

TIME-LINE FOR THE DIABETIC FOOT

Gordon E. Duggar, D.P.M.
J. Robin deAndrade, M.D.
Ora Griggs, R.N.

The Atlanta Veterans Administration Hospital is one of seven in the United States which was selected to participate in the STAMP program. STAMP is an abbreviation for Special Team for Amputation, Mobility, Prosthetics/Orthotics. Our hospital serves the veterans of the southeastern region. STAMP is an interdisciplinary team involving multiple services. There are six basic components of the program:

1. amputation surgery,
2. foot preservation,
3. wound management,
4. conditioning,
5. training and education, and
6. research.

Patients are referred with poor stumps, intractable pain, complicated amputations, ulcers, foot deformities, and problems requiring highly individualized special prostheses.

Foot preservation is of major importance in the STAMP program. We are fully aware of the load placed on the remaining limb after an amputation, so we place major emphasis on care of the foot. Also the amputation stumps often require care for such problems as slow-healing, breakdown, and irritation from prostheses.

This discussion primarily regards diabetic patients. Many, if not most, of the patients seen by STAMP are diabetics. We have a large patient volume at the Veterans Administration Hospital (VA) who are diabetics, and consequently many of our patients have major problems with their feet.

According to published statistics, about 20,000 amputations are done annually on diabetics. Of these, 65% are leg amputations, 31% toe amputations, and 4% are foot amputations. Up to 15% of all diabetics will undergo an amputation, which equals approximately 6 per 1000. Of these amputees, 30% will die during the first three post-amputation years and 60% will have died after five years. We have paid particular attention to this statistic and believe we have begun steps to lower the death rate at our hospital.

The diabetic at greatest risk can be profiled at: over age 20, black, male, smoker. Neuropathy and peripheral vascular disease (PVD) are present and the patient has been a diabetic for over 10 years. Improper and poorly fitted shoes, poor pedal hygiene, and a history of foot ulcers or previous

amputations are part of this profile.

The effects of neglected foot care and poor hygiene are well known to podiatrists. Podiatrists recognize the difficulty in achieving healing and limb salvage when such factors are present.

Authorities have estimated that up to 50% of amputations could be prevented by improved education regarding good foot care to patients and professionals. Such education is important so that known preventive measures such as prompt treatment of lesions can be instituted. We have presented a patient education program entitled "Together We Can Preserve Your Diabetic Foot" to Veteran groups. This presentation emphasizes the importance of the team approach and of the responsibilities of the patients themselves.

The concept of a time-line for the diabetic foot was introduced to our VAMC by Dr. deAndrade. This concept has been developed and the principles applied as we continue to fine-tune the concept. All persons who treat diabetics should recognize the digressive, destructive, predictable nature of the time-line. Our therapeutic aim is to learn how to better disrupt this time-line.

For the most part progression of involvement in a diabetic foot follows a regular pattern. This natural history can be utilized to identify a time-line. The time-line is influenced by identifiable risk factors.

Other clinicians, such as Wagner, have employed the concept of a time-line under different terminology such as Grade I, Grade II, etc. There is a pattern of events which constitute the time-line and integrated into this are certain risk factors.

The rationale of producing a time-line, identifying risk factors, and the benefits that would occur are as follows:

1. Understanding of the disease process since it allows us to immediately identify where in the scheme of things (what stage of disease) the foot is.
2. The disease can be documented readily and the influence of various therapeutic measures studied.
3. Prognosis and risk prediction can be accomplished.
4. Therapy can be judged and the expected

frequency of visits to health establishments and the treatment needed can be predicted.

5. The system can be established in such a way that non-professionals can be sensibly involved. Non-professionals such as the patient, relatives, and friends play an important part in the care provided to the patient with the diabetic foot.

There are three items that need to be described:

1. The time-line
2. The risk factors
3. Hierarchy of therapies.

The time-line consists of ten epochs arranged with 1 being normal and 10 representing the worst possible situation. The epochs are hierarchial in that the next succeeding epoch automatically includes the ones before. These terms are basically self explanatory. They are definite in that one can readily conclude whether a foot is in or out of a category (epoch). The following table describes the system.

