FOOT CARE IN DIABETES

Jackie Fan
OLMH Podiatrist

CONTENT

- Introduction:
- Foot risk Category
- Foot examination and screening
- Ulcer prevention and early management
- Education to patients

IDF DIABETES ATLAS: GLOBAL ESTIMATES OF DIABETES PREVALENCE FOR 2017

- **451 million** people with DM in 2017
- Expected to increase to **693 million** by 2045
- **5 million** deaths attributable to diabetes
- **USD 850 billion** healthcare expenditure on people with diabetes in 2017

- Diabetes Res Clin Pract. 2018 Apr; 138: 271-281

FREQUENCY OF OCCURRENCE

	With diabetes	With neuropathy
UK	2.2%	7.2%
USA	5.8%	
Sweden	3.6%	
Netherlands	2.1%	

Fig x. Annual incidence of foot ulcer of patients with diabetes or neuropathy in different countries

Lifetime risk = 15-25%

Diabetic foot ulcers, W.J. Jeff, K.G. Harding, 2003
Foot ulcers in the diabetic patient, prevention and treatment, S.C. Wu, V.R. Driver et al. 2007

THE IMPACT OF FOOT ULCERS

- 15-27% of all ulcers result in surgical removal of bone
- 85% of lower extremity amputation is due to foot ulcers that fail to heal

Diabetic foot ulcers, C.K. Bowering, 2001

Diabetic foot ulcers, W.J. Jeff, K.G. Harding, 2003

INTERNATIONAL WORKING GROUP ON THE DIABETIC FOOT GUIDANCE 2015

- There are five key elements prevention of foot problems:
  - (1) identification of the at-risk foot;
  - (2) regular inspection and examination of the at-risk foot;
  - (3) education of patient, family and healthcare providers;
  - (4) routine wearing of appropriate footwear;
  - (5) treatment of pre-ulcerative signs.

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INTERNATIONAL WORKING GROUP ON THE DIABETIC FOOT GUIDANCE 2015: ULCER TREATMENT

- (1) relief of pressure and protection of the ulcer;
- (2) restoration of skin perfusion;
- (3) treatment of infection;
- (4) metabolic control and treatment of co-morbidity;
- (5) local wound care;
- (6) education for patient and relatives; and
- (7) prevention of recurrence.

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(1) IDENTIFICATION OF THE AT-RISK FOOT- ADA CLASSIFICATION

Risk Classification System of the Task Force of the Foot Care Interest Group of the ADA			
Risk Category	**Definition**	**Treatment Recommendations**	**Suggested Follow-up**
0	No LOPS, no PAD, no deformity	Consider education on foot care, including information on appropriate footwear.	Annually (by generalist and/or specialist)
1	LOPS ± deformity	Consider prescriptive or accommodative footwear. Consider prophylactic surgery if deformity is not able to be safely accommodated in shoes. Continue patient education.	Every 3-6 months (by generalist or specialist)
2	PAD ± LOPS	Consider the use of accommodative footwear. Consider a vascular consultation for combined follow-up.	Every 2-3 months (by specialist)
3	History of ulcer or amputation	Consider patient education on foot care. Consider vascular consultation for combined follow-up if PAD present.	Every 1-2 months (by specialist)

LOPS, loss of protective sensation; PAD, peripheral arterial disease.

Comprehensive foot examination and risk assessment. A.J. Boulton, D.G. Armstrong, Diabetes Care 31:1679-1685, 2008

(1) IDENTIFICATION OF THE AT-RISK FOOT
DM NICE GUIDELINE

- **Low risk**
  - No risk factors present except callus alone.
- **Moderate risk**
  - Neuropathy or;
  - Deformity or; (ADA +/-)
  - non-critical limb ischaemia. (intermittent claudication) (ADA ?Cat 2)

(1) IDENTIFICATION OF THE AT-RISK FOOT:
DM NICE GUIDELINE

- **High Risk**
  - Non-critical limb ischaemia in combination with callus and/or deformity
  - Neuropathy and non-critical limb ischaemia together;
  - Neuropathy in combination with callus and/ or deformity; (ADA Cat 1)
  - Previous ulceration/ amputation or; (ADA Cat 3)
  - On renal replacement therapy; (Not mention is ADA)

