

# Vascular surgery in Victorian public hospitals 2003

Report to the public

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Published by the Quality and Safety Branch, Victorian Government  
Department of Human Services, Melbourne, Victoria, Australia.

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Also published on [www.health.vic.gov.au/vascularsurgery](http://www.health.vic.gov.au/vascularsurgery)

September 2005

(DW50501)

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## Introduction

The Melbourne Vascular Surgery Association (MVSA) was formed over ten years ago. MVSA has a membership of 30 vascular surgeons working in Melbourne, Geelong, and several country areas of Victoria. All of Melbourne's metropolitan public hospitals are represented in the Association. Approximately half of the participating surgeons also contribute their private practice data to the MVSA.

The MVSA commenced an independent audit of vascular surgery in 1999. As the volume of collected data increased, it became apparent that it would exceed the resources of this small group. The MVSA approached the Quality and Safety Branch of the Victorian Department of Human Services (the Department) to assist in managing the audit project. In 2003 the Department funded the audit project to facilitate the analysis and publication of the results of vascular surgery in Victoria in an Annual Report. In order to assess the performance of Victoria's vascular surgery units, four different areas of vascular surgery were determined, to be appropriate for auditing.

The areas of vascular surgery assessed were:

- 1 Stroke rate after carotid endarterectomy
- 2 Occlusion rate after infra inguinal bypass (for claudication and for tissue loss)
- 3 Amputation rate after infra-inguinal bypass
- 4 Death rate after repair of infra-renal aortic aneurysm (elective and ruptured)

These terms are explained in more detail later in the report.

The provision of results to the Department was achieved through a cooperative arrangement between the MVSA, the Royal Australasian College of Surgeons and the Australian and New Zealand Society for Vascular Surgery. The overall process for surgery auditing exists under the auspices of the Melbourne Vascular Surgery Quality Initiative (MVSQI). The following thirteen public hospitals participate in the audit process.

**Table 1: Participating hospitals**

Hospital	Surgeon in charge of data collection
The Alfred Hospital	Mr Campbell Miles
Austin Hospital	Mr Andrew Roberts
Ballarat Hospital	Mr Michael Condous
Box Hill Hospital	Mr Barry Beiles
Dandenong Hospital	Mr Roger Bell
Frankston Hospital	Mr George Somjen
Geelong Hospital	Mr David McClure
Monash Medical Centre	Mr Roger Bell
Northern Hospital	Mr Bernard Allard
Royal Melbourne Hospital	Mr Bernard Allard
St. Vincent's Hospital	Mr Mark Westcott
Western Hospital	Mr Barry Beiles
Williamstown Hospital	Mr Gary Frydman

## Data processes

The vascular surgery units in all the reporting public hospitals use standardised data collection forms. In a similar manner, standardised discharge data forms are also used. Data is entered onto a database developed by the MVSA.

In 2004, the Baker Medical Research Institute was retained to take over data management and to confirm data integrity provided by the participating hospitals. In addition, the staff members at the Cardiovascular Disease Prevention Unit – Baker Medical Research Institute are responsible for assessing the completeness and accuracy of the data submitted by the individual public hospital vascular units.

Data is circulated first to each individual site. De-identified audit results are then provided to the MVSQI steering committee. Following this, the results from the audit are reviewed, and can be used to assist in further development of appropriate standards and actions. The data analysed in this report has been risk-adjusted (except for carotid endarterectomy outcomes) and has been subjected to further statistical analysis, which can detect poor outcomes in a timely manner.

## MVSQI Steering Committee members

Representing the Melbourne Vascular Surgery Association

- Mr Barry Beiles
- Mr Andrew Roberts
- Mr Campbell Miles

Representing the Baker Medical Research Institute

- Professor Colin Johnston
- Associate Professor Christopher Reid
- Mrs Claudia Regetan

Representing the Department of Human Services

- Ms Alison McMillan

## Carotid endarterectomy

A carotid endarterectomy is an operation performed on the large arteries in the neck. There is a carotid artery on each side of the neck and between them the carotid arteries supply 80 per cent of the blood flowing to the brain. Deposits of cholesterol in the carotid arteries (atherosclerosis) can cause severe narrowing and block the arteries. This narrowing may result in a stroke. The operation (endarterectomy) is performed to remove the blockage and to prevent a stroke from occurring. The operation is performed along with other non-surgical therapies to control the risk factors for arterial disease.

