



A Practical and Innovative Scoring System for Wound Evaluation and Management

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Introduction

- Multiple diabetic foot ulcer and pressure ulcer scoring systems exist.

- They uniformly lack objectivity
- For the most part they do not take severity into consideration
- Their merits are not confirmed by reliability & validity studies

- We have generated a simple to use **Wound Score**.

- It integrates the essential features of the 4 most commonly used wound grading systems
- It grades with objective criteria the severity of each feature (assessment)

- This presentation demonstrate its adaptability to a variety of wounds regardless of location or wound etiology.

Materials & Methods

- 50 patients with lower extremity wounds were scored in both diabetic & non-diabetic patients with our 10 to 0 Wound Score using 5 assessments each graded from 2 (best) to 0 (worst).

- Wounds are labeled as "Healthy" if the score is 7.5 to 10 points; "Problem" if the score is 3.5 to 7 points and "Futile" if the score is 0 to 3 points

Wagner Grades

Grade	Findings	Criteria for Grading
0	Deformity, callus and/or neuropathy	Appearance
I	Superficial ulcer	Depth
II	Deep ulcer to tendon, bone, ligament or joint	Depth
III	Deeper ulcer with abscess formation or osteomyelitis	Infection
IV	Gangrene of some portion of the forefoot	Gangrene
V	Superficial ulcer	Gangrene

Deficiencies/Concerns of the WG System

- The ABI (ankle brachial index) determines whether to salvage or amputate; if the ABI is >0.45 then complex algorithms are used to manage 5 wound types each with very disparate grading criteria that vary from ulcer to infection to gangrene
- Grading is no longer applicable after wounds become "clean" following debridements and/or amputations
- The WG system initially only applied to the diabetic foot ulcers (DFUs), but later modified to include non-DFUs
- No validity or reliability studies exist for the WG system

NPUAP Stages

National Pressure Ulcer Advisory Panel

Stage	Findings	Comments
I	Non-blanching erythema	Usually over bony prominences
II	Partial thickness loss of dermis	Shallow with vascular wound bed
III	Full thickness tissue loss	Bone, tendon or muscle are not exposed
IV	Full thickness tissue loss with exposed bone, muscle or tendon	Often associated with undermining or tunneling
Unstageable	Full thickness loss covered with a slough	Actual depth not determined until slough removed
Suspected Deep Tissue Injury	Purplish discoloration of intact skin	Suggests damage to underlying tissues

Deficiencies/Concerns of the NPUAP Stages

- Uses only a single criterion (i.e. depth) to determine the wound stage
- Designed for pressure ulcers; not particularly applicable to diabetic foot ulcers (DFUs)
- Assessments such as perfusion, size or appearance of the wound base not considered
- Management not integral to the grading system

The Wound Score

Assessment	2 points	1 point	0 points
	Use ½ points if findings mixed or between 2 grades		
Appearance of the wound base	Red	White/ Yellow	Black
Size Including undermining	< thumb print	Thumb print to clenched fist	> clenched fist
Depth to wound base	Skin coverage	Muscle/tendon	Bone/ joint
Infection/Bioburden	Colonized	Cellulitis, maceration and/or osteomyelitis	Sepsis
Perfusion	Palpable pulses Pink, Warm, Normal Capillary refill	Doppler pulses Cool, pale or dusky, delayed (2-5 seconds) refill	No pulses Cold, purplish or black, Refill > 5 seconds

Summate 5 Assessments
10 points (best) to 0 points (worst)

