

## DRAFT

### **THE PROVISION OF EMERGENCY VASCULAR SERVICES 2007 (FINAL DRAFT 26.2.07)**

The aim of this document is to provide assistance in the setting up of emergency vascular services, by providing a checklist of the issues which need to be considered. The recommendations are not intended to be prescriptive but simply to provide help and guidance for this complex process.

The stimulus for collaborative rotas most often comes from vascular surgeons who cannot provide reasonable on site rotas, or from managers who are faced with a problem in the provision of emergency vascular care. However, emergency vascular rotas have implications for many other disciplines and services – for example, diagnostic and interventional radiology, anaesthesia/intensive care, general surgery, accident and emergency departments, and ambulance services.

The details of any emergency rota will depend heavily on local circumstances including the size of hospitals and their catchment populations, the distances between adjacent hospitals, and numbers of specialists.

#### ***1. Background***

- 1.1 Emergency vascular problems comprise acutely ischaemic (bloodless) limbs, leaking abdominal aortic aneurysms, and a miscellany of other conditions, including vascular trauma. These form a substantial proportion of emergency surgical admissions, and a major component of the workload for vascular surgeons<sup>1-4, 14</sup>. In contrast the majority of emergency vascular radiological interventions are for haemorrhage from the gastrointestinal tract or secondary to major trauma. There has been considerable debate about provision of emergency vascular services for a number of years<sup>5-8</sup>.
- 1.2 In the past general surgeons have often dealt with these patients. However, with increasing subspecialisation many surgeons without a specialist vascular interest have become concerned about their ability to treat vascular emergencies properly. The reasons for this are:
  - (i) Treatment of these patients has changed radically in recent years, becoming increasingly complex, and involving a team approach, including specialists in interventional radiology (particularly for acute limb ischaemia)<sup>9</sup>.
  - (ii) General surgeons who are not vascular specialists undertake no elective arterial surgery, and it is difficult for them to justify treating vascular emergencies under the scrutiny of clinical governance. Likewise, the Royal College of Radiologists recommends that Fellows should not be managing conditions outside routine hours that they would otherwise not be involved in treating routinely.

## DRAFT

- (iii) There is an accumulation of evidence that outcomes are better when vascular patients are treated by vascular specialists<sup>8</sup>.
  - (iv) The modern generation of newly appointed consultant general surgeons is insufficiently trained and experienced to manage complex emergencies outside their own specialist field<sup>10</sup>.
  - (vi) The general public expects that when they come into hospital a specialist will treat them.
- 1.3 The National CEPD report on Abdominal Aortic Aneurysms<sup>15</sup> recommends that “Strategic Health Authorities and Trusts should co-operate to ensure that only surgeons with vascular expertise operate on emergency aortic aneurysm patients, apart from exceptional geographical circumstances”. Their report found that although nearly every elective aneurysm studied was operated on by a vascular consultant, only 69% of emergency operations were performed by surgeons who had done five or more emergency aneurysm repairs in 2002/03. They also found that a greater proportion of patients underwent emergency surgery when admitted to larger vascular units, when managed by a member of the Vascular Society and when treated in a hospital with a vascular surgery on-call rota. The failure to operate on or transfer suitable ruptured aneurysm patients by on call non-vascular general surgeons is a significant cause of their increased overall mortality<sup>18</sup>.
- 1.4 There are insufficient vascular surgeons and interventional radiologists in most hospitals to provide a formal emergency rota, although many vascular specialists have striven to provide an emergency service by making themselves available well in excess of the on call rota recommended for vascular surgery<sup>13</sup>, which is currently no more onerous than 1 in 6. Many examples of *ad hoc* arrangements for cover of vascular emergencies exist, but few guarantee availability of vascular specialists at all times, and all depend on the goodwill of surgeons to treat newly referred patients when they are not contractually on call. It is no longer appropriate for hospitals which receive unselected general surgery emergencies not to have robust service and financial arrangements for the treatment or transfer of vascular emergency patients so that they can access specialist vascular care.
- 1.4 For most hospitals, there is an imbalance between the number of vascular surgeons required to do the elective arterial and venous surgery, and the number required for a formal emergency rota.
- 1.5 With all these considerations in mind, national recommendations have been published for the provision of vascular services<sup>8, 13</sup>. In 2004 the Vascular Society made recommendations for three categories of vascular unit<sup>13</sup>:
- (i) **Hospitals with two or more vascular surgeons.** These hospitals should have all the facilities required to offer a comprehensive, modern vascular service and may work with adjacent hospitals to provide a clinical network for emergency and, in some