DIABETIC FOOT TIME-LINE (DIFTL)

1. Normal
2. Symptomatic
3. Neuropathic
4. Dermopathic
5. Deformed
6. Ulcerated
7. Distressed
8. Arthropathic
9. Gangrenous
10. Terminal

HIERARCHY OF THERAPY (HOT)

1. Education
2. Foot Care
3. Insoles and Foot Wear
4. Topical Management
5. Pressure Relief
6. Ulcer Control
7. Reconstructive Surgery
8. Surgical Debridement
9. Partial Amputation
10. Leg Amputation

The time-line and treatment line pretty well parallel each other.

Ten risk factors have been identified which, to a significant degree, govern the rate of progression from one epoch to another. Some are under control of the patient, some are not. Obviously, treatment goals should include elimination or reduction of as many risk factors as is possible. These risk factors are:

1. Over forty years of age
2. Diabetic more than ten years

3. Stroke, blindness, heart, and kidney problems
4. Pedal ulcer or previous
5. Smoker
6. Substance abuser
7. Non-compliance
8. Socio-economic problems
9. Male
10. Physical disability

At the Atlanta VAMC we have developed another classification of the diabetic foot. It also has the nature of a time-line. This system involves three basic categories:

1. Healthy foot
2. Predisposed foot
3. Distressed foot
 - A. Beginning distress
 - B. Serious distress
 - C. Severe distress

The "distressed" category is divided into three subdivisions. A diabetic foot may move rapidly through these subdivisions or many years may be involved. Twenty thousand patients per year will get to the severely distressed category and require an amputation.

The healthy foot has the following characteristics.

- A. Skin
 - Smooth
 - Moist
 - Warm
 - Good turgor
 - Normal color
 - No lesions, cracks or fissures
 - No interdigital maceration or skin breakdown
- B. Nails
 - No pain
 - Normal shape and appearance, not diseased
 - No impacted grooves, no redness or swelling
 - No ingrown margins
 - No infection
- C. Circulation
 - Palpable DP and PT pulses
 - Good venous return in digits
 - Good color, warm, healthy skin
 - No foot or leg cramps
- D. Neurological
 - No signs of neuropathy, no burning, tingling of toes
 - No numbness, no "brick foot"
- E. Musculo Skeletal
 - No obvious deformity (hammertoes, prominences, bunions)
- F. Pedal Hygiene
 - Properly trimmed nails
 - No evidence of neglect

G. Shoes

- Cause no discomfort
- Appropriate footgear

The predisposed foot presents changes from the normal which have the potential to put the foot at risk.

- A. Altered architecture: hammertoes, curly toes, extreme or symptomatic pes valgo planus or cavus, heel bumps, exostoses, bunions, pain, pressure areas.
- B. Skin changes: dry, cracked, fissures, rash, tinea, corns, calluses.
- C. Diminished circulation: changes in color and temperature.
- D. Early neurologic changes: burning soles, tingling toes.
- E. Local changes from systemic causes: edema, gout, etc.
- F. Effects of trauma: deformity.

The distressed foot will exhibit:

- A. Beginning Distress
 1. Infection, open lesions
 2. Symptomatic deformity: painful hammertoes, bunions
 3. Onset of ulcerations
 4. Onset of circulatory problems: cold feet, vasospasm of toes, varicose veins, claudication
 5. Onset of neurological problems: numbness, loss of feeling
- B. Serious Distress
 1. Difficult infections, osteomyelitis
 2. Ulcers worsening and don't heal easily
 3. Ischemia
 4. Advancing neuropathy
- C. Severe Distress
 1. Overwhelming infection
 2. Arterial block
 3. Threatened limb loss
 4. Toxic: life at risk

Management and treatment of the diabetic foot.

