Guidelines for Diagnosis and Treatment of Diabetic Foot Infections

BAMP / UWI 80th CME
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Questions?

- What is the difference between wound colonization and wound infection?
- What are the signs of wound infection in chronic wounds?
- How should the clinician diagnose wound infection?
- How should the clinician grade diabetic foot infections?
- What is the best method to identify the organism causing the infection?
- Is a positive wound swab a good way to diagnose wound infection?
- What is the Lavine technique for obtaining a wound swab?
- Are antibiotics the best way to treat wound infection in Diabetics?

Clinical Case Scenario

- 54 y o man Diabetic for 20 years
- Visits GP C/O swelling of right foot x 2 days, and relative noted blood in his shoe
- GP notes:
  - Patient does not know when or how he sustained trauma to foot
  - No pain, only swelling (mainly on dorsum of foot)
  - a 1.2 cm linear wound anterior sole
  - Applies dressing, starts Antibiotics
- Two days later Patient is admitted to hospital with Grade 4 infected foot
- Debridement: Three toes lost; anterior half of sole lost, 5 x 5 cm wound on dorsum

Diabetic Foot Infection – A problem!

- Foot Infections are the most common cause for hospitalization for patients with diabetes
- The risk of hospitalization for a soft tissue or bone infection in a patient with diabetes is 10 fold greater than for patients without the disease.
- An infected foot wound precedes ~66% of lower extremity amputations in patients with diabetes

- Prevent foot wounds, prevent wound infection is to prevent amputation!!

Bioburden

- Organisms exist on the human skin in a commensal arrangement with no adverse effects in a balance between host resistance and microbial proliferation
- Factors related to the ***host*** or ***bacteria*** affect the balance and lead to clinically relevant changes

- A wound interrupts that balance
  - The protective function of skin in host defence is lost
- Diabetes upsets that balance

- The number and state of proliferation of organisms in a wound constitute the bioburden

Bioburden

- ***Contamination***
  - The presence of bacteria on the surface of the wound without microbial multiplication (Slotts 2004)

- ***Colonization***
  - The presence of multiplying bacteria in a wound without host response and without clinical symptoms and signs (Ayton 1985)

Bioburden

- **Colonization**
  - Presence of proliferating bacteria without a noticeable host response
  - All open wounds are contaminated and or colonized
  - Wound healing is not adversely affected as the balance between host response and microbial proliferation is maintained

Bioburden

- ***Critical colonization (Localized infection)***
  - The point at which the host immune response is no longer able to control the proliferation of microorganisms colonizing the wound (Kingsley, 2001)
  - Upset in the balance between host and proliferating organisms
  - Wound healing is compromised.

Bioburden

- **Wound Infection**
  - The presence of multiplying organisms within wound tissue that overwhelms the host's immune response and with associated clinical symptoms and signs (Kingsley, 2001)
  - Influenced by
    - increased numbers of bacteria
    - Virulence of bacteria
    - Synergistic actions of bacterial species
    - Penetration of bacteria into deeper viable tissues
    - Efficacy of host responses
- The severity of the wound infection is influenced by local and systemic factors

Bioburden

Wound State	**Definition**
Contamination	Presence of bacteria on the surface of a wound without microbial multiplication
Colonisation	Presence of multiplying bacteria on the surface of a wound without host response and without clinical signs and symptoms
Critical Colonisation	The point at which the host's immune response is no longer able to control the microorganisms colonizing the wound
Wound infection	Presence of multiplying microorganisms within a wound that overwhelm the host immune response with associated clinical symptoms and signs

Wound Infection

- Invasion and multiplication of organisms in wound tissues resulting in pathophysiological effects and tissue injury

- Diagnosing infection in a wound involves care givers being able to ***<u>observe/recognise the clinical signs in a wound and the patient</u>*** rather than simply obtaining positive microbiology from the lab

- The pathophysiological responses to the infection are expressed by the signs of inflammation, recognized as erythema, warmth, edema, pain

Wound Infection

- Key Points
  - Wound infection occurs in viable wound tissue not on the surface of the wound
  - It is not a phenomenon of necrotic tissue, slough, eschar or other debris on the wound bed (these facilitate bacterial proliferation)
  - It is caused by invasion and multiplication of organisms in the healthy wound tissues
  - It is manifested by signs of host reaction and tissue damage
  - It represents the presence of an inflammatory response and tissue injury due to the interaction of the host with proliferating bacteria

Diagnosing Wound Infection

- The identification and diagnosis of localized wound infection (critical colonization) is fraught with ambiguity in clinical practice.
- This is especially true for chronic wounds, which heal by secondary intention.
- Diagnosing wound infection is a ***clinical skill***, as progression along the wound continuum, from contamination to colonization to infection, cannot be predicted by the mere presence of a specific type of microorganism or by a certain quantity of bacteria (Sibbald, 2003).
- The host immune response plays a critical role in determining whether wound infection occurs and how it manifests

