached and/or undermined 4 = majority of edges are rolled, thickened or fibrotic (do not include callus formation)

Case:

- Wound care
  - Dressings
  - Debridement
  - Infection control
- Arterial supply
- Offloading
  - TCC EZ started

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Case:

- Wound c
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Case:

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- Offloadin

Case:

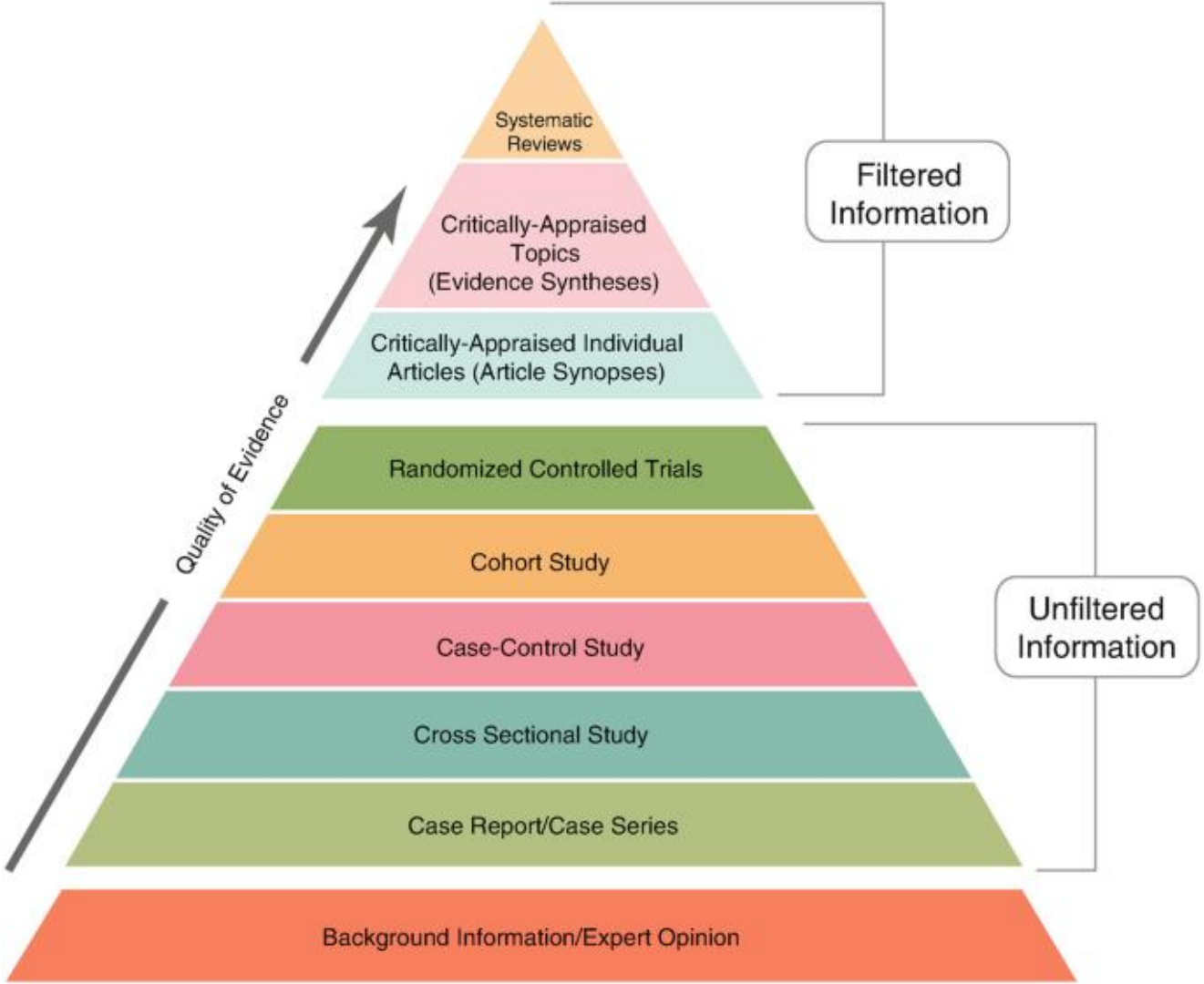
- Wound care
- Arterial supply
- Offloading
- Maintenance
  - Rocker-bottom shoes
  - Regular check-in and exams
  - Education and support

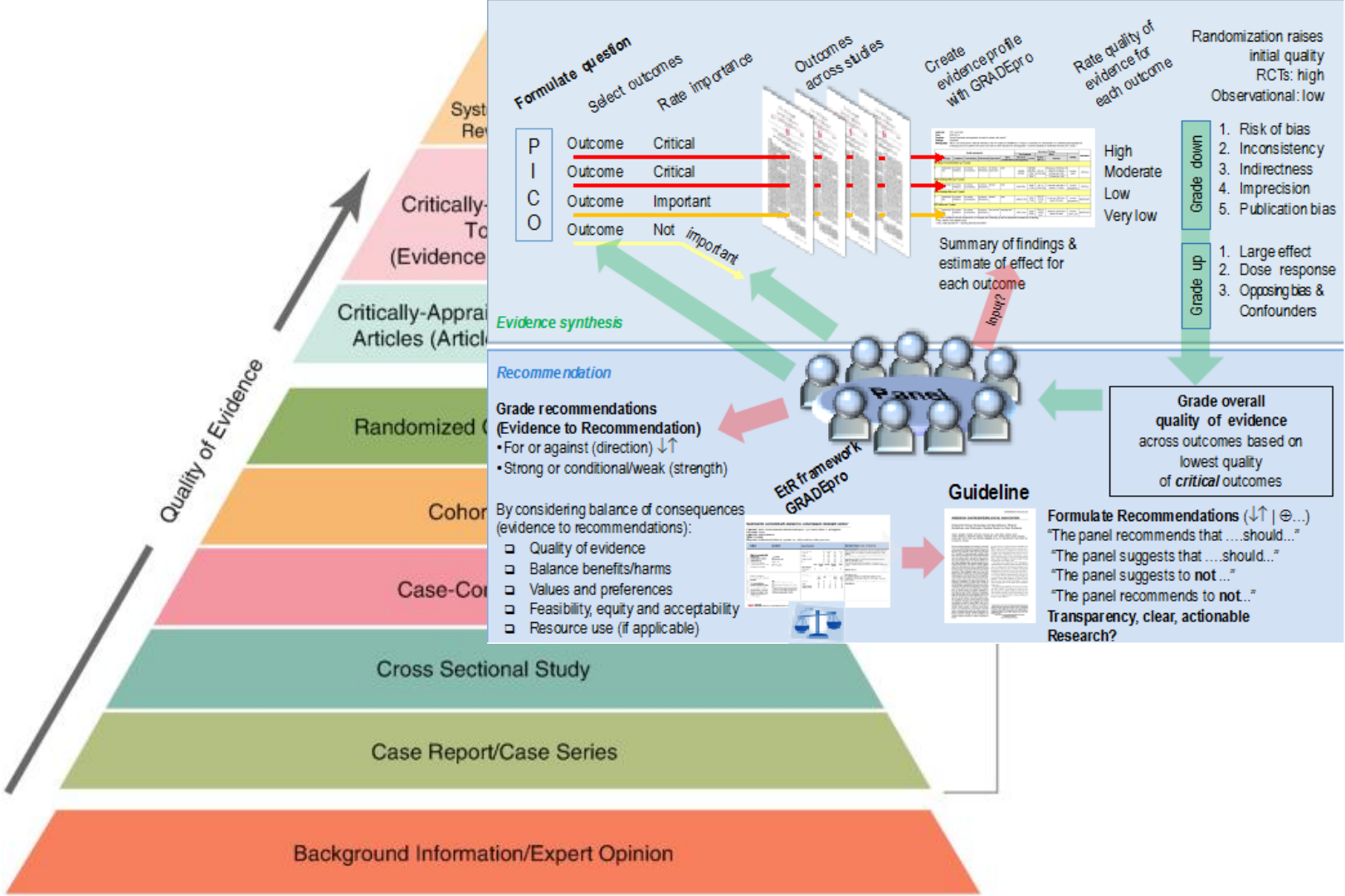
Developed by the British Columbia Provincial Nursing Skin & Wound Committee