These other therapies are:

- Lowering blood cholesterol levels to below 5 mmol/L
- Cessation of smoking
- Control of high blood pressure
- Control of diabetes.

In most cases patients are also commenced on drugs such as aspirin, which reduce platelet activity and inhibit clotting. This reduces the likelihood of blockages.

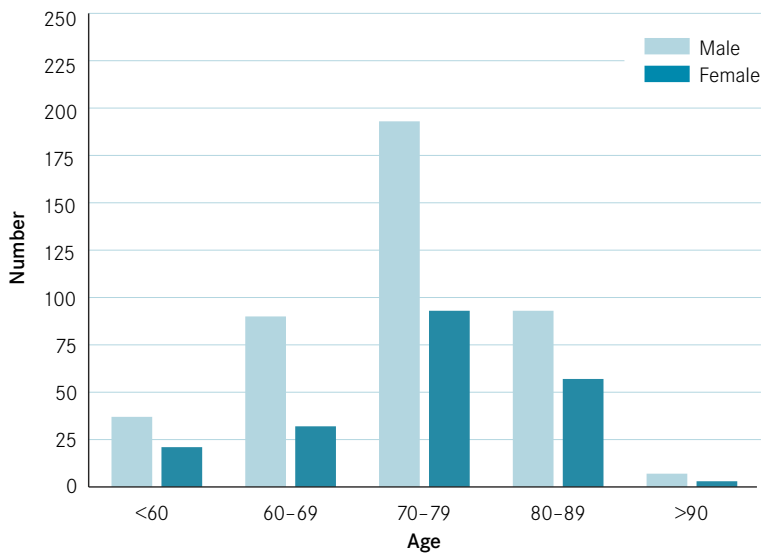
Endarterectomies may either be undertaken in a patient who has severe narrowing of the carotid arteries but no symptoms, or in a patient who has already experienced a ‘mini-stroke’ called a transient ischaemic attack (TIA). Another symptom that may occur is a temporary loss of vision occurring in one eye. Vision loss typically lasts only seconds, but may last for hours. This condition is called amaurosis fugax. The operation may also be indicated after a patient has had a stroke where the patient has a good recovery of brain function.

Asymptomatic narrowing is often identified after the carotid artery is listened to with a stethoscope. The diagnosis is made with a test called a duplex ultrasound scan or sometimes an angiogram with injection of a radio-opaque contrast dye is required.

### Demographic data for patients undergoing carotid endarterectomy 2003

Number of operations	624
Mean age Male	74 years
Mean age Female	75 years

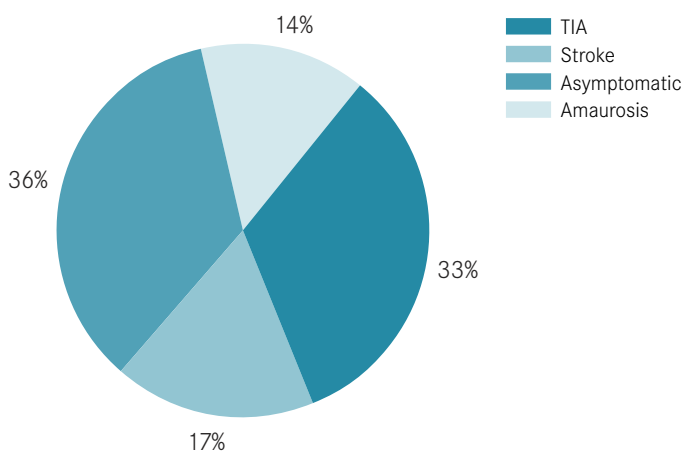
**Figure 1: Age and gender–Carotid endarterectomy**



**Risk factors noted at the time of surgery**

Diabetes	27 per cent
Ischaemic heart disease	53 per cent
Cigarette smokers	74 per cent
Hypertension	84 per cent

**Figure 2: Indication for carotid endarterectomy surgery**



## Audit area 1 – Stroke rate after carotid endarterectomy

This operation is performed to prevent the patient from experiencing a stroke, or to prevent them having another stroke. Stroke is also the most common major complication of the operation and this may occur during or immediately after the procedure. Many studies of the operation in the medical literature indicate the operative risk of a stroke with the operation needs to be less than 5 per cent to be of benefit to the majority of patients having the operation when a previous stroke or mini-stroke is the reason for the surgery.