## DRAFT

cases (see (iii) below), elective vascular patients. Where appropriate, these services should consider centralisation on a single site for diagnostic and interventional radiology and for major arterial and emergency surgery, with out-reach clinics and day surgery at the other sites to provide a point of local access for vascular patients.

- (ii) **Hospitals with a single-handed vascular service.** The vascular services in these hospitals are not in the best interests of vascular patients and should merge with an adjacent vascular service to provide a sustainable and effective vascular service on a single site, as in (i) above, maintaining only local out-patient clinics and day case surgery to provide a point of access for patients to the service.
- (iii) **Hospitals with no vascular service.** These hospitals should have strong links to the closest vascular unit for elective and emergency vascular patient care, with a visiting vascular surgeon from that unit providing outpatient clinics and day surgery locally.

1.6 Considerable debate continues with respect to the best model for the provision of emergency vascular services, particularly with respect to:

- (i) **Centralisation:** Arrangements for centralisation of vascular services in one hospital, while withdrawing services from others nearby. This creation of “major units” is almost invariably associated with difficult negotiations and only 2% of UK vascular units have plans to centralise<sup>13</sup>. There is resistance on the part of those hospitals which would lose their vascular services and consultants find it difficult to move from a hospital where they are known and respected and where they may have other clinical interests besides their vascular practice (egg transplant or emergency general surgery). Nevertheless, centralisation aims to create a high volume vascular unit, where patient outcomes are known to be superior<sup>8</sup> and where emergency rotas and training opportunities are easier to organise.
- (ii) **Collaboration.** Over 40% of adjacent hospitals with a vascular service in the UK have now established clinical network arrangements for emergency vascular rotas<sup>13</sup>, whilst retaining their elective vascular services locally. Where these arrangements have been established they work well and collaboration is now the most common way of providing emergency vascular services. There are a number of possible models for collaborative provision of emergency vascular services: these are described in section 4 and should be considered in conjunction with provision of imaging and interventional radiology cover.

## 2. Definitions

2.1 For the purposes of this document, the following definitions are used:

- (i) **Vascular surgical emergencies.** Patients with an immediate threat to life or limb (e.g. leaking aortic aneurysm, bloodless limb, trauma). This is the main group at whom the concept of an emergency vascular rota is directed.

## DRAFT

- (i) ***Vascular radiological emergencies.*** Whilst there is considerable commonality with vascular surgical emergencies this also includes management of haemorrhage (gastrointestinal bleeding, trauma and post partum) and pulmonary embolism.
  - (ii) ***In-house emergencies.*** There are two types. First, vascular emergencies that simply cannot be moved – for example patients with a vascular disaster who are already anaesthetised on an operating table. Second, there are vascular emergencies which arise on the wards. These patients may pose special difficulties when deciding exactly how collaborative rotas will work.
  - (iii) ***Urgent vascular cases.*** These make up the bulk of vascular patients admitted to hospital on the emergency surgical take (e.g. acute on chronic ischaemia but with a viable limb). They can be admitted to hospital and referred for a specialist vascular opinion the next day. There are also many patients about whom General Practitioners are urgently worried but who could be seen in clinic or on a ward by arrangement within a few days, rather than being admitted as an emergency.
- 2.2 ***Vascular surgeons.*** The term “vascular surgeon” means a surgeon with expertise and a regular practice in vascular surgery. Membership of The Vascular Society requires a recommendation from two colleagues that the individual is a practising vascular specialist and offers an additional credential to a listing on the Specialist Register of the General Medical Council as a trained general surgeon. There are increasing numbers of vascular surgeons who undertake no general surgery, although vascular surgery remains a part of general surgery for training purposes.
- 2.3 ***Vascular interventional radiologist.*** The term refers to a radiologist with expertise and regular practice in vascular diagnosis and intervention.