Antimicrobial/Antiseptic Summary Table

Product Microorganism Legend: *Aerobic	Acetic Acid Sol'n 0.25 - 3%	Chlor-hexidine (CHG) 0.5%	CHG Sol'n 2.0% w 70% alcohol	Dakin's Sol'n 0.025% - 0.5%	Honey-Medical Grade	Hypo-chlorous Acid 0.033%	Iodine 0.90% Cadexomer Iodine	Iodine 1.0%	Iodine 10% Sol'n	Iodoform Gauze	Methylene Blue / Gentian Violet
	Compounded	Bactigras	Solution	Compounded	Medi-honey	Vashe	Iodosorb	Inadine	Solution	Iodoform	Hydrofera Blue
Bacteria											
Gram Positive											
* Staph. Aureus	+	+	+	+	+	+	+	+	+		+
MRSA	+	+	+	+	+	+	+	+	+		+
VRSA											
Staph Multiple Species			+				+				+
Enterococcus				+	+	+	+		+		+
VRE+		+		+	+	+	+		+		+
* Beta Hemolytic Strep Group A											
Beta Hemolytic Strep Group B						+	+ Group G	+	+		
Staph Epidermidi -coagulase negative											+
Strep Pyogenes					+						+
*Corynebacterium Diptheriod											
Clostridium Perfringens											

https://www.clwk.ca/get-resource/antimicrobials-antiseptics-clinical-resource-table/


Systematic Reviews
Critically-Appraised Topics (Evidence Syntheses)
Critically-Appraised Individual Articles (Article Synopses)
Filtered Information
Quality of Evidence
Randomized Controlled Trials
Cohort Study
Case-Control Study
Cross Sectional Study
Case Report/Case Series
Unfiltered Information
Background Information/Expert Opinion


Quality of Evidence
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Cross Sectional Study
Case Report/Case Series
Background Information/Expert Opinion
Formulate question
Select outcomes
Rate importance
P
I
C
O
Outcome Critical
Outcome Critical
Outcome Important
Outcome Not important
Outcomes across studies
Create evidence profile with GRADEpro
Summary of findings & estimate of effect for each outcome
Rate quality of evidence for each outcome
High
Moderate
Low
Very low
Randomization raises initial quality
RCTs: high
Observational: low
Grade down
1. Risk of bias
2. Inconsistency
3. Indirectness
4. Imprecision
5. Publication bias
Grade up
1. Large effect
2. Dose response
3. Opposing bias & Confounders
Evidence synthesis
Input?
Recommendation
Panel
Grade overall quality of evidence across outcomes based on lowest quality of critical outcomes
Grade recommendations (Evidence to Recommendation)
• For or against (direction) ↓↑
• Strong or conditional/weak (strength)
By considering balance of consequences (evidence to recommendations):
Quality of evidence
Balance benefits/harms
Values and preferences
Feasibility, equity and acceptability
Resource use (if applicable)
EtR framework GRADEpro
Guideline
Formulate Recommendations (↓↑ | ⊖...)
"The panel recommends that ....should..."
"The panel suggests that ....should..."
"The panel suggests to not ..."
"The panel recommends to not..."
Transparency, clear, actionable
Research?

THE 2023 IWGDF GUIDELINES ARE AVAILABLE!

Download the full guidelines HERE.

Download each individual chapter via the menus below.

Practical guidelines (2023 update)

Read more

Prevention guideline (2023 update)

Read more

Classification guideline (2023 update)

Read more

IWGDF/IDSA Infection guideline (2023 update)

Read more

Intersocietal PAD guideline (2023 update)

Read more

Offloading guideline (2023 update)

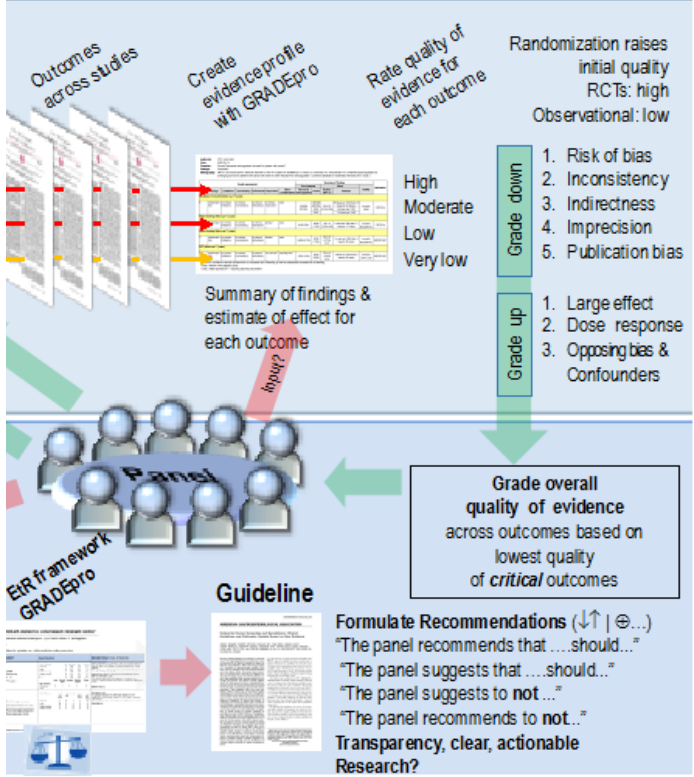
Read more

Wound healing interventions guideline (2023 update)

