

## **National Vascular Registry Report 2021: Summary for Anaesthetists**

The NVR is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme and is designed to promote quality improvement within NHS hospitals performing vascular surgery by providing information on their performance.

In this summary we present of those data with direct relevance to vascular anaesthetists. The full report is available at <https://www.vsqip.org.uk/reports/2021-annual-report/> .

### **Impact of Covid-19 on UK Vascular services (Preliminary data)**

The NVR collected data on the period January to June 2020. This showed the striking effect of the pandemic on elective infra-renal AAA repair, which fell to 12% of the previous years activity level. Emergency ruptured AAA repair and lower limb amputation rates were also lower, 71% and 74% respectively of 2019 rates.

The late data suggests rates were recovering to normal but we await data on later in 2020 and the impact of subsequent waves of infection.

### **Carotid endarterectomy**

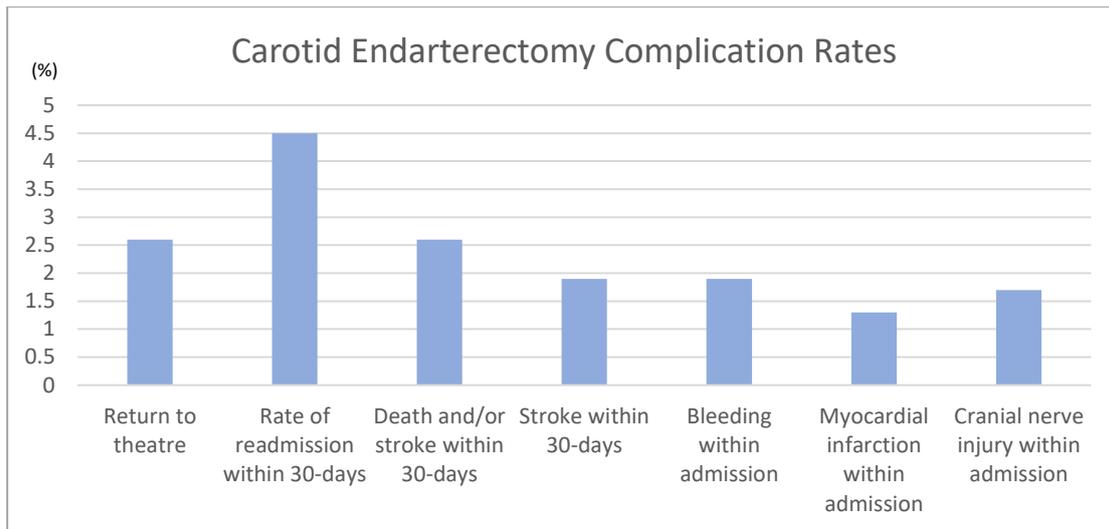
In 2020, a total of 2,991 carotid endarterectomies were performed in the UK. This number has reduced significantly from the 2019 NVR, with an overall 28% reduction in the number of carotid endarterectomies performed. This decline was noted from April 2020 following the pandemic.

Operative details of unilateral carotid endarterectomies performed during 2020:

- 64.2% were performed under General anaesthesia (GA) alone
- 8.6% were performed under local anaesthetic (LA) alone
- Combined GA/LA or block was used in 9.0%
- 18.1% were performed under block or regional
- 62.6% of procedures involved the use of a shunt

Medication for cardiovascular conditions was common among patients prior to surgery. Overall, 83.2% were taking statins, while 92.9% were on antiplatelet medication (54.4% on single therapy and 38.5% on dual therapy).

Surgical outcomes continue to be good and estimated rates of significant complication are low at 1-2%. The median length of hospital stay was 2 days (IQR: 2-5 days).



Areas of improvement highlighted by the report were:

- **Time from symptoms to surgery:** According to the NICE guideline NG128, the recommended target time from symptom onset to surgery is to be 14 days. The median time from symptom onset to surgery for symptomatic patients in 2020 was 12 days (IQR 7-21 days). There was however considerable variation between NHS trusts. 50 out of the 66 NHS trusts had a median time of 14 days or less. In 5 of the vascular units, the median wait exceeded 20 days, this is a considerable improvement from 16 in 2016.
- **Case volume:** There is a well-documented relationship between case volume and clinical outcomes for CEA. According to the VSGBI provision of services document, vascular units should perform a minimum of 40 CEA per annum. In 2020, there were still 38 units that did not meet this standard, this is up from 22 in 2019. Further reconfiguration of services may be required, given the decreasing national caseload.

