Background:

- Despite being associated with substantial clinical and economic burdens, as well as adverse effects on quality of life, lower extremity amputations (LEAs) are quite common in the United States (US).
- Nearly 85% of LEAs are above the foot and/or ankle.
- Peripheral Artery Disease (PAD) is responsible for the majority of these amputations. Critical limb ischemia (CLI) is the most advanced form of PAD with the average amputation rate among PAD-CLI patients estimated at 25%. Even with multiple endovascular strategies as alternative options, many CLI patients receive a LEA as first-line treatment.
- Limb salvage programs provide an alternative treatment care pathway for PAD-CLI patients aimed at preventing LEAs. Moreover, limb salvage procedures may reduce costs while improving patient outcomes.

Objective:

- To estimate the potential lifetime economic savings to a third party payer from the implementation of a limb salvage program in the US.

Methods:

- A simulation model was developed in MS Excel to estimate the direct healthcare cost of implementing a limb salvage program in the US for all CLI patients.
- The model was from a third party payer perspective.
- It was assumed that all the patients undergoing amputation will be eligible for the limb salvage program.
- Clinical endpoints were as follows:
  - Number of amputations performed annually and LEA reduction rate associated with a limb salvage program.
  - Cost parameters included:
    - Lifetime direct amputation burden and Limb salvage program cost estimates.
  - All parameter values were obtained from the published literature and adjusted to 2016 dollars using the Medical Care Component of the Consumer Price Index.

Results:

- Approximately 120,000 (119,700 to 121,667) LEA procedures are performed annually in the US.
- The estimated lifetime direct healthcare cost for an amputee patient is $794,027.
- When aggregated for the total number of LEA patients annually, the expected lifetime cost is estimated at roughly $95.2 billion USD.
- In the published literature, comprehensive limb salvage programs are shown to reduce the rate of amputations from 36% to 86%.
- Using the midpoint of this reduction (61%) and accounting for the estimated cost of a comprehensive limb salvage program ($23,152) yields aggregate cost savings of $55.3 billion. (Additional details about the limb salvage program can be found in Figure 1).
- The reduction in amputations from a formal limb salvage program is expected to save CMS from $31.5 billion assuming a 36% salvage rate to $79.2 billion assuming an 86% salvage rate (See Figure 2 for more information on the model calculation).

Conclusion:

- The lifetime economic burden of amputees is substantial. A national limb salvage program may reduce this burden by $55.3 ($31.5 to $79.2) billion.
- Policy efforts aimed at limb sparing treatments for PAD patients may lead to substantial cost savings while enhancing patients’ quality of life.

References:


Figure 2: Model Scaffold and Parameters

- Pre-procedure: Evaluation (e.g., ankle branchial index tests), Imaging, Angiography, Ultrasound
- Endovascular procedure: Angioplasty w/without stents or atherectomy
- Post-procedure: Follow-up evaluation and management

Figure 1: Comprehensive Limb Salvage Program

- # of Amputations
  - Total Burden
    - Limb Amputation Burden: $794,027
    - Limb Salvage Rate: $31.5 Bln
    - Limb Salvage Program Cost/Patient: $23,152
  - Savings
    - Lifetime Cost Savings: $55.3 Bln
    - Lifetime Cost to Amputee: $794,027