

Wound Care:

Learning Ordinary Approaches from
Extraordinary Cases

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Presenter Disclosure

Presenter: Dr. Karen Chien

Relationships with financial sponsors: None

- Any direct financial relationships, including receipt of honoraria: None
- Membership on advisory boards or speakers' bureaus: None
- Patents for drugs or devices: None
- Other: None

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Objectives

- 1 Identify the physiology and function of the skin that affects wound development and healing
- 2 Apply an approach to evaluate wound healing issues through several cases
- 3 Formulate treatment and prevention plans with basic and advanced wound care treatments

Physiology Review

Physiology of the Skin

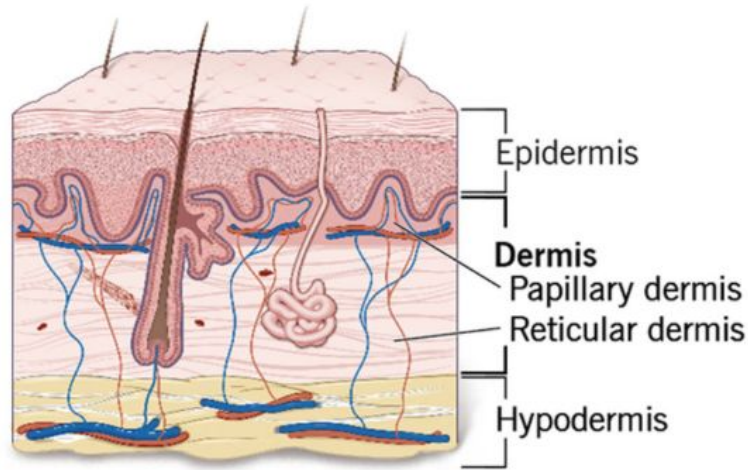


Image from Cleveland Clinic, reviewed 2022 . <https://my.clevelandclinic.org/health/body/22357-dermis>

EPIDERMIS

Protection, hydration
Produces new skin, melanin
Relies on diffusion O₂, nutrients

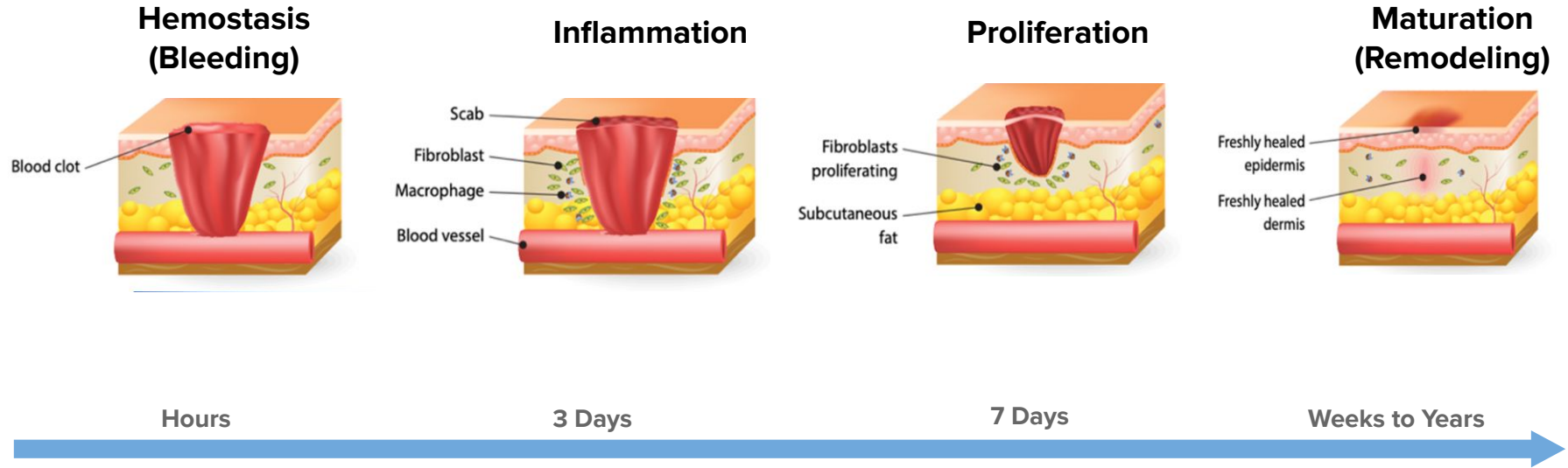
DERMIS

Structure and function
Papillary dermis connects to epidermis
Reticular dermis provides strength, pliability

HYPODERMIS

Insulation, protection, energy storage
Connects to muscle and bone layer

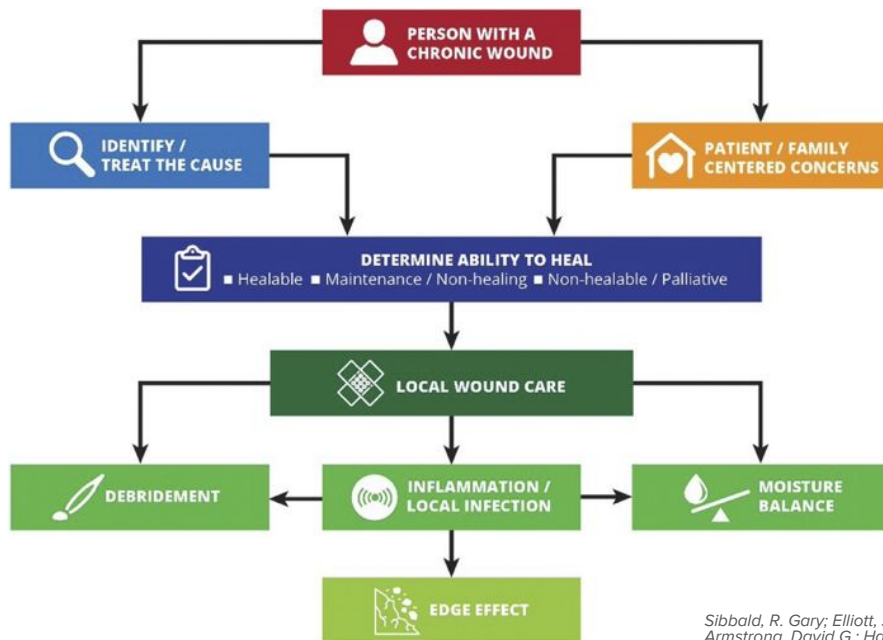
Physiology of Wound Healing



Orsted HL, Keast DH, Forest-Lalande L, Kuhnke JL, O'Sullivan-Drombolis D, Jin S, et al. Skin: Anatomy, physiology and wound healing. In: Foundations of Best Practice for Skin and Wound Management. A supplement of Wound Care Canada; 2017. 26 pp.

