The Need for Dedicated Limb Salvage Teams: What Are the Essential Components?

Christopher J. Abularrage, MD, FACS
Associate Professor of Surgery
Division of Vascular Surgery and Endovascular Therapy
The Johns Hopkins Hospital

Disclosures

• None

Lower Extremity Ulceration

Lower Extremity Ulceration

The WIfI Classification

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

Joseph L. Libby, MD; Michael S. Greens, MD; David G. Armstrong, MD, MS, PhD; Brent D. Evenson, MD; Joseph D. Johnstone, MD; Anne M. Conway, MD, MPH; and Neeraj Ahluwalia, MD, on behalf of the Society for Vascular Surgery Lower Extremity Guidelines Committee, treason for the Division and the Yale–New Haven Hospital and the Veterans Affairs, New York, NY.

(J Vasc Surg 2014;59:229-34.)

The WIfI Classification Validation

An early validation of the Society for Vascular Surgery Lower Extremity Threatened Limb Classification System

David L. Gold, MD; Ginger Marus, MD; Richard C. Hurley, MD; Susan M. Taylor, MD; Eugene M. Langston, MD; John E. Disc, MD, and Brent L. Johnson, MD, Crocker, NC.

Table IV. Observed 3-year outcomes by Wound characteristics, Ischemia, and foot Infection (WIfI) clinical stage

(J Vasc Surg 2016;63:1539-42.)
The WIfI Classification

The Society for Vascular Surgery lower extremity threatened limb classification system based on Wound, Ischemia, and Foot Infection (WIfI) coexists with risk of major amputation and time to wound healing.

Limb Salvage

How do you improve outcomes for WIfI Stage 3 & 4?

A multifactorial problem needs a multidisciplinary approach

Outcomes of Neuroischemic Wounds Treated by a Multidisciplinary Amputation Prevention Service

- Podiatry and vascular surgery
- Consultants as necessary
  - ID, Endo, Ortho, plastics, orthotics, Cards
A multifactorial problem needs a multidisciplinary approach

Multidisciplinary care improves amputation-free survival in patients with chronic limb ischemia

- Podiatry, vascular surgery, plastics
- Consultants as necessary
  - ID, Endo, Ortho, orthotics, Cards

The Johns Hopkins Experience
Multidisciplinary Diabetic Foot & Wound Service

- July 2012 – present
- 290 Diabetic patients
- 412 wounds
  - 58% Will Stage 3 or 4
- 352 Debridments & minor amputations
- 118 revascularizations

The Johns Hopkins Experience
Multidisciplinary Diabetic Foot & Wound Service

- Wound healing at 1 year

\[ P < .001 \]
The Johns Hopkins Experience
Multidisciplinary Diabetic Foot & Wound Service

- Major amputation at 1 year

\[ P = .56 \]

The Johns Hopkins Experience
Multidisciplinary Diabetic Foot & Wound Service

Risk of Major Amputation at 1 year

<table>
<thead>
<tr>
<th>Stage</th>
<th>DFWC</th>
<th>Cull et al.</th>
<th>Zhan et al.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>6%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>3%</td>
<td>23%</td>
<td>8%</td>
</tr>
<tr>
<td>4</td>
<td>6%</td>
<td>37%</td>
<td>64%</td>
</tr>
</tbody>
</table>

Diabetic Foot Ulcers
Nationwide Inpatient Sample 2005-2010

Risk-adjusted Annual Cumulative Cost for Inpatient Treatment of Diabetic Foot Ulcers in the US

Diabetic Foot Ulcers
Multivariable Analysis for Cost
Mean difference cost 2005 vs. 2010

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Unadjusted</th>
<th>Adjusted</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charlson Index≥3</td>
<td>$3,303</td>
<td>$15,220</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Diagnostic angi</td>
<td>$15,015</td>
<td>$29,079</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Open revasc</td>
<td>$15,145</td>
<td>$30,759</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Endo revasc</td>
<td>$17,662</td>
<td>$28,937</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Minor amputation</td>
<td>$9,918</td>
<td>$18,084</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

The Diabetic Foot

How do you control escalating costs?

- Early referral = earlier presentation of disease = lower stage
- Lower stage \(ightarrow\) decreased long-term costs
The Need for a Diabetic Foot Service

A Diabetic Foot Service Established by a Department of Vascular Surgery: An Observational Study

**Single Center Study examining Outcomes Pre/Post DFS**
- Decreased Amputations
- Decreased Surgeries

**Conclusion**
- Early referral to DFS—
  1. Earlier presentation of disease
  2. Reduced delays to treatment
  3. Decreased costs of care

Conclusions

- Multidisciplinary teams improve outcomes and control costs in limb salvage
- Necessary components include
  - Vascular surgeons
  - Surgical podiatrists
  - Plastic surgeons
  - Ortho foot & ankle
  - PMNR
  - ENDOCRINOLOGY for DFU
- SUCCESS
  - Opening lines of communication
  - Breaking down barriers to expeditious care