The acceptable mean stroke rate for patients undergoing carotid endarterectomy in Victoria has been set at 3 per cent.

### Results from the MVSQI for 2003

Of the 624 patients who had carotid endarterectomy performed during 2003, six experienced a stroke associated with surgery. This is a mean stroke rate of 1.12 per cent. On detailed individual analysis, all hospitals showed stroke rates below the acceptable upper limit. Ongoing analysis of performance is carried out to identify the occurrence of increased and unacceptable complication rates.

**Table 2: Stroke after carotid endarterectomy–Public hospitals**

Hospital code	1	2	3	4	5	6	7	8	9	10	11	12	13
Stroke (number)	0	0	0	1	1	0	0	0	2	0	0	0	0
Total procedures	46	41	27	53	16	15	28	24	16	74	68	30	6
Stroke rate (per cent)	0	0	0	1.9	6.25	0	0	0	12.5	0	0	0	0

## Infra-inguinal bypass

Similar to the carotid arteries in the neck and the coronary arteries in the heart, the arteries in the lower limbs can become partly or completely blocked by cholesterol deposits. The patients affected by arterial disease are most often the elderly who have multiple associated conditions including heart disease, diabetes, hypertension and smoking-related lung disease.

When the leg arteries are blocked the patient may experience no symptoms or have pain in the legs when walking. This is referred to as claudication. This pain can range from mild to severe. Ulceration or gangrene of the leg tissue can also occur. When the symptoms of claudication are severe, or if the survival of the leg is threatened, then the blood flow to the leg will need to be improved by either:

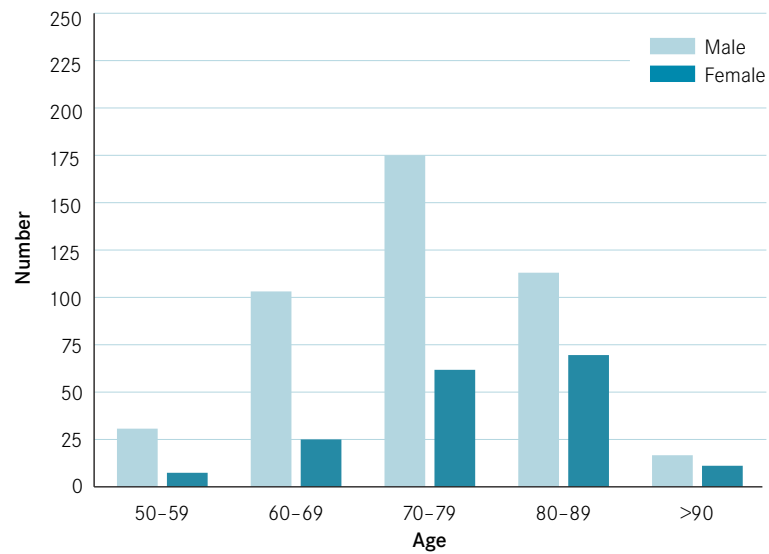
- Angioplasty (stretching the wall of the artery with a balloon)
- Bypass operation, or
- A combination of both.

Bypass is performed if the vessel disease is advanced or unsuitable for angioplasty. A graft is inserted to bypass the blockage and conduct blood from the groin artery above the blockage to the artery at the knee level below the blockage. This procedure is called an infra-inguinal (below the groin) bypass. The graft used for the bypass is usually a vein from the leg. Another option used where venous grafting is unsuitable or unavailable, involves the use of a vein from the arm or a synthetic (plastic) graft.