Major recommendation:

1. Review and improve referral pathways
2. From symptom onset to surgery to meet the 14 day standard
3. Reconfiguration of services where case load numbers remain below the threshold

### **Repair of elective infra-renal aortic aneurysms**

The organization of vascular services undertaking AAA repair continues to evolve. The number of NHS vascular units performing AAA repairs decreased from 75 in 2018 to 72 in 2020. There were 2,258 elective infra-renal AAA repairs submitted to the NVR in 2020, which is a decrease of 35% on the 3,456 procedures in 2019, mainly due to the impact of the COVID-19 pandemic.

During the first wave, it was recommended that only patients with infra-renal AAAs greater than 7cm should be offered elective surgery.

In recent years, there has been a decrease in the number of endovascular procedures over all age ranges. The reasons for this change could be a more conservative approach to treatment (particularly in older, sicker patients) and the influence of the draft NICE guidance, which recommended OR more strongly than an endovascular approach.

This reduction slowed slightly following COVID-19, accounting for around 60% of all elective infra-renal AAA repairs in 2019 and 2020.

NHS vascular units achieved good patient outcomes after elective infra-renal AAA repair in 2020. The in-hospital postoperative mortality was 3.3% after OR and 0.4% after EVAR. Over the 3-year period from January 2018 to December 2020, the risk-adjusted in-hospital mortality rates for all NHS vascular units were within the expected range of the national average (1.4% for 2018-20).

Postoperative details of elective infra-renal AAA repairs undertaken between January and December 2020:

- 913 open repairs (OR) -> down from 1,368 in 2019
- 1,345 endovascular repairs (EVAR) -> down from 2,088 in 2019

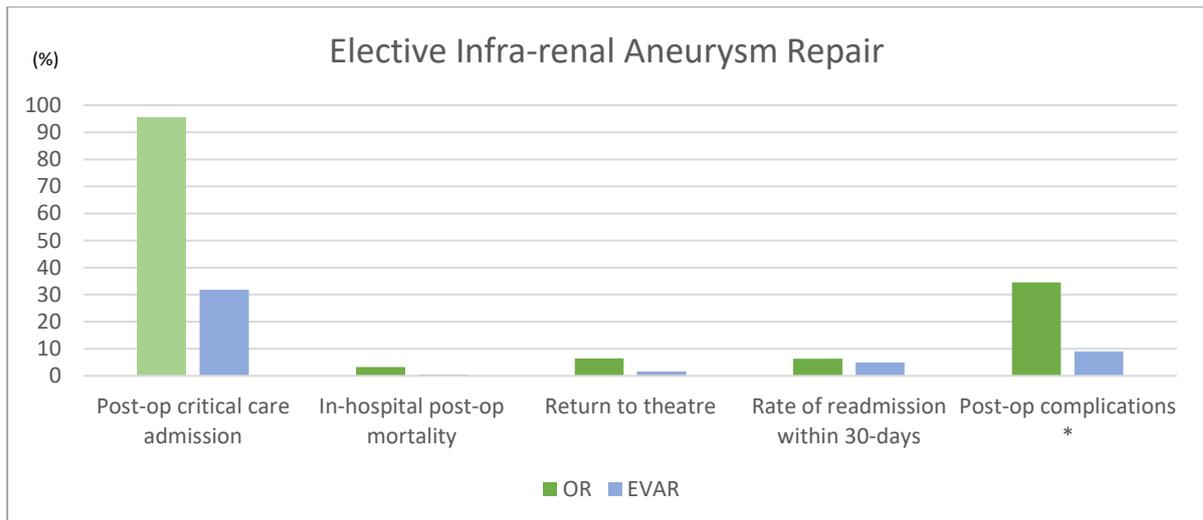
The median length of hospital stay was 7 days for OR (IQR 6-10) and 2 days for EVAR (IQR 1-3).

Postoperative in-hospital mortality after open repair has risen; in 2020, the rate was 3.3% compared to 2.3% in 2019 respectively. This outcome is likely to reflect the impact of COVID-19.

For EVARs, the rate has remained around 0.3-0.4%. The very low in-hospital mortality rates following elective EVAR repair raises the question of whether mortality remains the most valuable measure of outcome for infrarenal AAA [Boyle 2019].