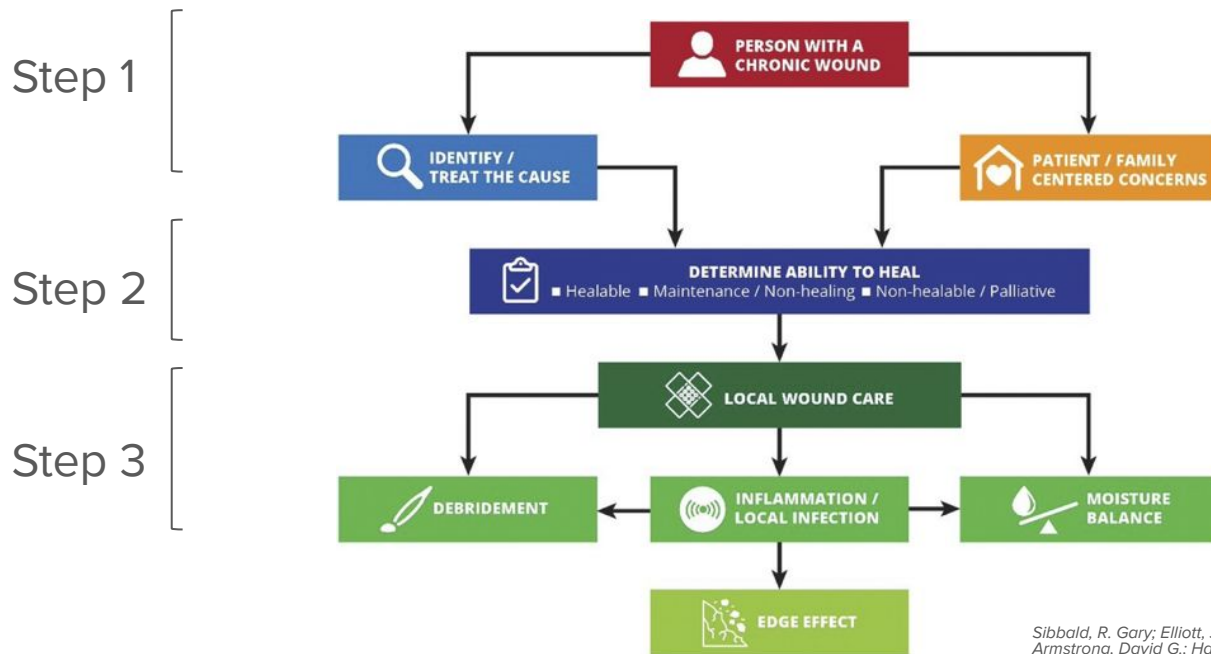
A Standardized Approach to Wound Care

Wound Bed Preparation (WBP)



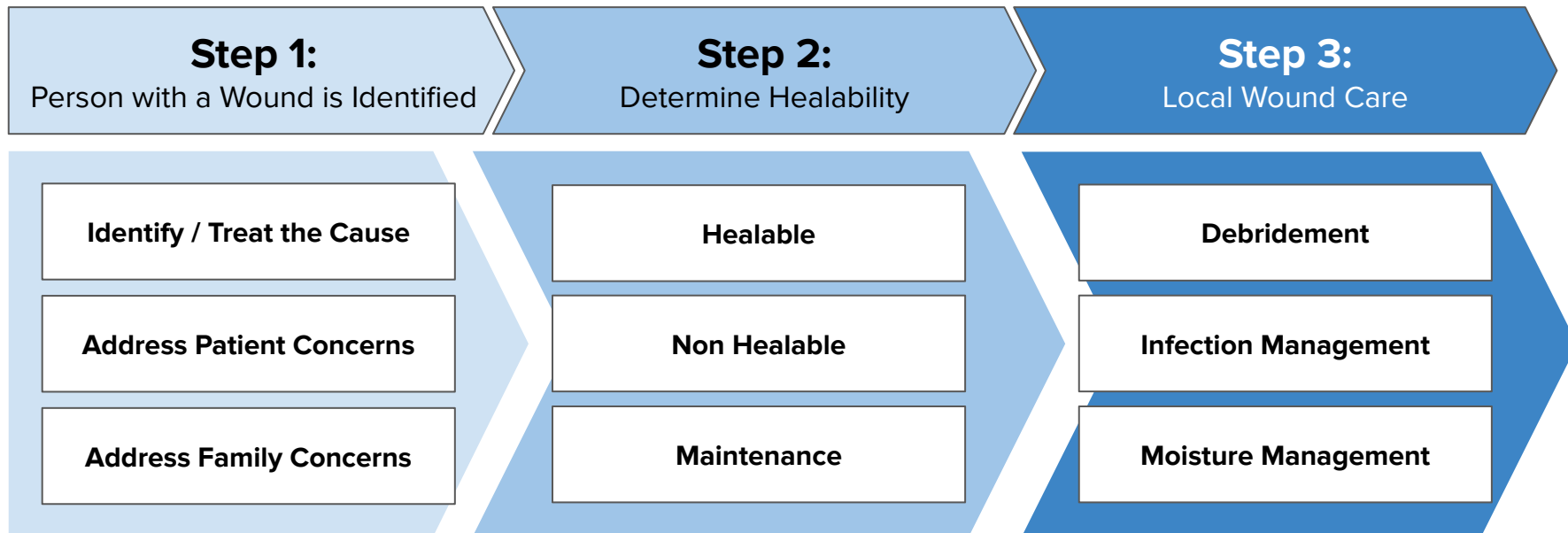
Sibbald, R. Gary; Elliott, James A.; Persaud-Jaimangal, Reneeka; Goodman, Laurie; Armstrong, David G.; Harley, Catherine; Coelho, Sunita; Xi, Nancy; Evans, Robyn; Mayer, Dieter O.; Zhao, Xiu; Heil, Jolene; Kotru, Bharat; Delmore, Barbara; LeBlanc, Kimberly; Ayello, Elizabeth A.; Smart, Hiske; Tariq, Gulnaz; Alavi, Afsaneh; Somayaji, Ranjani. Wound Bed Preparation. *Advances in Skin & Wound Care*. 34(4):183-195, April 2021.

Wound Bed Preparation (WBP)



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Wound Bed Preparation - Reimagined



Step 1: Person with a Wound is Identified

Step 1:

Person with a Wound is Identified

Identify / Treat the Cause

Address Patient Concerns

Address Family Concerns

Cornerstone of best practice in wound care:

- Identify and address the underlying cause
- Partner with your patient and their loved ones

Step 1: Person with a Wound is Identified

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Person with a Wound is Identified

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Cornerstone of best practice in wound care:

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Identify / Treat the Underlying Cause

ARTERIAL INSUFFICIENCY

VENOUS STASIS

LYMPHEDEMA

DIABETIC FOOT ULCERS

PRESSURE INJURIES

Step 1: Person with a Wound is Identified

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Cornerstone of best practice in wound care:

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Identify / Treat the Underlying Cause