### 3. *The implications for patients*

- 3.1 The fundamental aim of these proposals is that patients with emergency vascular problems should have access to treatment at all times by a team that includes consultants with both surgical and interventional radiology expertise.
- 3.2 Access to specialist care will often involve transfer of patients to the nearest hospital where emergency vascular treatment is available. In certain geographical areas this may involve travelling some distance, but there is good evidence that patient outcomes are not related to the distance travelled if they reach a centre where vascular expertise is available<sup>16</sup>.
- 3.3 The most severely ischaemic (bloodless) limbs require treatment within about six hours of onset if significant permanent damage is to be avoided. The evidence suggests that transfer of patients with leaking aortic aneurysms has no adverse effect on overall mortality. Indeed patient mortality after a ruptured abdominal

## DRAFT

aortic aneurysm may be as high as 95% if they stay in a hospital under the care of a non-vascular general surgeon, compared to as low as 35% if they transfer to an adjacent vascular service<sup>17,18</sup>.

- 3.4 Hypotension is not a contra-indication to transfer and although mortality increases with duration of hypotension, survival after surgery on a vascular unit is still 35% after 4 hours of hypotension<sup>19</sup>, which can be a better outcome than leaving the patient where they are without access to a vascular service. The only exception is the patient who suffers a cardiac arrest on presentation, as such patients are unlikely to survive either the transfer or any subsequent surgery on a vascular unit<sup>20</sup>.
- 3.5 When patients present as emergencies to hospitals without a vascular service, the decision about transfer should be straightforward. When they present to hospitals with a vascular service but without a vascular surgeon on call for emergencies, then the decision about transfer will depend on assessment by a sufficiently experienced doctor, guided by clear protocols. Local protocols should be developed, describing both the clinical criteria and the arrangements for transfer of patients.
- 3.6 When a patient presents to a hospital requiring the emergency expertise of an interventional radiologist but this is not available there need to be clear guidelines and protocols available to transfer the patient appropriately.
- 3.7 Arrangements for treatment of in house emergencies will depend on local circumstances and agreements. Patients developing acute vascular problems on the wards may be transferred to another hospital. Vascular emergencies on the operating table will require a vascular surgeon to attend.
- 3.8 Local arrangements should ensure high quality of care at all times and well organised transfer of patients back to their local hospital when appropriate (accompanied by good information about their treatment and future plans). Patients' families and carers must be dealt with sympathetically and must be fully informed about the all matters relating to transfer, both for treatment and for convalescence.

#### **4 Models for emergency vascular services**

- 4.1 Vascular units should include both surgical and radiological expertise. Services need to be organised to allow reasonable elective activity to exist alongside an emergency on call rota of 1 in 6 or more for vascular surgery and interventional radiology. Hospitals providing an emergency vascular service should be able to demonstrate arrangements for urgent vascular imaging and interventional radiology during the day and out of hours. In a Vascular Society survey of 125 hospitals with a vascular service in 2003, 45% of vascular units had two vascular surgeons, 21% had only one surgeon and just 5% had more than four surgeons<sup>13</sup>.

