

Management of Diabetic Foot Problems

Etiology and Examination

Diabetic Foot Disease: Epidemiology

20-25% of all hospitalizations of patients with diabetes.

85% of amputations that are preceded by foot ulcers.

Diabetic Foot Ulceration Cause:

Patients with diabetes are at much greater risk for developing vascular disease

Poor circulation often a contributing factor is foot ulceration

Poor circulation not the primary cause of most foot ulcers

Etiology of Diabetic Foot Ulcers:

Peripheral Neuropathy (60-70%)

Peripheral Vascular (15-20%)

Combined (15-20%)

Major Risk Factors in Diabetic Foot Ulceration

Loss of Protective Sensation

High Plantar Pressure

Poor Circulation

Past History of Plantar Ulceration

History of Neuropathic Fracture

Diabetic Foot Ulceration: Cause

Loss of Protective sensation

Mechanical Stress

+/- Ischemia

Mechanical Stress

Direct Injury

Low Pressure Ischemia

Moderate Repetitive Stress

Diabetic Neuropathy

Most commonly bilateral, symmetrical polyneuropathy

Three components effecting the feet

Sensory

Motor

Autonomic

Diabetic Neuropathy: Sensory**Subjective:**

- Numbness
- Paresthesias
- Cold feet
- Fat feet
- "block of wood"
- pain (?type)

Foot Pain

- When does it occur?
- What makes it worse?
- What makes it better?

Diabetic Neuropathy: Sensory**Objective:**

- Loss of protective sensation*
- Impaired vibratory sensation*
- impaired position sense
- impaired heat/cold

Examination: Protective Sensation**Semmes-Weinstein Monofilaments**

- 4.17 (normal)
- 5.07 (protective)
- 6.10 (loss of protective)

Diabetic Neuropathy: Motor

- Results in muscle imbalances which cause
 - Decreased ROM
 - Deformity
 - Alteration in weight bearing patterns

Diabetic Neuropathy: Autonomic

- Decreased vasomotor regulation
- Decreased tissue hydration
- Skin less pliable, more prone to cracking

Examination: Musculoskeletal

- Deformity, Limited ROM, Amputation
 - related to high pressures which relate to foot ulceration

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

Examination: Vascular

Ulcer Location/Appearance

Ischemic

On or between digits, heel
Necrotic or pale base
painful (unless neuropathic)

Neuropathic

plantar surface
circular
pink base
surrounding callus
painless

Examination: Ischemia

Location of ulcer
Decreased temperature
absence of pulses
decreased capillary filling time
Quality of Doppler sounds

Noninvasive Vascular Tests

Ankle Brachial Index (ABI)
Pulse volume recording
Duplex Scanning
Systolic Toe Pressures
TCPo₂

Examination: Soft Tissue

Surface area
Presence of tracts or tunnels
Depth
Are deep structures probed?
If probes to bone, strong likelihood of osteo

Examination: Soft tissue

Preulceration
Localized callus
Hemorrhage
Maceration
Heat

Treatment of Foot Ulceration

Treatment Strategies: Debridement

- Mechanical
- Sharp
- Enzymatic
- Autolytic

Treatment Strategies

Requirements for Healing

- Adequate circulation
- Absence of Infection
- Adequate Pressure Relief*
- Other factors can delay healing:
 - i.e. medications, necrotic tissue in wound bed

Reduction of Pressure

Options for Reduction of Plantar Pressure:

- Total contact cast/walking splint
- Short leg walker
- DH Pressure Relief Walker
- Felted foam relief pad
- Wedge Shoes
- Assistive devices
- Change in gait (quantity and characteristics)

Total Contact Cast

Mueller (1989): Total Contact Casting in Treatment of Diabetic Plantar Ulcers: Controlled Clinical Trial

Total Contact Cast

Advantages:

- | | |
|------------------------------|---------------------------|
| Faster healing times | Forced compliance |
| Ambulation maintained | Reduction of edema |
| No need for dressing changes | Immobilization of tissues |

Total Contact Cast

Disadvantages:

- Skill and time to apply
- Cannot visualize wound
- Risk of abrasions from cast
- Must be kept dry
- Must maintain non- weight bearing until dry
- Cumbersome for some patients
- May impair driving