### Demographic data for patients undergoing infra-inguinal bypasses 2003

Number of operations	622
Male	71.2 per cent
Mean age Male	74 years
Mean age Female	75 years
40 per cent of patients were aged greater than 80 years	

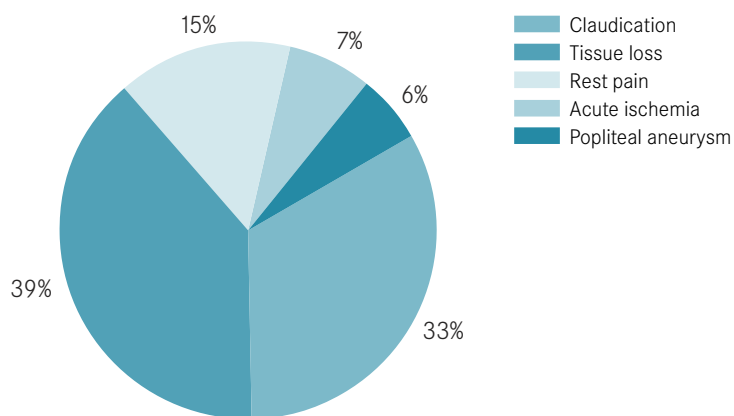
**Figure 3: Age and gender infra-inguinal bypass**



**Risk factors noted at the time of surgery**

Diabetic	39 per cent
Ischaemic heart disease	53 per cent
Current smokers	16.7 per cent
Ex smokers	56 per cent

**Figure 4: Indication for infra-inguinal bypass surgery**



## Results from the MVSQI for 2003

The MVSQI assesses the success rate of surgery for infra-inguinal bypass. The desired outcome is the discharge of the patient from hospital with a functioning bypass graft and a limb that has been saved from amputation. As such, the rates of occlusion and amputation following infra-inguinal bypass have been chosen for review.

Sometimes the extent of disease is so advanced that the leg needs to be amputated to save the patient's life, and sometimes a leg has to be amputated despite a functioning bypass if the pre-existing tissue loss is too advanced.

Several factors are associated with a higher than usual graft occlusion rate. These include: grafting onto the calf or foot arteries, the use of synthetic grafts, current smoking and bypasses performed for tissue loss.

All bypasses performed during 2003 have been examined to establish:

- The rate of graft occlusion when performed for claudication as well as for tissue loss, and
- The rate of amputation following infra-inguinal bypass.

Comparison of performance for infra-inguinal bypass outcomes with other publications is difficult because most series report results at 30 days, whereas the MVSQI assesses results at the time of discharge from hospital. Assessment at discharge was chosen to ensure complete and accurate collection of data.

## Audit area 2 – Occlusion following infra-inguinal bypass

The crude or unadjusted rate of graft occlusion following infra-inguinal bypass for disabling claudication (203 operations) for all hospitals was 5.9 per cent. On more detailed examination using cumulative sum analysis (CUSUM) no hospital recorded occlusion rates that were unacceptable. More detailed comparison will be possible as the numbers of recorded procedures increase.

**Table 3: Occlusion following all infra-inguinal bypasses–Public hospitals**

Hospital code	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>Total Bypasses</b>	4	41	39	64	43	16	5	19	19	77	16	55	52
<b>Occlusions (number)</b>	0	5	1	11	6	1	0	1	1	5	0	5	3
<b>Occlusion rate (per cent)</b>	0	12	2.6	17	14	6.3	0	5.3	5.3	6.5	0	9.1	5.8

**Table 4: Occlusion following infra-inguinal bypass for tissue loss–Public hospitals**

Hospital code	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>Total Bypasses</b>	1	18	16	20	20	8	3	7	6	31	6	30	31
<b>Occlusions (number)</b>	0	3	1	3	4	0	0	0	0	1	0	5	2
<b>Occlusion rate (per cent)</b>	0	16.7	6.3	15	20	0	0	0	0	3.2	0	16.7	6.5

## Audit area 3 – Amputation following infra-inguinal bypass

The crude amputation rate was 2.1 per cent (13 out of 622 patients). Risk adjustment has been applied to this outcome as with all previous infra-inguinal bypass data and further statistical analysis shows that there were no hospitals with poorer than expected results.

## Aortic aneurysm surgery

An abdominal aortic aneurysm is an enlargement, dilatation or bulging of the main artery (aorta) in the abdomen. This results from a weakening of the wall of the normal aorta. The majority (96 per cent) begin below the renal (kidney) arteries. The risk of rupture of the aneurysm increases progressively with increasing aneurysm size. Once the maximum diameter of the aneurysm exceeds 5.5 centimetres the risk of rupture rises sharply. The expected surgical mortality after elective repair of non-ruptured aortic aneurysms is relatively low while surgical repair following rupture of an abdominal aortic aneurysm is associated with significant morbidity and mortality.

