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Best practice guidelines

type 2 diabetes

Podiatry

**Best practice
guidelines for
management
of type 2
diabetes**



Queensland Government
Queensland Health

BRISBANE

INNERSOUTH DIVISION OF GENERAL PRACTICE

Foreword

Diabetes is a national and state health priority. Diabetes is responsible for significant morbidity and mortality, which impacts on the Queensland Health system, and more importantly, on the lives of those with diabetes, their families and carers.

Divisions of General Practice have, in the past, highlighted difficulties in accessing public Allied Health Services. To address this issue, Queensland Health, through the Principal Allied Health Adviser, formed the Queensland Diabetes Allied Health Task Group to develop evidence-based guidelines for the Allied Health areas involved in diabetes care — Diabetes Education, Dietetics and Podiatry.

The resulting Best Practice Guidelines for the Management of Type 2 Diabetes identify:

- evidence-based practices in the area of diabetes
- criteria other professionals should use when referring
- pathways for efficient service delivery, and
- services that can be provided by a range of accredited service providers

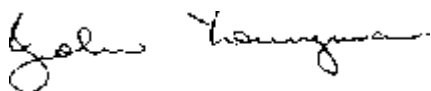
These guidelines support the Diabetes Health Outcomes Plan through implementation of strategies in the plan. Referral information in these guidelines have also been included in the General Practice Advisory Council's Management of Diabetes Mellitus in Adults — Standard Clinical Care Pathway 2000, providing an overview health professional involvement in type 2 diabetes across the continuum of care.

These guidelines should be used in conjunction with the Diabetes Health Outcomes Plan and the General Practice Advisory Council's Management of Diabetes Mellitus in Adults — Standard Clinical Care Pathway 2000.

Queensland Health is committed to providing efficient and effective services to people with diabetes. These Guidelines provide a blueprint for best practice in the area of type 2 diabetes and diabetes education, dietetics and podiatry.

I recognise the significant work done by professionals and professional associations involved in developing these guidelines and thank all those involved in the task group for their collaboration and support.

I am pleased to endorse these guidelines and ask that health professionals involved in the care of people with diabetes become familiar with this document and encourage its use.



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Acknowledgments

The Diabetes Allied Health Task Group developed terms of reference to progress the coordination of diabetes care throughout Queensland. From this, the development of Best Practice Guidelines for Podiatry was initiated by Queensland Health and the Brisbane Inner South Division of General Practice. A working group was formed consisting of podiatrists throughout Queensland with an interest in the production of diabetes care guidelines.

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1. Podiatry and diabetes management

The high incidence of foot problems and lower limb amputations associated with diabetes means the issue of foot care has become important in diabetes treatment. Podiatry has become an integral part of health care in the maintenance of foot health and the ambulatory status of people with diabetes. Podiatry is defined as the “diagnosis and treatment by medical, surgical, electrical, mechanical and manual methods of ailments or abnormal conditions of the human foot”.¹

The role of the podiatrist

Podiatrists are involved in the maintenance of foot health, mobility and the prevention of complications to the feet. They aim to decrease the level of morbidity and amputations traditionally associated with ‘diabetes foot disease’.

A recent study by Rith-Najarian et. al.² found that a multidisciplinary team approach to footcare significantly reduces amputation rates, improves screening and prevents complications (level III evidence). This shows podiatrists should work cooperatively within a multidisciplinary team to achieve and maintain optimal health outcomes.

These guidelines detail the full range of interventions for diabetes lower limb assessment and management. Podiatrists aim to provide expert care, advice and education for the person with diabetes within the scope of podiatry practice.

2. Qualifications

2.1 Mandatory

- Registration with the Podiatrists Registration Board (Qld)

2.2 Highly desirable

- A firm commitment to continuing education in the area of diabetes in either a formal or informal context. This could be through membership of the Australian Podiatry Association (Qld) or other relevant organisations

3. Standards of professional practice

3.1 Professional competence

Standards of professional practice are integral to the role of the podiatrist. They provide the professional with guidelines for the establishment and maintenance of effective services and ensure consistent practices between professionals. Standards of professional practice are also useful tools for the professional and the employer in determining professional responsibility, scope of practice, accountability, the streamlining of services and planning the future direction of services.

There are no specific standards for podiatrists in relation to diabetes services, although the Australian Podiatry Council has developed general standards of professional practice³. These standards are recommended for use by podiatrists employed by Queensland Health.

4. Referrals

Podiatrists are an integral part of the multidisciplinary diabetes care team which aims to reduce complications, prevent amputations and reduce morbidity associated with diabetes.

Podiatrists can accept referrals from all health care agencies and facilities. As podiatrists are primary care providers, members of the public do not need a referral to access these services. This system ensures timely and appropriate care for people with diabetes, enabling them to maintain foot health.

The tables below (Fig 1) outline referral criteria to be followed to ensure timely assessment and treatment of people with diabetes to prevent and/or reduce the development of complications.