Consequently, the NVR introduced a refined aortic dataset in 2020 to capture data on revision surgery and re-interventions following aortic surgery in the expectation that this will become a better measure of quality in time. The first NVR report on aortic devices was published in 2021 and we request that all aortic devices (both open and endovascular) are entered on the NVR.

Anaesthetic data was available on EVARs in most cases submitted. This showed a marked reduction in the use of general anaesthesia (GA) compared to previous reports. GA (alone or combined with local anaesthesia (LA) or neuroaxial blockade (NA) ) was used in only 48 % of cases. Rates were around 75% in the last dataset analysed. This could be a response to the potential risk to staff and patients of GA during the pandemic.



\*Post-op complications include: cardiac, respiratory, haemorrhage, limb ischaemia, renal failure and other

Data is now collected against the standards of the VSGBI Quality Improvement Framework

*Overall compliance with standards related to the elective AAA care pathway (Percentage of patients meeting standard)*

	2020	2019	2018	2017
Elective patients were discussed at MDT meetings	85.5	84.8	82	83.0
Patients underwent a formal anaesthetic review	97.2	94.7	95.4	96.3
Patients whose anaesthetic review was done by a consultant vascular anaesthetist	92	91.3	91.3	91.6
Patients had their fitness measured	80	83.2	85.5	84.7
Most common assessment methods:				
CPET	51.8	59.2	51.1	49.1
Echocardiogram	42.7	36.3	42.5	43.5

For the second time, the report examined the influence of frailty in patients undergoing elective AAA repair. In 2020, frailty was recorded in 75% (1,702) of patients, only a slight increase from the 73% found in 2019. Therefore, there was insufficient data to demonstrate a relationship between frailty and in-hospital postoperative mortality. From the available data however, there appears to be a higher prevalence of frailty in those having EVAR (39.6%) compared to open repairs (18.6%). We encourage vascular units to identify at risk 'frail' patients and ensure their degree of frailty is submitted to the NVR.

### Complex aneurysm repair

Aortic aneurysms that occur above or around the arteries to the kidneys are more complex than infra-renal aneurysms to repair, with a higher risk of complications or death. There were 70 active vascular units that reported complex AAA repairs to the NVR between 2019 and 2020.

In 2019, there were 799 procedures, of which 73 were open repairs. Activity was lower in 2020, with units performing 625 complex repairs, of which just 51 were open repairs. Among

the 574 endovascular procedures, there were: 349 fenestrated repairs (FEVAR), 34 branched repairs (BEVAR) and 115 thoracic repairs (TEVAR).

Rates of postoperative mortality after complex endovascular repairs were lower than after complex open repairs, being 2.4% for endovascular procedures (1.7% for FEVAR and 4.3% for TEVAR) and 7.8% for open repairs. Patients undergoing endovascular procedures had an average length of stay of 4 days (2-6 days), whilst patients undergoing complex open repair had an average length of stay of 9 days (6-17 days).

Interestingly, 6.6% of patients were readmitted within 30 days following EVAR, compared with 6.4% following OR.

The level of case-ascertainment for these procedures is currently unknown because the coding of complex aortic procedures in the national administrative hospital datasets prevents these procedures from being clearly identified.

### **Repair of ruptured abdominal aortic aneurysms**

During the audit period (Jan 2019- Dec 2020) covered in the 2020 NVR report, details of 1,155 procedures were submitted to the NVR (720 OR and 435 EVAR)

There were 477 procedures recorded on the NVR in 2020, compared to 678 in 2019, which represents a reduction of 30%.

Compared to patients undergoing elective surgery, patients who had surgery for a ruptured AAA were older (more than 50% were >75 years old) and had larger aneurysms.

In the 2015 NVR Annual Report, open repairs constituted 78% of all procedures. Since then, the choice of EVAR has increased over time; in 2020, 41.3% of patients with ruptured AAA underwent EVAR.

The in-hospital postoperative mortality rates for OR were 39.5% (95% CI 34.9 to 44.3) in 2019 but increased to 50.0% (95% CI 44.0 to 56.0) for 2020. For EVARs, the rates were around 20% for both years. This is likely to reflect the selection of more stable patients with better aortic anatomy for EVAR.