ARTERIAL INSUFFICIENCY

VENOUS STASIS

LYMPHEDEMA

DIABETIC FOOT ULCERS

PRESSURE INJURIES

Patient / Family-Centred Concerns

PAIN, COMFORT

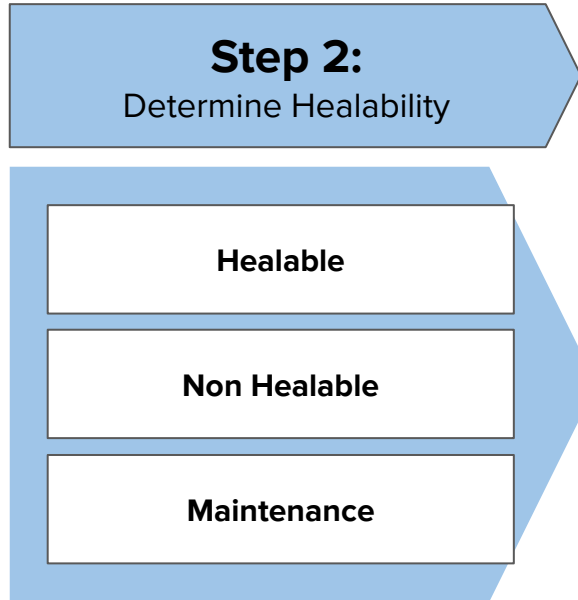
COMORBIDITIES

ACCESS TO TREATMENT

SOCIAL / FAMILY ISSUES

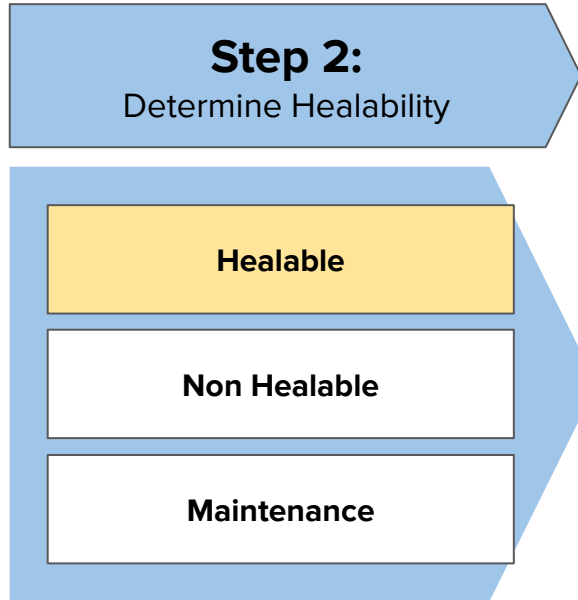
WORK / FINANCIAL ISSUES

Step 2: Determine Healability



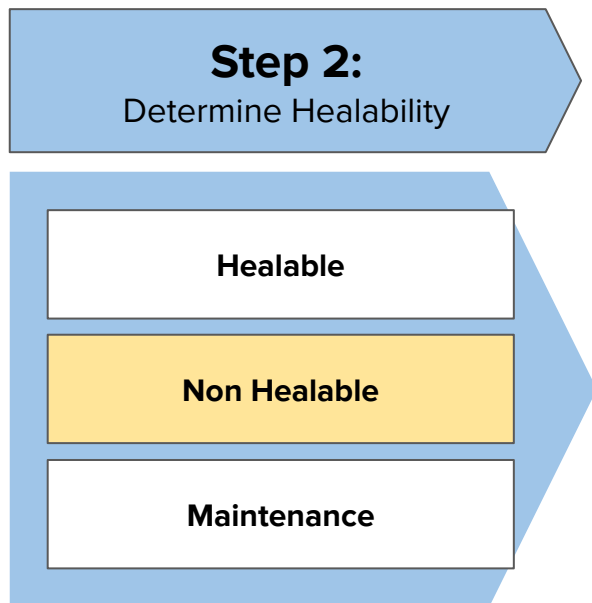
The extent of which you think a wound is healable will determine management approach

Step 2: Determine Healability



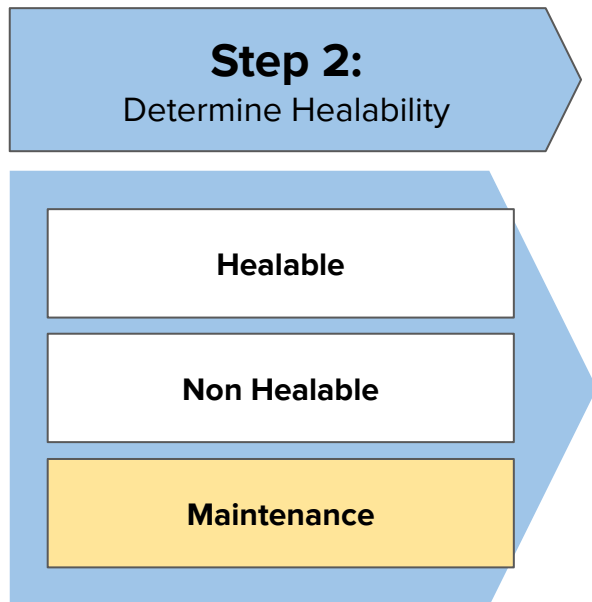
Healable: no known factors to prevent wound healing

Step 2: Determine Healability



Non Healable: no current capacity to heal, will worsen; eg. untreated peripheral vascular disease, cancer, palliative/end of life

Step 2: Determine Healability



Maintenance: healable wounds that cannot be healed due to patient or system-related concerns eg. lack of pressure-relieving devices, conflicting patient goals of care

Step 3: Local Wound Care

Step 3: Local Wound Care

Debridement

Infection Management

Moisture Management

Step 3: Local Wound Care

Step 3: Local Wound Care

Debridement

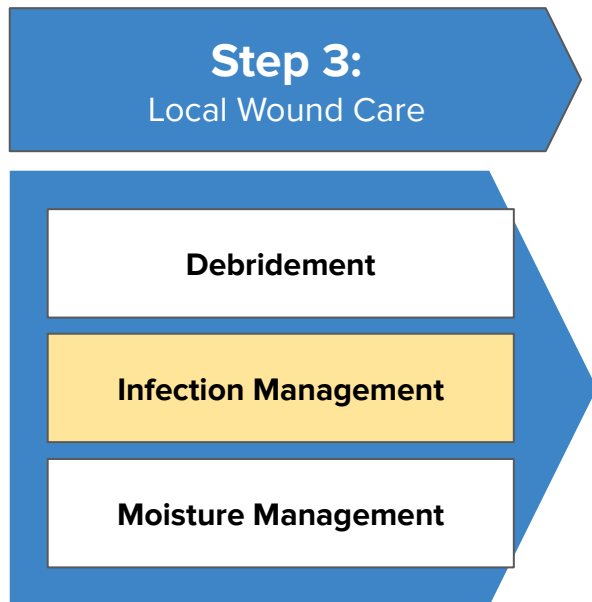
Infection Management

Moisture Management

Debridement = remove non-viable tissue

- Sharp / Surgical - mechanical
- Autolytic - endogenous processes
- Enzymatic - proteolytic enzymes
- Biologic - medical grade maggots

Step 3: Local Wound Care



Infection Management

- Wound healing can be stalled from high bacterial burden
- While bacteria can never be completely eliminated, it can be controlled at the surface and systemic level
- Superficial Infection: antimicrobial dressings are used universally to reduce surface bacterial load
- Systemic Infection: consider systemic bacterial based on clinical gestalt (fever, worsening pain, skin breakdown or other symptoms)

Step 3: Local Wound Care

Step 3: Local Wound Care

Debridement

Infection Management

Moisture Management

Antimicrobial Dressings

PVP-I



Chlorhexidine/PHMB



Silver



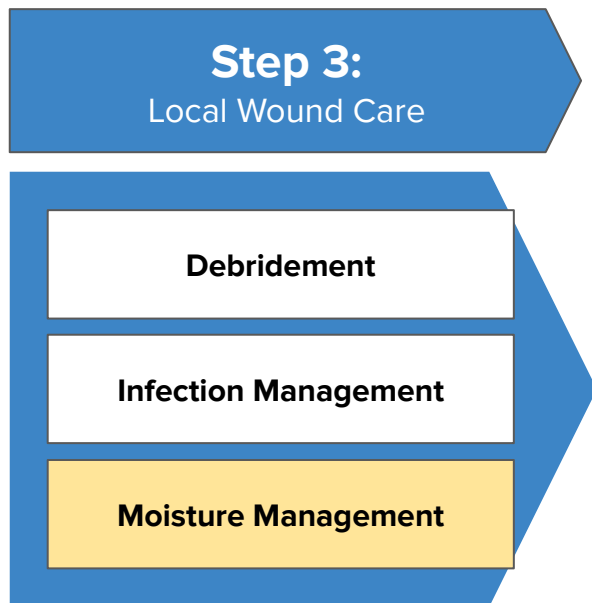
Gentian Violet/Methylene Blue



Honey



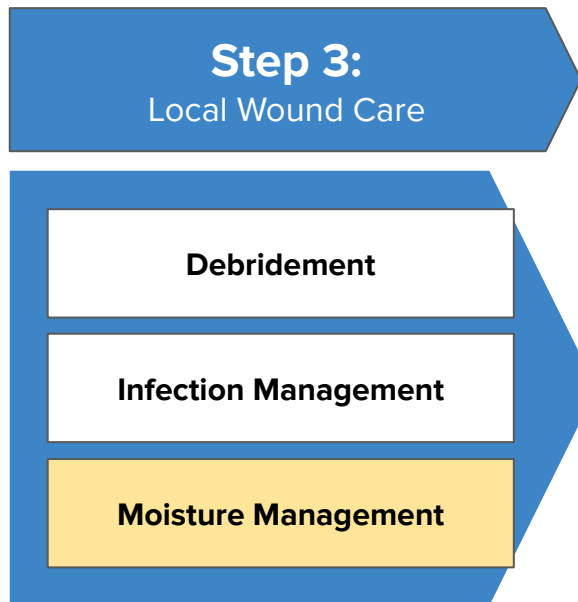
Step 3: Local Wound Care



Moisture Management

- Moist wound healing is the GOAL
- Well-validated
- Dry wounds are stalled wounds - **avoid scab formation**
- Final epithelialization only possible with a moist surface
- Can be controlled based on the type of secondary dressing