The traditional technique of open surgical repair of abdominal aortic aneurysm, which has been performed over the last fifty years, replaces the aneurysmal artery with an artificial or prosthetic (usually dacron) graft. The aorta above and iliac arteries below the aneurysm are temporarily clamped off. A graft is then sewn to the non-aneurysmal artery above and below the aneurysm. The graft may be either a ‘tube’ (straight) or ‘trouser’ (bifurcated) configuration depending on the extent of the aneurysmal disease. Open surgical repair was performed in all cases of ruptured aneurysms.

An alternative to open surgical repair has been practised since 1991 using a minimally invasive ‘keyhole’ approach. In this procedure a prosthetic stent graft, which is mounted on a metal skeleton, is introduced via the femoral arteries in the groin and placed in position within the aneurysm like an ‘internal sleeve’. Blood then flows from the normal, non-aneurysmal aorta through the stent graft and on into the arteries below the aorta. The long-term results of endovascular aortic repair (EVAR) continue to be evaluated worldwide. More recently, ruptured aortic aneurysms have been treated with endografts and early encouraging results have been reported.

### Demographic data for patients undergoing aortic aneurysm surgery 2003

Number of operations	487
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**Elective aneurysms 389 patients**

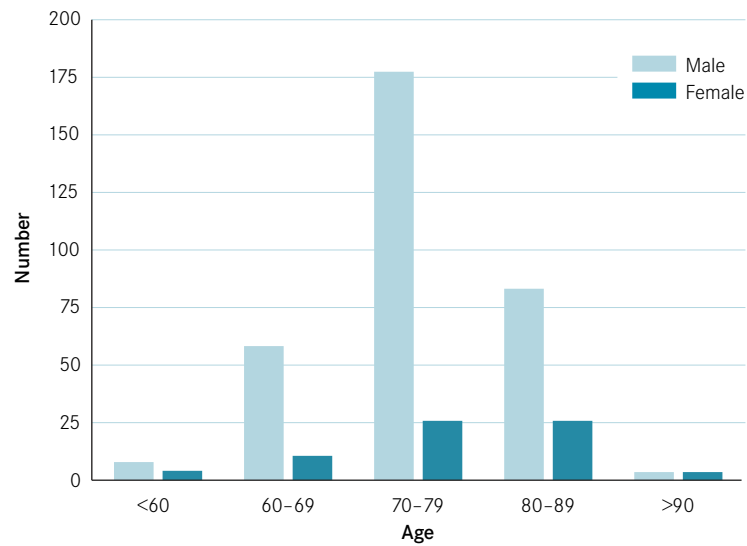
Male 82.5 per cent

Mean age Male 76 years

Mean age Female 78 years

33 per cent were aged greater than 80 years

**Figure 5: Age and gender–Elective AAA.**



**Risk factors noted at the time of surgery**

Hypertension 73 per cent

Ischaemic heart disease 54 per cent

**Ruptured aneurysm 88 patients**

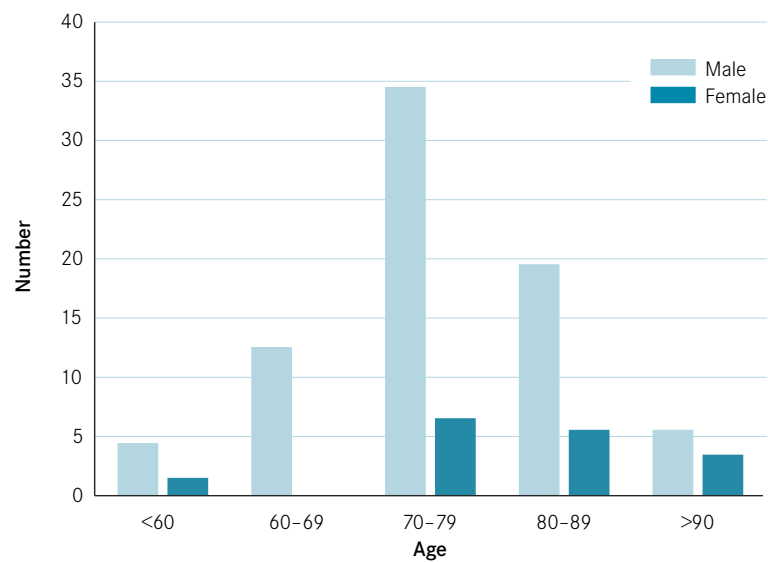
Male 82.5 per cent

Mean age Male 77 years

Mean age Female 80 years

40 per cent were aged greater than 80 years

**Figure 6: Age and gender–Ruptured AAA**



**Risk factors noted at the time of surgery**

Hypertension 61 per cent

Ischaemic heart disease 37 per cent

## Audit area 4 – Death rate after repair of infra-renal aortic aneurysm

### Results from MVSQI for 2003

The overall crude (non risk-adjusted) mortality for all patients undergoing aortic aneurysm surgery was 7.39 per cent.

#### Open surgical repair

Open surgical repair was performed in 224 patients. The elective ‘open’ surgery group had a mortality rate of 1.8 per cent. As expected the group of patients (n=88) who underwent repair of a ruptured aneurysm had a much higher mortality rate of 33 per cent. This higher rate is expected given the morbidity associated with the rupture of aneurysm.

#### Endovascular repair

Endovascular repair (EVAR) was performed in 165 patients with a similarly low mortality of 1.21 per cent. These results are comparable to currently accepted international standards. If endovascular repair proves to be durable and the need for secondary interventions is small, this may become the method of choice for treating anatomically suitable aneurysms.