(1) IDENTIFICATION OF THE AT-RISK FOOT:
DM NICE GUIDELINE

- **Active diabetic foot problem**
  - Ulceration or;
  - Spreading infection or;
  - Gangrene;
  - Critical limb ischaemia or; (ADA Cat 2)
  - Suspicion of an acute Charcot arthropathy, or unexplained red, hot , swollen foot with or without pain (ADA Cat 1)

MANAGING THE RISK
DM NICE GUIDELINE

- Low risk
  - Annual foot assessment & Education
- Moderate or high risk
  - Foot protection service
    - Ax the feet
    - Skin and nail care of the feet
    - Ax biomechanics (+/- orthoses and footwear)
    - Ax Vascular status of Lower limbs
    - 3-6 months (moderate) and 1-2 months (high)
    - Pressure re-distribution device

MANAGING THE RISK
DM NICE GUIDELINE

- Active Diabetic foot problem
  - Limb/ Life threatening:
    - Immediate refer to acute service and inform multidisciplinary foot care service
  - Other foot problem:
    - refer within one working day

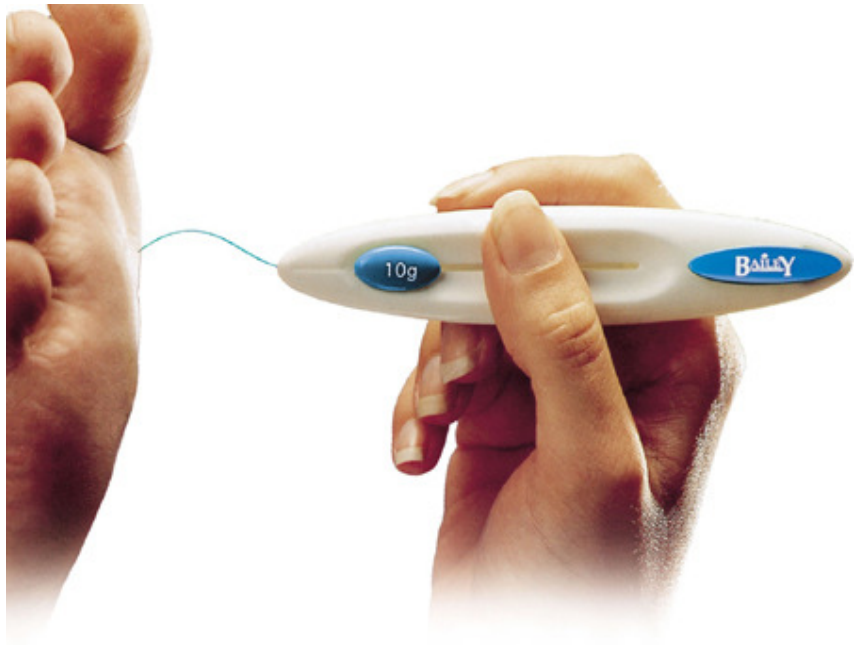
INTERNATIONAL WORKING GROUP ON THE DIABETIC FOOT GUIDANCE 2015

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(2) REGULAR INSPECTION AND EXAMINATION OF THE AT-RISK FOOT

- Assessment: Neurological
  - Monofilament sensation test (Light touch)
  - Test of pressure point (1st Apical, 1st, 3rd, 5th MTPJ)



http://www.algeos.com/html/products/monofilaments.htm

(2) REGULAR INSPECTION AND EXAMINATION OF THE AT-RISK FOOT

Assessment: Neurological

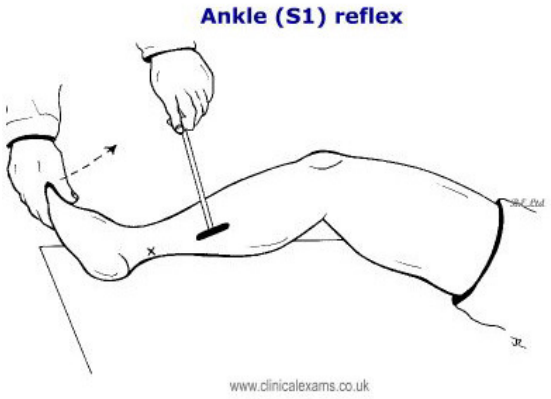
- Vibration Perception Threshold
- Tip of big toe or dorsal of phalangeal bone
- >25 is consider loss of protective sensation