Step 3: Local Wound Care



Moisture Management Dressings

Moisture Donating

Moisture Absorbing

Hydrogels



Films



Hydrocolloids



Gauze



Foams



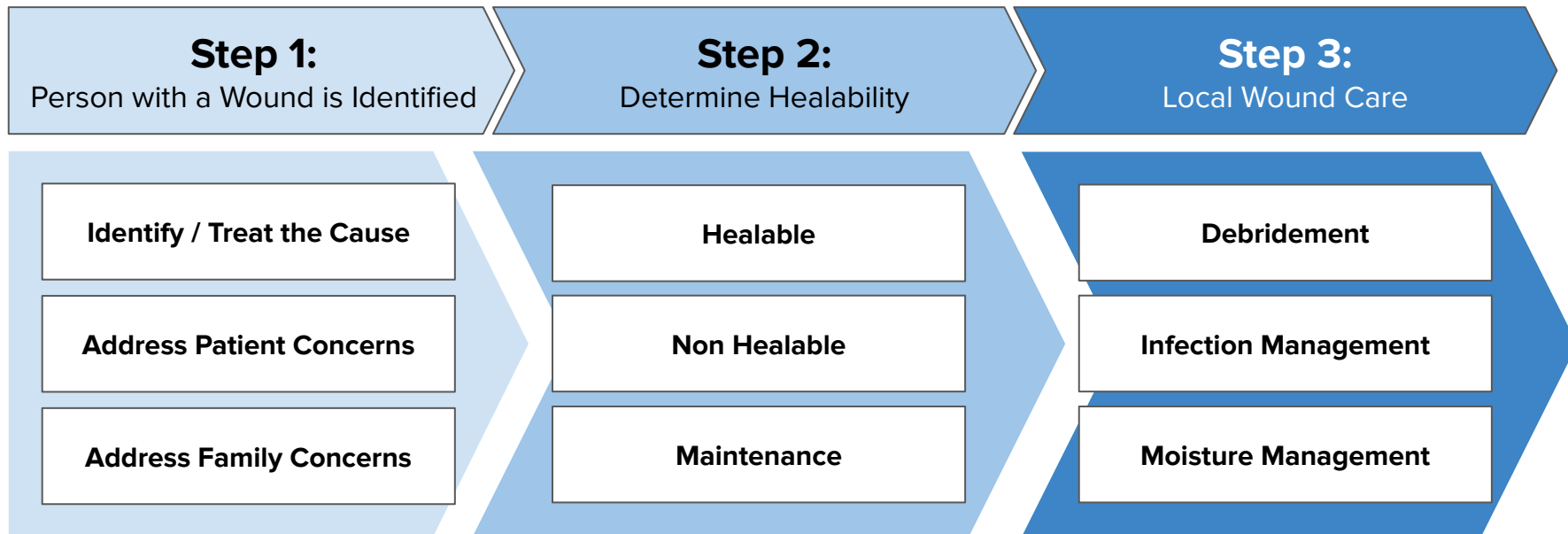
Super-Absorbents



Hydrofibres
Alginates



Wound Bed Preparation - Reimagined



Expanding on the WBP Paradigm

Augmenting the WBP Paradigm

While the wound bed preparation model provides a useful guide on how to manage the wound itself, **as Family Physicians, what else can we do for our patients?**

What other important interventions can help to heal more complex wounds and prevent future ones from developing?

Introducing the **VIP** Concerns

Address **VIP** Concerns:

Vascular, Intrinsic (Patient) Factors, Pressure

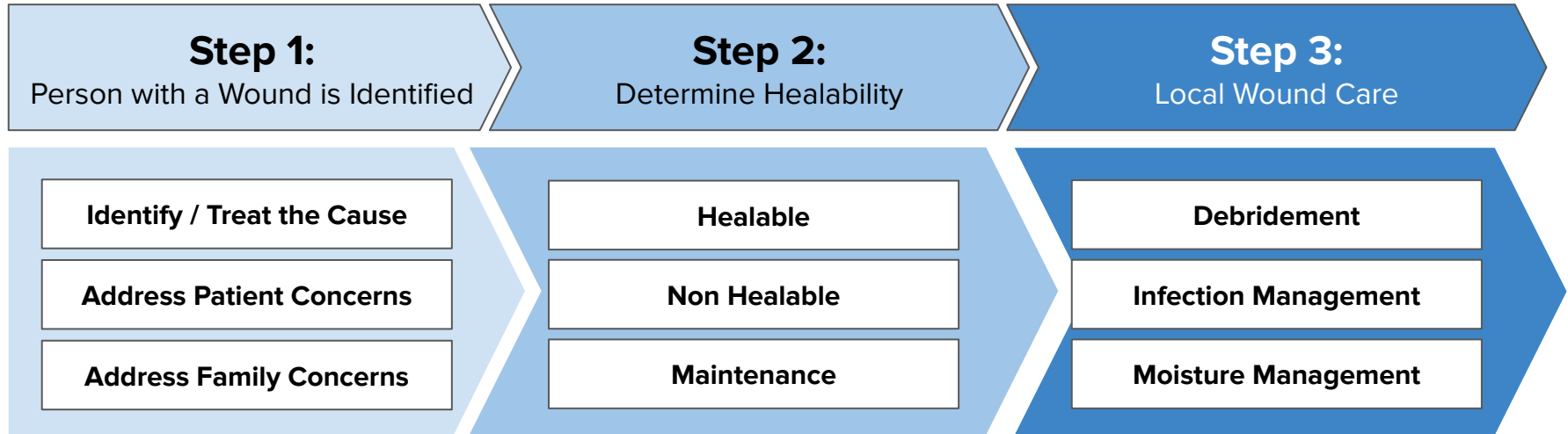
Vascular

Intrinsic (Patient) Factors

Pressure Relief

- **Vascular:** ensure adequate arterial circulation and minimize edema
- **Intrinsic (Patient Factors):** address modifiable risk factors eg hydration, nutrition, sensory impairment, immobility, altered cognition, treatable comorbidities, poor skin environment, lifestyle, utilize disease specific clinical practice guidelines
- **Pressure:** offload unnecessary or prolonged pressure

Wound Bed Preparation+ VIP



Address VIP Concerns:

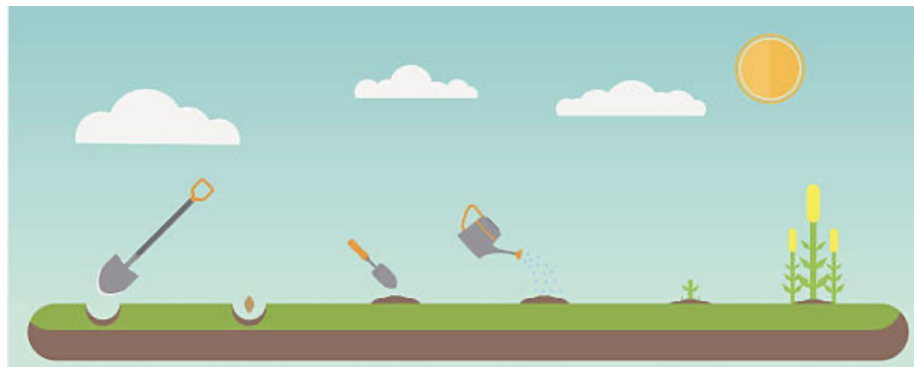
Vascular, Intrinsic (Patient) Factors, Pressure

Using WBP+ VIP: Elements of a Wound Care Order

Basics of a Wound Care Order

Local wound care: [**location**], [**etiology**]

1. **Cleanse** / debridement
2. **Primary** layer (*contact dressing*)
3. **Secondary** layer (*cover dressing*)
4. (+) **Compression** - optional
5. **Change** frequency
6. (+) **Care order** - eg pressure relief



