MINISTRY of Health
Shaping Fiji's Health

Clinical Practice Guideline

MANAGEMENT OF DIABETIC FOOT SEPSIS

LAST UPDATED: **September 2, 2010**

NOTE:
Special consideration: Referral to the High Risk Foot Clinic, National Diabetic Centre or Hospital in the Home (HITH) should be considered for management of diabetic foot sepsis.

Definition: Management of Diabetic Foot Sepsis

Parameters of the Guideline:

- Target population: Diabetic patients with foot sepsis
- Patient Groups specifically excluded from Guideline: Juvenile diabetics
- Contra-Indications: None

Definitions of Terms:

- **DFS:** Diabetic Foot Sepsis
- **Charcot's Joint / Foot:** Neuropathic osteoarthropathy. Non infective, progressive, painless degeneration of one or more weight bearing joints, with joint dislocation, bone destruction, resorption and eventual deformity. This is closely associated with peripheral neuropathy.
- **Ankle-Brachial Index:** The ratio of systolic blood pressure at the ankle and brachial artery. ABI = P (leg) / P (arm).
- **Multi-Disciplinary Team:** Physician, Surgeon, Dietician, Physiotherapist, Counsellors, Ophthalmologist, Social Worker, Prosthetist, Public Health personnel (specifically zone nurses), Foot Clinic staff and others as needed.

Disclaimer: *It is important to note that this is a general guideline for treatment and sets forth basic principles of care. Treatment of each patient should be individualized according to particular need. Patients with known or suspected allergies to medication and other peculiar aspects to their presentation should be offered safe alternative modes of therapy.*

Assessment

Patient History:
The following are important to note in the patient history:

General Medical History

- History of the presenting complaint
- Duration of diabetes and control
- History of other co-morbidities such as cardiac (hypertension and ischaemic heart disease), cerebrovascular, renal and eye
- Current medication and allergies
- Social History – activity, smoking, alcohol, diet, level of support available, and ability to maintain compliance to medications

Foot History

- Use of footwear
- Foot Care – awareness, daily care with inspection and washing
- Previous surgeries and deformities
- Neuropathic and vascular symptoms
- Skin and nail complaints

Foot Ulcers

- Duration, size, site, discharge
- Precipitating factors
- Associated infections
- Patient self care

Physical Examination:
The patient must be examined for signs of generalised infection and life threatening septicaemia:

- High body temperature
- Chills
- Dehydration
- Abnormally high or low blood glucose level – DFS and septicaemia are often associated with hyperglycaemia and diabetic ketoacidosis

It is important to note that patients with limb threatening infection may not exhibit systemic symptoms of fever, chills and leucocytosis.

Evaluation of the affected lower limb for infection should include the following:

- Skin colour, texture, oedema, temperature, swelling
- Toe and nail appearance – fungal, paronychia or interdigital lesions
- Ulcers – discharge, odour, depth and extent
- Established infection – cellulitis, sinus tracts, abscess
- Crepitus
- Gangrene

Evaluate vascular status by noting:

- Skin colour – pallor, erythema, cyanosis
- Pulses – femoral, popliteal, posterior tibial, dorsalis pedis arteries
- Capillary return (Normal < 2 seconds)
- Temperature gradient
- Ankle-brachial Index (Normal > 1; less than 0.9 is abnormal)

Evaluate neurologic status by noting:

- Pressure and touch sensation – cotton wool, Semmes Weinstein Monofilament
- Pain – pin prick
- Temperature – hot and cold
- Deep tendon reflex
- Signs of Charcot joints – painless joint swelling, painless subluxation/dislocation

Evaluation of foot ulcer:

Wagner's Classification of Diabetic Foot Ulcers[1]

Grading	Features
0	Pre-ulcer. No open lesion. May have deformities, erythematous areas of pressure or hyperkeratosis
1	Superficial ulcer. Disruption of skin without penetration of subcutaneous fat layer
2	Full thickness ulcer. Penetrates through fat to tendon or joint capsule without deep abscess or osteomyelitis
3	Deep ulcer with abscess, osteomyelitis or joint sepsis. It includes deep plantar space infections, abscesses, necrotizing fascitis and tendon sheath infections
4	Gangrene of a geographical portion of the foot such as toes, forefoot or heel
5	Gangrene or necrosis of large portion of the foot requiring major limb amputation

Investigations

Biochemical Tests:

- Full blood count; serum electrolytes; fasting or random blood sugar level
- Wound swab and blood cultures
- HbA1C (where available)
- Urinary ketones
- Urinalysis and culture/sensitivity where indicated

Radiographic Tests:[2,3]

- X-ray of the foot – suspected osteomyelitis or Charcot's joint. Will also reveal radio-opaque foreign bodies, and gas shadows when gas gangrene is present
- Chest x-ray – when indicated

Vascular Investigations of the Lower Extremity

Vascular investigations are indicated to evaluate the extent of occlusive vascular disease and in the assessment of healing potential especially when clinical examination suggests lower extremity ischaemia[4-6]. This involves:

Ankle-brachial indices (ABI) – easy way to determine foot blood flow[6] but may be misleading due to calcification of the arteries giving rise to higher pressures at the ankle[7,8] Normal value 1.1. Abnormal value <0.9.