Read more

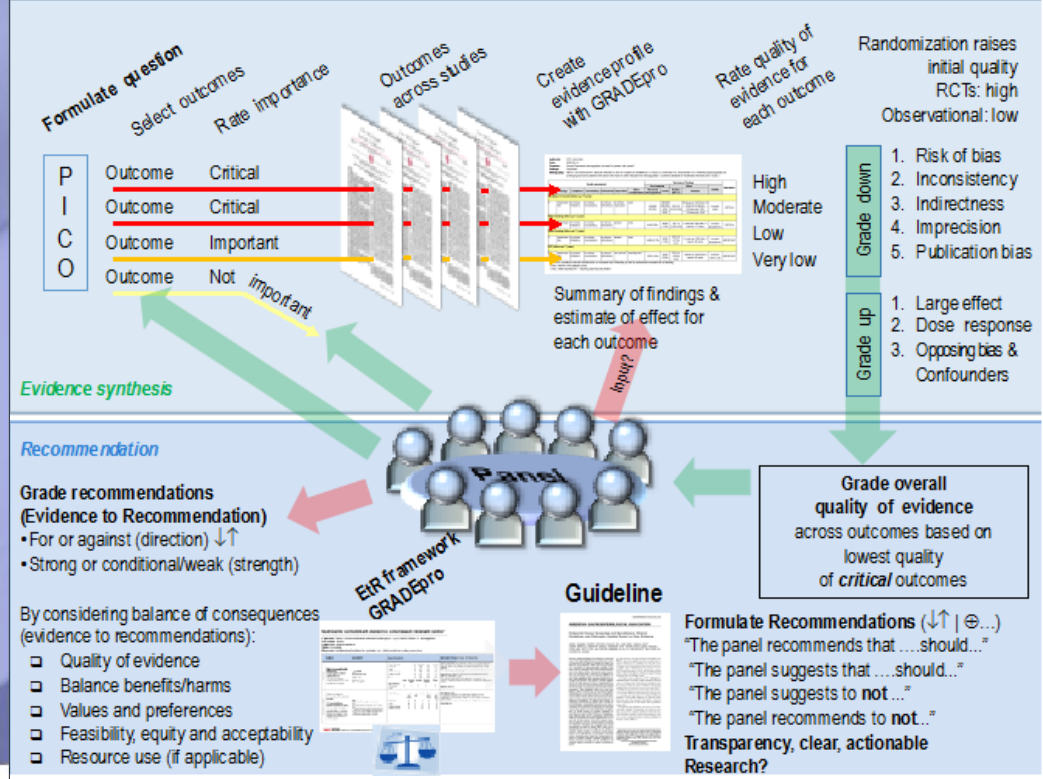
Charcot's neuro-osteo-arthropathy (2023 update)

Read more

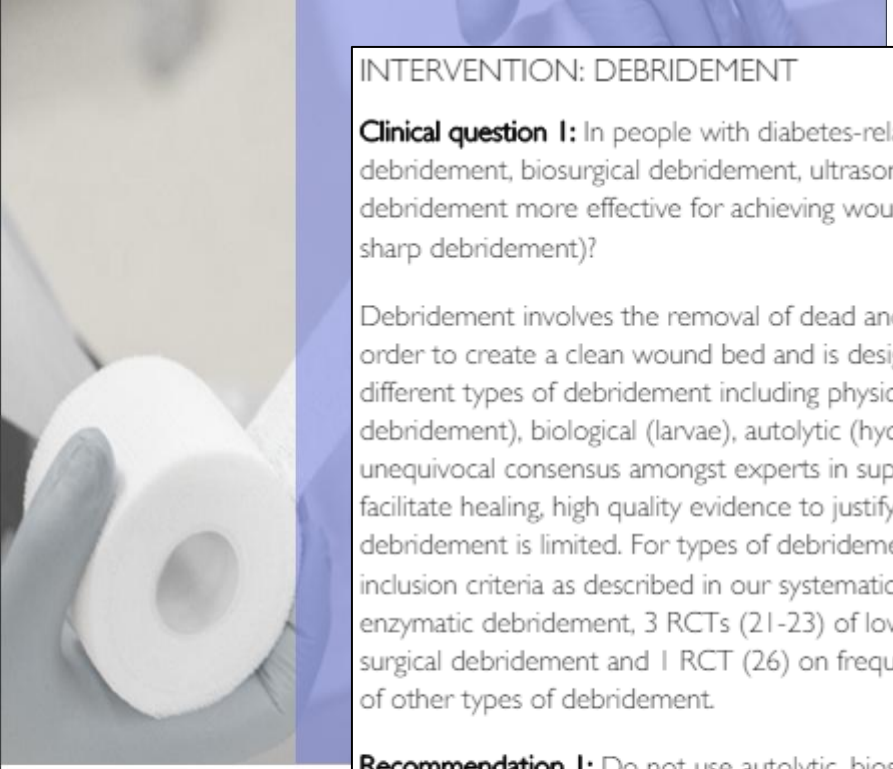


Guidelines on interventions to enhance healing of foot ulcers in people with diabetes

IWGDF 2023 update



Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease



INTERVENTION: DEBRIDEMENT

Clinical question 1: In people with diabetes-related foot ulcers, is enzymatic debridement, autolytic debridement, biosurgical debridement, ultrasonic debridement, hydrosurgical abrasion or chemical debridement more effective for achieving wound healing compared to best standard of care (including sharp debridement)?

Debridement involves the removal of dead and devitalised tissue (necrosis and slough) from wounds in order to create a clean wound bed and is designed to promote wound healing. There are several different types of debridement including physical (e.g. surgical, sharp, hydro-debridement, or gaseous debridement), biological (larvae), autolytic (hydrogels) or biochemical (enzymes). Although there is unequivocal consensus amongst experts in support of the need for regular wound debridement to facilitate healing, high quality evidence to justify debridement in general, and to identify the best form of debridement is limited. For types of debridement, we found ten RCTs that met our prespecified inclusion criteria as described in our systematic review (16-25). There were five RCTs (16-20) of enzymatic debridement, 3 RCTs (21-23) of low frequency ultrasonic debridement, 1 RCT (24) of surgical debridement and 1 RCT (26) on frequency of sharp debridement. However we found no RCTs of other types of debridement.

Recommendation 1: Do not use autolytic, biosurgical, hydrosurgical, chemical or laser debridement over standard of care. (GRADE Strength of recommendation: Strong; Certainty of evidence: Low)

Rationale: No publications of RCTs were found on the use of autolytic, biosurgical, hydrosurgical, chemical or laser debridement that met our prespecified inclusion criteria, or had sufficient cost effectiveness data to warrant their use. Thus we were unable to make a recommendation supporting their use.

ENZYMATIC DEBRIDEMENT

Recommendation 2: Do not routinely use enzymatic debridement as opposed to standard of care (i.e. sharp debridement) to improve wound healing outcomes in people with diabetes and a foot ulcer. (Strong; Low)