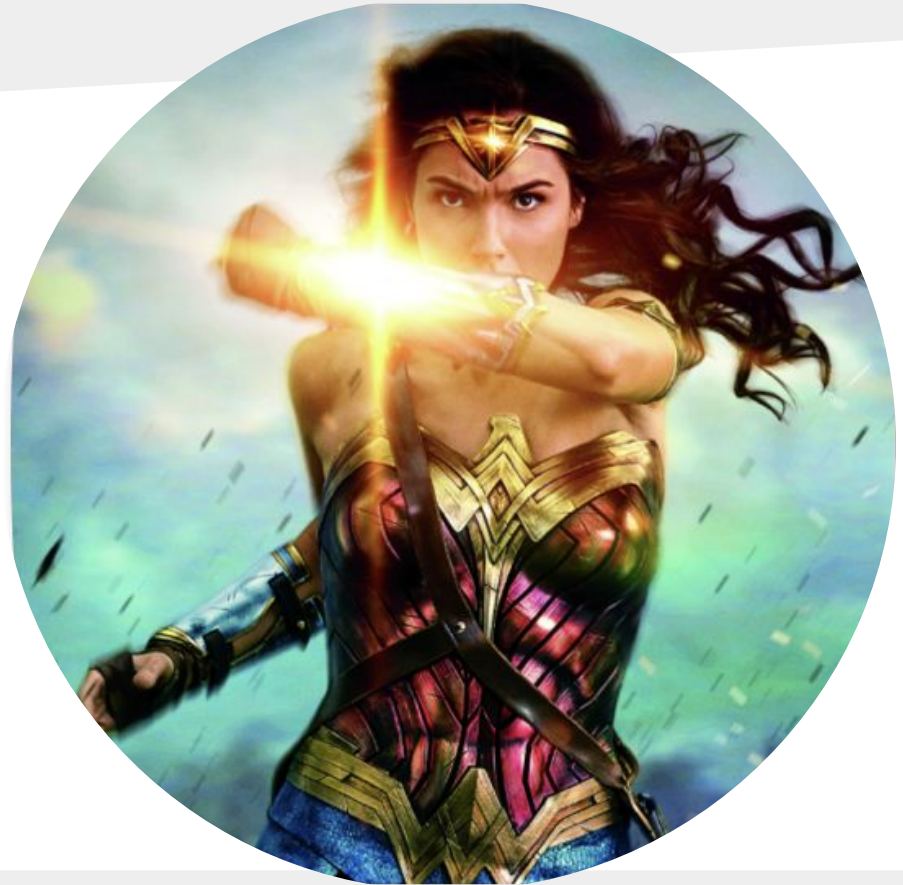
Case Studies of Ordinary Wounds in Extraordinary Patients

Case 1

Case 1: Ms. Diana Prince

Your first patient of the day is Ms. Diana Prince.

She is an Amazonian warrior with superhuman strength and agility. Diana reports to be over 5000 years of age and is somewhat reluctant to be visiting you today. She has sustained a wound on the back of her left forearm while helping to evacuate civilians during a crisis.

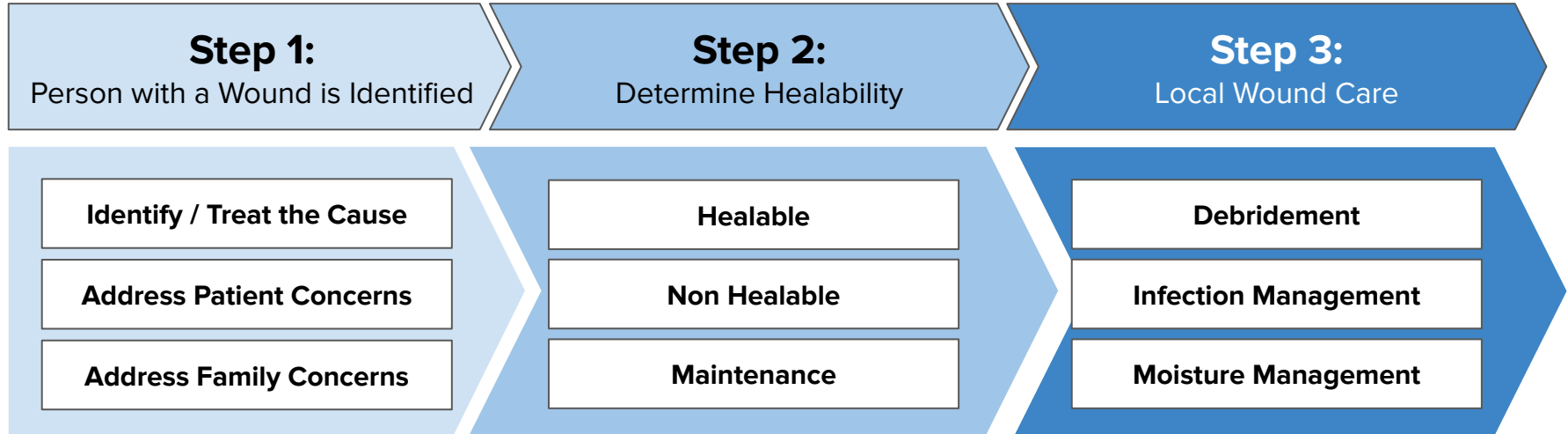


Case 1: Ms. Diana Prince



Left anterior mid forearm

Wound Bed Preparation+ VIP



Address VIP Concerns:
Vascular, Intrinsic (Patient) Factors, Pressure

Applying the WBP+ VIP Approach



Address **VIP** Concerns:

What type of wound is this? Skin tear



Applying the WBP+ VIP Approach



Address **VIP** Concerns:

What type of skin tear is this?

Type 1: No Skin Loss



Type 2: Partial Flap Loss



Type 3: Total Flap Loss



Applying the WBP+ VIP Approach



What type of skin tear is this? Type 2 Skin Tear

Type 2: Partial Flap Loss



Address VIP Concerns:

- Use of cuffs of power
- Dangerous lifestyle

Applying the WBP+ VIP Approach



Is the wound healable?

Address VIP Concerns:

Use of cuffs of power
Dangerous lifestyle

Applying the WBP+ VIP Approach



Is the wound healable?

Address VIP Concerns:

Use of cuffs of power

Dangerous lifestyle

Regenerative powers

Recurrent trauma

Adherence to recovery needs

Applying the WBP+ VIP Approach



Type 2 Skin tear - Left Anterior Forearm

1. Cleanse with normal saline
2. Apply chlorhexidine non-adherent contact dressing eg. BACTIGRAS®
3. Cover with silicone foam border eg MEPILEX BORDER®
4. Change q 5-7 days or PRN

Address VIP Concerns:

Use of cuffs of power

Dangerous lifestyle

Regenerative powers

Recurrent trauma

Adherence to recovery needs

Applying the WBP+ VIP Approach



Pearls of Care: SKIN TEARS

- Heal if given time to rest
- Avoid wound closures / extra adhesive dressings
- Moisturize surrounding skin
- Use non-adherent peri-wound skin barrier

Case 1 Summary & Plan

Step 1 Etiology: Type 2 Skin Tear

Step 2 Healability: Healable

Step 3 Local Wound Care: Left anterior forearm

1. Cleanse with normal saline
2. Apply chlorhexidine non-adherent contact dressing eg. BACTIGRAS®
3. Cover with silicone foam border eg MEPILEX BORDER®
4. Change q 5-7 days or PRN

Step 4 Address VIP Concerns:

Consider lifestyle modification to avoid future trauma?

Avoid fighting in the trenches until the wound is healed?

Redesign cuffs of power?



Case 2

Case 2: Mr. Clark Kent

Your next patient is Superman.

During a rescue mission, Superman was reportedly exposed to “Kryptonite” which, due to a genetic intolerance, is toxic for him.

Superman was unconscious when EMS brought him to your hospital’s ER where he was promptly intubated and admitted to the ICU.



Case 2: Mr. Clark Kent

Since coming into hospital, Superman has developed a sore on his lower back requiring your assessment.