Wound Infection

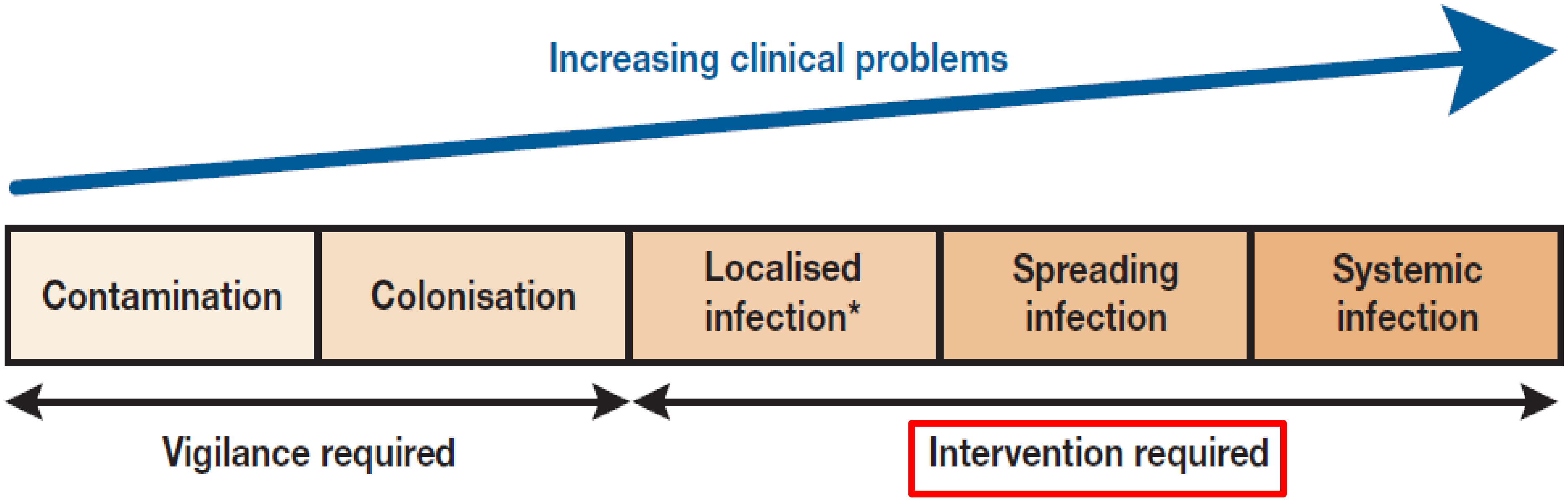
- **Diabetes** significantly affects the hosts immune response to proliferating bacteria:
  - Hyperglycemia, Neuropathy, Vascular disease, Decreased Immune functioning compromise the local and systemic response to infection masking the more common clinical features and hindering diagnosis.

PRINCIPLES OF BEST PRACTICE

A World Union of Wound Healing Societies' Initiative

Wound infection
in clinical practice
An international consensus

How to cite this document: World Union of Wound Healing Societies (WUWHS). *Principles of best practice: Wound infection in clinical practice. An international consensus*. London: MEP Ltd, 2008. Available from www.mepltd.co.uk



*Localised infection may or may not be accompanied by the classical signs and symptoms of inflammation. When it is not, various terms have been used, eg critical colonisation (see main text)

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ACUTE WOUNDS

eg surgical or traumatic wounds, or burns

Localised infection	Spreading infection
■ Classical signs and symptoms: – new or increasing pain – erythema – local warmth – swelling – purulent discharge ■ Pyrexia – in surgical wounds, typically five to seven days post-surgery ■ Delayed (or stalled) healing (Box 5, see page 10) ■ Abscess ■ Malodour	As for localised infection PLUS: ■ Further extension of erythema ■ Lymphangitis (Box 5, see page 10) ■ Crepitus in soft tissues (Box 5, see page 10) ■ Wound breakdown/dehiscence

Notes

- Burns – also skin graft rejection; pain is not always a feature of infection in full thickness burns
- Deep wounds – induration (Box 5, see page 10), extension of the wound, unexplained increased white cell count or signs of sepsis may be signs of deep wound (ie subfascial) infection
- Immunocompromised patients – signs and symptoms may be modified and less obvious

↓

SYSTEMIC INFECTION (adapted from[7–9])

Sepsis – documented infection with pyrexia or hypothermia, tachycardia, tachypnoea, raised or depressed white blood cell count

↓

Severe sepsis – sepsis and multiple organ dysfunction

↓

Septic shock – sepsis and hypotension despite adequate volume resuscitation

↓

Death

NB: Other sites of infection should be excluded before assuming that systemic infection is related to wound infection

↑

CHRONIC WOUNDS

eg diabetic foot ulcers, venous leg ulcers, arterial leg/foot ulcers or pressure ulcers

Localised infection	Spreading infection
■ New, increased or altered pain* ■ Delayed (or stalled) healing* (Box 5, see page 10) ■ Periwound oedema ■ Bleeding or friable (easily damaged) granulation tissue ■ Distinctive malodour or change in odour ■ Wound bed discoloration ■ Increased or altered/purulent exudate ■ Induration (Box 5, see page 10) ■ Pocketing (Figure 2) ■ Bridging (Figure 3)	As for localised infection PLUS: ■ Wound breakdown* ■ Erythema extending from wound edge ■ Crepitus, warmth, induration or discoloration spreading into periwound area ■ Lymphangitis (Box 5, see page 10) ■ Malaise or other non-specific deterioration in patient's general condition