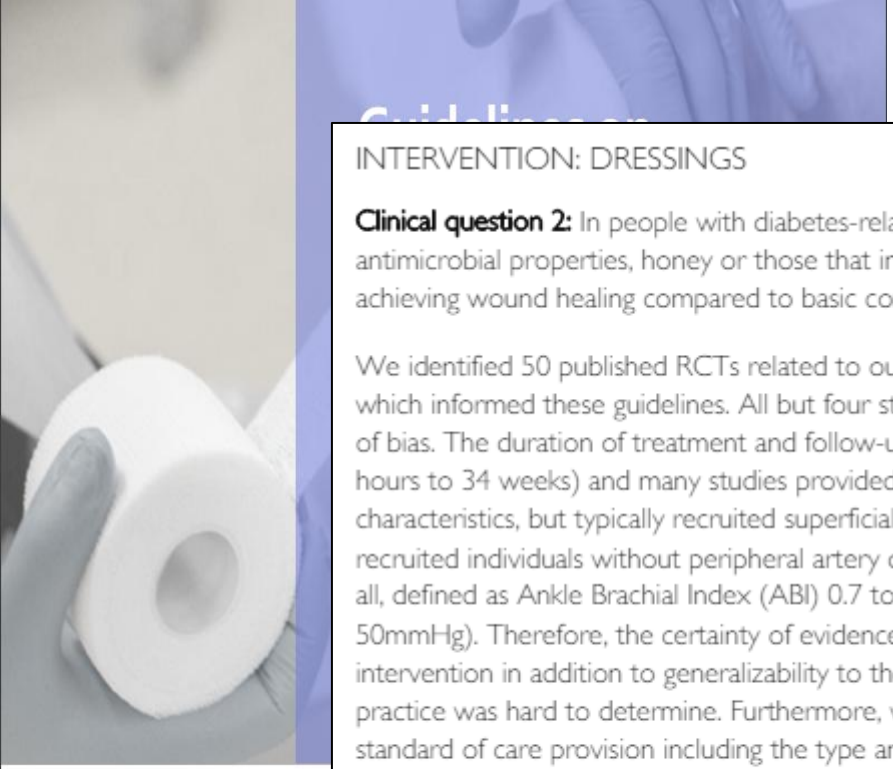
Recommendation 2a: In specific situations where the availability of sharp debridement may be limited by access to resources and/ or availability of skilled personnel, consider using enzymatic debridement. (Conditional; Low).

ULTRASONIC DEBRIDEMENT

Recommendation 3: Do not use any form of ultrasonic debridement over standard of care (i.e. sharp debridement). (Strong; Low)

IWGDF 2023 update

Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease



INTERVENTION: DRESSINGS

Clinical question 2: In people with diabetes-related foot ulcers, are dressings or applications with surface antimicrobial properties, honey or those that influence chronic wound biology more effective for achieving wound healing compared to basic contact dressings and best standard of care?

We identified 50 published RCTs related to our interventions and reporting our outcomes of choice which informed these guidelines. All but four studies reviewed were considered at high or moderate risk of bias. The duration of treatment and follow-up period varied widely between the studies reviewed (24 hours to 34 weeks) and many studies provided limited description of the ulcer and patient characteristics, but typically recruited superficial ulcers or non-infected ulcers. Additionally, most studies recruited individuals without peripheral artery disease (PAD) or with mild PAD (in most studies, but not all, defined as Ankle Brachial Index (ABI) 0.7 to 0.9, Transcutaneous Oxygen pressure ($TcPO_2$) 30 - 50mmHg). Therefore, the certainty of evidence and assessment of balance of effect in favour of the intervention in addition to generalizability to the typical diabetes-related foot ulcers seen in clinical practice was hard to determine. Furthermore, we also noted a significant lack of clear descriptions of standard of care provision including the type and quality of offloading provided, type and impact of any additional supportive interventions undertaken, such as revascularization.

Given this is a large group of interventions, we have broken down the key recommendations into smaller sections, based on the groups of types of products and applications currently available.

Part of the 2023 IWGDF
the prevention and management of
diabetes-related foot disease

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IWGDF 2023 update

TOPICAL ANTIMICROBIAL OR ANTISEPTIC DRESSINGS

Recommendation 6: Do not use topical antiseptic or antimicrobial dressings for wound healing of diabetes-related foot ulcers (Strong; Moderate)

HONEY OR BEE PRODUCTS

Recommendation 7: Do not use honey (or bee related products) for the purpose of wound healing in diabetes-related foot ulcers (Strong; Low)

COLLAGEN OR ALGINATE

Recommendation 8: Do not use collagen or alginate dressings for the purpose of wound healing of diabetes-related foot ulcers (Strong; Low)

SUCROSE OCTASULFATE

Recommendation 9: Consider the use of the sucrose-octasulfate impregnated dressing as an adjunctive treatment, in addition to the best standard of care, in non-infected, neuro-ischaemic diabetes-related foot ulcers which have had insufficient change in ulcer area with best standard of care including appropriate offloading for at least 2 weeks (Conditional; Moderate).

Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease

TOPICAL ANTIMICROBIAL OR ANTISEPTIC DRESSINGS

Recommendation 6: Do not use topical antiseptic or antimicrobial dressings for wound healing of

TLC-NOSF (UrgoStart® range): A very high level of evidence, consistent outcomes

In Leg Ulcers

NICE[1] recommends the UrgoStart range for VLUs and DFUs

Systematic review on MMPs reducers[3]

Systematic review – Benefit of TLC-NOSF dressings[4]

CHALLENGE[6,7], double-blind RCT (vs neutral dressing)
Venous and mixed leg ulcers - 187 patients

WHAT[9], RCT (vs another MMP reducer dressing) ;
Venous and mixed leg ulcers - 117 patients

Cost-effectiveness analyses[11,12]

NEREIDES/CASSIOPEE[18], multicentre, prospective clinical trials.
Venous and mixed leg ulcers - 37 and 51 patients

STARTER[19], multicentre, prospective clinical trial - 22 VLUs

The Condé trial[20], prospective clinical trial - 51 grafted VLUs

REALITY[22], pooled data analysis of real-life studies on VLUs, DFUs and PUs - 10,220 patients
GOS[23], German prospective Observational Study on DFUs, VLUs and PUs - 1,140 patients
GOS-2[24], German prospective Observational Study on DFUs, VLUs and PUs - 961 patients including HRQoL
SAS[25], French prospective observational study on DFUs, VLUs and PUs - 279 patients

Most recent case studies and case reports from the UK[26-30], **Italy**[31], or **Spain**[32-34]

In vitro study[40] on MMP reduction

Most recent best practices, LU Pathways[41, 42, 52] including TLC-NOSF dressings

Meta -analyses & systematic reviews

RCTs

Investigational studies (non-comparative clinical trials)

Observational studies (real-life clinical studies)

Case series, Case reports

Pre-clinical studies (animal research, in-vitro studies)

Expert consensus / opinion

In Diabetic Foot Ulcers

NICE[1] recommends the UrgoStart range for DFUs and VLUs

2020 IWGDF guidelines[2] recommends UrgoStart dressings to enhance wound healing of DFUs

Systematic review on interventions to enhance healing of foot ulcers in diabetes[5]

Systematic review on MMPs reducers[3]

Systematic review – Benefit of TLC-NOSF dressings[4]

EXPLORER[9,10], international double-blind RCT (vs neutral dressing)
Patients with DFUs, neuropathy and PAD - 240 patients

Cost-effectiveness analyses[13-17]

SPID[19], multicentre, prospective clinical trial. Neuropathic DFUs - 33 Patients

REALITY[22], pooled data analysis of real-life studies on VLUs, DFUs and PUs - 10,220 patients
GOS[23], German prospective Observational Study on DFUs, VLUs and PUs - 1,140 patients
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Most recent case studies and case reports from the UK[25, 30], **Spain**[34,35], **Portugal**[36], **China**[37], **Vietnam**[38], or the **UAE**[39]