What type of wound may he have?

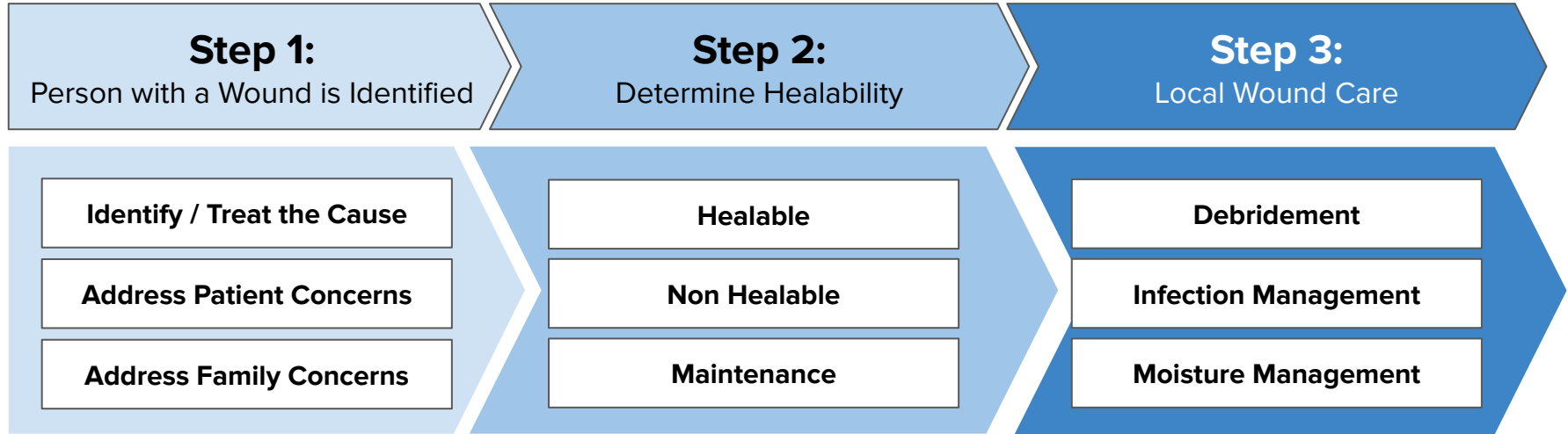


Case 2: Mr. Clark Kent



Right sacrum

Wound Bed Preparation+ VIP



Address VIP Concerns:

Vascular, Intrinsic (Patient) Factors, Pressure

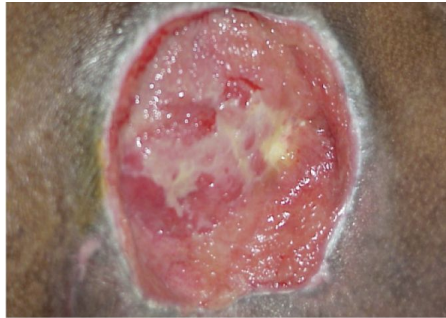
Applying the WBP+ VIP Approach



Address **VIP** Concerns:

What type of wound is this?

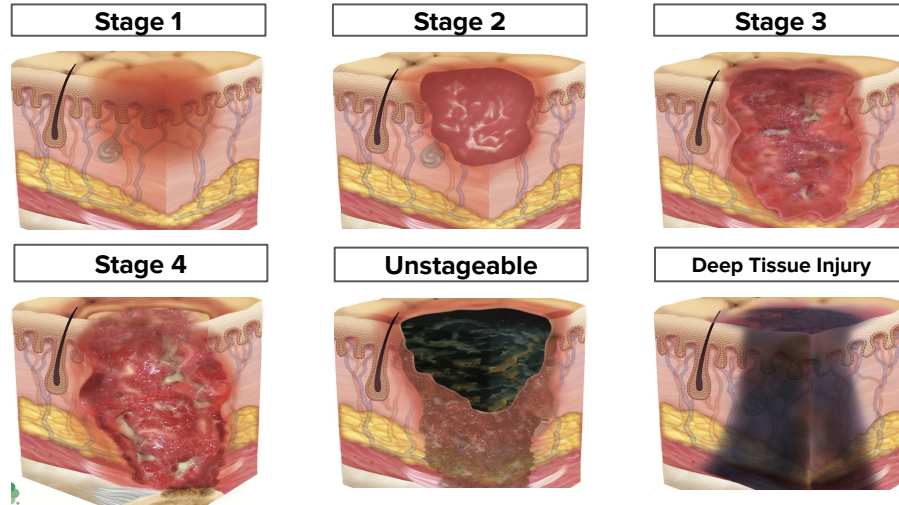
Pressure Injury



Applying the WBP+ VIP Approach



Address **VIP** Concerns:



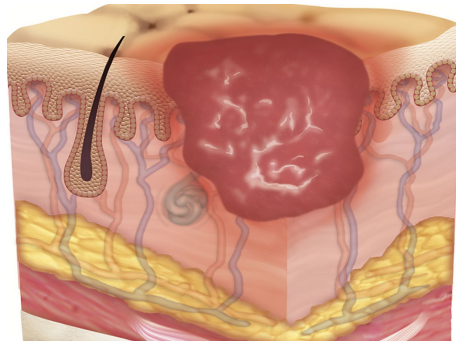
Applying the WBP+ VIP Approach



Address **VIP** Concerns:

Kryptonian physiology

What type of wound is this? Stage 2 Pressure Injury



Applying the WBP+ VIP Approach



Is the wound healable?

Address **VIP** Concerns:

Kryptonian physiology

Applying the WBP+ VIP Approach



Stage 2 Pressure Injury - Right Sacrum

1. Cleanse with normal saline
2. Paint with PVP-I (10:1 Povidine-Iodine) eg BETADINE®
3. Cover with super-absorbent dressing eg MESORB®
4. Change daily and PRN

Address VIP Concerns:

- Kryptonian physiology
- Offloading surfaces
- Repositioning schedule
- Continence management
- Adherence to recovery needs

Applying the WBP+ VIP Approach



Pearls of Care : PRESSURE INJURIES

- Main focus : pressure relief
- Be vigilant to DTI identification, esp persons with pigmented skin
- Watch nutrition, hydration, other health factors

Case 2 Summary & Plan

Step 1 Etiology: Stage 2 Pressure Injury

Step 2 Healability: Healable

Step 3 Local Wound Care: Right sacrum

1. Cleanse with normal saline
2. Paint with PVP-I (10:1 Povidone-Iodine) eg BETADINE®
3. Cover with super-absorbent dressing eg MESORB®
4. Change daily and prn

Step 4 Address VIP Concerns:

How to provide effective pressure relief?

How do we optimize care to consider Superman's unique physiology?



Case 3

Case 3: Mr. Anthony Stark

Your next patient is Mr. Anthony (Tony) Stark.

Self-described “genius billionaire”, an “adrenaline junkie” who embraces a glamorous but somewhat stressful lifestyle.

He reports that he has lately been working feverishly on a top-secret project.



Case 3: Mr. Anthony Stark

Mr. Stark admits to spending prolonged periods of sitting and/or standing during these work stints.

He has acquired a nagging wound on his leg some months ago which doesn't seem to be healing.

What problem do you think he has?