The results of the IMPROVE trial reported 30-day mortality rates of 37.4% for open repair and 35.4% for EVAR among patients with ruptured AAA. The NVR data does not include any information on out-of-hospital care, such as transfers of patients from non-arterial hospitals to arterial hospitals. This may mean that comparisons between patient characteristics and post-op outcomes at different NHS trusts should be interpreted with caution.

All NHS trusts demonstrated in-hospital mortality rates after repair for ruptured AAA within the expected range around the overall national average (34.5%). The range is 20-60%, to reflect some centres with relatively low volumes.

Where data was submitted on anaesthetic technique, this continued to show a trend towards the use of LA as the primary anaesthetic technique. 50% of cases were LA alone and a further 7% RA (technique not specified). We hope in future to gain information on the use of sedation and conversion rates under LA.

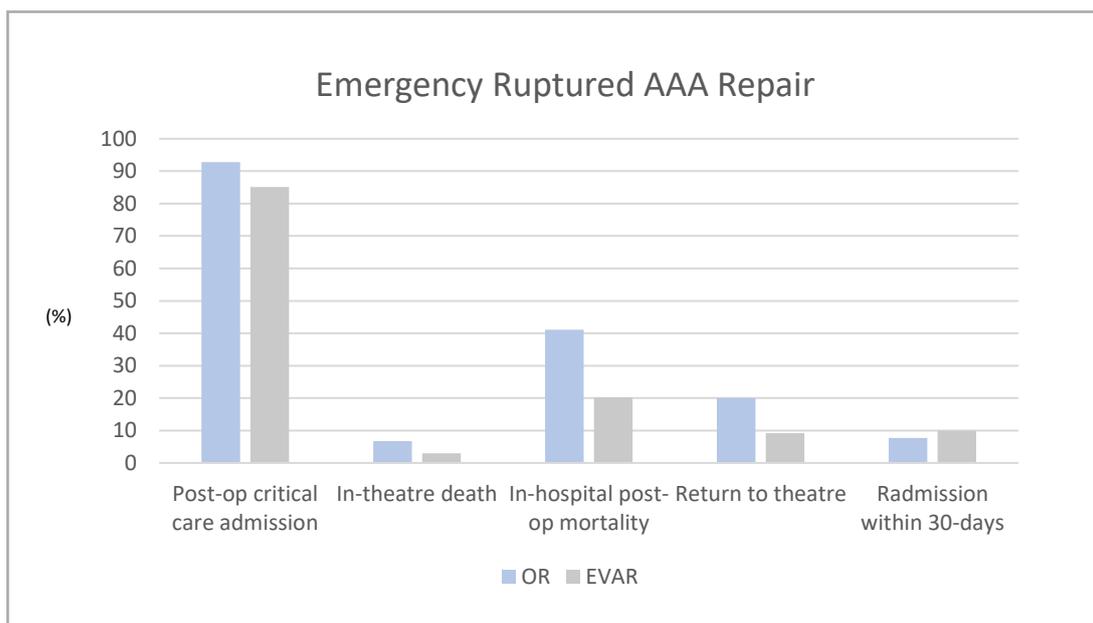
Postoperative details of emergency repairs for ruptured AAAs undertaken between January 2019 and December 2020 as follows:

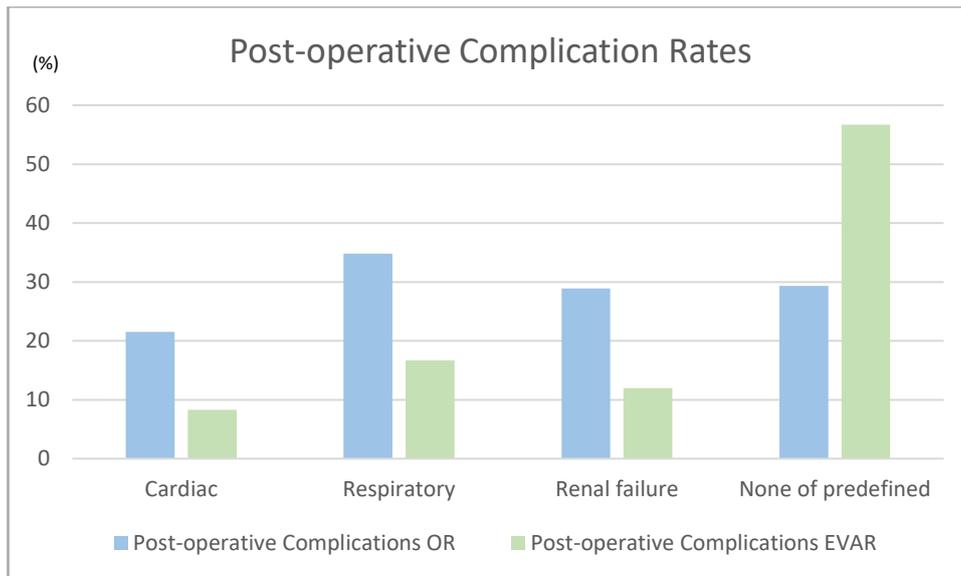
- median length of hospital stay was 14-15 days for OR compared with 7 days in 2020 and 9 days in 2019 for EVAR, among those discharged alive
- Over 80% of patients who had OR required level 3 critical care after the procedure, compared to 40% following EVAR
- a greater proportion of patients who had open repair suffered from cardiac, renal and respiratory complications

