Delays in management of the Vascular patient

Victorian Audit of Surgical Mortality

Jason Chuen, Vascular Surgeon, Austin Health

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Time-critical scenarios in Vascular Surgery

• Acute limb or organ ischaemia
  • Reperfusion injury

• Haemorrhagic shock

• Progressive metabolic stress in patients with poor physiological reserve
Typical sources of delay

• Patient presentation
• Reaching provisional diagnosis (±investigations)
• Prioritisation, treatment pathway assignment
• Communication re: clinical severity or urgency

• Logistical transfer problems
• Institutional structural limitations
• Definitive treatment
• Recognition and management of complications
Case 1 – Acute Limb Ischaemia

- Pt in late 70s, previously independent alone at home
- History of 6 months of gradual decline and deconditioning
- Bilateral claudication for 2 months
- Not walking for 6 weeks
- Bilateral ischaemic rest pain for 2 weeks
- Hx of COPD, Alcohol dependency, Hypertension, AF (unwarfarinised)

- *Delayed patient presentation*
Case 1 continued

• 1017h – Ambulance called
• 1101h – Ambulance on scene
• 1108h – Ambulance loaded and departed scene
• 1125h – Ambulance at destination
• 1133h – Patient triaged in ED

• Initial ambulance assessment: Incontinence – faecal; social problem
Case 1 continued – Ambulance call 1017h

- 1618h – USS performed. Bilateral SFA occlusion, no flow seen in calf vessels
- 2200h – Vascular review and admission, decision to operate next day
- 0313h – CTA performed. L distal CFA occlusion, R popliteal occlusion
- 0700h – Ward RMO attends for poor UO, Rapid AF, K+ 3.1, Cr 105, eGFR 59
Case 1 continued – Ambulance call 1017h

- 0845h – Unit RV – cold ischaemic left leg below knee, insensate foot, planned for thrombectomy / embolectomy & fasciotomy
- 1030h – L CFA endarterectomy & patch, PFA embolectomy, calf fasciotomies
- 1415h – ICU RV in recovery – Pt not engaged or capable to decide NFR/ACD status. Daughter to D/W family. BP stable & normal 3h post-cessation of inotropes. Deemed not to require ICU. Pt transferred to ward.
- 1530h – MET Call, intermittent inotropy then 1643h PEA arrest. ICU not keen to take pt unless “vascular surgeons wanted full resuscitation”. CPR ceased after 20 min. RIP.
Delays in Acute Limb Ischaemia

Surgery 2014, 9:56
http://www.wjes.org/content/9/1/56

Patient delay is the main cause of treatment delay in acute limb ischemia: an investigation of pre- and in-hospital time delay

Louise S Londero1*, Birgitte Nørgaard2 and Kim Houlin3

Kolding Hospital, Denmark

• 300 beds, general community hospital
• 42 patient cases of suspected ALI studied
• Prospective data collection over a 3 month period
• “Fast-Track” ED pathways for a variety of conditions incl. “Limb in extremis”
• “ED Length of Stay” targets ie 4-hour rule
• Once patient is assessed to have ALI vascular specialist is contacted

Rutherford Acute Limb Ischaemia Classification
0=ASx 1=Subacute 2=Urgent Salvage 3=Unsalvageable
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<tr>
<td>Operation (n=14)</td>
<td>20,5 min. [0-335]</td>
<td>126,5 min. [31-603]</td>
<td>103,5 min. [31-415]</td>
<td>324,5 min. [122-873]</td>
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<tr>
<td>CT/MR and operation (n=8)</td>
<td>93,5 min. [35-660]</td>
<td>335,5 min. [119-915]</td>
<td>180,5 min. [63-314]</td>
<td>822 min. [494-1185]</td>
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<tr>
<td>Trombolysis or endovasc. treatment (n=4)</td>
<td>4051 min [1614-7186]</td>
<td></td>
<td>2222,5 min. [1414-3031]</td>
<td>5621 min. [1686-8376]</td>
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• Onset of symptoms to medical contact median 24 hours (0-1200)

• 30 patients had immediate intervention
  • Surgery (14 pts) - 324.5 (122–873) minutes
  • Imaging+Surgery (8pts) - 822 (494–1185) minutes
  • Thrombolysis (4pts) - 5621 (1686–8376) minutes

• At 30d followup 6 had BKA (14%) and 4 had died (9.5%)
Clinical Research

Sources of Delay in the Acute Limb Ischemia Patient Pathway

Pasha Normahani, Nigel J. Standfield, and Usman Jaffer, London, United Kingdom

**Background:** Acute limb ischemia (ALI) continues to pose a significant challenge to clinicians and is associated with an unacceptably high rate of morbidity and mortality. Despite its time critical nature, little is known regarding the delays encountered during the patient pathway. The aim of this study was to identify sources of delay in the patient pathway at our institution.

**Methods:** Sixty-seven cases of ALI of the lower extremities from 66 patients, who had presented to our center between May 2003 and April 2014, were identified for retrospective analysis. Data were retrieved from the patient records, discharge summaries and hospital laboratory, emergency department and radiology databases.
St Mary’s Hospital, London

- 500-bed Tertiary-level inner city hospital
- 2014 case notes reviewed from 2003-2014
- 67 cases eligible & retrospectively analysed

Fig. 1. Diagrammatic representation of sources of delay in the management of acute limb ischemia.