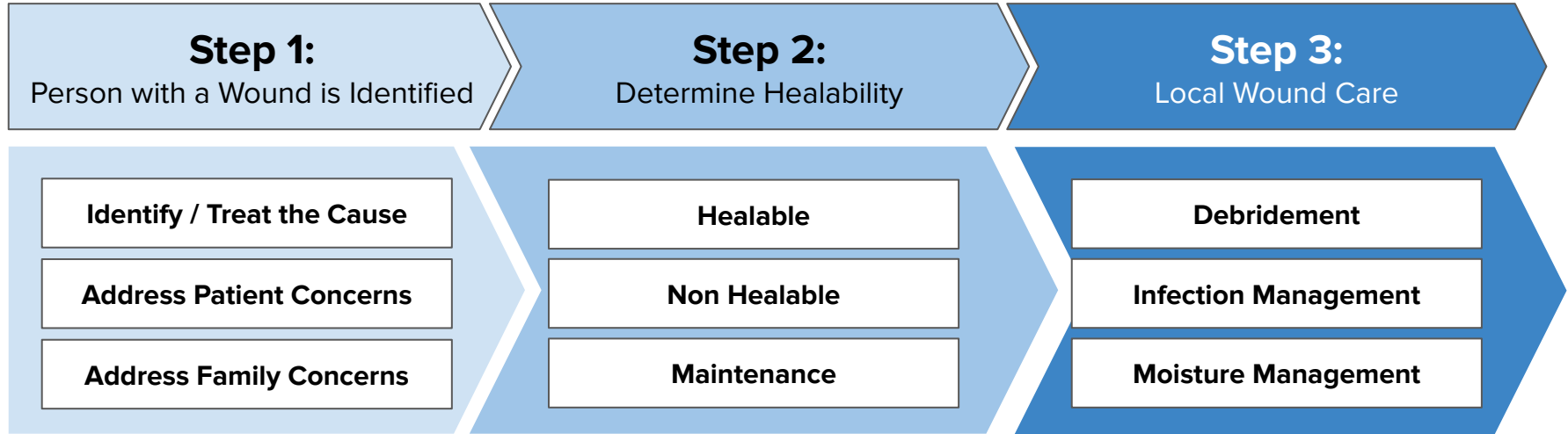


Case 3: Mr. Anthony Stark



Right lateral distal leg

Wound Bed Preparation+ VIP



Address VIP Concerns:

Vascular, Intrinsic (Patient) Factors, Pressure

Applying the WBP+ VIP Approach



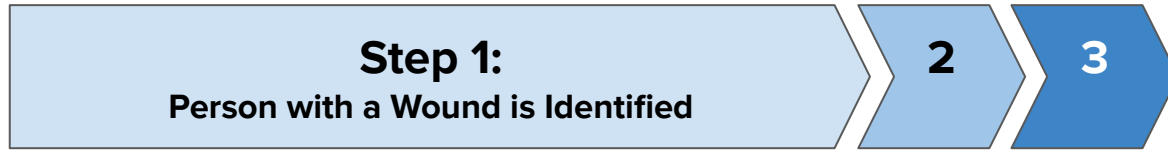
Address **VIP** Concerns:

What type of wound is this?

Venous Leg Ulcer



Applying the WBP+ VIP Approach



What type of wound is this?

Venous Leg Ulcer

Any patient/family concerns?

Nuisance

Address **VIP** Concerns:

Prolonged sit / stand

Poor self-care

Dangerous pursuits

Applying the WBP+ VIP Approach



Is the wound healable?

****Need to establish adequate arterial circulation permissive of healing and compression therapies**

How is this done??

Address VIP Concerns:

Prolonged sit / stand

Poor self-care

Dangerous pursuits

Adherence to care

Confirm vascular status

Applying the WBP+ VIP Approach



Assessment of vascular status :

- 1. General perfusion physical findings, Handheld Doppler (HHD)**
Biphasic waveform -> ABI > 0.9
- 2. Ankle-brachial index (ABI)** Community Care standard
- 3. Toe-brachial index (TBI) or TcO₂ status**
- 4. Full vascular lab studies**

Address VIP Concerns:

Prolonged sit / stand

Poor self-care

Dangerous pursuits

Adherence to care

Confirm vascular status

Applying the WBP+ VIP Approach



1

Step 2:
Determine Healability

3

Strong pulses palpable right dorsalis pedis, tibialis posterior

Good distal capillary refill

HHD demonstrates triphasic waveforms ABI > 0.9



Healable!

Address **VIP** Concerns:

Prolonged sit / stand

Poor self-care

Dangerous pursuits

Adherence to care

Confirm vascular status

Applying the WBP+ VIP Approach



Right Lateral Venous Leg Ulcer

1. Cleanse with normal saline
2. Apply PVP-I non-adherent contact layer eg INADINE®
3. Cover with super-absorbent dressing eg MEXTRA®, EXU-DRY®
4. Apply compression to target 20 mmHg eg COBAN 2®
5. Change q2D and prn

Address VIP Concerns:

Prolonged sit / stand

Poor self-care

Dangerous pursuits

Adherence to care

Confirm vascular status

Calf pump exercises

Compression use

Applying the Expanded Wound Bed Paradigm



Pearls of Care : **VENOUS LEG ULCERS**

- Compression is vital for healing
- Confirm arterial supply to establish safety of compression therapy
- Calf muscle pump activation
- Watch nutrition, hydration, other health factors

Case 3 Summary & Plan

Step 1 Etiology: Venous Leg Ulcer

Step 2 Healability: Healable

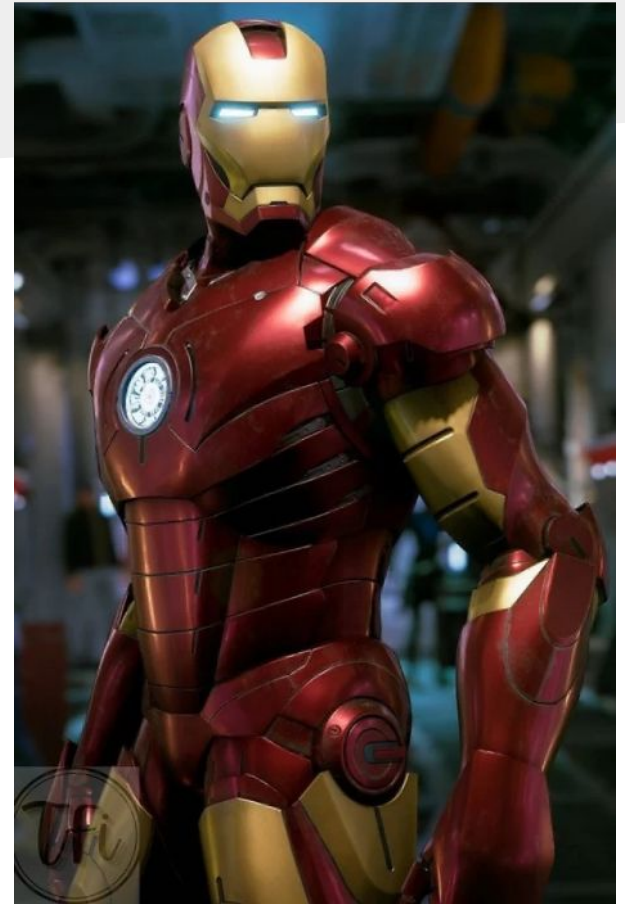
Step 3 Local Wound Care: Right lateral distal leg

1. Cleanse with normal saline
2. Apply PVP-I non-adherent contact layer eg INADINE®
3. Cover with super-absorbent dressing eg MEXTRA®, EXU-DRY®
4. Apply compression eg COBAN 2®
5. Change q2D and prn

Step 4 Address VIP Concerns:

How to promote adherence to compression - assistive technologies?

What kind of preventative strategies, lifestyle modifications can we promote?



Case 4

Case 4: Mr. Bruce Wayne

Mr Wayne is a 48 year-old CEO of a multinational corporation who engages in civilian vigilantism in his spare time.

Mr Wayne admits he has a somewhat imbalanced lifestyle with irregular meals and disrupted sleep patterns. A few years ago, he was diagnosed with Type 2 DM and continues to struggle with its management.

He is seeing you today as some months ago, he developed a wound on his left foot which hasn't healed.



Case 4: Mr. Bruce Wayne

This ulcer is on the sole of his left foot and presented after an extended period of heavy training and crime-fighting.

He did not seek immediate treatment as this wound was initially not particularly painful, though it has increased in size and has since become more bothersome.

What problem does he likely have?