## DRAFT

A similar situation pertains in interventional radiology. Thus most units need to either centralise or collaborate in clinical networks to achieve 24/7 emergency cover on a rota no more onerous than 1 in 6. Very few vascular units have concrete plans in existence to coalesce services on a single site in the UK, mostly in large city conurbations. Collaborative clinical networks appear much more popular, with 44% of hospitals in 2003 participating in a network and another 23% with concrete plans to do so in the future. There is a positive relationship between the existence of a clinical network and the provision of 24 hour vascular emergency cover, with 37/55 (67%) hospitals in a network providing full emergency cover compared to only 17/70 (24%) hospitals outside a network ( $P < 0.01$ , Chi Square Test)<sup>13</sup>.

- 4.2 Every vascular patient should have equality of access and clinical outcomes and these goals should drive the strategy for every vascular service, large or small. Such services should aim to provide a local gateway for vascular patients into both elective and emergency vascular care. Those services which do plan to coalesce on a single site must continue to provide dedicated vascular outpatient clinics to the adjacent hospitals by visiting vascular surgeons from the centralised site. It is hoped that by working more closely in clinical networks, vascular services will see the benefits of centralisation in a better light and move towards centralised services as a model for the future.

### **Clinical networks**

- 4.3 A clinical network exists when two or more adjacent hospitals collaborate to provide a service to patients. That service might include both elective and emergency care or it might provide simply for emergencies. A number of models exist, according to the level of vascular service in the participating hospitals. These networks should provide a complete and coherent vascular service including surgery and vascular interventional radiology.

### **Hospitals with no vascular service**

- 4.4 Some smaller or more remote hospitals do not have the staff or facilities to provide a vascular service. These hospitals need a formal contractual arrangement with an adjacent hospital to provide emergency vascular cover, so that any patient presenting with a vascular emergency transfers without question or delay to the covering vascular emergency service in the network according to locally developed protocols. Very few hospitals are more than an hour by road from their neighbours<sup>13</sup> and there is evidence that even with transfers of more than one hour, the patients' outcomes are improved substantially by transferring to a vascular unit<sup>16-18</sup>.

### **Hospitals with a single-handed vascular service**

## DRAFT

- 4.5 It is not in the best interests of vascular patients to be served by a local single-handed vascular service. Such consultants must inevitably work in isolation, with limited opportunities for peer-related development or team working, and the service is suspended whenever the consultant is on leave. Many of these hospitals undertake a relatively low volume of vascular surgery and have limited facilities. There is evidence that lower volume hospitals achieve poorer clinical outcomes for their patients<sup>8</sup>. Vascular emergency cover is likely to be provided by non-vascular general surgical colleagues who may be more inclined to conservative management in high risk vascular emergency cases, resulting in poorer outcomes for the patients<sup>18</sup>.
- 4.6 The best strategy for a single-handed service will depend on local circumstances. If the hospital's catchment population will not sustain enough elective work for a second vascular surgeon then the hospital should merge its in-patient elective and emergency vascular service with an adjacent hospital, whilst maintaining the out-patient access and facilities described above under 'hospitals with no vascular service'. The single-handed surgeon might then start to work as part of a geographical unit, maintaining some local sessional commitment but taking vascular patients from the local hospital to an adjacent, fully-equipped hospital for investigation and in-patient care. The emergency vascular service based at the adjacent, larger unit will include emergency vascular patients presenting at and transferred from the local hospital.
- 4.7 If the catchment population would sustain a second vascular surgeon but the hospital is just a few miles from an adjacent larger vascular centre then it would make more sense to merge the service rather than try to set up a rival unit by appointing a second surgeon. The unnecessary duplication of facilities would be waste of scarce resources. Patients' interests would be better served in a single hospital with a higher volume of vascular activity while they continued to access the service from the clinics and the casualty department in their local hospital. The ability to deliver an acceptable on-call rota would be enhanced as would postgraduate training opportunities.
- 4.8 If the hospital is not in the vicinity of an adjacent larger unit and is committed to the development of a vascular service with all the necessary equipment and personnel, then it may be more appropriate to appoint a second vascular surgeon and develop the service locally if the catchment population is large enough to sustain this. Such local development should include participation in a collaborative clinical network with adjacent hospitals for the provision of vascular emergency cover as specified below.