Annual foot assessment	Requires podiatry referral
<ul style="list-style-type: none"> - neurological - vascular - biomechanical - dermatological - footwear 	<p>History of:</p> <ul style="list-style-type: none"> - previous foot ulceration - previous partial or total foot amputation - poor ability to heal injured skin in normal time frame - peripheral vascular disease - neuroarthropathy - neuropathic symptoms <p>Clinical signs of:</p> <ul style="list-style-type: none"> - foot ulcer - foot abnormality - skin pathology - warm oedematous foot - peripheral neuropathy - peripheral vascular disease - gait abnormalities, - unsteadiness or change of gait - muscle wastage in the lower limb - restricted joint range of motion
<p>Foot care and health promotion</p> <p>Education and information:</p> <ul style="list-style-type: none"> - footcare - footwear facts - when to seek help - good glycemic control and its relationship to feet 	

Figure 1: Indications for referral to a podiatrist

5. Clinical management guidelines

5.1 Introduction

These clinical management guidelines are designed to allow podiatrists and other health professionals to standardise assessment and treatment strategies for a person with type 2 diabetes.

All assessments and management should be based on evidence and professionally-recognised approaches. They should also be consistent with best practice models which promote a self-management philosophy.

The following flow chart (Fig 2) gives a broad overview of the assessment and referral criteria a multidisciplinary team should follow.

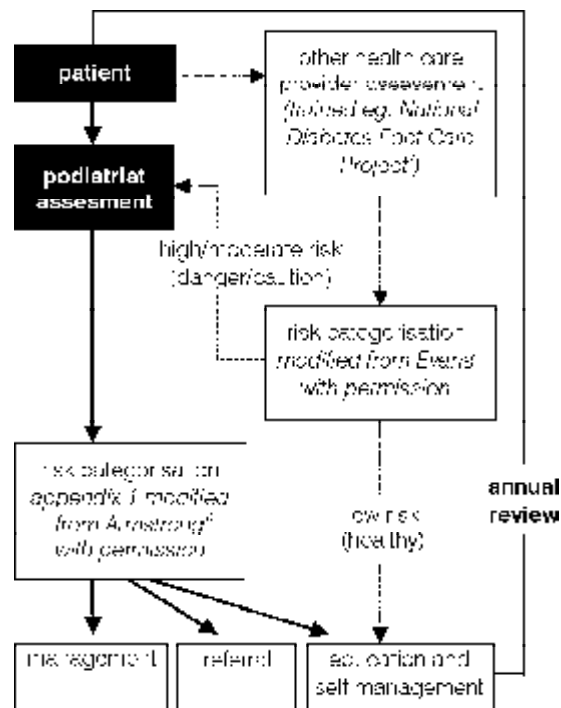


Figure 2: Lower limb assessment and referral pathway

5.2 Annual basic foot screening by non-podiatrists

Professionals other than podiatrists perform assessments of the feet, so a general category for basic foot screenings has been included.

This screening tool:

- can be implemented when time, resources or access to a podiatrist are limited
- is not intended to replace a thorough comprehensive foot assessment – if problems are detected, referral to a podiatrist for a comprehensive assessment is needed
- includes a basic risk assessment tool that directs the person found to be at risk to a thorough assessment
- should only be undertaken by those competent in the provision of foot care who have completed appropriate training, eg. the National Diabetes Foot Care Program⁷

5.3 Risk categories for basic foot screening by non-podiatrists

5.4 Comprehensive foot assessment by podiatrists

Mayfield⁸ and others^{4,9,10,11} have stated that all individuals with diabetes should receive a foot examination yearly to identify high risk conditions.

Thorough assessment and management of the foot health status of a person with diabetes requires investigations within the categories listed below:

- dermatological
- vascular
- neurological
- biomechanical (including pressure)
- morphological
- footwear
- education.

Basic foot screening includes a cursory assessment in these areas, whereas a

Table 1: Foot screening risk categorisation (Modified with permission from Evans⁵)

	Neurological	Vascular	Structural	Self care	Past ulcer
Clinical test	- 10g monofilament	- pulse palpation	- observation	- question/ observation	- question
Danger <i>Action – refer to a podiatrist</i>	- no stimuli felt	- no pulses	- weightbearing ulcer	- unaware - unable to self-care - lives alone	- > 1 past ulceration
Caution <i>Action – refer to a podiatrist</i>	- reduced stimuli felt	- reduced pulses	- weightbearing callus - corn from shoes	- needs more education - needs better care - needs help to care	- 1 ulcer (resolved)
Healthy <i>Action – review annually if all criteria met</i>	- all stimuli felt	- normal pulses	- no skin lesions	- aware, able (can see and reach)	- never ulcerated

comprehensive assessment investigates these areas in depth. Clinicians can:

1. perform extensive investigations into areas requiring attention (listed below by category)
2. note the level of risk for the patient
3. determine effective management strategies and a basis for their implementation (also listed below)

A comprehensive assessment is preferred.

5.5 Risk categories

Identifying the risk status of a person with diabetes is essential in the management of their feet. By assessing the level of risk, appropriate and timely management can occur. A Risk Categorisation tool is documented in Appendix 1 and should be used to record the risk status of the person with diabetes following a thorough assessment. This risk categorisation can also determine return visit rates to streamline services.

5.5.1 History

Questions on the history of neuropathy, vascular disease or treatment, prior ulceration, or amputation (level III evidence⁸) must be included when documenting the history of the patient to determine risk status.

Other components of a medical history, including other medical conditions, blood pressure, blood glucose level and other clinical indicators must also be taken into account when determining risk categorisation and management strategies.

5.6 Level of service delivery

Effective client management enables the provision of better services and improved health outcomes for the person with diabetes. As mentioned earlier, many groups^{8,9,11} say assessment for diabetes foot complications should be done yearly.