Notes

- In patients who are immunocompromised and/or who have motor or sensory neuropathies, symptoms may be modified and less obvious. For example, in a diabetic patient with an infected foot ulcer and peripheral neuropathy, pain may not be a prominent feature[4]
- Arterial ulcers – previously dry ulcers may become wet when infected
- Clinicians should also be aware that in the diabetic foot, inflammation is not necessarily indicative of infection. For example, inflammation may be associated with Charcot's arthropathy

*Individually highly indicative of infection. Infection is also highly likely in the presence of two or more of the other signs listed

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WOUND INFECTION

PRIMARY Symptoms/Signs

- Rubor (erythema)
- Dolor (pain)
- Calor (warmth)
- Edema/swelling
- Purulence
- Fever

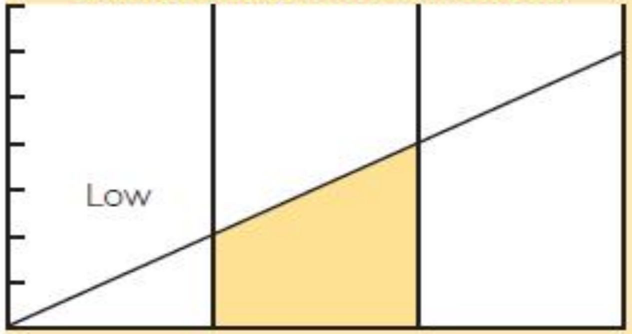
SECONDARY/ADDITIONAL

- Changes in wound bed color (dark discolored granulation tissue)
- Friable/hyper granulation; tunneling
- Abnormal/increased odor (not due to reaction with dressing material) eg odour of pseudomonas
- Increased wound discharge; serous, watery, rather than pus
- Wound newly painful, periwound inflamed, indurated
- Probe To Bone positive.
- Delayed healing, > 30 days no decrease in size (stalled)
- Wound increasing in size.

Wound Infection

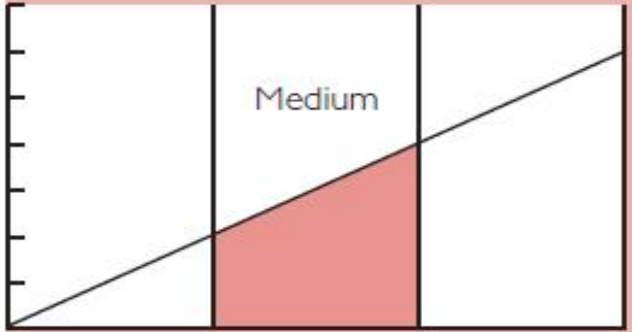
- **Patients with diabetes often do not manifest the typical signs of infection**
  - Impaired inflammatory response worsened by persistent hyperglycemia
  - Impaired circulation
  - Neuropathy and impaired pain response
  - If there is poor circulation there will be minimal swelling
  - With good circulation and neuropathy there will be much swelling but minimal pain
  - **ADA concensus defined infection in diabetic leg ulcers as *<u>purulent discharge or two or more signs of inflammation</u>***

Contaminated or colonized



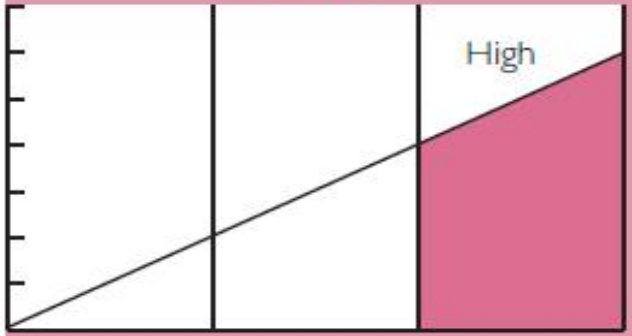
Bacteria are present on the wound surface (contaminated). A steady state of replicating organisms are attaching to the wound tissue and multiplying but they are not associated with tissue damage or delayed healing (colonization).

Critically colonized (local infection, covert infection, increased bacterial burden)



- The bacterial burden in the wound bed is increasing.
- Initiates the body's immune response (inflammation).
- The wound is no longer healing at the expected rate: wound size is not decreasing.
- Look for the signs outlined in the enabler NERDS.

Infected



- Bacteria are present within the wound and have spread to the deeper and surrounding tissue. They are multiplying and causing tissue damage.
- There is an associated host inflammatory response that has now spread to the deeper tissue and surrounding skin.
- The wound is painful and may increase in size with potential satellite areas of breakdown.
- Look for the signs outlined in the enabler STONES.