### Hospitals with two or more vascular surgeons

- 4.9 These hospitals should have all the necessary facilities, including vascular imaging (CTA and MRA), a vascular interventional suite, a vascular laboratory

## DRAFT

and a dedicated vascular ward. The ITU/HDU should be large enough to cope with the vascular workload.

- 4.10 Adjacent hospitals with two or more vascular surgeons and interventional radiologists should explore methods of collaboration to provide an emergency service. Such hospitals could in theory merge with adjacent units to centralise vascular services with 6 or more surgeons and vascular radiologists on one site. In practice this has proved hard to achieve. Either the vascular team does not want to move or their colleagues do not want them to move or there is insufficient capacity on a single site to manage the increase in workload. Many of these units are now exploring clinical networks with adjacent hospitals instead, particularly to provide emergency cover. Different models exist, but the commonest is for the patient to transfer to the hospital on call. This requires active support and collaboration with the ambulance services. Alternative models involve the specialist moving between hospitals out of hours to operate on the patients without transferring them. In normal working hours each hospital looks after its own emergencies. Both of these systems work well in practice, with no detriment to patient outcomes<sup>21-24</sup>. Two or three hospitals can collaborate as equal partners and the network arrangements allow an acceptable on call rota for the vascular team.
- 4.11 If the hospitals are close enough to each other, as in some major cities, then consideration should be given to amalgamating vascular in-patient and diagnostic facilities on one site, leaving out-patient facilities at the other. This adjustment prevents duplication of expensive equipment on two sites, makes the arrangements for emergency care more straightforward, enhances the experience available for training and provides enough members of the vascular team to develop individual expertise in service development, administration, teaching and research alongside their clinical activities.
- 4.12 Sometimes the partnership is not so equal and in these cases the network may function at a more formal contractual level. One hospital may arrange a contract with an adjacent hospital to provide an emergency service for its patients when its own vascular surgeons are not on call for the general surgery emergency rota. This arrangement allows the local vascular surgeons to honour their general surgical commitments but they do not offer a reciprocal vascular emergency service to the adjacent, often larger hospital. The contractual arrangement allows a transfer of resources to the adjacent hospital so that it can cope with the additional workload involved. In adjacent hospitals with no vascular surgeons, the contract may cover all elective and emergency services.
- 4.13 Where there is an adjacent hospital with no vascular service, vascular surgeons should take active steps to initiate an outpatient consulting service at the adjacent hospital and to transfer vascular emergency patients from it to their base hospital for treatment. This initiative will better serve the needs of the patients in the locality and allow equality of access to all of the facilities and

## DRAFT

treatments available at the base hospital. Any increase in workload may provide justification for additional vascular consultant appointments and facilities at the base hospital.

### 5. *Commitments of the vascular surgeon*

5.1 **Emergency rotas should be published well in advance.** The arrangements will depend on local circumstances and agreements, which should take account of:

- (i) Whether an emergency rota involving more than one hospital is to operate 24 hours each day, or only “out of hours” (for example 1700-0800 weekdays and at weekends)
- (ii) The need for surgeons to travel will be influenced by the distance between collaborating hospitals and by general surgical emergency commitments of the vascular surgeons.
- (iii) The projected emergency workload (based on review of past caseload and clinical audit).

5.2 **The vascular surgeon on call for emergencies should be readily available.** Whether fixed commitments should be cancelled will be governed by expected emergency caseload. Successful models exist where surgeons cancel clinics and use operating lists for emergencies. Equally successful models exist where no such planned cancellations occur. Local audit to assess caseload and local negotiations to balance planned against emergency service needs are strongly advised. A compromise whereby planned work is reduced to release some capacity is also worth considering.

5.3 **Activities outside the hospital.** If vascular surgeons choose to undertake activities outside the hospital when on call for emergencies, they must either arrange for another vascular surgeon to provide cover or be prepared to attend immediately if a vascular emergency demands. These arrangements must be explicit, and well known both to the duty general surgeons and the hospital telephone switchboard.