In vitro study[40] on MMP reduction

Most recent best practices, DFU Pathways[43-53] including TLC-NOSF dressings

Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease

Recommendation 12: Consider the use of hyperbaric oxygen as an adjunct therapy in neuro-ischemic or ischemic diabetes-related foot ulcers where standard of care alone has failed and where resources already exist to support this intervention. (Conditional; Low)

interventions to

Recommendation 15: Do not use any interventions reported in the field of physical therapies for wound healing in the management of diabetes-related foot ulcers. (Strong; Low)

foot ulcers in people

Recommendation 16: We suggest not using cellular skin substitute products as a routine adjunct therapy to standard of care for wound healing in patients with diabetes-related foot ulcers. (Conditional; Low)

with diabetes

IWGDF 2023 update

Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease

Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease

CASE STUDY

Successful Limb Salvage Combining Revascularization Surgery with an Advanced Acellular Dermal Matrix (ADM) in Treating Multiple Non-Healing Diabetic Foot Ulcers

By Asem Saleh, MSc MD RPVI FRCSC; Idevania Costa, RN NSWOC PhD; Paul F. Gratzer, MASc PhD PEng

Figure 3: Progression of healing of the heel wound from treatment day with the ADM to closure

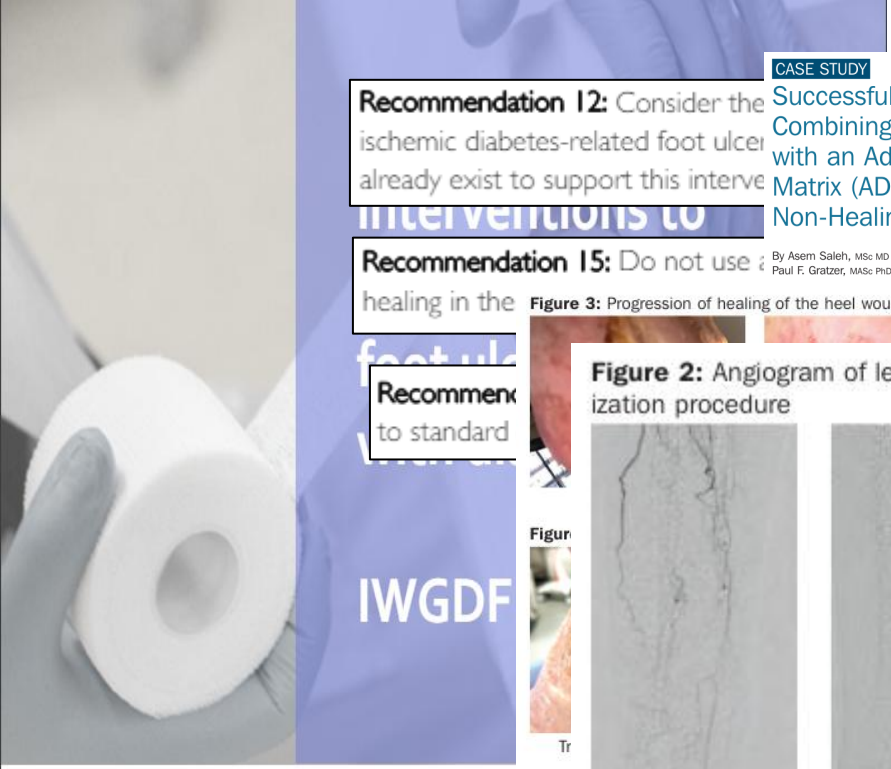
Treatment day | 1 week | 2 weeks

Figure 4: Progression of healing of the lateral foot wound from treatment day with the ADM to closure

Treatment day | 1 week | 2 weeks | 3 weeks

Figure 5: Progression of healing of the lateral foot wound from treatment day with the ADM to closure. Note that at week 3, a necrotic centre was present in the wound. Debridement of the necrotic tissue was conducted and a second piece of ADM was placed onto the wound. The wound then went on to close four weeks later

Treatment day | 1 week | 3 weeks | 4 weeks | 28 weeks



Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease

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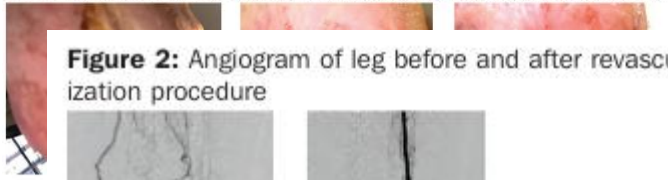
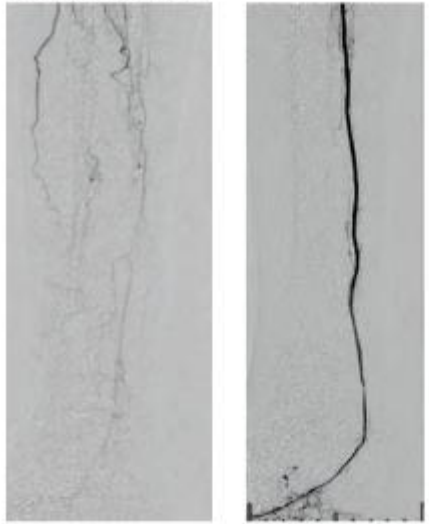