However, the frequency of basic foot screening or comprehensive foot examinations depends

Table 2: Frequency and length of podiatry consultations based on patient risk category

Patient type (minutes)	Podiatry frequency (assessment and/or management)	Evidence	Time
foot screening	annually	IV ^{9,10,11}	30 mins
foot assessment and risk 0	annually	IV ^{8,10,12}	60 mins
risk 1	6 months	IV ^{10,12}	30 mins
risk 2	2-3 months	IV ^{10,12}	30 mins
risk 3	1-2 months	IV ^{10,12}	30 mins
risk 4 – ulcer	weekly – biweekly	IV ^{10,12}	30 mins
risk 5 – infected ulcer	weekly/hospitalisation	IV ^{10,12}	30 mins
risk 6 – vascular compromise	1 - 2 months	IV ^{10,12}	30 mins

on time, resources and professional limitations (see Table 2). Yearly assessments are considered to be the basic level of service delivery.

For those found to be at risk, follow-up management is needed. The level of management, review periods and times will depend on the level of risk. This can not be categorised as either basic or optimal, as individuals require regular reassessment of risk factors and various levels of management depending on their needs.

In addition, changes in a person's foot health can occur at any time and the level of management will need to be adjusted accordingly at the clinician's discretion.

5.7 Flexible competencies

In some regions of Queensland and in some instances, access to a podiatrist is not always possible, requiring other health professionals to provide elements of podiatry intervention. In this document, the assessments and interventions other health professionals can provide are listed in the flexible competencies column.

It is the responsibility of these professionals to ensure they have the ability to carry out assessments and interventions within their professional scope of practice. If they do not have the expertise to deal with specific specialised problems, they should refer the patient to other health professionals.

5.8 Assessment and management

These clinical management guidelines detail relevant assessment and management strategies. Assessments should be conducted at least annually and be performed in a standard, reproducible manner for yearly comparison^{8,9,11}. Assessments should determine whether abnormalities or anomalies exist, and if so, appropriate management strategies should be put in place.

Within the assessment tables (Tables 3,6,8,10, 12 and 14) tests are listed along with the indicators that would prompt further action. Evidence for the effectiveness of these assessments is also documented. If time is limited, it is recommended that the assessments which meet the higher level of evidence be used.

Once a comprehensive assessment is completed, the patient's level of risk can be categorised and management strategies implemented.

The management tables which follow (Tables 4, 5, 7, 9, 11 and 13) list factors determined during assessment that require management, treatment or referral. The interventions listed have been researched for their evidence base and are documented in the table.

A large proportion of the evidence was obtained through a technical review by Mayfield et al⁸ which allocated evidence levels to information gathered.

These levels of evidence were reviewed and modified so they are in line with levels of evidence used in Queensland Health. For details of quality of evidence rating scale used within this document, refer to Appendix 2.

5.8.1 Dermatology

5.8.1.1 Dermatology assessment

Table 3: Dermatology assessment

Assessment criteria	Evidence for criteria	Findings/thresholds	Flexible competencies		
Skin observations	1. skin condition (i) integrity	III ^B	break in epidermis ulceration - fissure - tear - lesion probe for depth of lesion	Podiatrist, Diabetes educator, GP, RN	
	(ii) texture	IV	Atrophy Hypertrophy Elasticity Hydrosis	Podiatrist, Diabetes educator, GP, RN	
	2. skin lesions (i) hyperkeratosis	III ^B	Presence site depth	Podiatrist, Diabetes educator, GP, RN	
	(ii) dermopathy	IV	Location Severity	Podiatrist, GP, Specialist	
	3. infection	IV	see infection assessment	—————	
	4. temperature (i) thermography	III ^B	Increase/decrease - symmetry - local - general	Podiatrist	
	(ii) touch	IV	increase/decrease - symmetry - local - general	Podiatrist, Diabetes educator, GP, RN	
	5. colour	IV	Local General tracking streaks haemosiderosis	Podiatrist, Diabetes educator, GP, RN	
	pathology	1. nail	IV	Thickening Infection Discolouration	Podiatrist, Diabetes educator, GP, Pharmacist, RN
		2. skin	III ^B	Discolouration Infection see also skin observations	Podiatrist, GP, Pharmacist, RN

5.8.1.2 Dermatology management

Table 4: Management of dermatological conditions

Observations/findings	Interventions	Evidence for interventions	Flexible competencies	
Skin observations	1. skin condition (i) break in skin integrity	- probe for depth of lesion - classify wound (see table below) - refer to wound management discussion	IV	Podiatrist, GP, Specialist
	(ii) texture	- emollients for dry skin	IV ⁸	Podiatrist, Diabetes educator, GP, RN,
	2. skin lesions (i) hyperkeratosis present (ii) dermopathy	- debride and/or enucleate - address aetiology by removal of causative pressure and/or friction - educate	III ⁸ II ⁸	Podiatrist, GP
	3. infection	- see infection management	-----	-----
	4. temperature (i) asymmetrical temperature	- investigate charcots joint - investigate for infection	IV	Podiatrist, GP
	(ii) touch	- investigate for vascular compromise - investigate for infection	IV	-----
5. colour	- investigate for vascular compromise - investigate for infection	IV	-----	
pathology	1. disorders of nail onychocryptosis onychochauxis onycholysis onychogryphosis	- reduce length and/or thickness - remove dead tissue - identify aetiology and address if possible - excision - refer for oral antifungal medications - educate patient to prevent recurrence if required	IV ⁸ IV ⁸ II ⁸	Podiatrist, GP
	2. Skin	- see above management or refer to specialist	IV	-----

5.8.1.3 Wound management discussion

(Adapted with permission from the Australasian Podiatry Council (1997)¹³)

Successful ulcer management requires a multidisciplinary approach. Effective communication between all health professionals is necessary to ensure that factors such as choice of dressings and frequency of dressing changes are consistent.