5.4 **Leave.** Vascular surgeons should arrange for colleagues to cover emergency commitments when they are on leave, with explicit written agreements as far in advance as possible.

5.5 **Urgent vascular cases.** In addition to the on call rota for emergencies, arrangements also need to be made for vascular urgent cases (referred from the community or from other hospital specialists) at times when there is no vascular surgeon on call for emergencies within that hospital. This may mean a separate “rota” for accepting such referrals within normal working hours and/or arrangements to transfer these patients to another hospital which is providing emergency vascular cover.

## DRAFT

5.6 **In house emergencies.** These cases should present no problems in large hospitals with an on site vascular emergency rota, or when a local vascular surgeon is on call. Consideration should be given their management when no vascular surgeon is on emergency call in that hospital, as follows:

- (i) Emergencies on the operating table often arise during normal working hours, when it will usually be possible for a local vascular surgeon to attend. Out of hours an attempt may reasonably be made to contact a local vascular surgeon to attend on a goodwill basis. Rarely, it may be necessary for the duty vascular surgeon to travel from another hospital.
- (ii) Emergencies arising out-of-hours on the wards. There should be clear agreement within a protocol about how these patients are to be dealt with when no vascular surgeon is on call for emergencies in that hospital. Transfer to the duty vascular surgeon in another hospital may be required.
- (iii) Postoperative complications arising in patients recovering on the vascular wards (for example bleeding after vascular reconstruction or acute occlusion of a recently inserted graft) will usually be dealt with by the consultant in charge of the patient's care unless this is delegated to colleagues by local arrangement. By contrast, patients referred from the community with complications (for example blocked grafts) will usually be dealt with by the duty vascular surgical team.

## ***6. Relationships between vascular surgery and general surgery***

- 6.1 Some vascular surgeons continue to participate in general surgical emergency rotas, by mutual agreement with their local colleagues. If they do so, they should have a reduced commitment to emergency general surgery, commensurate with the burden of the vascular emergency service they are offering.
- 6.2 As far as possible emergency commitments in vascular and general surgery should coincide for individual surgeons.
- 6.3 In most hospitals emergency and urgent vascular cases will continue to be admitted by the duty general surgical team.
- 6.4 Referral to the duty vascular surgeon should be at a senior level by a consultant or Specialist Registrar who has seen the patient, is satisfied with the diagnosis and has come to a view on fitness for transfer, if required.
- 6.5 Patients referred by other consultants should remain under the care of that consultant until accepted by the vascular surgeon.

## DRAFT

6.6 The duty general surgical trainees should provide full support for the duty consultant vascular surgeon, with regard to patient care, administrative duties and assistance in the operating theatre (exactly as they would for patients admitted under the care of the consultant general surgeon). This applies equally if the consultant vascular surgeon has travelled from another hospital.

### *7. Arrangements for transfer of patients*

7.1 The decision to transfer a patient to another hospital should be made at senior level according to local protocols. The receiving vascular surgeon should be contacted personally by the consultant who has made the decision, or by a senior trainee.

7.2 As a rule, specialist vascular investigations (such as arteriography) should not be done before transfer, but where doubt exists over the diagnosis of ruptured aneurysm, especially after discussion with the on call vascular team, a CT scan should be performed as an emergency before transfer to confirm a leak and the scans transferred with the patient. This step avoids inappropriate transfers of patients with other intra-abdominal emergency conditions. Four out of five hospitals with a CT scanner have an out of hours CT service and one of NCEPOD's key recommendations is that all Trusts should ensure the availability outside normal working hours of radiology services including CT scanners<sup>15</sup>. When patients require specialist imaging or interventional radiological management this should be discussed with an interventional radiologist before transfer is arranged.

7.3 Arrangements should be explored for collaboration between the laboratory services of the hospitals involved in joint vascular rotas – in particular with relation to cross matching and provision of bank blood for transfusion.