These figures should not be directly compared because patients who have open procedures may represent the more complex cases that are unsuitable for endovascular repair. Further work is required to clarify which patients benefit most from the two approaches.

Major recommendation:

- Improve access to EVAR for emergency AAA via network based pathways, access to hybrid facilities 24/7 and surgical/radiology workforce planning.





## Lower Limb Interventions for Peripheral Artery Disease

### 1) Lower limb revascularisation

A total of 28,918 lower limb revascularisation procedures (endovascular, hybrid and open bypass) were performed between 2019 and 2020, which is up from the previous year. NHS hospitals submitted a total of 11,371 open surgical bypass procedures to the NVR, which is a significant drop of over 30% from the 2020 report.

- 52.1% elective bypass procedures were performed in 2020, which is 30% drop from 2019 (61.3%). There were 47.9% non-elective bypass procedures performed in 2020, compared to 38.7% in 2019
- Majority of patients were over the age of 60 years presenting for elective and non-elective procedures, 79.7% and 80.3% respectively.
- Most had comorbidities, the commonest being hypertension (70.5% elective, 67.3% non-elective), followed by ischaemic heart disease (34.6% elective, 34.9% non-elective) and diabetes (34.5% elective, 39.9% non-elective). A small proportion of patients had no comorbid disease (11.5% elective, 11.4% non-elective)
- 85.2% of elective patients and 73.8% of non-elective patients were recorded as being on one anti-platelet agent
- Timing to revascularisation for chronic limb threatening ischaemia:
  - Median wait from admission to surgery was 4 days
  - 58.8% of patients had their bypass within 5 days of admission (the PAD QIF standard), which is a significant improvement from 47% in 2019
- The length of stay was 5 days (IQR 3-8) for elective procedures and 13 days (IQR 8-22) for emergency procedures

- Complications were relatively uncommon: 91.9% of elective and 81.5% of non-elective procedures did not require a further unplanned intervention

The In-hospital postoperative mortality rate was 1.6% for elective patients and 4.9% for non-elective patients.

The report highlighted that the risk adjusted in-hospital mortality following lower limb bypass has slightly improved over time and is steadily decreasing from 2.8% (2014 to 2016) to 2.6% (2016 to 2018) to 2.8% in this cycle.

For bypasses, 86.9% were under general anaesthetic and 8.7% had some local infiltration

For angioplasty, as in previous years, LA was the predominant anaesthetic technique used (in 90.5% % of procedures). RA was used in 1.9%, with only 7.6% GA. Conversion rates and use of sedation were not logged but these are ambitions for future data collection.

#### Major Recommendations:

- Vascular units should review their pathways of care for patients with critical limb ischaemia using the VSGBI Quality Improvement Frameworks for peripheral arterial disease
- Patients admitted with critical limb ischaemia as non-elective should have a revascularisation procedure within 5 days
- Improved data entry for this group especially for those who require a second unplanned procedure during the same admission

