A Cost-Analysis Study Comparing Endovascular and Surgical Options for Patients with Chronic Lower Limb Ischaemia

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Disclosure

Speaker name:
..........Ramon L. Varcoe.......................................................

I have the following potential conflicts of interest to report:

- Consulting: Medtronic, Abbott Vascular, Boston
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

- I do not have any potential conflict of interest
Peripheral Artery Disease

- A global epidemic
- Affecting more than 202 million people worldwide (in 2010)\(^1\)
- Increasing incidence of 23.5% every 10 years
- More rapidly increasing in low-middle income countries

\(^1\) Fowkes FG et al. Lancet 2013;382:1329-40
The COST of PAD

• In 2010 the total global cost attributable to CVD was US$863 billion\(^1\)
• It is expected to increase 22% to US$1,044 billion in 2030 as our population ages (greater in LMIC)
• PAD is the third leading cause of death in this group, but the largest associated cost

A Contemporary Analysis

• A number of older studies have demonstrated lower costs treating PAD with EVT compared with open surgery (1995-2008)\(^1\)

• There are NO contemporary cost-analyses with EXPENSIVE endovascular devices
  • New generation stents
  • Re-entry and crossing devices
  • CTO dedicated guidewires and catheters

\(^1\) Moriarty JP. et al. Systematic Review JVS 2011;54:1131-44
Methods

• 1-July-2013 to 30-Jun-2016
• Prospective database
• Individualised PATIENT SPECIFIC costing data
Methods

- 1-July-2013 to 30-Jun-2016
- Prospective database
- Individualised PATIENT SPECIFIC costing data
- Encompassing ALL hospitalised patients
- Two Major Teaching Hospitals
- Health-care-provider perspective (not societal)
- Economic outcomes only (not clinical)
<table>
<thead>
<tr>
<th>Cost Categories</th>
<th>Goods</th>
<th>Services</th>
<th>Wages</th>
<th>VMO Payments</th>
<th>Superannuation and Workers Comp. Insurance</th>
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<tbody>
<tr>
<td>Allied Health</td>
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<td>✓</td>
<td>✓</td>
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</tr>
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<td>Medical</td>
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<td></td>
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<tr>
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</tr>
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<td>Critical Care (ICU, HDU, CTICU, CCU, NICU, PICU)</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>Imaging</td>
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<tr>
<td>Operating Theatres</td>
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<tr>
<td>Pathology</td>
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<tr>
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<tr>
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<tr>
<td>Specialist Procedural Suites</td>
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<tr>
<td>Administration</td>
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<tr>
<td>On Costs</td>
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<td>✓</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

(excl. prosthetics)
Inclusion Criteria

1. Chronic Lower Limb Ischaemia (RC 3-6)

2. Underwent either:
   
   i. *Open*-* or Endovascular-Revascularisation procedure*
   
   ii. *Minor or major amputation*
Inclusion Criteria

1. Chronic Lower Limb Ischaemia (RC 3-6)
2. Underwent either:
   i. Open- or Endovascular-Revascularisation procedure
   ii. Minor or major amputation

Exclusion Criteria

1. Both open and endovascular procedures
2. Minor amputation then went on to major
Endovascular Revascularisation

924 Patients

4 Also had Open

920 Unique Endovascular Revascularisation Procedure

303 Rutherford 3

82 Rutherford 4

535 Rutherford 5 or 6
## Endovascular Revascularisation

<table>
<thead>
<tr>
<th>Procedure Type</th>
<th>N=920</th>
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</thead>
<tbody>
<tr>
<td>PTA</td>
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</tr>
<tr>
<td>Stent (1x)</td>
<td>429</td>
</tr>
<tr>
<td>Stent (&gt;1x)</td>
<td>143</td>
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<tr>
<td>Atherectomy</td>
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</tbody>
</table>
Open Surgical Revascularisation

- 67 Patients
- 63 Unique Open Revascularisation Procedure
  - 27 Rutherford 3
  - 6 Rutherford 4
  - 30 Rutherford 5 or 6
- 4 Also had Endo
# Open Surgical Revascularisation

<table>
<thead>
<tr>
<th>Surgery</th>
<th>N=63</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aorto- or Ilio-femoral Bypass</td>
<td>5</td>
</tr>
<tr>
<td>Extra-anatomical Bypass</td>
<td>12</td>
</tr>
<tr>
<td>Fem-pop Bypass (Above Knee)</td>
<td>7</td>
</tr>
<tr>
<td>Fem-pop Bypass (Below Knee)</td>
<td>18</td>
</tr>
<tr>
<td>Fem-tibial Bypass</td>
<td>18</td>
</tr>
<tr>
<td>Popliteal-tibial Bypass</td>
<td>1</td>
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<tr>
<td>Other</td>
<td>2</td>
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Resource Utilisation

- **Open Surgery**
  - ICU (Mean Hours): 13.37
  - Bed Days: 8.83

- **Endovascular**
  - ICU (Mean Hours): 2.44
  - Bed Days: 3.25

*P* < 0.0001
SPECIFIC Costing Data ($AUD)

- Open Surgery

- Allied Health
- Medical
- Nursing
- Critical Care
- Imaging
- Operating Theatre
- Pathology
- Pharmacy
- Prosthetics
- Specialist Procedural Suites
- Administration
- On Costs

Costs range from $0.00 to $9,000.00.
Average Total Cost ($AUD)

- Open Surgery: $26,489.92
- Endovascular: $13,063.59

P < 0.0001
How Does the Cost of Revascularisation Compare With Amputation?
Minor Amputation

204 Patients

1 Went on to Major

203 Unique Minor Amputation

- 56 Toe
- 133 Toe + Metatarsal
- 5 Mid Tarsal
- 9 Trans-metatarsal
Major Amputation

38

Major Amputation

8 Above Knee

30 Below Knee
Resource Utilisation

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<td>Endovascular</td>
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<td>3.25</td>
</tr>
<tr>
<td>Major Amputation</td>
<td>50.32</td>
<td>17.79</td>
</tr>
<tr>
<td>Minor Amputation</td>
<td>2.62</td>
<td>12.68</td>
</tr>
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SPECIFIC Costing Data ($AUD)

Costs associated with increased length of stay
Average Total Cost ($AUD)

- Major Amputation: $47,116.75
- Minor Amputation: $28,850.74

P<0.0001
Average Total Cost ($AUD)

- Open Surgery: $26,489.92
- Endovascular: $13,063.59
- Major Amputation: $47,116.75
- Minor Amputation: $28,850.74

P < 0.0001
Limitations

• Only inpatient costs
• Did not include rehab or nursing home costs after amputation
• Does not capture out of hospital costs associated with PAD
• Systematic underestimation of true PAD costs
• No data is provided for repeat interventions
Conclusion

• The short-term cost of contemporary EVT is significantly less than both open-surgical revascularisation and amputation

• There are increased prosthetic costs with EVT

• Markedly outweighed by costs associated with length of stay & ICU utilisation
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