

The WIFI Classification: From Concept to Practical Applications

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A New Classification for Patients with Limb Ischemia

The Society for Vascular Surgery Lower Extremity Threatened Limb Classification System: Risk stratification based on Wound, Ischemia, and foot Infection (WIfI)

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On behalf of the Society for Vascular Surgery Lower Extremity Guidelines Committee, Tucson, Ariz; San Francisco and Van Nuys, Calif; Brighton and Worcester, Mass; and Washington, D.C.

Critical Limb Ischemia

- Critical limb ischemia first defined in 1982
- CLI was defined as an ankle pressure (AP) <40 mm Hg in the presence of rest pain and <60 mm Hg in the presence of tissue necrosis
- CLI is associated with decreased quality of life, increased risk for amputation, and increased mortality.
- The 5-year mortality for CLI patients is 50% to 60%

Critical Limb Ischemia

- The term CLI was to be only applied to patients **without diabetes** at risk for limb loss due to chronic ischemia.
- Over the last 40 years, the use of the term CLI has been applied to a much broader spectrum of patients than originally intended.
- Since CLI has been applied to patients with a broad spectrum of co-morbidities efforts to measure and compare outcomes of different treatment options have been problematic

What about current classification systems?

- Several other classification systems currently exist and are being used
- Most common - The Fontaine and Rutherford Systems
- Majority categorize patients with limb ischemia based on two factors: ischemic rest pain and tissue loss.
- They lack sufficient detail about ischemia, wound categorization
- Severity of infection is not included

WifiClassification

- SVS undertook the task of creating a new classification of limb ischemia
- New Classification - Wound, Ischemia, and foot Infection (Wifi).
- Authors believe that the implementation of this classification system permit more meaningful analysis of outcomes, including diabetic patients.

The target population

- Ischemic rest pain, with confirmatory objective hemodynamic studies (ABI <0.40, AP <50, TP <30, TcPO₂ <20)
- A diabetic foot ulcer
- Non-healing lower limb or foot ulceration of at least 2 weeks duration
- Gangrene involving any portion of the foot or lower limb.

SVS Wifl classification system

- I. Components:
 - Wound
 - Ischemia
 - Foot Infection
- II. Grades: Each component is graded on a spectrum from 0 (none) to 1 (mild) to 2 (moderate) to 3 (severe)
- III. Classes: Based on grades assigned, a Wifl class is assigned.
- IV. Stages: Four clinical stages defined, which still require prospective validation.

Prognostic Value

- The classification system addresses two questions:
 - First, what is the perceived risk of amputation for each possible combination?
 - Second, what is the perceived benefit from revascularization for each possible combination?

W: Wound

Grade	Ulcer	Gangrene
0	No ulcer	No gangrene
1	Small, shallow ulcer(s) on distal leg or foot; no exposed bone, unless limited to distal phalanx	No gangrene
2	Deeper ulcer with exposed bone, joint or tendon; generally not involving the heel; shallow heel ulcer, without calcaneal involvement	Gangrenous changes limited to digits
3	Extensive, deep ulcer involving forefoot and/or midfoot; deep, full thickness heel ulcer ± calcaneal involvement	Extensive gangrene involving forefoot and /or midfoot; full thickness heel necrosis ± calcaneal involvement

I : Ischemia

Grade	ABI	Ankle systolic pressure	TP, TcPO ₂
0	≥0.80	>100 mm Hg	≥60 mm Hg
1	0.6-0.79	70-100 mm Hg	40-59 mm Hg
2	0.4-0.59	50-70 mm Hg	30-39 mm Hg
3	≤0.39	<50 mm Hg	<30 mm Hg