Figure 2: Angiogram of leg before and after revascularization procedure



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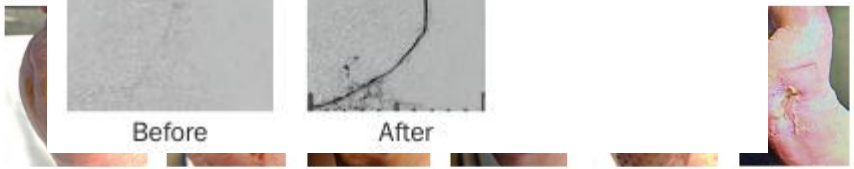
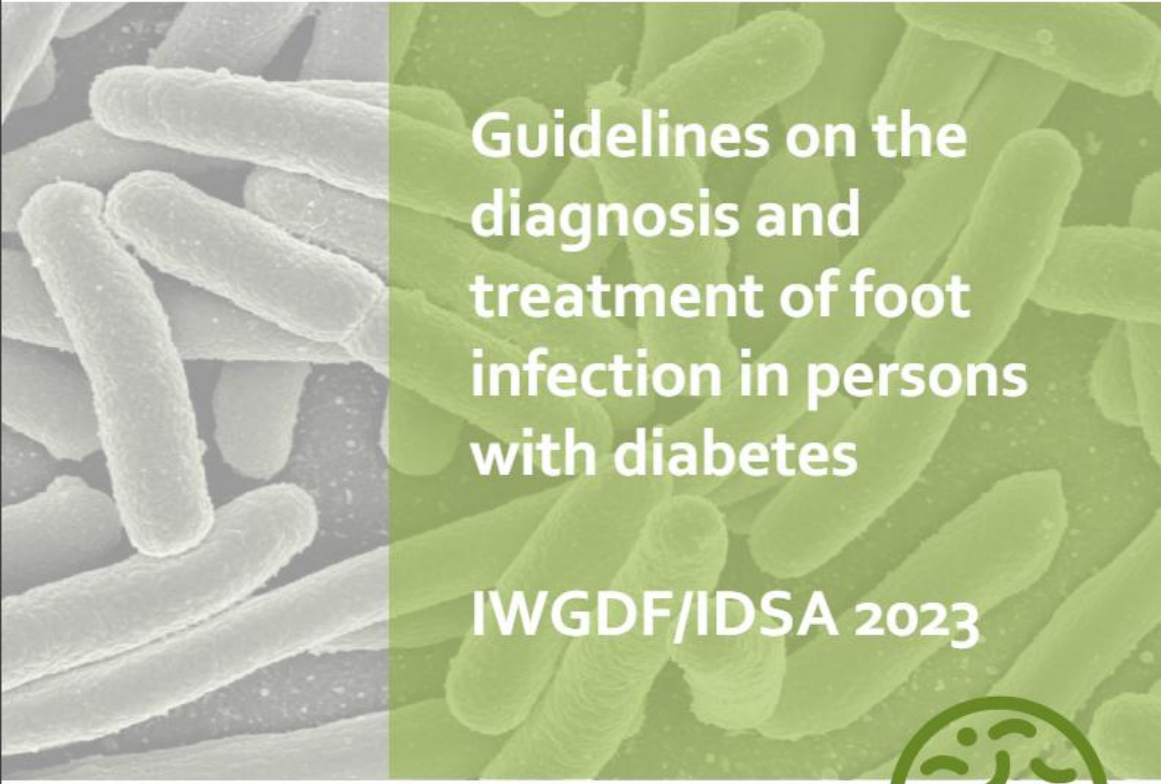
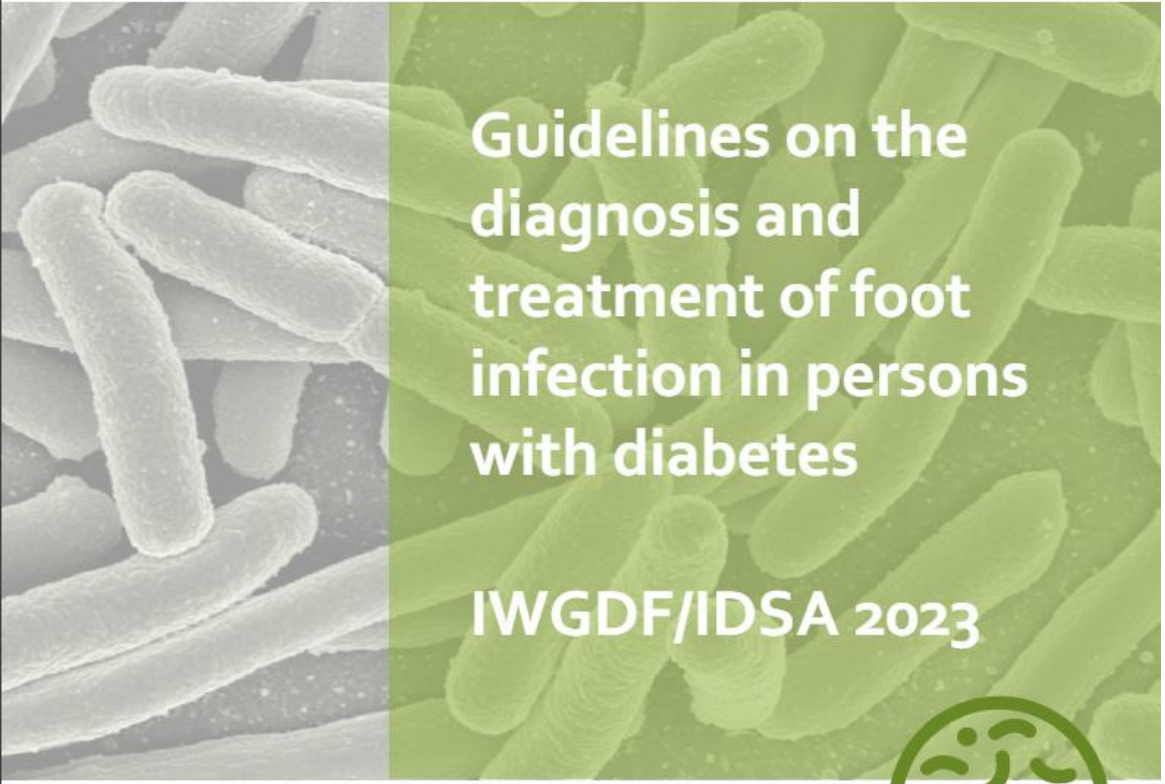




Guidelines on the diagnosis and treatment of foot infection in persons with diabetes

IWGDF/IDSA 2023

Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease



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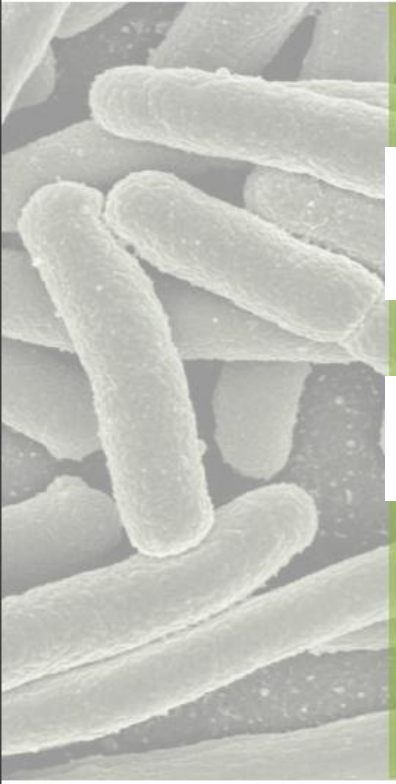

Guidelines on the

Recommendation 2: Consider hospitalising all persons with diabetes and a foot infection who have either a severe foot infection as classified by the IWGDF/IDSA classification, or a moderate infection which is associated with key relevant morbidities. (Conditional; Low)

treatment of foot

infection in persons

Recommendation 3: Assess inflammatory serum biomarkers such as C-reactive protein, erythrocyte sedimentation rate, or procalcitonin in a person with diabetes and a possible infected foot ulcer for whom the clinical examination is diagnostically equivocal or uninterpretable. (Best Practice Statement)

Recommendation 5: In a person with suspected soft tissue diabetes-related foot infection, consider a sample for culture to determine the causative microorganisms, preferably by aseptically collecting a tissue specimen (by curettage or biopsy) from the wound. (Conditional; Moderate)

Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease

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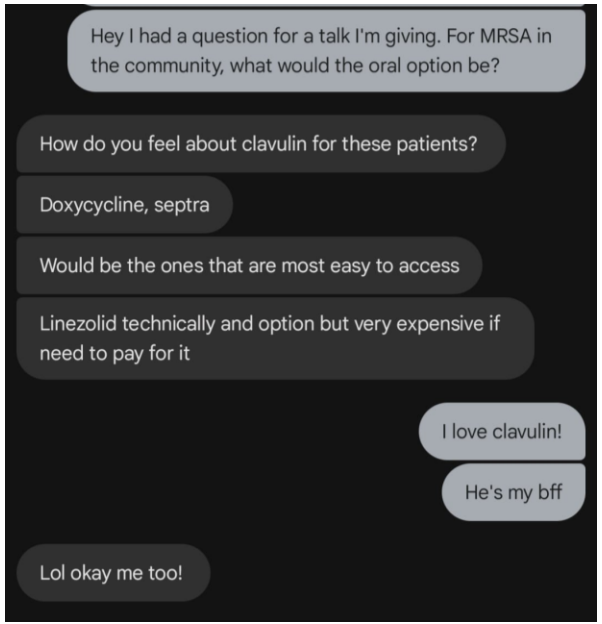
Table 4: Proposals for the empirical antibiotic therapy according to clinical presentation and microbiological data (from Lipsky et al. [11])