IDSA GUIDELINES

2012 Infectious Diseases Society of America Clinical Practice Guideline for the Diagnosis and Treatment of Diabetic Foot Infections[a]

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IWGDF Guidance on the diagnosis and management of foot infections in persons with diabetes

Prepared by the IWGDF Working Group on Foot Infections

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IDSA Guidelines: The 10 Key Questions

1. When to suspect, how to classify a DFI
2. How to assess the wound, foot, patient
3. When & with whom to consult
4. When to hospitalize, discharge
5. When & how to collect cultures
6. How to select/modify antibiotic regimen
7. When & which imaging studies
8. How to diagnose & treat osteomyelitis
9. When & what surgery to consider
10. What wound care & dressings

IDSA Guidelines

I. In which diabetic patients with a foot wound should I suspect infection, and how should I classify it?

Recommendations

1. Clinicians should consider the possibility of infection occurring in any foot wound in a patient with diabetes (strong, low). Evidence of infection generally includes classic signs of inflammation (redness, warmth, swelling, tenderness, or pain) or purulent secretions, but may also include additional or secondary signs (eg, nonpurulent secretions, friable or discolored granulation tissue, undermining of wound edges, foul odor) (strong, low).

2. Clinicians should be aware of factors that increase the risk for DFI and especially consider infection when these factors are present; these include a wound for which the probe-to-bone (PTB) test is positive; an ulceration present for >30 days; a history of recurrent foot ulcers; a traumatic foot wound; the presence of peripheral vascular disease in the affected limb; a previous lower extremity amputation; loss of protective sensation; the presence of renal insufficiency; or a history of walking barefoot (strong, low).

II. How should I assess a diabetic patient presenting with a foot infection?

Recommendations

4. Clinicians should evaluate a diabetic patient presenting with a foot wound at 3 levels: the patient as a whole, the affected foot or limb, and the infected wound (strong, low).
5. Clinicians should diagnose infection based on the presence of at least 2 classic symptoms or signs of inflammation (erythema, warmth, tenderness, pain, or induration) or purulent secretions. They should then document and classify the severity of the infection based on its extent and depth and the presence of any systemic findings of infection (strong, low).
6. We recommend assessing the affected limb and foot for arterial ischemia (strong, moderate), venous insufficiency, presence of protective sensation, and biomechanical problems (strong, low).
7. Clinicians should debride any wound that has necrotic tissue or surrounding callus; the required procedure may range from minor to extensive (strong, low).

IV. Which patients with a diabetic foot infection should I hospitalize, and what criteria should they meet before I discharge them?

Recommendations

14. We recommend that all patients with a severe infection, selected patients with a moderate infection with complicating features (eg, severe peripheral arterial disease [PAD] or lack of home support), and any patient unable to comply with the required outpatient treatment regimen for psychological or social reasons be hospitalized initially. Patients who do not meet any of these criteria, but are failing to improve with outpatient therapy, may also need to be hospitalized (strong, low).

15. We recommend that prior to being discharged, a patient with a DFI should be clinically stable; have had any urgently needed surgery performed; have achieved acceptable glycemic control; be able to manage (on his/her own or with help) at the designated discharge location; and have a well-defined plan that includes an appropriate antibiotic regimen to which he/she will adhere, an off-loading scheme (if needed), specific wound care instructions, and appropriate outpatient follow-up (strong, low).

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Clinical Classification of Diabetic Foot Infection

Clinical Manifestations of Infection

Wound without purulence or other evidence of inflammation

≥More than 2 of purulence, erythema, pain, tenderness, warmth or induration. Any cellulitis/erythema extends ≤2 cm around ulcer and infection is limited to skin/superficial subcut tissues. No local complications or systemic illness

Infection in patient who is systemically well & metabolically stable but has any of: cellulitis extending >2 cm; lymphangitis; spread beneath fascia; deep tissue abscess; gangrene; muscle, tendon, joint or bone involved

Infection in a patient with systemic toxicity or metabolic instability

IDSA & IWGDF Severity Classifications of a Diabetic Foot Infection

- **Grade 1** No symptoms or signs of infection (con't wound care etc, NO swab)

- **Grade 2**
  - **(Mild)** Infection involving skin and subcutaneous tissues only

    (with at least two of the following)

    Local swelling or induration
    - Erythema <2 cm around the ulcer
    - Local tenderness and pain
    - Local warmth
    - Purulent discharge

What is our local experience?
Need for Nationwide Audit!

In hospital experience has suggested high failure rate for Antibiotic treatment as outpatient without adequate wound care/debridement. We advise extreme diligence consider hospitalization

IDSA & IWGDF Severity Classifications of a Diabetic Foot Infection

- **Grade 3 (Moderate)** Erythema > 2 cm around ulcer *plus*
  - *One or more of the items in Grade 2, or*
  - *Infection involving deeper tissues than skin and subcutaneous tissue (tendons, bone, muscle, positive probe to bone)*
- **Grade 4 (Severe)** *Any infection associated with systemic signs*
  - *Temp > 38°C or < 36°C*
  - *Pulse > 90/min, Vomiting, Confusion*
  - *Resp. rate > 20/min*
  - *$PACO_2$ < 32 mm Hg (Metabolic acidosis)*
  - *WBC > 12,000 or < 4000*
  - *> 10% immature neutrophils*
  - *Severe hypoglycemia*

Require Hospitalization under surgical care

Diagnosing “bugs” in Wound Infection

- Identifying infection causing organisms:
  - Wound tissue
  - Wound fluid aspirate
  - Wound swabs
  - Bone cultures
- Wound tissue is considered the best specimen for culture from which to identify the organisms causing wound infection.
- logistics make it impractical in some settings.