Healthy
7 ½ to 10 Points
100% healing

Problem
3 ½ to 7 Points
90% healing

Futile
0 to 3 Points
Amputation

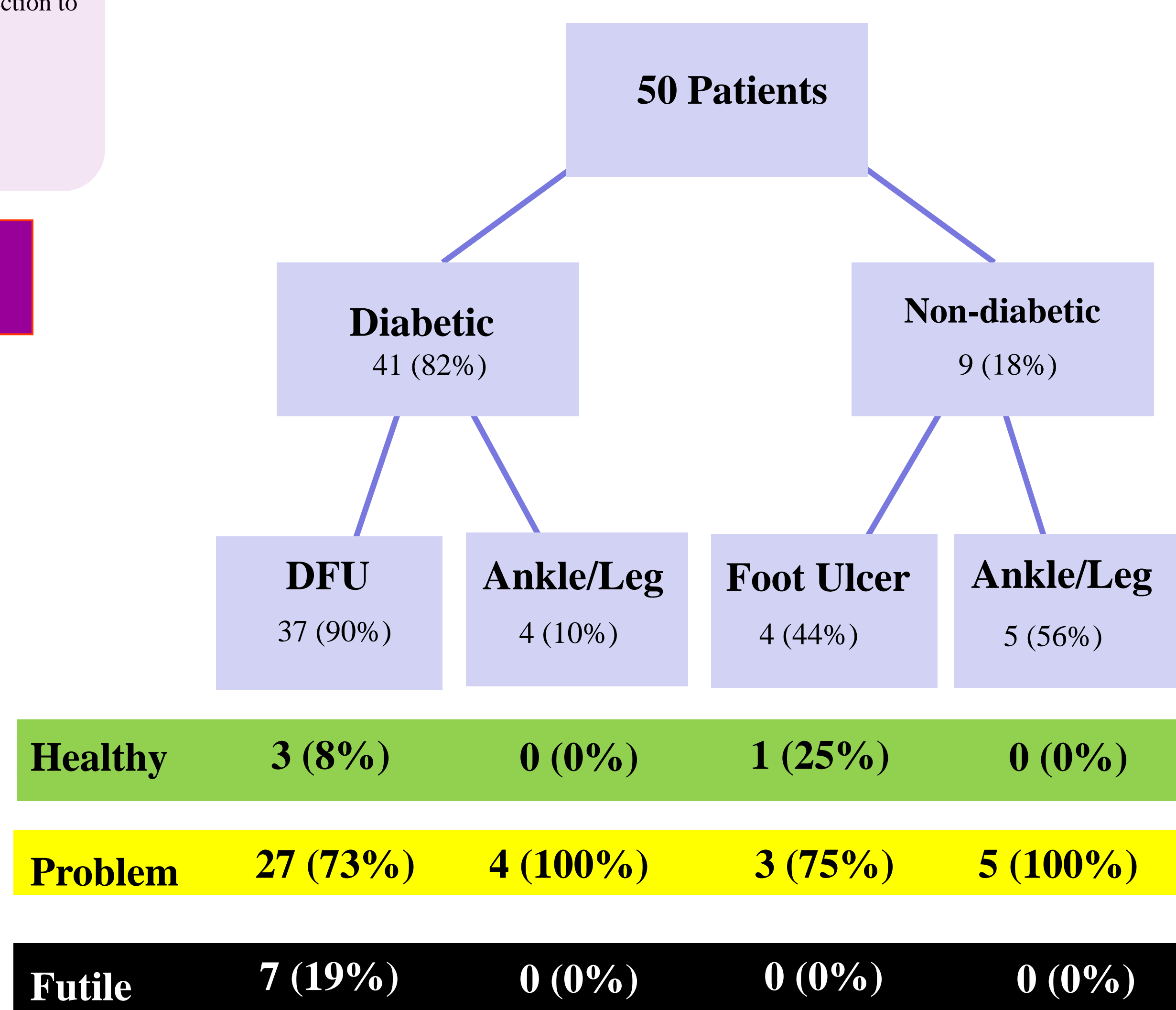
Grade each from 2 (best) to 0 (worst) with objective parameters

NPUAP Stage
National Pressure Ulcer Advisory Panel

Infection Severity Scale
Infectious Disease Society of America

Wagner Grade
University of Texas/ San Antonio (Lavery)

Observations



Results with Interpretations

- Patients are divided into patients with diabetes mellitus (DM) versus non-DM
- The "wound location" data set divides the patients into DFU/Foot ulcer and Ankle/Leg categories.
- Null Hypothesis: There is no association between the presence of DM and the wound location ($p = <0.001$)
- The Chi Square Test shows there is a statistically significant association with the presence of DM and the wound location
- The majority (90%, $p = <0.001$) of ulcers that occur in the foot are in patients with DM
- 82% ($p = <0.001$) of the wounds in our study group whether in the foot or in the leg occurred in patients with DM

University of Texas / San Antonio (Lavery)

Stage	Depth of Wound			
	0	I	II	III
Stage A	Pre- or post-ulcerative lesion completely epithelialized	Superficial wound, not involving tendon, capsule or bone	Wound penetrating to tendon or capsule	Wound penetrating to bone or joint
Stage B	Above depth with infection	Above depth with infection	Above depth with infection	Above depth with infection
Stage C	Above depth with ischemia	Above depth with ischemia	Above depth with ischemia	Above depth with ischemia
Stage D	Above depth with infection and ischemia	Above depth with infection and ischemia	Above depth with infection and ischemia	Above depth with infection and ischemia

Deficiencies/Concerns of the UTSA Evaluation

- Merely describes the characteristics (infection, depth and perfusion) of a wound without giving a score; it provides 16 permutations in a matrix format
- No gradation of infection and ischemia severity findings
- Does not offer guidelines for treatment and only applies to the foot according to the authors
- No validity or reliability studies; increasing wound severity observed with moving to the right & downward on the matrix

Infectious Disease Society of America

Severity	Predominant Findings	Comments, Associated Findings
Uninfected	No purulence or inflammation	Cultures may demonstrate wound colonization
Mild	2 or more manifestations of inflammation limited to skin or subcutaneous tissues	E.g., purulence, pain, erythema, tenderness, warmth or induration that extends < 2 cm around the wound
Moderate	2 or more findings of cellulitis extending > 2 cm, Lymphangitis streaking, spread involving the superficial fascia, deep tissue abscess, gangrene and involvement of deep structures such as muscle tendon, joint or bone	
Severe	Systemic sepsis	Toxicity or metabolic instability, fever, chills, tachycardia, hypotension, confusion, vomiting, leukocytosis, acidosis, dysglycemia and/or azotemia

Deficiencies/Concerns of the IDSA DFU Severity

- Limited to DFUs as specified by the IDSA
- Gangrene not differentiated as "wet" or "dry" in the moderate DFU infection
- Arbitrariness of the size considerations (i.e., <2 cm rim = mild; >2 cm rim = moderate wound)
- No validity or reliability studies; treatment is intuitive—the exam & lab findings dictate how the DFU is managed rather than the IDSA severity; thus it is not an aid to management, but rather a logical continuum grading of infection severity

Conclusions

The objectivity and versatility of the Wound Score made scoring of our initial series of 50 patients' foot, leg and ankle wounds, whether diabetic or not, easy. It provided objective criteria for justifying management and measuring improvement. In addition, we feel it is an especially valuable tool for comparative effectiveness research of wound care products and other management interventions.

References

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