Logistic regression statistical analysis of the results illustrated that a higher risk of death occurs in patients aged over 80 years of age, in females and where suprarenal cross clamping (where the clamp is placed above the kidney arteries) was required to control bleeding during open surgery. Rupture of an aneurysm also carries a higher risk of death, as does surgery for aneurysms that extend above the kidney arteries. Further statistical analysis also showed that all reporting hospitals performed satisfactorily during 2003.

**Table 5: Mortality for elective AAA repair by hospital—Public hospitals**

Hospital code	1	2	3	4	5	6	7	8	9	10	11	12
Total cases	30	43	18	38	13	27	36	9	3	30	13	9
Mortality (number)	0	0	0	3	0	1	0	0	0	0	0	0
Mortality (per cent)	0	0	0	7.9	0	3.7	0	0	0	0	0	0

**Table 6: Mortality after ruptured AAA repair by hospital—Public hospitals**

Hospital code	1	2	3	4	5	6	7	8	9	10	11
Total cases	7	13	9	2	10	12	3	11	4	6	4
Mortality (number)	4	7	2	0	2	1	3	2	2	3	2
Mortality (per cent)	57	54	22	0	20	8	100	18	50	50	50

## Conclusion

This report assures the community that they receive a high standard of treatment for arterial disease in Victorian public hospitals. The report has focused on the three most common surgical procedures used to treat cerebrovascular disease, aortic aneurysmal disease and occlusive disease of the lower limbs. This report will be published on an annual basis to ensure that this high standard is maintained.

Low numbers of procedures, such as with carotid endarterectomies, make analysis difficult. Similarly, when the infra-inguinal data was checked for each individual hospital, there were no identifiable problems but the number of operations in this group was also low at some hospitals. It may be only when the subcategories of procedures are analysed separately that a problem appears, as there is no detectable issue of competence when the group as a whole is assessed. It is, therefore, important that results from individual surgeons are reviewed separately from consolidated hospital results. This helps to ensure the identification and management of higher than expected complication rates.

A careful process of clinical evaluation by experienced clinicians has been adopted by the MVSA as the definitive step in assessing whether or not there has been unacceptable performance. This has been refined after lengthy debate, and membership of the MVSA implies compliance with this process.

The publication of this report demonstrates the value of having a professional group such as the MVSA auditing clinical performance. Contracting an independent body such as the Baker Medical Research Institute to oversee the data collection process, data integrity and validation and data analysis enhances the quality of this regulation. This has only been possible because of the involvement of the Department of Human Services. This is expected to be an ongoing arrangement in order to ensure that Victorians receive the highest possible quality of health care by vascular units in the State.