7.4 In general there is no need for medical personnel to accompany the patient during transfer unless there are exceptional circumstances. Such decisions may be left to the discretion of the referring hospital team although the default arrangement should be specified in the local transfer protocol.

7.5 Specific arrangements should be made with the local ambulance service as to how to expedite transfers, for example by requesting a 999 call as soon as the patient is ready to go.

7.6 There should be a clear agreement about where the patient should be admitted – to an admissions unit, to the Accident and Emergency department, to a surgical ward or to the operating theatre area.

### *8. Implications for other services*

## DRAFT

- 8.1 The **ambulance service** and the **Accident and Emergency departments** need to be fully informed and in tune with the emergency vascular rota, understanding the need and arrangements for occasional emergency transfer between the two hospitals.
- 8.2 All **primary care** organisations referring emergencies (general practices, deputising services, and NHS Direct) need to be fully conversant with the arrangements. Many inter-hospital transfers are avoided if the ambulance is aware of which hospital is on call for vascular emergencies and is directed to go there directly by the patient's GP, if necessary bypassing the nearest hospital. Without such medical direction, ambulances are often obliged to take the patient to the nearest hospital first.
- 8.2 **Emergency diagnostic and interventional services.** A multi-disciplinary team is vital to a vascular service. Interventional vascular radiologists are important members of this team, providing both imaging and intervention. It is essential that surgical and radiological services collaborate to provide complete emergency care. Arranging emergency rotas in interventional vascular radiology is not easy as interventional radiology faces similar problems to vascular surgery. Interventional radiologists may also be required to provide emergency cover for general radiology. Many non-vascular radiologists are no longer prepared to offer an emergency angiography service and where there is no vascular radiology on-call rota there should be access to out of hours non-invasive vascular imaging by either CT angiography or magnetic resonance angiography, which may be interpreted by the vascular surgeon on call. More complex problems such as haemorrhage and trauma will require formal radiological input for diagnosis and treatment. On table angiography in the operating theatre should also be available and facilities to allow endovascular repair of ruptured aneurysms may also be provided but only to teams with elective experience in endovascular techniques and endovascular aneurysm repair.
- 8.4 **Anaesthesia and intensive care.** Colleagues in anaesthesia and intensive care medicine are also vital members of the multidisciplinary team. Anaesthetists will be affected by emergency rotas in a clinical network because of the likely fluctuations in emergency vascular operations when the hospital is on and off call and also because of the potential impact of vascular emergencies on intensive care facilities (particularly after emergency operations for aortic aneurysms). The NCEPOD report on ruptured abdominal aortic aneurysms showed a 30 day mortality of 27% for anaesthetists who undertook a higher than median volume of aneurysm repairs, compared to 40% for those who undertook a lower than median volume<sup>15</sup>. Although the numbers were too small to make a definitive conclusion, NCEPOD have recommended that anaesthetic departments should review the allocation of vascular cases so as to reduce the number of anaesthetists caring for very small volumes of elective and emergency aortic surgery cases. It is not appropriate to undertake emergency aneurysm surgery in

## DRAFT

a hospital without an intensive care facility and all such patients should be nursed in an ITU/HDU environment in the immediate post-operative period.

- 8.5 **Hospital telephone switchboards** should be fully informed and conversant with the arrangements for vascular emergencies.