(2) REGULAR INSPECTION AND EXAMINATION OF THE AT-RISK FOOT

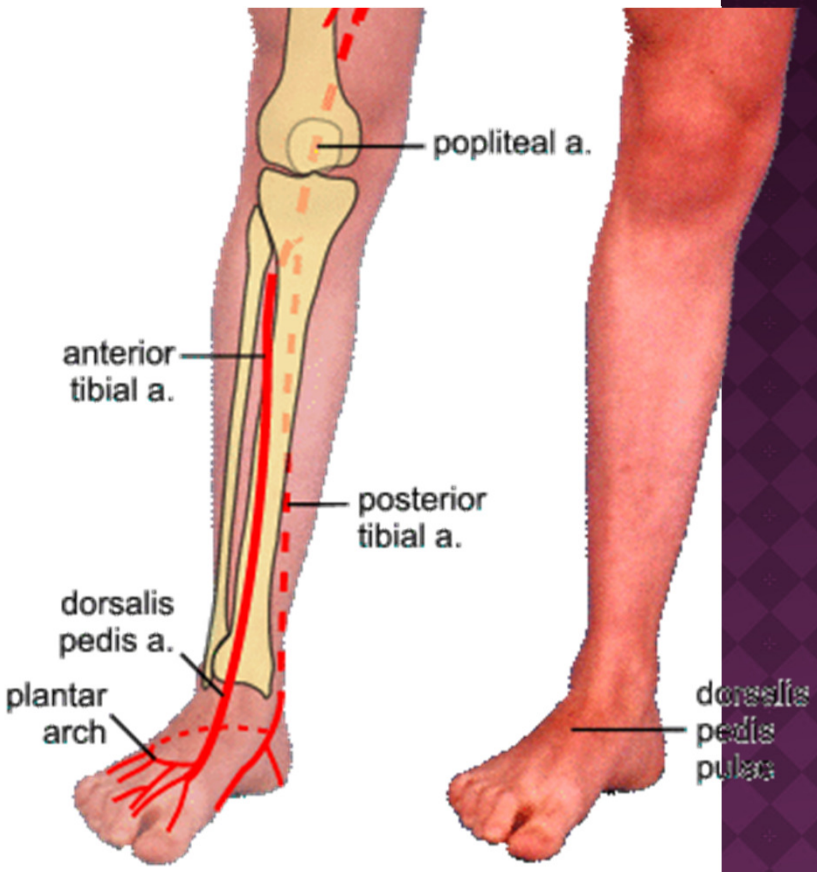
- Assessment: Neurological
  - Temperature test
  - Pin-pick (Pain)
  - Knee and Ankle reflex
  - 2 point discrimination
  - Proprioception





(2) REGULAR INSPECTION AND EXAMINATION OF THE AT-RISK FOOT

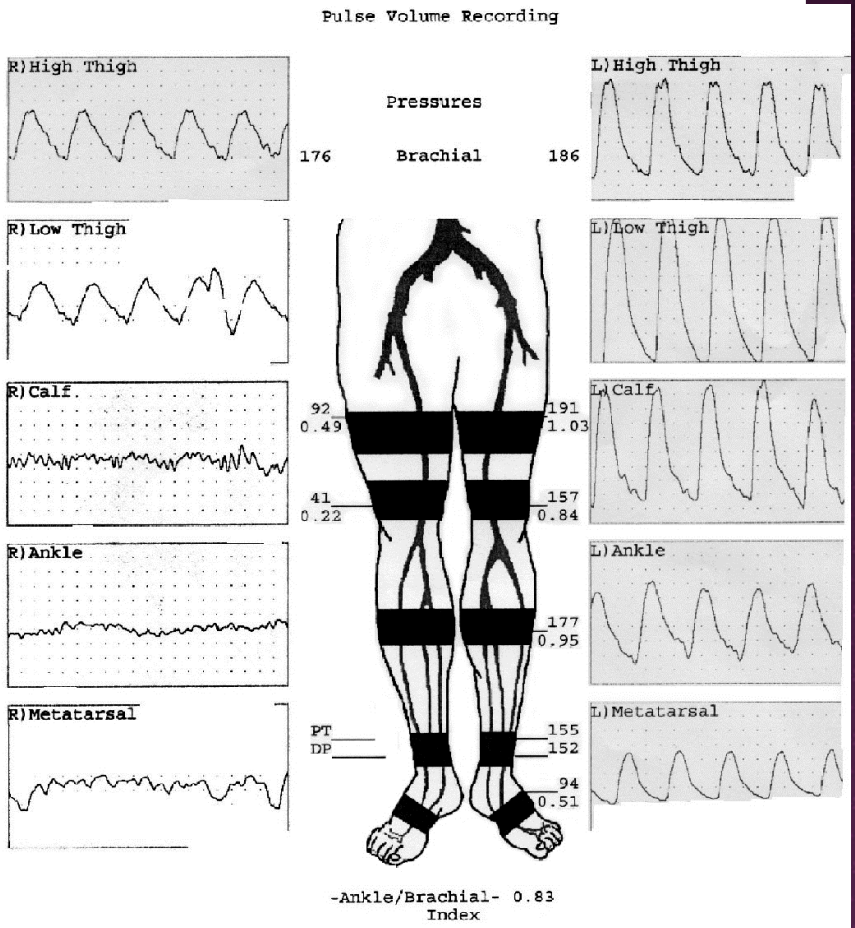
- Assessment: Vascular
  - Pulse palpation:
  - Dorsalis pedis and posterior tibial artery
  - Doppler Signal
  - Capillary refill time
  - Buerger's Test
  - Ankle Brachial Index
  - Sign: Thin, shiny skin, loss of digital hair.