Total Contact Cast**Contraindications:**

- Acute infection
- Fluctuating edema
- Poor skin integrity of leg
- Significant PVD
- Claustrophobia
- Narrow, deep wound

Total Contact Cast**Cast Changes:**

- Discomfort
- Looseness or damage
- Fever, lymph node swelling, unexplained rise in blood sugar
- Staining from drainage
- 5 - 7 days after application of first cast
- Every 1 - 2 weeks until healed

Walking Splint:**Advantages:**

- Can be removed for skin inspection, shower, sleep
- Does not require frequent refabrication
- Can be used where TCC contraindicated
- Available to patient with reulceration

Walking Splint**Disadvantages:**

- Skill and time to fabricate
- Can be removed
- Too cumbersome for some patients
- May impair driving

Orthopedic Walkers**Advantages:**

- Readily available
- Easy to apply
- Removable
- Minimal risk
- Use where TCC contraindicated

Orthopedic Walkers**Disadvantages:**

- Removable
- Difficult to fit some midfoot deformities
- May impair driving
- Cumbersome for some

Relief Pads**Advantages:**

- Easy to apply
- Easier mobility than cast/splint/walker
- Adhered to foot
- Minimal risk
- Use where TCC contraindicated

Relief Pads:**Disadvantages:**

- Must be kept dry (can slip and cause more problem)
- Easy mobility
- Risk of edge pressure
- Contraindicated if adhesive allergy, adjacent tissue fragile
- Occasional tinea

Wedge Shoes**Advantages:**

- Easy to apply
- Accommodates bulky bandage, swelling
- Removable
- Use where TCC contraindicated

Wedge Shoe**Disadvantages:**

- Unstable for some
- Removable
- Driving difficult
- Must use proper gait pattern

Reduction of Pressure**Other considerations:**

- Decreased walking speed
- Decreased step length contralateral leg
- Use of assistive device
- Limit amount of ambulation (Brand)
- Change in gait pattern (Mueller)

Prevention

The major components of a preventative program include:

- Risk identification
- Proper footwear
- Patient education
 - daily foot inspection
 - daily footcare
- Scheduled follow-up

Appropriate footwear:

Use risk categories as guide

Shoe Fit: key points

Approx. 1/2" beyond longest toe

Appropriate heel to ball length

Adequate depth

Adequate ball width

Snug heel fit

Use of Brannock device for foot measurement**Risk category #1:**

Instruct in risk factors and relationship to foot problems

Educate in proper shoe fit

Do not usually need specialized shoe

Add non-molded insert to shoe

Higher Risk Categories:

Soft, molded insoles

decelerate foot thus decreasing force

spread forces of weight bearing over greater surface area

Custom Molded shoe

Needed when off-the-shelf shoe cannot

accommodate the shape of the foot.

Common in severe hammer toes, hallux valgus, Charcot

No shoe is the ideal shoe if it sits in the patient's closet!

Sometimes need to compromise

Pay attention to what the patient wears on feet 24 hours/day

Skin care do's:

Wash feet daily. Dry well, especially between toes

Apply thin coat of lubricant daily, avoid between toes

Cut toe nail after showering. Cut straight across and smooth corners

with emery board. See podiatrist for thick or ingrown nails

Reduce thick corns or calluses with gentle use of pumice stone or

obtain professional foot care

Check water temperature before bathing

Wear socks if your feet are cold

Use sunscreen with sandals in summer

Ask your health care provider to check your feet on each visit

Skin care don'ts:

- Do not soak your feet
- Do not put moisturizer between your toes
- Do not cut corns or calluses
- Do not use hot water bottles or heating pads on feet
- Do not use chemical agents, corn plasters, strong antiseptics or heating pads on feet

Footwear Do's

- Wear shoes that fit the size and shape of the foot
- Break in new shoes slowly, checking for signs of irritation
- Keep shoes and insoles in good repair
- Always wear sock or stockings with shoes
- Shake out shoes before putting them on

Footwear Don'ts:

- Do not walk barefoot
- Do not wear socks that are baggy or have holes or prominent seams
- Do not wear socks that are tight at the top
- Do not wear sandals with thongs between toes

Self Inspection Do's:

- Inspect feet daily for signs of redness, blisters, cuts, cracks, sores
- Feel for hot spots
- Feel for tender spots
- Use a mirror if you can't see your feet
- Have someone check your feet if you have poor vision

Self Inspection Don't:

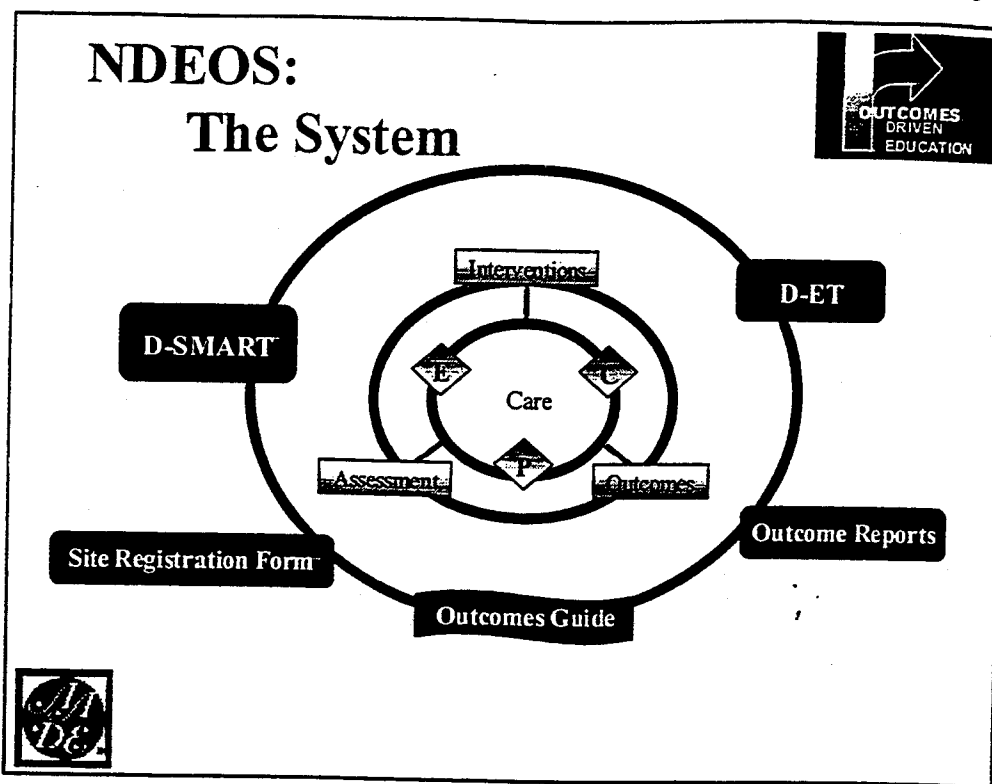
- Do not wait to report problems to your health care provider**

Scheduled follow-up

- Frequency dependent on risk
- Includes: re-evaluation
 - routine footcare
 - check of footwear

Role of Specialized Clinic

National Diabetes Education Outcomes System



What is the NDEOS? The NDEOS is a system which gathers, tracks, and aggregates the outcome measures unique to diabetes education and supports the integration of education into diabetes care.

How does the NDEOS relate to my practice? The framework for the NDEOS is assessment, intervention, and outcome and is based on the 2000 National Standards for Diabetes Education. It is focused on outcomes rather than content and tracks patient and program outcomes longitudinally. Guiding principles for the project included developing measurement tools that have validity across multiple practice settings, disciplines, and patient populations.

What are the components of the NDEOS? The NDEOS includes the following tools:

Assessment: *D-SMART (participant self-report) & Site Report Form*

Planning & Intervention: *D-ET (Diabetes Educator Tool)*

Outcomes Reporting: *Individual and aggregate reports*

Training: *Diabetes Educator Outcomes Guide*

How do I obtain these tools? In the Spring, the D-SMART will be made available to AADE membership via the AADE web site. Check the AADE web site (www.aadenet.org) in the Spring for more details.

When will the NDEOS be available? AADE will be testing an automation approach at 5-10 diabetes program sites during the 2000-2001 year. Prototype testing will include data input options, data repository, and outcomes reporting. Based on the testing and market analysis, the NDEOS will be available to our members in June 2001. Continue to check the AADE web site (www.aadenet.org) for more details.