Standard wound assessment at every visit would include:

- assessing and measuring wound colour, depth, area and any alteration in characteristics since the previous treatment
- grading the wound (see below)
- document fully and accurately the above information, together with treatment performed and dressings used
- refer as indicated by vascular assessment

Factors that may influence the rate of wound healing should be considered. Persistent hyperglycaemia, infection and excessive pressure are common causes of delayed wound repair and must be controlled or eliminated for healing to take place.

Issues that need to be addressed include:

- identification of aetiological factors
- providing an optimal wound healing environment
- the systemic health of the patient
- management of the contralateral limb
- prevention of recurrence

5.8.1.4 Wound classification

The use of a wound classification system is an important part of any wound treatment protocol. By classifying a wound, the progress of resolution can be seen, allowing clear communication between practitioners.

A classification system that includes depth of ulceration as well as infection and peripheral arterial occlusive disease is put forward by Armstrong et al (1998)¹⁴ and is recommended for use. However, other classification systems may already be in use. If so, they should be adhered to so practitioners within a facility can communicate clearly.

5.8.1.5 Nail management

(Adapted with permission from the Australasian Podiatry Council, (1997)¹³)

The ability of the person with diabetes to care for their feet and nails must also be determined. The podiatrist should assess the person's vision, foot hygiene, foot care knowledge and the need for assistance with foot care if necessary.

The table below can then be used as a guide to when the podiatrist should provide nail care for the person with diabetes.

Table 5: *Who cares – a guide to nail management*

Self Care	Relatives/ supporters	Podiatrist
can see	can't see	can't see
can reach	can't reach	can't reach
normal nails	normal nails	abnormal nails ^a
no pvd ^b	no pvd ^b	no pvd ^b
no neuropathy	no neuropathy	neuropathy

a. abnormal nails – thick (gryphotic), crumbly (mycotic), ingrown - +/- infection.

b. pvd = peripheral vascular disease

5.8.2 Infection

5.8.2.1 Assessment of infection

Table 6: Assessment of infection

Assessment criteria	Evidence for criteria	Findings/thresholds	Flexible competencies		
infection observations	(i) observations - including; - discharge, - purulence, - pyrexia, - cellulitis	IV	- erythema, - purulent discharge, - pyrexia, - cellulitis, - proximal tracking - see also dermatological assessment	Podiatrist, GP, RN	
	(ii) concomitant infections - fungal - paronychia	IV	- dermatophytosis - candidiasis	Podiatrist, GP, RN	
assessments	physical	(i) wound swab	IV	- causative organism identified, sensitivity and specificity	Podiatrist, GP, RN
		technical	(i) osteomyelitis - sinus depth - x-ray - blood lab findings	IV	- probe sinus - sequestrum and involucrum specialist - refer for bone scan for increased uptake of mn, indicative of osteoblastic activity ('hot spots')
	(ii) gas gangrene - soft tissue distention - x-ray findings		IV	- gaseous signs and air collections in bacterial infection of soft tissues and fascial planes on x-ray - blood culture and sensitivity	Podiatrist, GP, Medical specialist

5.8.2.2 Infection management

Table 7: Management of infection

Observations/ findings	Evidence for intervention	Interventions	Flexible competencies
(i) superficial infection (epidermis, dermis)	IV ¹⁵	<ul style="list-style-type: none"> - debridement of necrotic tissue - standard wound care techniques - refer on for antibiotic therapy 	Podiatrist, GP, Medical specialist, RN
(ii) deep tissue infection (eg. capsule, ligament, tendon)	IV ¹⁵	<ul style="list-style-type: none"> - debridement of infected tissue - immobilisation - refer on for antibiotic therapy 	
(iii) osteomyelitis / septic arthritis (iv) gas gangrene	IV ¹⁵ IV	<ul style="list-style-type: none"> - podiatrist identifies and refers on for appropriate treatment eg.: antibiotics, surgery - refer on for appropriate management eg.: expert advice (infectious disease consultation) 	

5.8.3 Vascular

5.8.3.1 Vascular assessment

Table 8: Assessment of vascular status

Assessment criteria	Evidence for criteria	Findings/thresholds	Flexible competencies	
Observations	nail condition – refer to dermatology sections on observation and pathology	III ⁸	- nail pathology – refer to dermatology section	
	skin condition – refer to dermatology sections on observation and pathology	III ⁸	- skin pathology – refer to dermatology section	
	temperature – refer to dermatology section	III ⁸	- symmetry - refer to dermatology section	
	varicosities	IV	- location - severity	Podiatrist, GP, RN
	hair growth – refer to dermatology section	IV	- absence	
	colour – refer to dermatology table		- pallor - rubor - cyanosis - symmetry also see dermatology section	
physical assessment	palpation of pulses - posterior tibial - dorsalis pedis - popliteal	III ¹⁵	- grade - rate - rhythm - symmetry	Podiatrist, Diabetes educator, GP, RN
	peripheral oedema	IV ⁸	- pitting/non-pitting - symmetry - location - duration	Podiatrist, Diabetes educator, GP, RN
	subcapillary venus plexus filling time	IV	- delayed	Podiatrist, Diabetes educator, GP, RN
	symptoms: - intermittent claudication - rest pain	III ⁸	- claudication distance - location of pain - duration	Podiatrist, GP
technical assessment	doppler assessment	III ¹⁵	- waveform analysis - quality of sound	Podiatrist, Specialist
	ankle /brachial index	III ¹⁵	- abnormal	Podiatrist, Specialist
	toe/brachial index		-abnormal	Podiatrist, Specialist