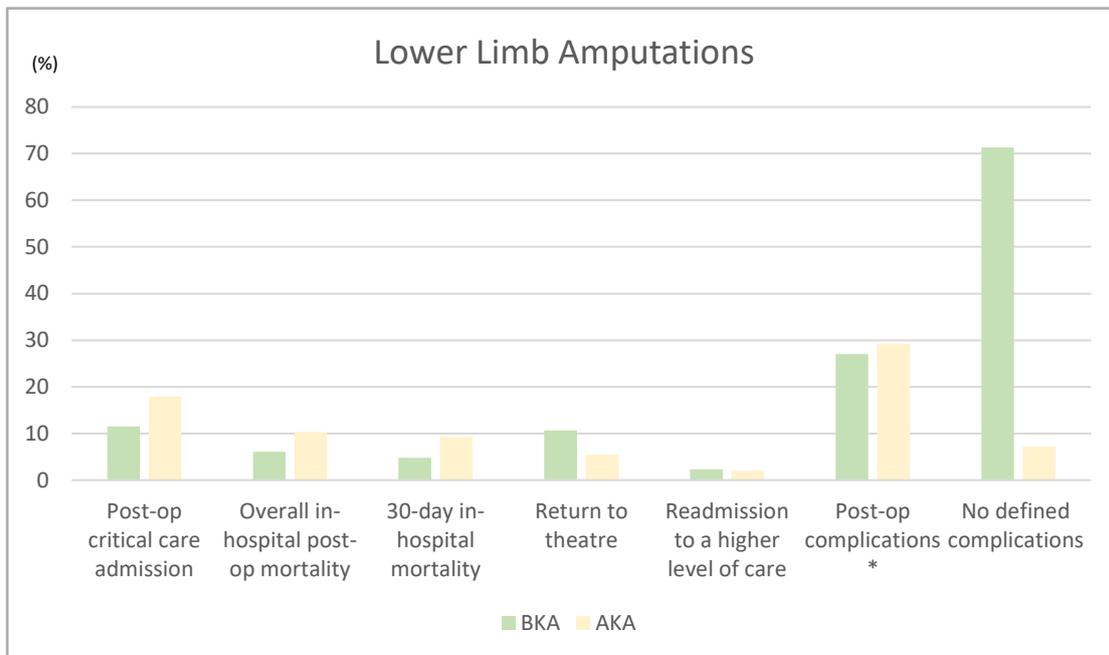
## ***2) Major lower limb amputation***

There were 6,429 major unilateral amputations performed between January 2019 and December 2020. In 2020, a total of 3,169 major unilateral amputations were performed; 50.4% below-knee amputation (BKA) and 49.6% above-knee amputation (AKA)

- BKA's were more common in those under the age of 60 (31.3%), while AKA were more common in those over the age of 80 (23.4%). Most patients in both groups were mainly men, and were either current or ex-smokers
- Majority of patients requiring a BKA were diabetic (69.1%), compared to the majority being hypertensive (64.7%) in those requiring an AKA.
- It was common for patients to be on multiple medications, antiplatelet agents and statins being the commonest.
- Oral anticoagulants were taken by 39.2% of patients
- Most patients were non-elective admissions and > 85% underwent surgery during daytime hours

- A consultant was present in > 70% of cases, however, this did not relate to the severity of the ASA assessment. Consultant presence for AKA was lower (73.6% compared to 77.6% for BKA)
- Prophylactic antibiotics and DVT prophylaxis were recorded in under 70% of patients. This does not reflect actual clinical practice but failure of data entry
- 1 in 5 patients suffered a complication following major amputation; these were commonly respiratory (7.9% BKA, 11.4% AKA), cardiac (3.9% BKA, 4.3% AKA) complications and surgical site infections (6.4% BKA, 3.9% AKA). The proportion of cardiac complications were smaller in 2020 compared to 2019 (4.1% BKA, 6.2% AKA)
- 10.7 % BKA and 5.5% AKA had a return to theatre during their admission

Anaesthetic data showed reasonable consistency with previous data. 67 % of procedures were done under GA, 18 % were combined GA with LA/RA. 33 were under LA/RA alone (a slight increase from 28% last year and 21 % the year before – we will continue to monitor this trend. No data on any outcome effect were given.



\*Post-op complications include: respiratory, cardiac, limb ischaemia, renal failure, surgical site infection, post-operative confusion, haemorrhage, cerebral

**Major Recommendations:**

- Patients for major amputation should be admitted to a recognised arterial centre via agreed time based protocols
- Patients admitted non-elective for critical limb threatening ischaemia should have their revascularisation surgery within 5 days
- A consultant should be present or at least supervising a senior trainee (ST4 and above) undertaking the amputation

- The patient should have routine antibiotic and DVT prophylaxis according to local policy and this should be recorded on NVR

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