Peripheral Vascular Disease
Table IV. Key time segments for therapeutic care components during the intervention.

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<tr>
<th>Time segment</th>
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<th>ALI</th>
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<tr>
<td>Symptom onset to admission (d)</td>
<td>74</td>
<td>0.75 (0.27, 3.29)</td>
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<tr>
<td>Admission to ABI (h)*</td>
<td>21</td>
<td>3.3 (2.5, 6.3)</td>
</tr>
<tr>
<td>Admission to heparin (h)†</td>
<td>42</td>
<td>2.1 (1.4, 4.8)</td>
</tr>
<tr>
<td>Admission to vascular specialist at bedside (h)</td>
<td>74</td>
<td>2.4 (1.1, 6.0)</td>
</tr>
<tr>
<td>Admission to revascularization (h)</td>
<td>29</td>
<td>14.3 (4.9, 21.3)</td>
</tr>
<tr>
<td>Length of stay (d)</td>
<td>74</td>
<td>7.0 (4.3, 10.4)</td>
</tr>
</tbody>
</table>

NOTE: Key time segments are reported as median (25th percentile, 75th percentile).  
* Twenty-one (28.4%) patients with ALI and 41 (32.5%) or TBI performed on admission.  
† Forty-two (56.8%) patients with ALI and 29 (23.0%) therapeutic heparin before revascularization.

Survival curves stratified by time from symptom onset to admission.

Critical delays in this case

- Delay to presentation
  - Pt had symptoms of claudication for at least 2 months
  - Pt had symptoms of critical limb ischaemia (rest pain) for at least 2 weeks

- Delay to vascular assessment
  - Patient was in ED for 8.5 hours before Vascular admission note written
  - Was patient assessed prior to this? No notes = Don’t know

- Decision to delay surgery by 12 hours
  - This patient had established neurological deficit on assessment in ED
  - No uncertainty documented re: surgical plan or diagnosis
  - Reason for delay not outlined
From the evidence

• Symptom-onset to Specialist assessment time is critical
  • Danish study – Median 27.25 hours
  • St Mary’s study – Median 11.95 hours
  • FRIENDS registry – Median 20.4 hours

• Delay is associated with increased risk of amputation (but not death)
  – (JP Elliot et al)

• Delay to surgery is associated with greater myositis and soft tissue infarction
Additional areas of concern

• Delay to revascularisation increases risk of reperfusion injury
  • Risk of compartment syndrome, contractures
  • Expectation of metabolic acidosis, hyperkalaemia, myoglobinuria and ARF

• ICU or HDU admission should have been mandatory
  • If patient not for ICU this should have been decided earlier
  • Patient was in Recovery for 3 hours before decision not to TF to ICU

• Alternate plans: Palliation or Primary Amputation
What contributes to delay?

• Failure to diagnose / suspect condition – public and GP awareness
• Uncertain diagnosis / Mixed bag presentations
  • Embolic vs thrombotic events
• Structural limitations, infrastructure or resource shortages
• Failure to plan, train, or rehearse
• Increasing complexity, variety in clinical treatment options
  • Rise of endovascular interventions, ICU/organ support options, care plans
• Reliance on medical imaging or confirmatory tests
Health Services and Outcomes Research

Achieving Rapid Door-To-Balloon Times
How Top Hospitals Improve Complex Clinical Systems

Elizabeth H. Bradley, PhD; Leslie A. Curry, PhD, MPH; Tashonha R. Webster, MPH;
Jennifer A. Mattera, MPH; Sarah A. Roumanis, RN; Martha J. Radford, MD;
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David N. Berg, PhD; Harlan M. Krumholz, MD, SM

Background—Fewer than half of patients with ST-elevation acute myocardial infarction (STEMI) are treated within
guideline-recommended door-to-balloon times; however, little information is available about the approaches used by
hospitals that have been successful in improving door-to-balloon times to meet guidelines. We sought to characterize
experiences of hospitals with outstanding improvement in door-to-balloon time during 1999–2002.

Methods and Results—We performed a qualitative study using in-depth interviews (n=122) with clinical and
administrative staff at 11 hospitals that were participating with the National Registry of Myocardial Infarction and had
Data were organized with the use of NUD-IST 4 (Sage Publications Software) and were analyzed by the constant
comparative method of qualitative data analysis. Eight themes characterized hospitals’ experiences: commitment to an
explicit goal to improve door-to-balloon time motivated by internal and external pressures; senior management support;
innovative protocols; flexibility in refining standardized protocols; uncompromising individual clinical leaders;
collaborative teams; data feedback to monitor progress and identify problems and successes; and an organizational
culture that fostered resilience to challenges or setbacks in improvement efforts.

Conclusions—Several themes characterized the experiences of hospitals that had achieved notable improvements in their
door-to-balloon times. By distilling the complex and diverse experiences of organizational change into its essential
components, this study provides a foundation for future efforts to elevate clinical performance in the hospital setting.
(Circulation. 2006;113:1079-1085.)

Key Words: health services research ■ myocardial infarction ■ quality
Key themes from successful centres

• Explicit goal of reducing door-to-balloon time motivated by internal and external pressures
• Visible senior management support
• Innovative, standardised protocols
• Flexibility in implementing standardised protocols
• Uncompromising individual clinical leaders
• Collaborative interdisciplinary teams
• Data feedback to monitor progress and identify problems or successes
• Organisational culture that fostered persistence despite challenges and setbacks