5.8.3.2 Vascular management

Table 9: Management of vascular compromise

Observations/ findings	Interventions	Evidence for interventions	Flexible competencies	
signs of arterial insufficiency	- risk factors	- smoking cessation - diet and lifestyle modification as necessary - graded walking program/exercise therapy - patient education (refer to education section)	III ⁸ II ⁸	Podiatrist, GP, Diabetes educator, Dietitian, Exercise physiologist Physiotherapist
	- asymptomatic	- graded walking program/exercise therapy (dependant on if neuropathy is present) - patient education (refer to education section)	II ⁸	Podiatrist, Diabetes educator, Dietitian, Exercise physiologist, GP Physiotherapist
	- claudication/ rest pain (critical ischaemia)	- graded walking program/exercise therapy(dependant on if neuropathy is present) refer for further investigation and revascularisation (eg. bypass surgery, angioplasty)	II ⁸ II ⁸	Podiatrist, Diabetes educator, Exercise physiologist, GP Physiotherapist
venous system	- venous insufficiency	- education (refer to education section) - assess suitability for compression hosiery		Podiatrist, GP, Occupational therapist

5.8.4 Neurological

5.8.4.1 Neurological assessment

Table 10: Assessment of neurological status

Assessment criteria		Evidence for criteria	Findings/thresholds	Flexible competencies	
neurological observations	- patient symptoms	IV	- neuropathic vs. asymptomatic - determine aetiology of neurological symptoms	Podiatrist, GP, RN	
	- skin	III ^B	- refer to dermatology section		
	- neuroarthropathy	IV	- findings from skin observations - radiographic assessment findings (x-ray, bone scan) - differentiate from infection	Podiatrist, GP	
assessments	physical	- foot and leg muscles	III ^B	- tone, - strength, - wasting, - extrinsic vs. intrinsic	Podiatrist, Exercise physiologist, GP, Physiotherapist
		- joint mobility	III ^B	- loss of passive extension of mtp joints and ip joints	Podiatrist, Physiotherapist
		- proprioception	IV ^B	- stability	Podiatrist, Physiotherapist
		- deep tendon reflexes	IV	- ankle and knee reflexes - response - comparison	Podiatrist, Diabetes educator, GP, RN
	technical	- pressure perception	I ^B	- perception of 5.07/10g sensory monofilament symmetry	Podiatrist, Diabetes educator, GP, RN, Specialist
		- vibration test	III ^B	- perception of 128hz tuning fork, or biothesiometer/ neurothesiometer symmetry	Podiatrist, Diabetes educator, GP, RN, Specialist
		- radiographic assessment	IV	- decreased bone mass, - undiagnosed fractures and charcot joint disease	Podiatrist, GP, Specialist

5.8.4.2 Peripheral neuropathy management

Table 11: Management of peripheral neuropathy

Observations/ findings	Interventions	Evidence for interventions	Flexible competencies
- neuropathic pain (burning, paraesthesia, night pain etc) in the presence of hyperglycaemia	- tight blood glucose control - topical capsaicin - refer for appropriate medication	I ⁸ II ¹⁶	Podiatrist GP Diabetologist/ Endocrinologist
neuropathic ulceration	- classify according to relevant wound classification score +/- wound swab, fbc etc (refer to wound assessment section) - treat any concurrent soft tissue or bone infection (refer to infection section) - minimise direct pressure on lesion (refer to biomechanical section)	IV IV III ⁸	Podiatrist GP Diabetologist/ Endocrinologist
neuroarthropathy	- complete non-weightbearing total contact cast and later a bi-valve cast - refer for surgery (usually after acute phase) - refer to footwear and aids management)	III ¹⁷ III ⁸	Podiatrist, GP
asymptomatic neuropathy	- education - if biomechanical problem (refer to biomechanical section) - if hyperkeratotic lesions (refer to dermatology section)	IV	Podiatrist

5.8.5 Biomechanics

5.8.5.1 Biomechanical assessment

Table 12: Biomechanical assessment

Assessment criteria		Evidence for criteria	Findings/thresholds	Flexible competencies	
observations	i) gait	IV	- visual gait analysis to assess: - limp - instability - footdrop - decreased rom - asymmetry	Podiatrist, Physiotherapist	
	ii) foot function	III ⁸	- static stance position of foot - active muscle tests	Podiatrist, Physiotherapist	
	iii) foot/leg structure	IV	- assess for: - foot deformity - toe deformity - charcot foot - signs of hip, knee, leg deformity/pathology	Podiatrist, Physiotherapist	
assessments	physical	i) foot function rom tests	III ⁸	- lower extremity joint rom and qom (can include goniometry) - muscle strength tests - muscle length tests	Podiatrist, Physiotherapist
		ii) foot structure	IV	- palpate exostoses - joint restrictions - fat pad depth - intrinsic minus foot type	Podiatrist, Physiotherapist
		iii) gait	IV	- detailed gait assessment involving: - position and motion of foot and lower leg segments - assess these in phases of gait	Podiatrist, Physiotherapist
	technical	i) foot function	III ⁸	- plantar pressure assessment (eg. emed, musgrave, force plate analysis)	Podiatrist, Physiotherapist
		ii) foot structure	IV	- x-ray investigation	Podiatrist, Physiotherapist
		iii) gait	IV	- video gait analysis (refer to gait assessment above)	Podiatrist, Physiotherapist