V. When and how should I obtain specimen(s) for culture from a patient with a diabetic foot wound?

Recommendations

16. For clinically uninfected wounds, we recommend not collecting a specimen for culture (strong, low).
17. For infected wounds, we recommend that clinicians send appropriately obtained specimens for culture prior to starting empiric antibiotic therapy, if possible. Cultures may be unnecessary for a mild infection in a patient who has not recently received antibiotic therapy (strong, low).
18. We recommend sending a specimen for culture that is from deep tissue, obtained by biopsy or curettage after the wound has been cleansed and debrided. We suggest avoiding swab specimens, especially of inadequately debrided wounds, as they provide less accurate results (strong, moderate).

Wound Infection

- Wound cleaning is advocated prior to obtaining swabs
- Use ***Levine*** technique in order for the culture to isolate wound tissue microorganisms as opposed to microorganisms on the surface
- Moistening the swab with normal saline improves the yield
- ***Levine*** technique provides culture findings most comparable to tissue specimens as this technique attempts to sample microorganisms from within the wound tissue, not just from the wound surface (Bonham)

Microbiological considerations

Recommendation 13:
Obtain cultures, preferably of a tissue specimen rather than a swab, of infected wounds to determine the identify of causative microorganisms and their antibiotic sensitivity (Strong; High)

Recommendation 14:
Do not obtain repeat cultures unless the patient is not clinically responding to treatment, or occasionally for infection control surveillance of resistant pathogens (Strong; Low)

Rationale 13 & 14 - When to send specimens for testing:
Since infection is diagnosed clinically, the purpose of microbiological sampling is to identify the likely pathogens and their antibiotic susceptibilities to enable the clinician to select the most appropriate antimicrobial therapy. Acute infection in a previously untreated patient is usually caused by aerobic gram-positive cocci (often as a monomicrobial infection), but deep or chronic wounds often harbour polymicrobial flora, including aerobic gram-negative and obligate anaerobic bacteria (128,129). Skin disorders, environmental exposures, and especially recent antibiotic therapy can predispose to unusual or antibiotic-resistant pathogens. Wound cultures are helpful for most DFIs, but are difficult to obtain in cases of cellulitis without ulceration (where skin aspiration has limited sensitivity) and unnecessary for clinically uninfected wounds. One exception is culturing uninfected wounds when seeking evidence of colonisation with highly resistant organisms to determine if isolation of an institutionalised patient is needed. Clinicians should try to stay updated on antibiotic-resistance patterns of common pathogens in their area of practice. Blood cultures are only indicated for severe infections, where there are signs of systemic manifestations of sepsis (30). When osteomyelitis is suspected a key consideration (discussed in the osteomyelitis section) is when to obtain a specimen of bone for culture (and histopathology).

It is usually best to obtain specimens for culture as soon after the patient presents as possible, but for patients already receiving antibiotic therapy it is sometimes useful to discontinue that treatment (if the patient is stable) and wait a few days before sampling to avoid false-negative cultures. Repeat cultures are usually unnecessary unless the patient is not clinically responding to treatment, or if the initial specimen was likely to be contaminated.

IDSA/IWGDF

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Wound Swab – How to do it

The swab is rotated over a 1 cm^2 area of the wound with sufficient pressure to express fluid from within the wound tissue

Levine Technique

Clean the wound thoroughly ?saline ?water (not antiseptic before swab) debride if necessary

Moisten swab with sterile saline

Press swab over viable tissue and rotate over an area of 1 cm^2 (**not over slough, necrotic tissue or eschar**)

CLEANING AGENTS

The usefulness of specific agents to correct host factors depends on a balance between their antibacterial properties and their cytotoxicity to wound healing cells, such as white blood cells (WBCs) and fibroblasts.[89] For the majority of wounds, isotonic saline is adequate to clean the wound surface. A *Cochrane* review concluded that water, although not isotonic, is a suitable alternative, as long as it's free of any potential contaminants.[90] Because the fluid has only brief contact with the wound surface, it isn't crucial that the solution be isotonic (0.9% sodium chloride). If you choose to use an isotonic solution, however, an inexpensive saline solution can be prepared by combining one teaspoon of noniodized salt in one quart of water. (See *Patient Teaching: Preparing saline*

IWGDF Guidance on use of interventions to enhance the healing of chronic ulcers of the foot in diabetes

Prepared by the IWGDF Working Group on Wound Healing

Recommendations

1. Clean ulcers regularly with clean water or saline, debride them when possible in order to remove debris from the wound surface and dress them with a sterile, inert dressing in order to control excessive exudate and maintain a warm, moist environment in order to promote healing. (GRADE strength of recommendation: Strong; Quality of Evidence: Low)
2. In general remove slough, necrotic tissue and surrounding callus with sharp debridement in preference to other methods, taking relative contra-indications such as severe ischemia into account. (Strong; Low)
3. Select dressings principally on the basis of exudate control, comfort and cost. (Strong; Low)
4. Do not use antimicrobial dressings with the goal of improving wound healing or preventing secondary infection. (Strong; Moderate)
5. Consider the use of systemic hyperbaric oxygen therapy, even though further blinded and randomised trials are required to confirm its cost-effectiveness, as well as to identify the population most likely to benefit from its use. (Weak; Moderate)
6. Topical negative pressure wound therapy may be considered in post-operative wounds even though the effectiveness and cost-effectiveness of the approach remains to be established. (Weak; Moderate)
7. Do not select agents reported to improve wound healing by altering the biology of the wound, including growth factors, bioengineered skin products and gases, in preference to accepted standards of good quality care. (Strong; Low)
8. Do not select agents reported to have an impact on wound healing through alteration of the physical environment, including through the use of electricity, magnetism, ultrasound and shockwaves, in preference to accepted standards of good quality care. (Strong; Low)
9. Do not select systemic treatments reported to improve wound healing, including drugs and herbal therapies, in preference to accepted standards of good quality care. (Strong; Low)