Assessment of Ischaemic Leg, J.J. Earnshaw 2003

VASCULAR ASSESSMENT: ABI

- Ankle to Brachial Index (ABI)
  - >1.3 Calcification
  - 0.9-1.3 Normal
  - 0.5-0.9 Intermittent Claudication
  - <0.5 Critical Ischaemia
  - 0.1-0.2 Impending gangrene



VASCULAR ASSESSMENT

- Buerger's Test
  - Patient to lie supine
  - Elevate leg , take note of the angle when the limb is pallor
  - Patient to sit up quickly and swing both legs over the edge of bed

BUERGER'S TEST

- Ischaemic foot will show reactive hyperaemia, blue and then a dusky red appearance
- The vascular angle < 30◦ indicates arterial insufficiency

http://thoracickey.com/assessment-of-chronic-lower-limb-ischaemia/

THE DIFFERENCES BETWEEN FOOT ULCER AND OTHER ULCERS

- Weight bearing
- Macrovascular vs Microvascular
- Oedema
- Toe deformity
- Nail Pathology

DM ULCER CLASSIFICATION: WAGNER

Wagner Ulcer Classification System	
Grade	**Lesion**
1	Superficial diabetic ulcer
2	Ulcer extension involving ligament, tendon, joint capsule, or fascia with no abscess or osteomyelitis
3	Deep ulcer with abscess or osteomyelitis
4	Gangrene to portion of forefoot
5	Extensive gangrene of foot

A Review of the Pathophysiology, Classification, and Treatment of Foot Ulcers in Diabetic Patients, W. Clayton, T.A. Elasy, Clinical Diabetes, 27:2, 2009

DM ULCER CLASSIFICATION: TEXAS

University of Texas Wound Classification System	
Stage	**Description**
Stage A	No infection of ischaemia
Stage B	Infection present
Stage C	Ischaemia present
Stage D	Infection and ischaemia present
Grading	**Description**
Grade 0	Epithelialized wound
Grade 1	Superficial wound
Grade 2	Wound penetrates to tendon or capsule
Grade 3	Wound penetrates to bone or joint

TYPES OF DM ULCERS

- **Neuropathic ulcer**
  - Usually Painless
  - Plantar pressure site (e.g MTPJ, PIPJ, bony prominence)
  - Peripheral Callus
  - May present with halo of white macerated tissue surrounding

TYPES OF ULCER

- **Ischaemic ulcer**
  - Distal apexes of toes
  - Halo of erythema around the ulcer
  - Regular Border
  - 6 P's sign: Pulseless, Pain, Pallor, Perishing Cold, Paralyses, Paresthesia
  - Claudication

DIFFERENCES BETWEEN ISCHAEMIC AND NEUROPATHIC ULCER

Symptoms	Neuropathic	Ischaemic
Pain	Relieved with ambulation	Occurs with ambulation
Location	Foot and toes	Foot and toes
Appearance of foot	Architectural changes in foot	Normal-appearing foot
Appearance of wound	Pink, moist, callus formation, plantar surface, skin usually warm, celluitis	Pale color, dry,well-defined margins, limb color pale, hairless extremity, skin cool to touch
Co-morbidities	Diabetes, chemotherapy Other diseases (Hansen’ s)	History of peripheral artery disease Other circulatory problems