5.8.5.2 Biomechanical management

Table 13: Management of abnormal biomechanical findings

Observations/ findings	Interventions	Evidence for intervention	Flexible competencies
gait - unusual/ abnormal gait	- referral to podiatrist for detailed assessment		
foot structure and function	- foot deformities i) toe deformities - educate - correct - accommodate	II-III ⁸	Podiatrist, Orthotist
	iii) charcot foot - total contact casting - accommodate	III ¹⁷ II ⁸	Podiatrist Orthotist
	iv) amputees/ amputation site - footwear modification - prosthesis - orthoses - assess contralateral limb and monitor	II ⁸	Podiatrist, Orthotist
	- muscle weakness and decreased range of motion - educate - accommodate - exercise programs/physical therapy - investigation to rule out other pathologies	IV	Podiatrist, Physiotherapist, Exercise physiologist
	- plantar pressure lesions reduce pressure by: - reduction of hyperkeratosis - inserts/insoles - total contact casting - footwear - refer for surgery - monitor lesion - educate	III ⁸ III II ¹⁷	Podiatrist

5.8.6 Footwear

5.8.6.1 Footwear assessment

Table 14: Assessment of footwear

Criteria	Evidence basis	Findings/thresholds	Flexible competencies
fit	IV	- length - width - depth	Orthotist Podiatrist
shoe style	IV	- last - heel height - firm heel counter - stability - break line - protects feet (enclosed shoe) - appropriate for foot type - appropriate for activities - accommodates inserts/orthotics (if required) - does not cause injury to the foot	Orthotist Podiatrist
adjustable fastening	IV	- accommodates oedema - accommodates deformity	Orthotist Podiatrist
condition	IV	- age - wear patterns – biomechanical assessment if necessary	Orthotist Podiatrist
materials	IV	- facilitates ventilation - pliable enough to prevent injury to digits - cushioned sole - hypoallergenic (if required)	Orthotist Podiatrist

5.8.6.2 Footwear intervention

Once footwear has been assessed and biomechanical assessment and management strategies have been discussed, footwear advice can be given according to the individual needs of the patient. This intervention is in the form of education, which is discussed below.

5.8.7 Patient Education

5.8.7.1 Patient Education Assessment

These guidelines recommend that patients'

education needs be assessed by asking a series of questions.

Essential components⁸ of a diabetes education assessment include:

- assessment of the patient's ability to conduct foot examinations themselves and to respond appropriately to high risk foot conditions detected (level of evidence IV)
- knowledge of foot hygiene practices (level of evidence IV)
- footwear selection (level of evidence II)
- the ability to avoid foot trauma (level of evidence III)

The questions listed below are reproduced with permission from the Australasian Podiatry Council, (1997)¹³.

Assessment 1

The person with diabetes should have an understanding of the effects of diabetes on foot health.

They should:

- identify why the feet and legs are at risk due to their diabetes
- understand the risks inherent in diabetes and implementing recommended changes to footwear, footcare, activity patterns and lifestyle behaviours
- take responsibility for the management and monitoring of daily foot health care, in association with the podiatrist and other health care workers (where applicable)

Assessment 2

The person with diabetes should understand the importance of choosing appropriate footwear and its purpose.

They should understand that:

- shoes offer protection from injury
- shoes must fit correctly to protect (and not injure) the foot
- footwear should be suitable for the occasion

Assessment 3

The person with diabetes should be able to identify and effectively manage risk factors that may cause foot problems.

This occurs when the person can:

- state the complications of diabetes which result in the foot being at risk
- describe how to help prevent the onset or results of these complications
- carry out preventative treatment strategies

when there are complications affecting the lower limb or foot

Assessment 4

The individual should understand the importance of monitoring blood glucose and lipid levels and the potential effect continued hyperglycaemia has on foot health.

This occurs when the individual can:

- identify what constitutes a high blood glucose level
- identify the relationship between high blood glucose levels and infections and the importance of seeking medical assistance
- identify what constitutes a high blood lipid level
- understand the long-term relationship between hyperglycaemia, hyperlipidaemia and the development of complications that may affect foot health

Assessment 5

The person with diabetes should be able to identify the services available to assist them, their role and appropriate use.

This occurs when the person can:

- describe the role of the podiatrist, general practitioner, specialist, diabetes educator and dietitian
- identify the services they would access when an acute foot problem arises and state how they would contact them
- state appropriate additional resources which may be useful in their care (as documented by Diabetes Australia)

Assessment 6

The person with diabetes should be involved in self-care to maintain optimal foot health.

The occurs when the person with diabetes can:

- identify and effectively manage risk factors which may result in foot problems

- act on early warning signs of development of foot or lower limb problems
- seek appropriate help

The person with diabetes should be able to discuss and demonstrate skills in foot care to ensure they are capable of independent self care.

5.8.7.2 Patient education management

Education on foot care which aims to prevent the foot complications associated with diabetes has become widely recognised as an important aspect of diabetes education programs.