### 9. *Facilities*

- 9.1 **Beds.** Any emergency vascular rota which involves a hospital accepting patients from an enlarged catchment area will have implications for bed usage. Review of past case numbers (from Hospital Activities Analysis of the hospitals concerned) will help to predict future needs. Continuing audit is important in this regard.
- 9.2 **Nursing.** Most emergency vascular patients need to be cared for by nurses experienced in specialist vascular care. This is essential when treatment such as low dose intra-arterial thrombolysis is used.
- 9.3 **Critical care.** Each hospital needs clear agreements about the level of care designated for patients with emergency vascular conditions. While there is a clear need for intensive care after operation for leaking aortic aneurysms, hospitals may differ in their policies for other patients: for example patients having thrombolysis may be managed on a high dependency unit or on a specialist vascular surgical ward. The experience of the staff is the important determinant.
- 9.4 **Networking of intensive care facilities.** The limited availability of intensive care facilities may demand occasional transfer of patients through existing network arrangements. Whether such transfers take place before or after emergency surgery in stable patients should be the subject of discussion prior to surgery between the surgeon, anaesthetist and intensivist, although broad principles to suit the locality may be laid out in a transfer protocol. In some cases it may be more appropriate to transfer another, more stable ITU patient to create the necessary ITU bed space. In general the system should involve acceptance of vascular emergencies by the duty hospital and then the identification of the most appropriate place for critical care.
- 9.5 **Surgical and radiological facilities.** The general facilities which are required for a consultant vascular surgeon to treat patients are set out in The Vascular Society's Provision of Vascular Services 2004 document<sup>13</sup>. Provision of these facilities is essential for hospitals accepting vascular emergencies for treatment. An emergency operating theatre must be readily available to the duty vascular surgeon, to allow treatment of leaking aneurysms, bloodless limbs, and other conditions posing an immediate threat to life or limb.

## DRAFT

9.6 *Junior staff support.* This should be provided by general surgical trainees (see 6.6) except in hospitals which have a separate rota for trainees allocated to the duty vascular surgical team. Information about the collaboration should be part of the induction process for all staff in the surgical, anaesthetic, theatre, and critical care areas.

### ***10. Planning, implementation, management and administration***

10.1 The initial planning and agreements for any emergency vascular service must be at a professional level, between vascular specialists.

10.2 Full involvement, agreement and cooperation is required of:

- (i) Hospital management, including Chief Executives, Medical Directors and Clinical Directors.
- (ii) Strategic Health Authorities and PCTs, including Chief Executives, Medical Directors, and Directors of Public Health.
- (iii) All the disciplines and services referred to in section 8.

10.3 Any funding implications of the reconfiguration of services should be considered and support from the SHA obtained if the service crosses PCT boundaries.

10.4 Planning of emergency vascular rotas should take into account all the considerations set out in this document.

10.5 Consideration should be given to identifying a manager who would assume responsibility for administration of the emergency vascular rota, in cooperation with a specified consultant. They should give special attention to:

- (i) Informing all parties likely to be affected (see section 7)
- (ii) Arranging rotas for each hospital well in advance – ideally on a regularly repeating basis, which allows for planning as far in the future as necessary
- (iii) Coordinating individual on call arrangements, with agreements well in advance about cover for leave
- (iv) Ensuring thorough publicity, with distribution of on call rotas to all those who may be affected, both in hospital and in the community.

### ***11. Clinical Governance***

## DRAFT

- 11.1 All the vascular teams involved in a collaborative rota should meet formally on a regular basis to review caseload and transfers, complications and deaths and significant event audit. Such meetings should be multidisciplinary team meetings to include vascular surgeons, radiologists, nurse specialists, vascular scientists and others involved in the care of vascular emergencies. Where more than one hospital is involved in a vascular rota, it may be worthwhile holding meetings in the different hospitals on a rotating basis.
- 11.2 The vascular surgeons should audit their service continuously, keeping a thorough record of:
- numbers of patients transferred (with notes about the appropriateness of transfer)
  - their involvement in local emergency cases when not "on call" for emergencies
  - any occasion on which they are required to travel to other hospitals
  - mortality, morbidity, and significant events
  - outcomes before and after inception of the emergency rota
- 11.3 All index operations should be submitted to the National Vascular Database organised by The Vascular Society.
- 11.4 Local protocols should be developed for referral criteria, mechanisms of transfer, and fundamentals of management of common emergency vascular conditions. These should be agreed and "owned" by all the consultants involved in the emergency rota.

## DRAFT

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