Neuropathic Ulcers: Diabetes and Wounds, Part II, Differential Diagnosis And Treatment, C.A. Worley, 2006

OTHER TYPES OF WOUNDS

- Neuro-ischaemic ulcer
- Necrobiosis Lipodica
- Venous ulcer
- Pressure injury

ABC of arterial and venous disease, Ulcerated lower limb, N.J.M. London, R. Donnelly, 2000

NECROBIOSIS LIPOIDICA DIABETICORUM

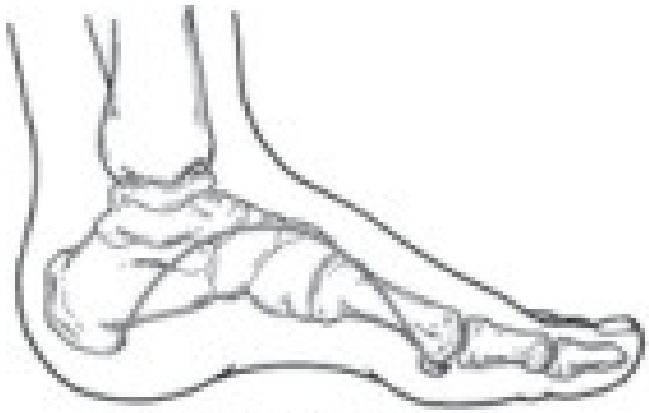
- Red-brown plaque with yellow center
- Common seen in limbs
- 0.3% in US diabetic population
- Collagen degeneration
- Unknown etiology
- Topical cortisone in early acute stage
- Wound care if ulcer developed

THE DIFFERENCES BETWEEN FOOT ULCERS AND OTHER ULCERS

- Weight bearing
- Macrovascular vs Microvascular
- Oedema
- Toe deformity
- Nail Pathology

FOOT PATHOLOGIES AND OTHER RISK FACTORS

CHARCOT ARTHROPATHY



Normal Foot



Charcot Foot

Neuropathy + mechanical trauma = destruction of the bone and joint

CHARCOT ARTHROPATHY

- Usually with neuropathy
- Callus at bony prominence
- At risk of breakdown

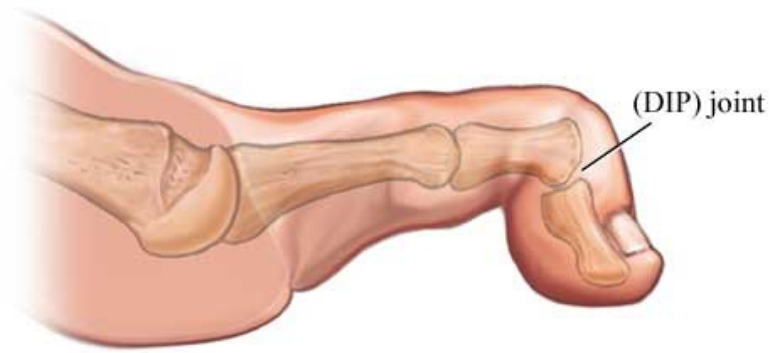
TOE DEFORMITY: HALLUX ABDUCTO VALGUS (HAV)

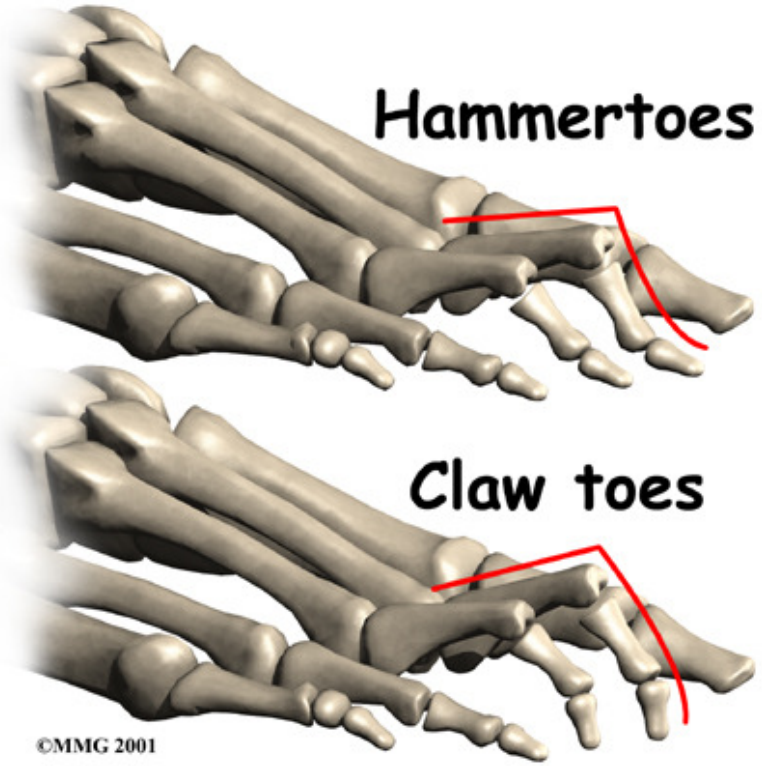
- Lateral deviation of 1st Met bone.
- Inter-metatarsals angle >10, Hallux Valgus angle >15
- More common in females
- Family Hx