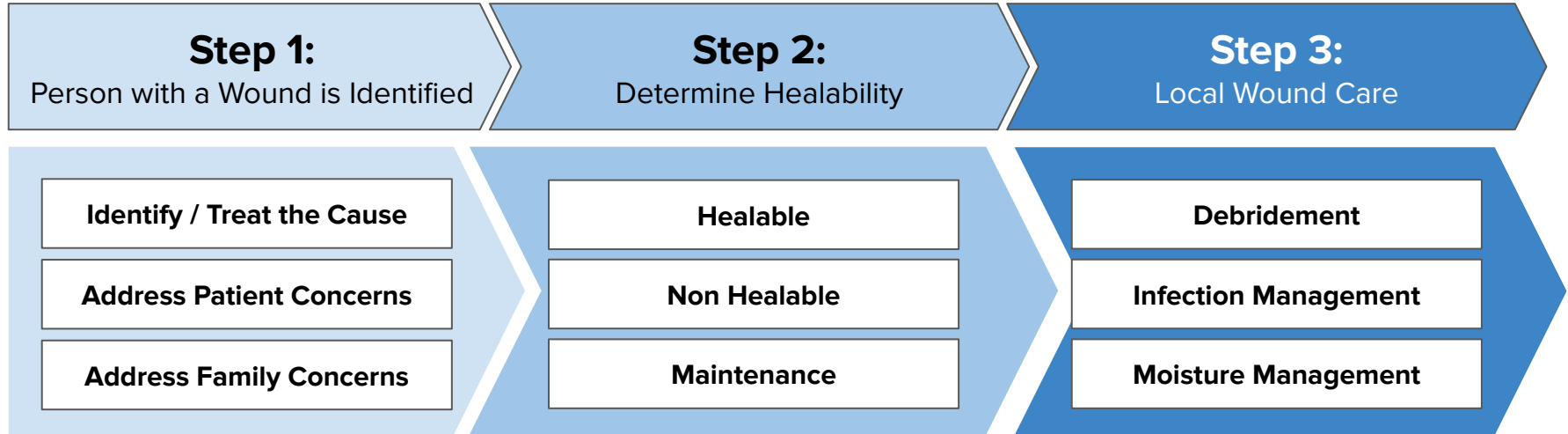


Case 4: Mr. Bruce Wayne



Left plantar D2 metatarsal

Wound Bed Preparation+ VIP



Address VIP Concerns:
Vascular, Intrinsic (Patient) Factors, Pressure

Applying the WBP+ VIP Approach



What type of wound is it?	Diabetic Foot Ulcer (DFU)
Any patient/family concerns?	Nuisance Increasingly painful Malodorous

Address VIP Concerns:

- Optimize T2DM control
- Poor self-care / lifestyle
- Assess for neuropathy
- Confirm vascular status
- Assess / Control infection

Applying the WBP+ VIP Approach



What type of wound is it?

Wagner Grade 2 Right Plantar DFU



WAGNER'S CLASSIFICATION

Grade 0: Skin intact but may have deformity or cellulitis

Grade 1: Superficial ulcer

Grade 2: Deep ulcer to ligament, tendon, bone, or deep fascia

Grade 3: Deep abscess, OM, or joint sepsis

Grade 4: Partial-foot gangrene

Grade 5: Whole-foot gangrene

Address VIP Concerns:

Optimize T2DM control

Poor self-care / lifestyle

Assess for neuropathy

Confirm vascular status

Assess / Control infection

Applying the WBP+ VIP Approach



Is the wound healable?

- What if Bruce had new diagnosis of critical PAD?
- Vascular Surgery performs angioplasty on R posterior tibial artery
 - ABI restored to normal range
 - How about now?

Address VIP Concerns:

- Optimize T2DM control
- Poor self-care / lifestyle
- Assess for neuropathy
- Confirm vascular status
- Assess / Control infection

Applying the WBP+ VIP Approach



Wagner's Grade 2 Left plantar D2 metatarsal DFU

1. Sharp debridement
2. Cleanse with normal saline
3. Paint with 10% PVP-I & apply PVP-I non-adherent dressing eg INADINE®
4. Cover with super-absorbent dressing eg MESORB®
5. Apply tubular or longitudinal elastic compression dressing to target 15-20 mmHg eg 2 layers of TUBIGRIP®, EDEMAWEAR®
6. Change daily and prn
7. Refer to chiropody for callus management and offloading footwear

Address VIP Concerns:

- Optimize T2DM control
- Poor self-care / lifestyle
- Assess for neuropathy
- Confirm vascular status
- Assess / Control infection
- Routine foot exams

Applying the WBP+ **VIP** Approach



Pearls of Care: **DIABETIC FOOT ULCERS**

- Vascular Ax, Infection Mx critical for healing
- Offloading, callus management - Chiropody referral
- Optimize glycemic control, diet/weight, lifestyle

Case 4 Summary & Plan

Step 1 Etiology: Wagner's Grade 2 Diabetic Foot Ulcer

Step 2 Healability: Healable

Step 3 Local Wound Care: Left plantar D2 metatarsal DFU

1. Sharp debridement
2. Cleanse with normal saline
3. Paint with 10% PVP-I and apply PVP-I non-adherent dressing eg INADINE®
4. Cover with super-absorbent dressing eg MESORB®
5. Apply tubular or longitudinal elastic compression dressing to target 15-20 mmHg eg 2 layers of TUBIGRIP®, EDEMAWEAR®
6. Change daily and prn
7. Refer to chiropody for callus management and offloading footwear

Step 4 Address VIP Concerns:

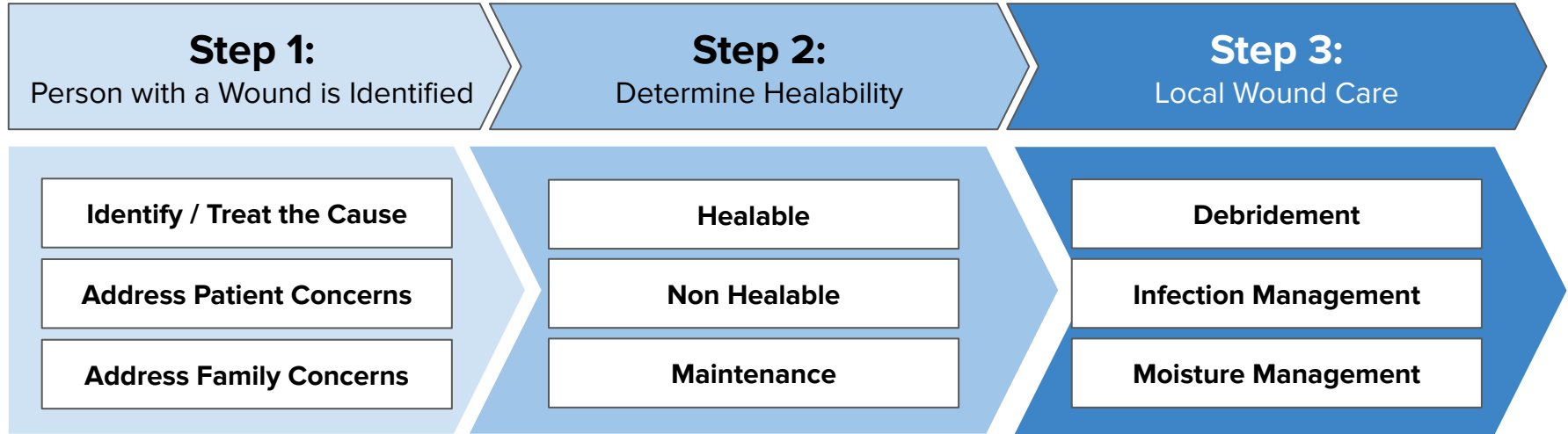
How can you provide appropriate offloading for someone very active?

How do you convince a stoic workaholic to slow down and improve their self-care?



Summary

Wound Bed Preparation+ VIP



Address VIP Concerns:

Vascular, Intrinsic (Patient) Factors, Pressure

Questions?

Thank you!

Please fill out your session evaluation now!

#myfmf



FamilyMedicineForum



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