Heparin-revascularization treatment of acute limb ischemia

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Description of condition and intervention

Acute limb ischemia (ALI) is happening due to embolism or to thrombosis of an underlying vascular pathology or at the site of prior revascularization. The incidence estimated 1.5 cases out of 10,000 people every year, with 15%-20% mortality rate (Siddiqui, 2021). The risk factors of ALI are systemic thrombophilia, dissection, intimal hyperplasia, vasculitis, and aneurysm thrombosis. This health problem can be treated by safe and effective vascular surgery, which includes thromboembolectomy and bypass, whereas endovascular includes catheter-directed thrombolysis (CDT) and stent placement.

In this evidence brief, we present the effect and cost of the following intervention being analysed in FairChoices:DCP Analytical tool:

Heparin-revascularization treatment of acute limb ischemia

International guidelines

Organization	Indications/recommendations
ESVS, 2020	Clinical practice guidelines on management of acute limb ischemia

Intervention attributes

Type of interventions

Curative

Delivery platform

The recommended platform to deliver this intervention is first-hospital level.

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

High level of urgency. Treatment outcomes may be highly affected by some days of delay.

Population in need of interventions

Treated population: All incident cases aged 30 to 99 years of peripheral arterial disease are the population treated for acute limb ischaemia by heparin-revascularization. The treated fraction is assumed to be 0.2 for this intervention.

Affected population: All incident cases of peripheral artery disease with the condition acute limb ischaemia in the age-group 30 to 99 years, both genders benefit from this intervention. The affected fraction is 0.2 with the condition for this intervention.

Disease state addressed

This intervention targets peripheral artery disease.

Intervention effect and safety

Table 1: Effect and safety of heparin re-vascularization for acute limb ischaemia

Effect of intervention		Certainty of evidence
Mortality (due to condition)	0.5 risk reduction (assumed)	See appendix

Model assumptions

Table 2: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Intervention	Heparin-revascularization for treatment of acute limb ischaemia	
Cost calculation		
Treated population	Incident cases of peripheral artery disease	Global Burden of Disease 2019
Gender	Both male & female	
Age	30-99 years	
Treated fraction	0.2	
Effect calculation		
Affected population	Incident cases of peripheral artery disease	Global Burden of Disease 2019
Affected gender	Both male & female	
Affected fraction age	30 to 99 years	
Affected fraction	0.2	Those with condition
Comparison	No intervention	
Mortality reduction (RRR)	0.5	Assumed

Intervention cost

The mean direct cost per episode of major amputation is 46,182 R (Pakistan) in 2007 (Ali SM 2008).

References

Johansson KA et al 2020: Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105.

Ali SM, Fareed A, Humail SM, Basit A, Ahmedani MY, Fawwad A, Miyan Z. The personal cost of diabetic foot disease in the developing world--a study from Pakistan. Diabet Med. 2008 Oct;25(10):1231-3. doi: 10.1111/j.1464-5491.2008.02529.x. PMID: 19046203.

Editor's Choice – European Society for Vascular Surgery (ESVS) 2020 Clinical Practice Guidelines on the Management of Acute Limb Ischaemia Björck, MartinESVS Guidelines Committee, Document Reviewers, et al. European Journal of Vascular and Endovascular Surgery, Volume 59, Issue 2, 173 – 218.

Siddiqui, N. A., Luvsannyam, E., Jain, M. S., Abbas, M., Jayaraman, A., Zhuleku, R., Ullah, N., Corona, A., & Hussain, M. T. (2021). Acute Limb Ischemia Complicated by Heparin-Induced Thrombocytopenia in an Asymptomatic COVID-19 Patient. Cureus, 13(7), e16162. https://doi.org/10.7759/cureus.16162.

Appendix

Literature Review for effectiveness & safety

This literature search is an example of Level 1 search for intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, metaanalysis, systematic review, clinical practice guidelines).