LESSER TOES DEFORMITY

- Claw toes
- Hammer toes
- Mallet toes
- Retracted toes





TOE DEFORMITY

- Excessive pressure at bony prominence due to deformity.
- Combine with inappropriate footwear
- Can cause callus and ulceration

TO KEEP YOU AWAKE QUIZ 2

- Grade 3 (Deep ulcer with tendon/ bone involvement.
- Infection sign
- Caused by improper self nail care!

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TIPS TO PATIENT: AVOID CORN PLASTER

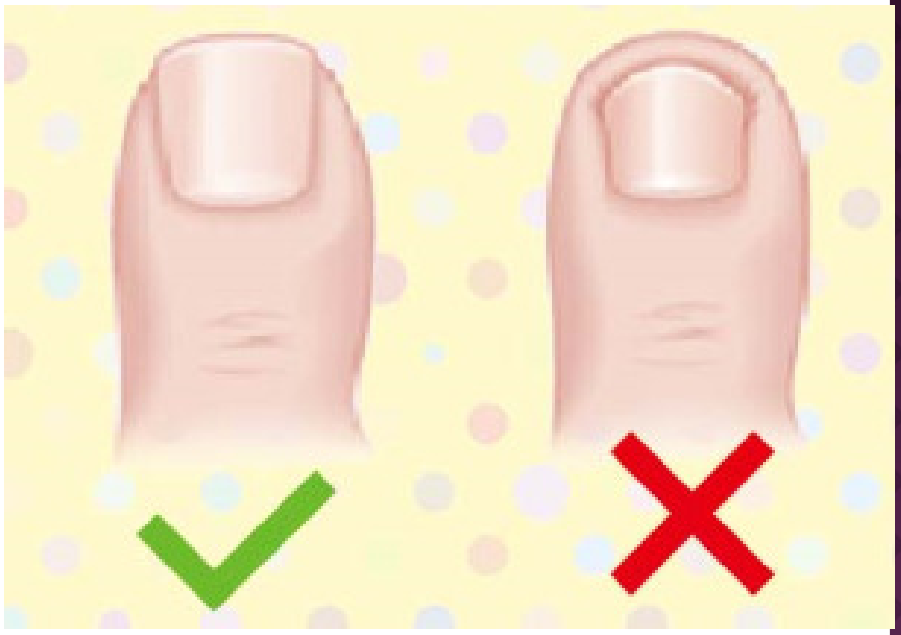
TIPS TO PATIENTS: NAILS CARE

- Inappropriate nail care can cause nail problem such as ingrown toenails and infection