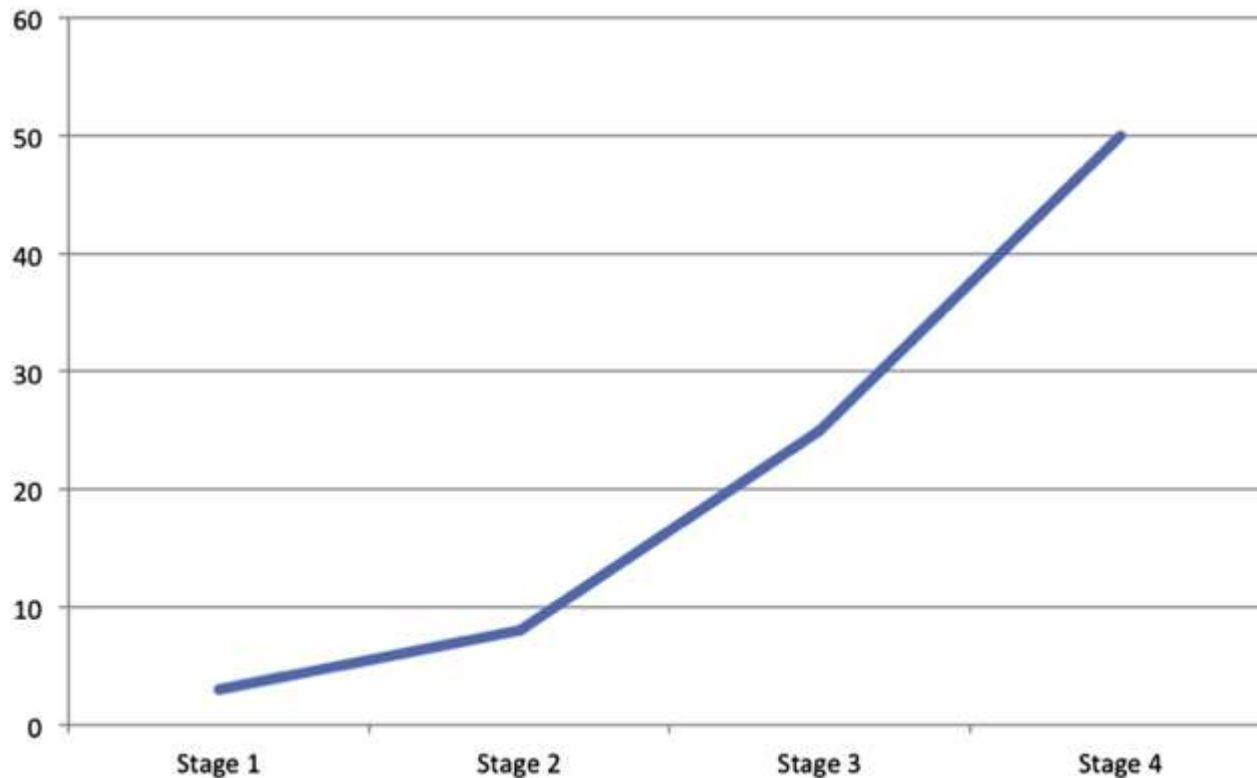
FI: Foot Infection

Clinical manifestation of infection	SVS	IDSA/PEDIS infection severity
No symptoms or signs of infection	0	Uninfected
Local infection involving only the skin and the subcutaneous tissue (without involvement of deeper tissues and without systemic signs as described below).	1	Mild
Local infection (as described above) with erythema >2 cm, or involving structures deeper than skin and subcutaneous tissues (eg, abscess, osteomyelitis, septic arthritis, fasciitis),	2	Moderate
Local infection (as described above) with the signs of SIRS	3	Severe ^a

Prognostic Value – 4 Stages

Risk of amputation	Proposed clinical stages	Wifl score
Very low	Stage 1	Wo lo flo,1, Wo l1 flo,1, W1 lo flo,1, W1 l1 fl o
Low	Stage 2	Wo lo fl2, Wo l1 fl1, Wo l2 flo,1, Wo l3 flo, Wo l3 flo, W1 lo fl2, W1 l1 fl1, W1 l2 fio, W2 lo flo/1
Moderate	Stage 3	Wo lo fl3, Wo l2 fl1,2, Wo l3 fl1,2, W1 lo fl3, W1 l1 fl2, W1 l2 fl1, W1 l3 flo,1, W2 lo fl2, W2 l1 flo,1, W2 l2 fio, W3 lo fio,1
High	Stage 4	Wo l1,2,3 fl3, W1 l1 fl3, W1 l2,3 fl2,3, W2 lo fi3, W2 l1 fl2,3, W2 l2 fi1,2,3, W2 l3 flo,1,2,3, W3 lo fl2,3, W3 l1,2,3 flo,1,2,3

Estimated 1 Yr Risk of Amputation Based on WIFI Stage



W₁ – shallow neuroischemic ulcers



W 2 – deep ulcers with exposed bone and tendon or digital gangrene



W2: Forefoot Wound with exposed tendon and bone. Revascularization followed by TMA



W₃: Complex Full Thickness Foot Ulcers



Patient Example 1

- Patient 1
 - Ischemic rest pain, and ABI of 0.30
 - No wounds
 - No signs of infection
- Patient would be classified as **Wound 0 Ischemia 3** foot **Infection 0** or **WIFI 030**.
- The consensus clinical stage is 2 – low risk of major limb amputation at one year.
- The anticipated benefit of revascularization - high.

Example 2

- A 55-year-old man with diabetes, dry gangrene of two toes and a <2-cm rim of cellulitis at the base of the toes, and absent pedal pulses. The ABI is 1.5. The TP is 35 mm Hg.
- He would be classified as **Wound 2 Ischemia 2 foot Infection 1** or **Wifi 221**.
- The clinical stage would be 4 - high risk of amputation
- The anticipated benefit of revascularization is also high

Example 3

- A 44-year-old non-diabetic woman with systemic sepsis, a fever, an elevated WBC count of 26,000, and serum blood glucose of 600. She has a 6-cm full thickness wound on the plantar aspect of the forefoot with crepitus. The DP is palpable, and the ABI is 1.08.
- She would be classified as follows: **W2 I0 fl 3** or **Wlfl 203**.
- The clinical stage is 4 - high risk of amputation
- The anticipated benefit of revascularization is low.

Conclusion

- The Wifl classification system can be applied to broad spectrum of patients at risk of limb loss
- It has the advantage of a more nuanced assessment as compared to other classification systems – similar to the TNM classification for oncology
- However, It is complex and assessing scores for each category and then defining a stage can be cumbersome
- Prognostic ability has yet to be validated

Thank You