It has been reported by Malone et al (1989)¹⁸ that patient education is of benefit to patients considered to be in a high-risk category (level of evidence I). Several studies^{18,19,20} have investigated the effect of education in diabetes foot care. These studies have noted that education on the complications that diabetes can cause in foot health was more effective than no education, and intensive education was more beneficial in preventing complications than basic education.

These guidelines therefore recommend that group education sessions on footcare and footwear be incorporated into a comprehensive diabetes service. Timing and group numbers for this education is at the discretion of the health professional. No specific group education format is recommended at present.

6. References

1. Department of Health, Podiatry Registration Act (1969) and Podiatrist By Laws (1996). Approved by Governor in Council.
2. Rith-Najarian S, et al (1998) Reducing lower extremity amputation due to diabetes. Application of the staged diabetes management approach in a primary care setting. *Journal of Family Practice* 47(2):127-32.
3. Australian Podiatry Council (1994). Competency Standards and Related Assessment Methods for the Australian Podiatry Profession – Summary. Australian Podiatry Council.
4. The Royal Australian College of General Practitioners and Diabetes Australia (1998). Diabetes Management in General Practice, 5th Edition. *National Capital Printing, Canberra*.
5. Evans A and Phillips P (1998). Traffic Lights – a new, user-friendly classification structure for the diabetic foot. *Australasian Journal of Podiatric Medicine* 32(4):133-137.
6. Armstrong, D. et al (1996). Treatment-based classification system for assessment and care of diabetic feet. *Journal of the American Podiatric Medical Association*. 86(7):311-316.
7. National Association of Diabetes Centres in Partnership with the Australian Podiatry Council (1998). Pilot Training Manual. National Foot Care Project.

8. Mayfield, JA et al (1998). Preventative Foot Care in People with Diabetes. *Diabetes Care*. 21(12):2161-2177.
9. NSW Health Department and Australian Diabetes Educators Association (1997). Improving Diabetes Care and Outcomes – Principles of Care and Guidelines for the Clinical Management of diabetes Mellitus. *NSW Health*.
10. Continuous Quality Improvement Guidelines, Diabetes Mellitus, (1995). Diabetes Guidelines Advisory Group Oregon Diabetes Project, *Oregon Health Division*.
11. Kimberley Aboriginal Medical Services' Council (1998). Systematic Review of Existing Evidence and Primary Care Guidelines on the management of non-insulin-dependent diabetes in Aboriginal and Torres Strait Islander Populations, *Office for Aboriginal and Torres Strait Islander Health Services*.
12. Lavery L.A. et al (1998). Practical Criteria for Screening Patients at High Risk for Diabetic Foot Ulceration. *Archives of Internal Medicine* 158:157-162.
13. Australasian Podiatry Council (1997). Australian Podiatric Guidelines for Diabetes (2nd Edition). Australian Podiatry Council and Diabetes Australia.
14. Armstrong DG et al (1998). Validation of a Diabetic Wound Classification System: the contribution of depth, infection and ischaemia to the risk of amputation. *Diabetes Care* 21:855-859.
15. Boyko EJ et al (1997). Diagnostic utility of the history and physical examination for peripheral vascular disease among patients with diabetes mellitus. *Journal of Clinical Epidemiology* 50:659-668.
16. Sindrup SH, Jensen TS (1999). Efficacy of pharmacological treatments of neuropathic pain: an update and effect related to mechanism of drug action. *Pain* 83(3):389-400.
17. Mueller MJ, et. al (1989). Total contact casting in treatment of diabetic plantar ulcers. Controlled clinical trial. *Diabetes Care* 1912(6):384-8
18. Malone JM et al (1989). Prevention of amputation by diabetic education. *American Journal of Surgery*. 158:520-524.
19. Barth R et al (1991). Intensive education improves knowledge, compliance and foot problems in Type 2 Diabetes. *Diabetic Medicine* 8:111-117.
20. Edmonds ME et al (1996). Education and the Diabetic Foot. *Diabetic Medicine*. 13:s61-64.
21. National Health and Medical Research Council of Australia Quality of Care and Health Outcomes Committee: Guidelines for the development and implementation of clinical practice guidelines. Canberra: Australian Government Publishing Service. (1995).

Appendix 1

The University of Texas diabetic foot risk classification system

(from references 6 and 12 with permission)