NICE CG119 recommends starting empirical antibiotic therapy based on the severity of the infection, using the antibiotic appropriate for the clinical situation and the severity of the infection, and with the lowest acquisition cost. For mild infections, oral antibiotics with activity against Gram-positive organisms should be offered. For moderate and severe infections, antibiotics with activity against Gram-positive and Gram-negative organisms, including anaerobic bacteria, should be offered (oral or intravenous for moderate infection, based on the clinical situation and the choice of antibiotic, and for severe infection, intravenous antibiotics should be started based on the clinical situation). It is recommended that the definitive antibiotic regimen and the duration of treatment should be informed by both the results of the microbiological examination and the clinical response to empiric antibiotic therapy. No specific antibiotics are recommended by the guideline.

NICE - CG119

- Mild Infections (Grade 2)
  - Oral antibiotics with activity vs Gram +ve organisms
- Moderate and Severe (Grade 3 and 4)
  - Broad spectrum with activity vs both G +ve and G –ve and Anaerobes.

Table 8: Suggested Antibiotic Regimens: DFI

Agent(s)	Mild	Moderate	Severe
Advised Route	Oral for Most	Oral or IV	Parenteral
Dicloxacillin	Yes		
Clindamycin	Yes		
Cephalexin	Yes		
TMP/SMX	Yes	Yes	
Amoxicillin/clavulanate	Yes	Yes	
Levofloxacin	Yes	Yes	
Cefoxitin		Yes	
Ceftriaxone		Yes	
Ampicillin/sulbactam		Yes	
Linezolid (± aztreonam)		Yes	
Daptomycin (± aztreonam)		Yes	
Ertapenem		Yes	
Cefuroxime (± metronidazole)		Yes	
Ticarcillin/clavulanate		Yes	
Piperacillin/tazobactam		Yes	Yes
Levo- or Cipro- floxacin + Clindamycin		Yes	Yes
Imipenem-cilastatin			Yes
Vanco + Ceftazidime ± metronidazole			Yes

Site	Severity	Route	Location	Duration
Soft tissue only	Mild	Topical or oral	Outpatient	7-14 days; extend up to 28 d if slow to resolve
	Moderate	Oral (or initial parenteral)	Outpatient/ inpatient	2-4 weeks
	Severe	Initial IV, switch to oral when possible	Inpatient, to outpatient	2-4 weeks
Bone or joint	Extent of surgery	*Route*		*Duration*
	No residual infected tissue (e.g. post amputation)	Parenteral or oral		2-5 days
	Residual infected soft tissue only	Parenteral or oral		2-4 weeks
	Residual infected (but viable) bone	Initial IV, then consider oral switch		4-6 weeks
	No surgery, or residual dead bone post-op.	Initial IV, then consider oral switch		>3 months

Surgical Treatment

Treatment

Surgical

Recommendation 16:
Consult a surgical specialist in selected cases of diabetic foot infections that are moderate, and in all cases that are severe, (Weak; Low)

Recommendation 17:
Perform urgent surgical intervention is necessary in most cases of deep abscesses, compartment syndrome and virtually all necrotizing soft tissue infections (Strong; Low)

Recommendation 18:
Consider surgical intervention is usually advisable in cases of osteomyelitis accompanied by: spreading soft tissue infection; destroyed soft tissue envelope; progressive bone destruction on X-ray; or, bone protruding through the ulcer (Strong; Low)

Rationale 16 – 18:
Surgery is the cornerstone of treating many deep soft tissue infections (125) and early intervention may be associated with better outcomes (47,155-157). Emergent surgery, however, is only needed in specific circumstances, such as gas gangrene or necrotizing fasciitis, compartment syndrome or systemic sepsis. The treating clinician should consider the need for surgery in every infection, which may range from minor debridement or drainage to extensive resections, revascularisation or major amputation. When the wound has a dry eschar, especially in an ischemic foot, it is often best to avoid debriding the necrotic tissue; often these will resolve with autoamputation. Major amputation should, and usually can, be avoided unless the limb is: non-viable; affected by a potentially life-threatening infection (e.g., gas gangrene or necrotizing fasciitis); or, is functionally useless. Revascularisation (either endovascular or open bypass) may be needed for a severely ischaemic infected limb. In many non-urgent infections the initial surgical intervention should be limited to incision and drainage, with further resection needed only if the patient is not responding.