- A. The Healthy Foot
 1. Good medical management of diabetes and other illnesses
 2. Specific foot health education and training for patients including advice about shoes
- B. The Predisposed Foot
 1. Good medical management of diabetes and other illnesses
 2. Specific foot health education and training for patients and professionals

3. Periodic professional evaluation of foot

- A. Specific Foot Care
 1. Evaluation and treatment of ingrown nails, excrescences, deformities.
 2. Routine palliative and hygiene care for toenails, skin, excrescences—may need to be done by a professional;
 3. Biomechanical care, prescription of shoes and shoe inserts
 4. Certain deformities should be surgically corrected rather than to be allowed to deteriorate leading to long-term palliative care which may not prevent the destructive process
- B. Prompt recognition and treatment for developing problems.

The distressed foot should have treatment that meets the standards of care that are suggested as follows.

- A. Beginning Distress
 1. Rest affected part, careful ambulation
 2. Culture and sensitivity as required
 3. Broad spectrum oral antibiotics as dictated by C&S and clinical findings
 4. Debridement as required
 5. Local medical care
 6. Podiatric appliances, orthoses, special shoes
 7. Follow-up
 8. Appropriate medical care for diabetes and other illnesses
- B. Serious Distress
 1. Probably requires hospital admission
 2. Restricted or no ambulation
 3. C&S, broad spectrum oral or IV antibiotics
 4. Adequate debridement
 5. Local medical care
 6. Consultations
 7. Follow-up
 8. Appropriate medical care for diabetes and other illnesses
- C. Severe Distress
 1. Prompt admission
 2. No ambulation
 3. C&S—IV antibiotics
 4. Timely and sufficient debridement and dressings
 5. Local medical care
 6. Appropriate medical care for diabetes and other illnesses
 7. Consultations, vascular procedures, conservative amputations, limb-saving and life-saving amputations
 8. Follow-up appliances, shoes, casts, prostheses

The time-line for the diabetic foot leads to:

Termination

20,000 Amputations annually

10,000 leg

9,000 toes

1,000 feet

11,000 will have opposite amputation in five years

Death

6,000 within 3 years of amputation—30%

12,000 within 5 years of amputation—60%

Treatment

A major aspect of treatment for our patients under STAMP includes prescription of prostheses, artificial limbs and parts of limbs, braces, special shoes, shoe corrections and inserts. Also, STAMP operates a special ulcer clinic where difficult cases are treated. We feel certain that this clinic and our other activities have significantly prolonged life and limb.

The registered nurse assigned to STAMP has many diverse duties and responsibilities. Specific knowledge and abilities are needed. During the early days of the STAMP program the nurse observed a particular problem while working with patients who had undergone amputation. It was apparent that insufficient attention was being given to the remaining limb that quite often was also in jeopardy. Not feeling clinically prepared to approach these rather complex problems, the nurse sought consultation with some of the STAMP doctors having expertise in these areas. From these beginnings specific STAMP clinics were developed, such as the Cast Clinic for Amputation Stump Care, and the Foot and Leg Ulcer Clinic. From this beginning the con-

cept of foot preservation began to permeate all our treatment plans.

Some specific programs which have been instituted are:

1. Patient foot education for all unilateral amputees.
2. Foot care education to patients and inservice programs for staff.
3. Follow-up of patients with foot and leg ulcers who have been discharged from inpatient status.
4. Devices to alleviate pressure have been identified and put to use and less effective devices discarded.

In order to make these programs work follow-up is absolutely essential. Many of our patients are unable to provide dressing changes themselves. Often a "significant other" (wife, friend, helper, etc.) must be depended upon to provide needed home care. Non-compliance proves to be frustrating as well as a waste of time and cost. It can be the fault of the patient, significant other, or even the health practitioner. We try to approach these problems through education and support groups. Foot preservation for the diabetic patient is an emphasized service of the Atlanta VAMC STAMP program. Although only established a few years, positive results are being seen.

Bibliography

American Diabetes Association: *The Physician's Guide to Type II Diabetes*, 1984.

Gibbons G, Elipoulos G: Infections of the diabetic foot. In *Management of Diabetic Foot Problems*, Philadelphia, WB Saunders, 1984.

Soulier, SM: The use of running shoes in the prevention of plantar diabetic ulcers. *J Am Podiatr Med Assoc* 76:1986.