Identification of Risk Factors

Condition	Risk Factors
Foot Ulcers	**Neuropathy, peripheral vascular disease, abnormal foot pressures, hyperglycaemia, trauma, foot deformity, limited joint mobility, previous ulceration or amputation, poor vision, chronic renal disease, old age, duration of diabetes.**
Amputation	**Foot ulcer and its risk factors, infection, chronic hyperglycaemia, previous amputations.**
Charcot's Arthropathy	**Neuropathy, minor trauma, foot deformities, joint infections, amputations and surgical trauma.**
Threatening Infections	**Hyperglycaemia, impaired neurological response, neuropathy and peripheral vascular disease.**

Treatment

Principles of Treatment

- Debridement of necrotic tissue (removal of all non-viable tissues)

- Wound care

- Reduction of plantar pressure (off-loading)

- Treatment of infection
  Infection in a diabetic foot is usually secondary to ulceration. Rarely, infection itself causes ulceration. It can either be local or systemic. Treatment requires early incision and drainage or debridement and empirical broad-spectrum antibiotic therapy. If there is co-exiting gangrene or extensive tissue loss, early amputation at the appropriate level should be considered to remove the focus of infection.

- Vascular management of ischaemia

- Medical management of co morbidities
  Diabetes is a multi organ systemic disease. Co-morbidities must be assessed and managed via a multidisciplinary team approach for optimal outcome. Patient compliance is also important as it determines the outcome

- Surgical management to reduce or remove bony prominences and / or improve soft tissue cover. Chronic foot ulcer or high pressures in structurally deformed foot not amenable to treatment with therapeutic footwear or off-loading techniques are treated surgically to reduce high-pressure areas or to redistribute pressure evenly so as to affect ulcer healing. All infected bones and tissues are to be removed and amputation done for gangrenous parts until viable bones and tissues are attained. It is performed in such a manner so as to allow optimum function of the remaining foot.

- Reduce risk of recurrence
  Specialty diabetic foot care clinics with a multidisciplinary approach encompassing patient education, podiatric and orthotic care play a vital role in diabetic foot care.

Additional guide to Treatment

Parameters	Non Limb Threatening	Limb Threatening
1. Foot Ulcer	Superficial or stable	Deep and overt
2. Foot Infection	Mild to moderate - may arise from scratches, small punctures or fissures	Severe - gangrene, necrotising fascitis and abscesses may be present
3. Organisms	Usually mono microbial, aerobic gram positive cocci	Usually poly-microbial
4. Cellulitis from ulcer	< 2 cm	> 2 cm, lymphangitis
5. Osteomyelitis	Absent - wound does not probe from joint to bone	Present - wound probes to joint or bone
6. Clinical symptoms of systemic illness	Stable - no symptoms or signs of sepsis or systemic involvement	Has features of sepsis or systemic involvement. e.g. fever, hyperglycemia
7. Ischemia	Absent	Present - vascular consult needed
8. Hospitalization	Hospitalization not required, close supervision on outpatient basis	Hospitalization required to treat infection and systemic involvement

Management

Diabetes mellitus is a multi organ disease. Assessment and management of the co-morbidities must be done through a multidisciplinary team approach for the best possible outcome.

Acute stage

For the septicaemic patient:
Intravenous high doses of antibiotics – broad spectrum cover
Fluid resuscitation and rehydration
Treatment of hyperglycaemia and diabetic ketoacidosis

Treatment of metabolic and co-morbid problems

Surgical drainage and debridement of dead tissues must not be delayed.
Emergency amputation may be required in septicaemic patients with severe and ascending infection. The level of amputation will depend on anatomy and wound classification.

Frequent assessment of response to treatment

Ongoing Management

Patient education
Prevention
[9-12] Orthoptics / prosthetic management

Non-limb threatening infections

Outpatient management
Admission after 48-72 hours if deterioration
Antibiotic therapy
Wound care and debridement
[13-17]
Correction of hyperglycaemia and co-morbidities

Limb threatening infection

Hospitalisation
Multi-disciplinary care
Surgery – Debridement, I&D, amputation
Empirical antibiotics according to Fiji National Antibiotic Guidelines 2nd ed. 2003/2004
Correction of hyperglycaemia, electrolyte imbalance and co-morbidities

Antibiotic Treatment

Empirical Regime according to Fiji National Antibiotic Guidelines 2nd ed. 2003/2004:

- Metronidazole 400mg PO TDS
- Cloxacillin 1g IV QID; alternatives – Erythromycin 500mg PO QID or Ceftriaxone 1g IV BD
- Gentamycin 240mg IV OD (adjust maintenance dose according to renal function)