Infection severity	Additional factors	Usual pathogen(s)[b]	Potential empirical regimens[c]
Mild	No complicating features	GPC	Semisynthetic penicillinase-resistant penicillin (cloxacillin) 1st generation cephalosporin (cephalexin)
	ß-lactam allergy or intolerance	GPC	Clindamycin; Fluoroquinolone (levo/moxi-floxacin);trimethoprim-sulfamethoxazole; doxycycline
	Recent antibiotic exposure	GPC + GNR	ß-lactam- ß lactamase inhibitor1 (amoxicillin /clavulanate, ampicillin/sulbactam)
			Fluoroquinolone (levo/moxi-floxacin); trimethoprim-sulfamethoxazole
	High risk for MRSA	MRSA	Linezolid; trimethoprim-sulfamethoxazole; clindamycin; doxycycline, Fluoroquinolone (levofloxacin, moxifloxacin)
Moderate or severe[d]	No complicating features	GPC ± GNR	ß-lactam- ß lactamase inhibitor1 (amoxicillin /clavulanate, ampicillin/sulbactam) 2nd , 3rd generation cephalosporine (cefuroxime, cefotaxime, ceftriaxone)
	Recent antibiotics	GPC ± GNR	ß-lactam- ß lactamase inhibitor2 (ticarcillin /clavulanate, piperacillin/tazobactam) 2nd , 3rd generation cephalosporine (cefuroxime, cefotaxime, ceftriaxone) group 1 carbapenem (ertapenem) ; (depends on prior therapy; seek advice)
	Macerated ulcer or warm climate	GNR, including Pseudomonas sp.	ß-lactam- ß lactamase inhibitor2 (ticarcillin /clavulanate, piperacillin/tazobactam) semisynthetic penicillinase-resistant penicillin (cloxacillin) + ceftazidime or ciprofloxacin group 2 carbapenem (mero/imi-penem)
	Ischaemic limb/necrosis/gas forming	GPC ± GNR ± strict Anaerobes	ß-lactam- ß lactamase inhibitor1 (amoxicillin /clavulanate, ampicillin/sulbactam) or ß-lactam- ß lactamase inhibitor2 (ticarcillin /clavulanate, piperacillin/tazobactam) Group 1 (ertapenem) or 2 (mero/imi-penem) carbapenem 2nd (cefuroxime) /3rd (cefotaxime, ceftriaxone) generation cephalosporin + clindamycin or metronidazole
	MRSA risk factors	MRSA	Consider adding, or substituting with, glycopeptides (vancomycin, teicoplanin); llLinezolid; daptomycin; fusidic acid, trimethoprim-sulfamethoxazole; doxycycline
	Risk factors for resistant GNR	ESBL	Carbapenem (erta/mero/imi-penem); Fluoroquinolone (ciprofloxacin); Aminoglycoside (amikacin); colistin

Part of the 2023 IWGDF Guidelines on the prevention and management of diabetes-related foot disease

Given the paucity of data on the resolution of infection, recurrence of infection, and the acquisition of antimicrobial resistance, our recommendation is to choose any of the systemic antibiotics regimens that have shown to be effective in published randomised controlled trials to treat a patient with diabetes and a soft tissue infection of the foot. Antibiotic dosing for skin and soft tissue infection is usually standard, but therapy for DFO may require higher than standard doses. We refer treating clinicians to their national guidelines for dosing advice. We suggest considering beta-lactam antibiotics (penicillins- with or



- MRSA infection
- Linezolid: very expensive if need to pay for it
- Septra – nephrotoxicity, hyperkalemia in the elderly, arrhythmias
- Doxycycline – readily available, cheap, “safe”/esophagitis

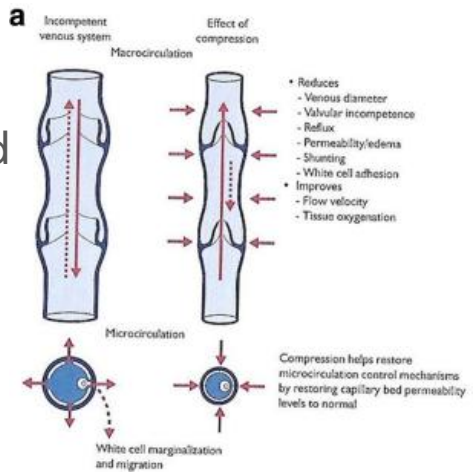
OVIVA Trial: Oral vs IV Antibiotics for Bone and Joint Infection (2019)

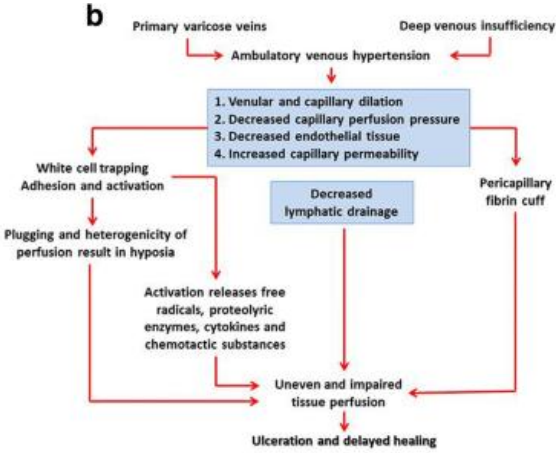
- Compared the effectiveness of **oral vs. IV antibiotics in treating bone and joint infections**.
- Multicenter, **randomized, controlled trial**
  - 1,054 patients with bone or joint infections
- Randomized to **6 weeks of IV antibiotics vs. oral antibiotics**
- Oral antibiotics were **non-inferior** to IV antibiotics for infection cure at one year.
  - No significant difference in treatment failure between groups.
  - Fewer complications (e.g., catheter-related issues) in the oral group.

- **Oral antibiotics** should be considered as a first-line option for bone and joint infections.
  - Reduces hospital stay, catheter-related risks, and healthcare costs.
  - Supports patient-centered, outpatient management of infections.