Table 14: The University of Texas diabetic foot risk classification system

Category 0	Category 1	Category 2	Category 3
<p>No neuropathy</p> <ul style="list-style-type: none"> - patient diagnosed with diabetes - protective sensation intact (semmes weinstein 10g monofilament detected) - ankle-brachial index (ABI) >0.8 and toe systolic pressure >45mmHg - foot deformity may be present - no history of ulceration <p>possible treatment</p> <ul style="list-style-type: none"> - possible shoe accommodations - patient education - follow up 6-12 months 	<p>Neuropathy, no deformity</p> <ul style="list-style-type: none"> - protective sensation absent (semmes weinstein 10g monofilament NOT detectable) - ankle-brachial index (ABI) >0.8 and toe systolic pressure >45mmHg - no history of diabetic neuropathic osteoarthropathy (charcot's joint) - no foot deformity - no history of ulceration <p>possible treatment same as category 0 plus:</p> <ul style="list-style-type: none"> - possible shoe gear accommodation (pedorthic/orthotist consultation) - quarterly visits to assess shoe gear and monitor for signs of irritation - follow up 3-4 months 	<p>Neuropathy with deformity</p> <ul style="list-style-type: none"> - protective sensation absent - ankle-brachial index (ABI) >0.8 and toe systolic pressure >45mmHg - no history of neuropathic ulceration - no history of charcot's arthropathy - foot deformity present (focus of stress) <p>possible treatment same as category 1 plus:</p> <ul style="list-style-type: none"> - pedorthist/orthotist consultation for possible custom-moulded/extra-depth shoe accommodation - possible prophylactic surgery to alleviate focus of stress (eg. correction of hammer-toe or bunion deformity) - follow up 2-3 months 	<p>History of pathology</p> <ul style="list-style-type: none"> - protective sensation absent - ankle-brachial index (ABI) >0.8 and toe systolic pressure >45mmHg - history of neuropathic ulceration, amputation or charcot's neuropathy - foot deformity present (focus of stress) <p>possible treatment same as category 2 plus:</p> <ul style="list-style-type: none"> - more frequent visits may be indicated for monitoring - follow up 1-2 months
Category 4A	Category 4B	Category 5	Category 6
<p>Neuropathic wound</p> <ul style="list-style-type: none"> - all stage a wounds (see wound classification) - protective sensation absent - ankle-brachial index (ABI) >0.8 and toe systolic pressure >45mmHg - foot deformity normally present - no acute diabetic charcot's arthropathy <p>possible treatment same as category 3 plus:</p> <ul style="list-style-type: none"> - pressure reduction program instituted - wound care program instituted 	<p>Acute charcot's joint</p> <ul style="list-style-type: none"> - protective sensation absent - ankle-brachial index (ABI) >0.8 and toe systolic pressure >45mmHg - non-infected neuropathic ulceration may be present - diabetic neuropathic osteoarthropathy (charcot's joint) present <p>possible treatment same as category 3 plus:</p> <ul style="list-style-type: none"> - pressure reduction program instituted - thermometric and radiographic monitoring - if ulcer present, treatment is the same as for category 4a 	<p>The infected diabetic foot</p> <ul style="list-style-type: none"> - all stage b wounds (see wound classification) - protective sensation may be present - infected wound - charcot's arthropathy may be present <p>possible treatment</p> <ul style="list-style-type: none"> - debridement of infected necrotic tissue and/or bone as indicated - possible hospitalisation, antibiotic treatment regimen - medical management 	<p>The ischaemic limb</p> <ul style="list-style-type: none"> - all stage c and d wounds (see wound classification) - protective sensation may be present - ABI < 0.80 or toe systolic pressure <45 or pedal transcutaneous oxygen tension < 40 mmHg - ulceration may be present <p>possible treatment</p> <ul style="list-style-type: none"> - vascular consult, possible revascularisation - if infection present, treatment same as for category 5. Vascular consult concomitant with control of sepsis

Category 1-3 Risk factors for ulceration, Category 4-6 Risk factors for amputation
 The University of Texas Classification System for Diabetic Foot Wounds (from 6 and 12 with permission)

Table 15: *The University of Texas classification system for diabetic foot wounds (from 14 with permission)*

		Grade/Depth "How deep is the wound?"			
		0	1	2	3
Stage/Comorbidities "is the wound infected, ischaemic, or both?"	A	- pre- or post-ulcerative lesion completely epithelialised	- superficial wound not involving tendon, capsule or bone	- wound penetrating to tendon or capsule	- wound penetrating to bone or joint
	B	with infection	with infection	with infection	with infection
	C	with ischaemia	with ischaemia	with ischaemia	with ischaemia
	D	with infection and ischaemia	with infection and ischaemia	with infection and ischaemia	with infection and ischaemia

Appendix 2

Methodology for determining evidence basis

In developing any clinical practice guidelines in the present environment, it is expected that assessment and management strategies documented be supported by evidence that shows that the practices produce positive outcomes.

The searches were focused but not confined to the period of 1990 -1999. Systematic reviews and meta-analyses were the primary sources of the searches including the Cochrane Databases, The University of York – NHS centre for reviews and dissemination and Evidence Based Medicine Database.

Medline searches were used to get primary research papers, guidelines, consensus statements and reviews when the systematic reviews or meta- analyses discussed above did not exist for specific topics.

The NHMRC Quality of Evidence rating scale (1995)²¹ has been used in judging the quality of evidence where no evidence rating was available.

Level of evidence

- i Evidence obtained from a systematic review of randomised controlled trials, providing it includes at least two properly designed trials of moderate size or a systematic review that does not include trails which it could be reasonably argued could not effect the findings of the review
- ii Evidence obtained from a least one properly designed randomised controlled trial
- iii Evidence obtained from a well designed controlled trial without randomisation, from

well designed cohort or case – controlled analytic studies, preferably from more than one centre or research group or from multiple time series with or without intervention

- iv Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committee



type

Best practice guidelines for management of type 2 diabetes

Podiatry

These guidelines are intended as a general guide only and are not intended to be prescriptive. The guidelines should not be considered all inclusive nor should they be considered exclusive of other methods of service delivery. Health professionals must exercise independent judgement as to what is appropriate for individual patients or groups of patients under particular circumstances.

Queensland Health accepts no responsibility for any personal injury, loss or claim however sustained or caused as a result of any person using or relying on the information in these guidelines. Any duty owing remains the responsibility of those health professionals who provide relevant services."

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