Patients with renal impairment to have medical consultations

Change to oral therapy when infection under control

Change antibiotics according to culture & sensitivity results

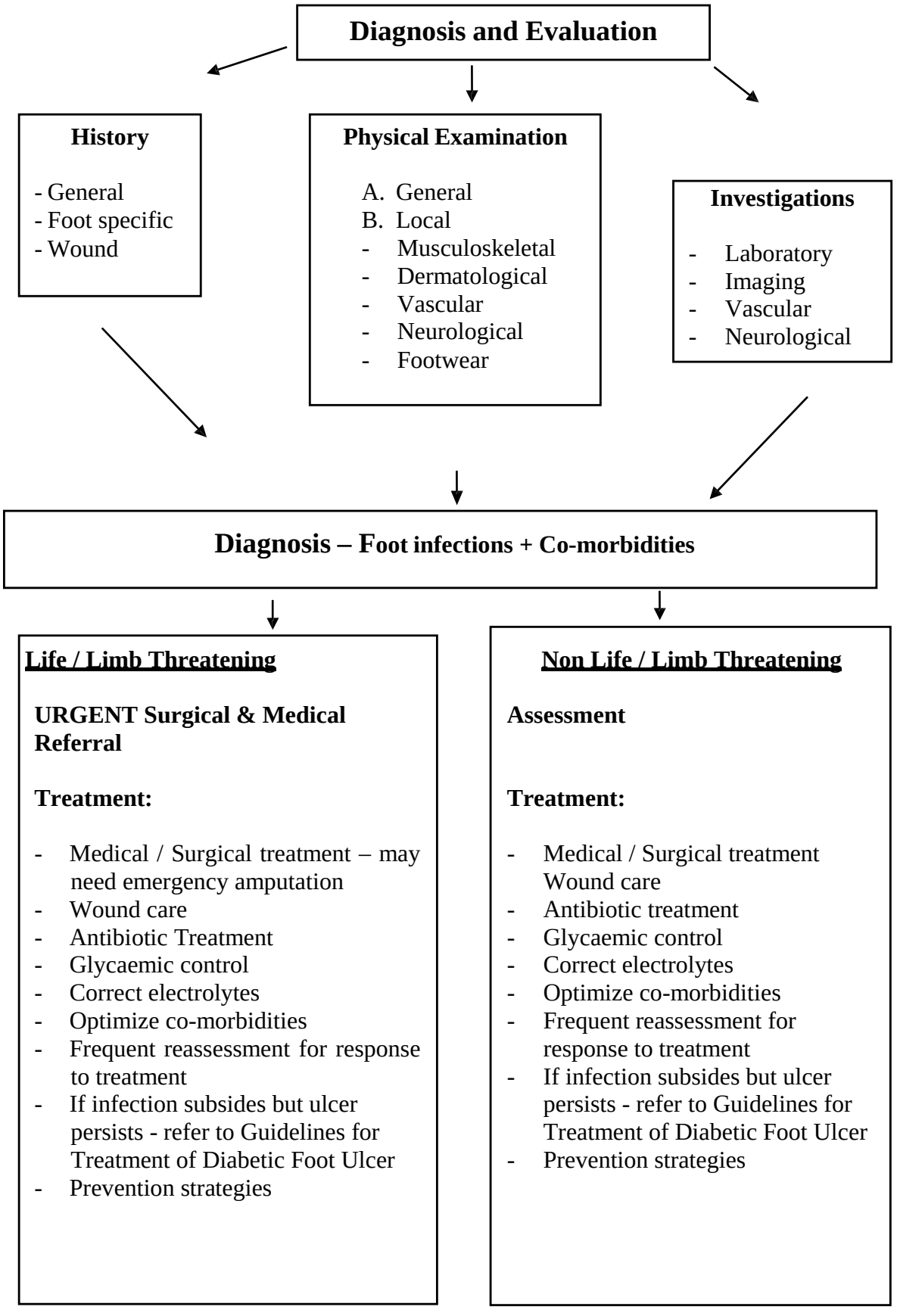
Duration of antibiotics:

- 1 – 2 weeks at the discretion of attending surgeon and response[18-20]
- Osteomyelitis with all infected bone removed: 1 – 2weeks[20]
- Osteomyelitis without all infected bone removed: 6 weeks[20-22]

Prevention

- Patient education on foot care
- Diet and hyperglycaemic control
- Therapeutic shoes
- Reduction of plantar pressure E.g. insoles, orthoses
- Surgery to correct structural deformities

ALGORITHM FOR A PATIENT WITH DIABETIC FOOT PROBLEMS



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Scope and Application	This CPG is intended for use by all health care workers in their daily care of patients with Diabetic Foot Sepsis
Effective Date	2010
Supercedes Policy Number	Not applicable
Review Responsibilities	The Chairperson of the Surgical CSN will initiate the review of this guidelines every 3 years from the date of issue or as required.
Further Information	Surgical CSN Chairperson

RESPONSIBILITY:

CPG Owner: National surgical CSN

CPG Writer: Ministry of Health **Date: November 2010**

Endorsed:

National Medicines & Therapeutic Committee, MOH

Date: 23 November 2010

Endorsed:

National Health Executive Committee, MOH

Date: 25 November 2010