Wound Healing – Venous Hypertension

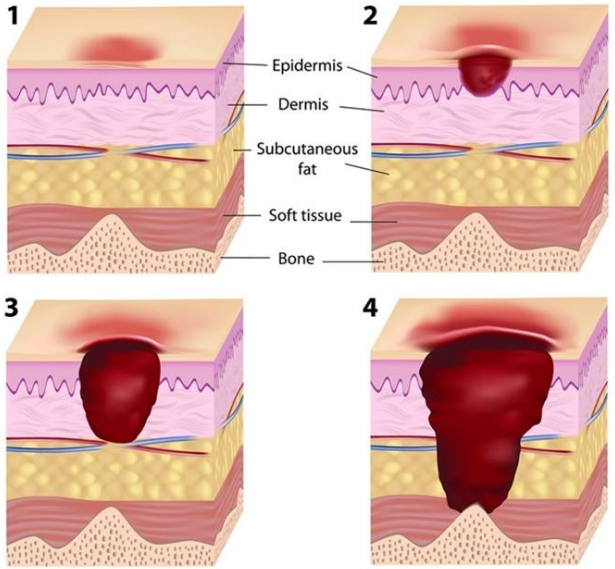
1. Increased venous pressure → prolonged bleeding, delayed sealing
2. Edema → ↑ ↑ ↑ inflammation and surrounding tissue damage
3. Venous HTN → impaired angiogenesis, fibroblasts
4. Venous HTN/Edema → impaired collagen, less elastic wounds and recurrences





Wound Healing – Pressure

1. Pressure → damaged capillaries, poor sealing
2. Pressure → ↑ ↑ ↑ inflammation and impaired cell access to wound
3. Poor blood flow → absent granulation and new tissue growth
4. Pressure → disorganized collagen, uneven callous, increased pressure



Compression therapy:

- COBAN
- Profore
- Unna boot

1. Layer of skin protection
2. Multiple layers of absorbent material
3. 20-25mmHg of compression

Compression Device	ABI Requirement	Compression Level
Unna Boot	≥ 0.8	Moderate (20–30 mmHg)
Coban 2 Compression System	≥ 0.8	High (35–40 mmHg)
Coban 2 Lite Compression System	0.5 – 0.8	Reduced (about 25% less ,25–30 mmHg)
Profore Multi-Layer Compression System	≥ 0.8	High (up to 40 mmHg at the ankle)
Tubigrip Elastic Tubular Bandage	Use with caution; professional assessment recommended	Light (10–15 mmHg)

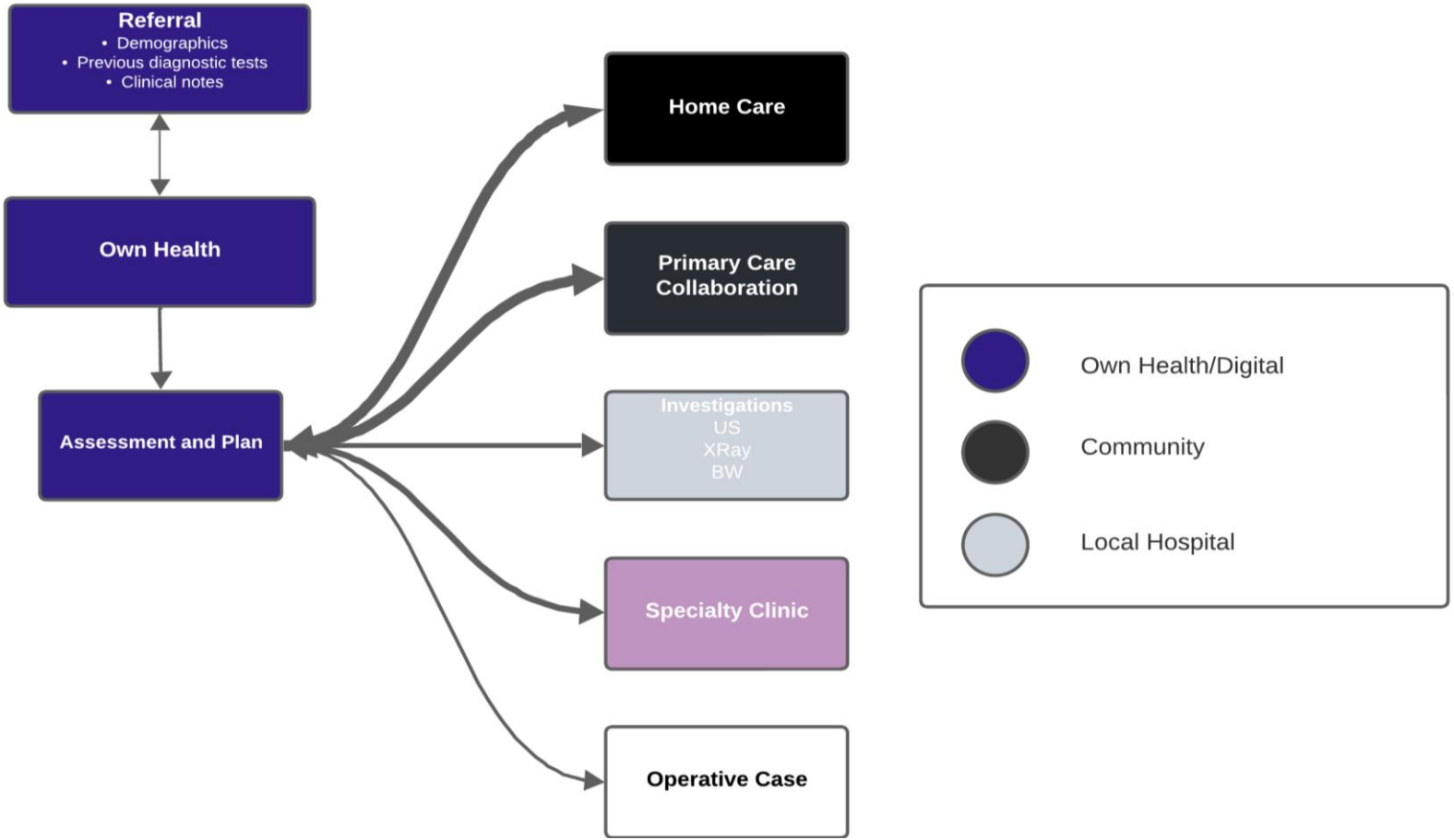
The future of Own Health: Health PEI

Health PEI

- Context & Challenge: off-island services for 180 annual vascular surgeries, fragmented care; limited local capacity for consultation.

- Plan & Impact: Multi-year partnership to develop a comprehensive vascular care system on PEI, reducing reliance on out-of-province services, shortening waitlists, improving care accessibility and efficiency, and creating a scalable model for underserved regions.
  - Integrate Own Health's Doctor Dash tool with AlayaCare to streamline wound care documentation and management on Home Care pathways.
  - Build local capacity with education for NSWOCs, primary care teams, and home care nurses.
  - Establish risk stratification pathways and clear escalation protocols to identify high-risk cases and build a culture of preventative care including smoking cessation, medical optimization and education to empower patients in their health journey.

How do we collaborate and bring the fragments together?



[redacted] 68, MALE

Details | Appointments | Photos | Documents

2025 Feb. 25 at 2:00 PM

Better

2025 Feb. 04 at 1:37 PM

Recurrent wound

2025 Jan. 07 at 2:08 PM

Looks really good

Edit patient | Tasks | Community Notes | eForms | Upload

[redacted] 68, MALE

Details | Appointments | Photos | Documents

Upcoming:

Past: 31

Wound - Dr. Saleh
Asem Saleh
2025 Feb. 25 at 2:40 PM

Reason for visit: N/A
Appointment note: N/A
Appointment type: In Person
Booked by: Precillia Baroi on 2025 Feb. 21

2025 Feb. 25 at 2:12 PM

Photogenic Wound Assessment Tool (PWAT)

IMPRESSION / PLAN

Ongoing drainage. The ulcer itself is a small crack at the very center.

---

1. Size - 1

0 = wound is closed (skin intact) or nearly closed (<0.3cm2)

1 = 0.3 to 2.0 cm2

Edit patient | Tasks | Community Notes | eForms | Upload

Thanks!!

- Asem Saleh
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- 905-923-1361