Surgical Treatment - IGWDF

Rationale 16 – 18:

Surgery is the cornerstone of treating many deep soft tissue infections (125) and early intervention may be associated with better outcomes (47,155-157). Emergent surgery, however, is only needed in specific circumstances, such as gas gangrene or necrotizing fasciitis, compartment syndrome or systemic sepsis. The treating clinician should consider the need for surgery in every infection, which may range from minor debridement or drainage to extensive resections, revascularisation or major amputation. When the wound has a dry eschar, especially in an ischemic foot, it is often best to avoid debriding the necrotic tissue; often these will resolve with autoamputation. Major amputation should, and usually can, be avoided unless the limb is: non-viable; affected by a potentially life-threatening infection (e.g., gas gangrene or necrotizing fasciitis); or, is functionally useless. Revascularisation (either endovascular or open bypass) may be needed for a severely ischaemic infected limb. In many non-urgent infections the initial surgical intervention should be limited to incision and drainage, with further resection needed only if the patient is not responding.

Surgical Treatment -NICE

Debridement, dressings and off-loading

1.1.31 Debridement should only be done by healthcare professionals from the multidisciplinary foot care team, using the technique that best matches their specialist expertise, clinical experience, patient preference, and the site of the ulcer.

IX. In which patients with a diabetic foot infection should I consider surgical intervention, and what type of procedure may be appropriate?

Recommendations

38. We suggest that nonsurgical clinicians consider requesting an assessment by a surgeon for patients with a moderate or severe DFI (weak, low).

39. We recommend urgent surgical intervention for most foot infections accompanied by gas in the deeper tissues, an abscess, or necrotizing fasciitis, and less urgent surgery for wounds with substantial nonviable tissue or extensive bone or joint involvement (strong, low).

40. We recommend involving a vascular surgeon early on to consider revascularization whenever ischemia complicates a DFI, but especially in any patient with a critically ischemic limb (strong, moderate).

41. Although most qualified surgeons can perform an urgently needed debridement or drainage, we recommend that in DFI cases requiring more complex or reconstructive procedures, the surgeon should have experience with these problems and adequate knowledge of the anatomy of the foot (strong, low).

Keep in Mind!

- Behaviour modification and preventing trauma to the foot is a major part of the challenge of care.
- Patients with longstanding wounds are at higher risk for wound infection
- Wound contamination and colonization require vigilance in wound care not swabs and antibiotics.
- Proper systematic wound assessment is necessary to develop the skill for diagnosing wound infection early.
- Diagnosing infection in chronic wounds in diabetics is difficult and with dire consequences for limb and patients if we don’t recognize and treat early.

Do's!

- Make a clinical diagnosis of wound infection based on signs and symptoms in the wound, the foot and the patient.
- Do recognize the role of neuropathy in disguising the severity of foot infections.
- Try to grade the severity of each wound infection that you diagnose.
- Ensure there is adequate circulation (at least a normal DP pulse) if you are going to start antibiotics and not refer in grade 2 (mild) infections.
- Do review in 48 hours all newly diagnosed infections being treated as outpatients. Recheck the circulation and reassess the wound.

Don't

- Swab wounds to make a diagnosis of infection.
- Make the clinical diagnosis of an infected wound first, then take an appropriate specimen for culture
- Start antibiotics and not refer in diabetic foot infection if there is no certainty (documentation) of adequate circulation

Un-resolved issues/Controversies?

- Osteomyelitis

- Questions??

Subject: Update: global consensus on wound infection
From: Wounds International <info@sb-mailer.molecloud.net>
Date: 2016-11-18 7:41 AM
To: smferdi@caribsurf.com