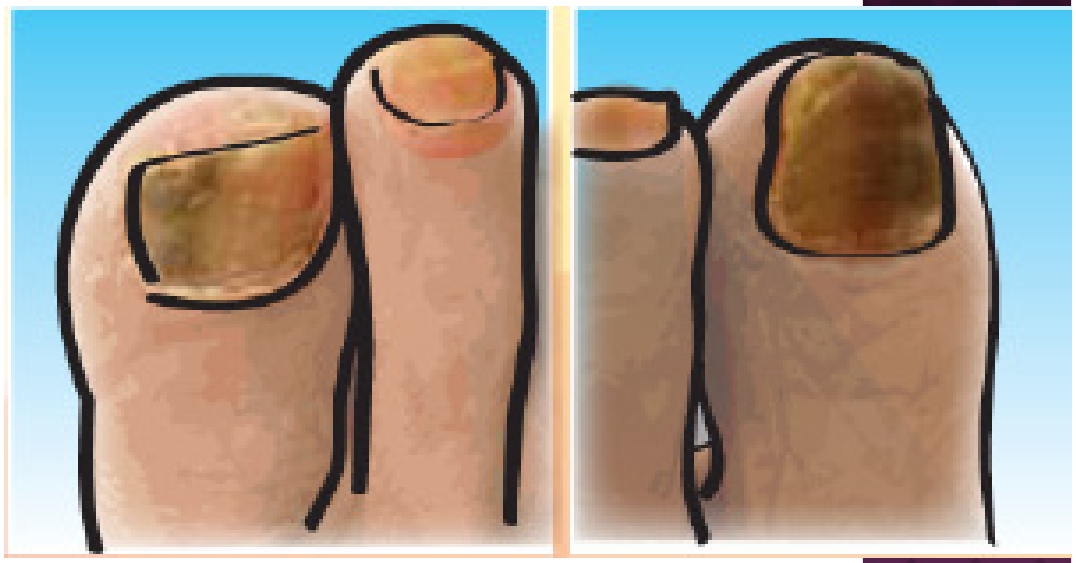
TIPS TO PATIENTS: NAILS CARE

- Trimming should be horizontally
- Filing of nail corners each time after trimming
- Avoid n-shape trimming as it can leave nail spike



TIPS TO PATIENTS: NAILS CARE FOR FUNGAL NAILS

- Onychomycosis is caused by fungus
- Moist, perspiration and foot hygiene provide suitable environment for fungus to grow



TIPS TO PATIENTS: NAILS CARE FOR FUNGAL NAILS

- Prevent fungal nails
  - Feet and toe webs should be dry thoroughly after bathing
  - Avoid tight footwear (This may cause micro-trauma to nail plate).
  - Change socks daily
  - Avoid sharing nail nippers
  - Seek advise if suspected



TIPS TO PATIENTS: SKIN CARE ON TINEA PEDIS

- Tinea pedis/ athletes foot is caused by fungus
- Again moist/ humid environment is suitable for fungus
- Symptoms includes : Itchiness; small red papules; blister; excoriation of skin and/or foul smell.

TIPS TO PATIENTS: SKIN CARE ON TINEA PEDIS

- Prevent tinea pedis
  - Cleansed foot daily
  - Dry thoroughly for both feet and toe webs.
  - Use cotton socks
  - Change socks daily
  - For people with more perspiration, bring socks to work to change in between breaks
  - Avoid walking bare feet in public area

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INAPPROPRIATE FOOTWEAR





TIPS TO PATIENTS: CHOOSING THE RIGHT SHOES



Velcro or shoe lacing

Soft back heel edge

Soft and elastic surface

Toe box wide and deep enough

Firm back heel

Minimal stitching

Non-slippery

Arch support

Soft heel for shock absorption

TIPS TO PATIENTS: CHOOSING THE RIGHT SHOES

- Shoes size may varies between both feet
- Should use the bigger foot for fitting.
- Should buy footwear in the afternoon as feet may be bigger due to edema



TIPS TO PATIENTS: CHOOSING THE RIGHT SHOES

- Fitting method 1
  - Put the shoes on and try to get the heel to the back of footwear
  - Use the finger to press the longest toe (does not always means the big toe!)
  - There should be about 1 cm free space.



TIPS TO PATIENTS: CHOOSING THE RIGHT SHOES

- Fitting method 2
  - If the insole of the footwear is removable, remove it from the footwear
  - Step on the insole to check the feet is within the insole area.



TIPS TO PATIENTS: CHOOSING THE RIGHT SOCKS

- Choose suitable size; not too tight as may reduce circulation
- Should have some elasticity
- Cotton can absorb excessive perspiration, to help with foot hygiene and prevent infection
- White socks can help to check with signs of wound



FOOT CARE EDUCATION: TOE EXERCISE

- Suitable for people with:
  - Toe deformity
  - Plantar fascia



FOOT CARE EDUCATION: FOOT AND ANKLE EXERCISE.

- Suitable for people with
  - Ankle edema
  - Varicose veins
  - Poor foot circulation



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INSOLE MANAGEMENT

- Reduce external irritation
- Offloading device
- Accommodative orthotics
- Wound Care Product





Thank You!
Q&A