INTERNATIONAL WOUND INFECTION INSTITUTE

Don’t miss the update of the global consensus on wound infection

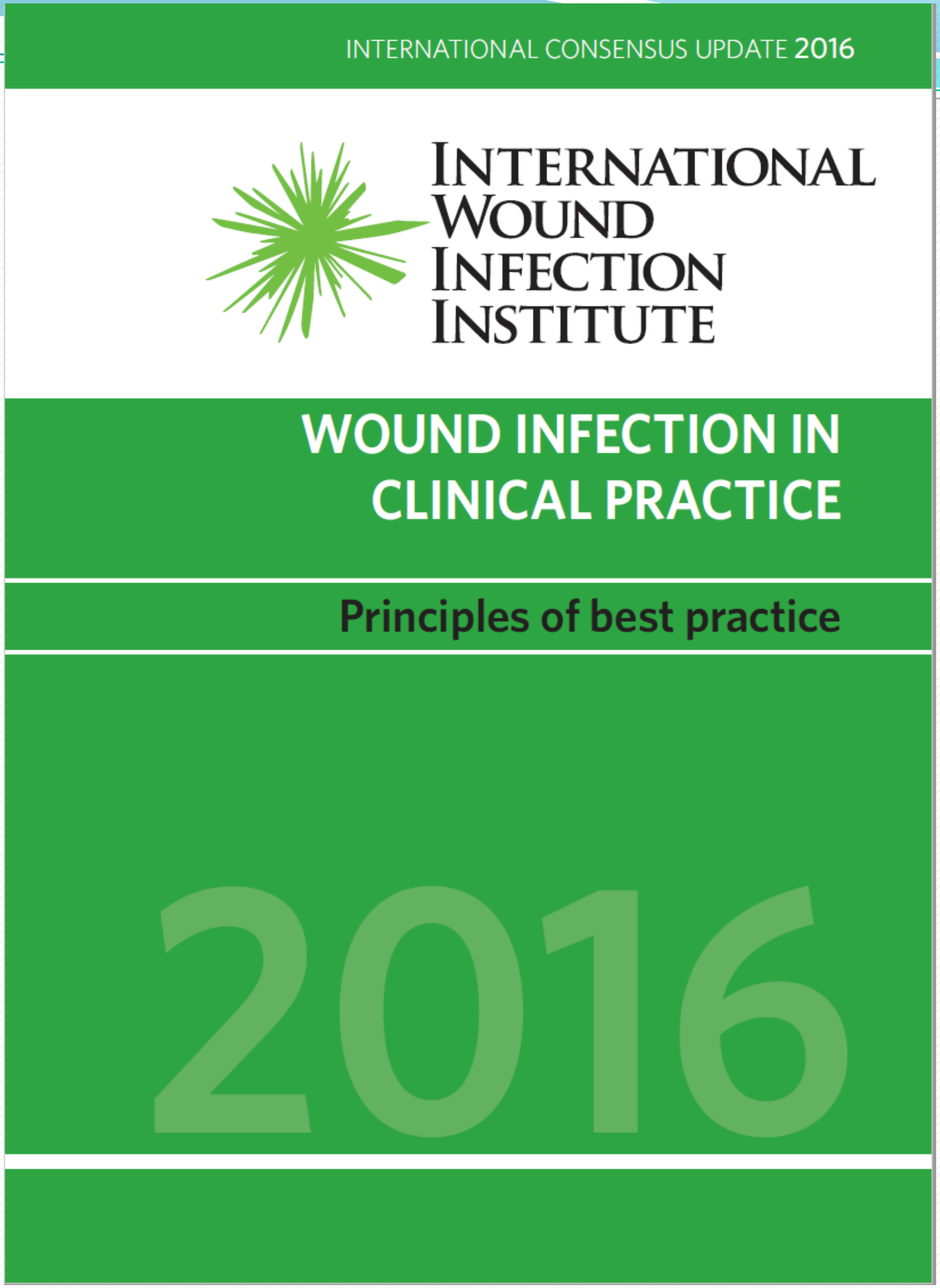
Published by the International Wound Infection Institute (IWII), supported by Wounds International, this second edition of Wound Infection in Clinical Practice is an update of the 2008 version produced by the World Union of Wound Healing Societies (WUWHS).

The intent of this edition is to provide a practical resource for clinicians that builds on the original guidance through incorporation of clinical evidence and understanding that has come to light in the past few years. To achieve this, the IWII collaborative team has undertaken a comprehensive review of contemporary literature, including systematic reviews and meta-analyses where available. They have also employed a formal Delphi process to reach consensus on wound infection issues for which scientific research is minimal or lacking. This rigorous process provides an update on the science and expert opinion regarding prevention, diagnosis and control of wound infection.

This edition outlines new definitions, presents new paradigms and advancements in the management and diagnosis of a wound infection, and highlights controversial areas of discussion.

We hope this updated resource will guide your clinical practice and will serve as an informative resource for the education of other health professionals, as well as individuals with, or at risk of, wound infection.

Please click here to download a copy.


INTERNATIONAL CONSENSUS UPDATE 2016

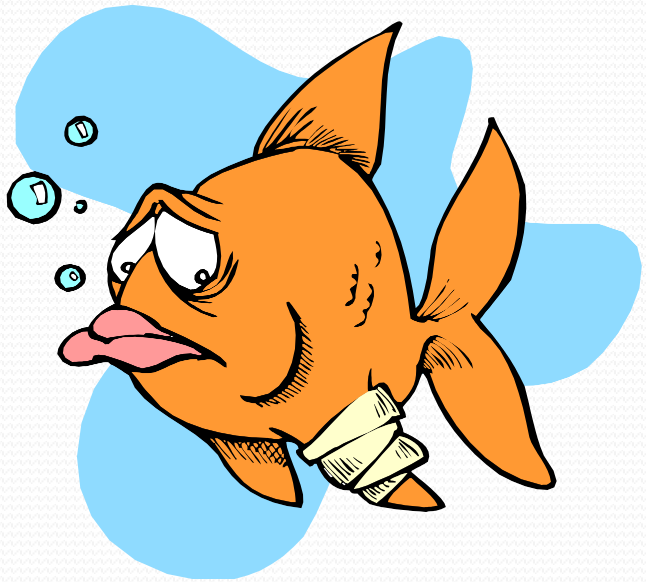
INTERNATIONAL WOUND INFECTION INSTITUTE

WOUND INFECTION IN CLINICAL PRACTICE

Principles of best practice

2016

Thank You!



Together we can make a difference!!

Diabetic Foot Infections

- Foot infections are the most common cause of hospitalization for patients with diabetes
- The risk of hospitalization for a soft tissue or bone infection in a patient with diabetes is 10-fold greater than patients without the disease
- An infected foot wound precedes two-thirds of lower extremity amputations in patients with diabetes

Lavery LA, et al. *Diabetes Care*. 2006;29:1288-1293.
Grey JE, et al. *BMJ*. 2006;332:285-288.