



Vascular surgical emergencies: how will future surgeons be trained?

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ABSTRACT

INTRODUCTION We wished to assess whether pattern and impact of emergency vascular surgical referrals has altered since a previous study in 1990. Following introduction of shift working patterns, we wished to assess how these changes may affect vascular training and vascular on-call cover.

PATIENTS AND METHODS Prospective survey of emergency vascular referrals at two district general hospitals (DGH-R and DGH-L) in 2003. DGH-R received only regional referrals whereas DGH-L also received 'next day' referrals from a smaller hospital. Results were compared between centres and with a previous study undertaken at DGH-R in 1990.

RESULTS From 1990 to 2003 emergency vascular referrals at DGH-R increased by 51% (53 to 80). The number seen at DGH-R and DGH-L were similar in 2003. There were significantly more out-of-hours referrals in DGH-R than DGH-L (59% versus 35%; $P = 0.0123$). Referrals were more likely to be seen initially by the vascular team at DGH-L than DGH-R (80% versus 47%, $P < 0.0001$).

CONCLUSIONS Vascular emergency referrals have increased. A trainee was likely to see more emergency referrals at DGH-L than DGH-R. This may impact on future training.

KEYWORDS

Vascular – Emergencies – EWTD

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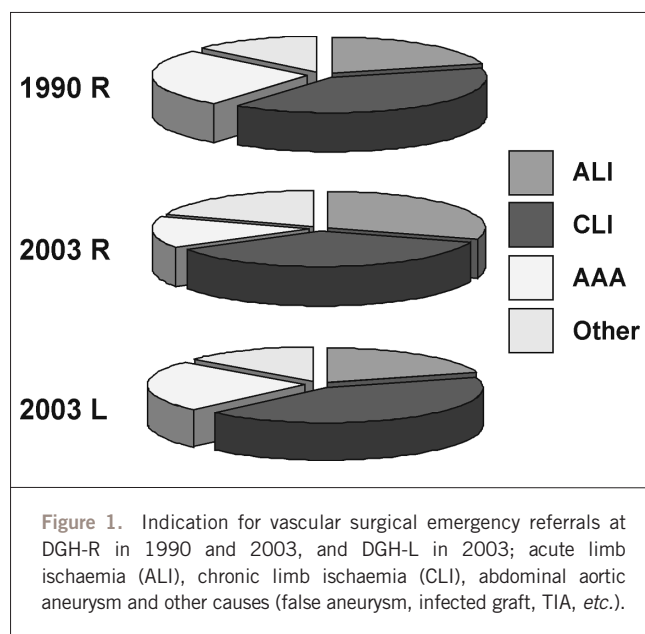
Emergency referrals constitute a substantial and unpredictable part of vascular surgical workload. In a study performed 12 years ago, we showed that emergency vascular surgical referrals resulted in an average of five extra operating hours per week. Extra workload resulted in cancellation of elective cases.¹ In recent years, significant changes in patient management and reduction in doctors' working hours have been introduced.

Significant reduction in doctors' working hours has affected all levels of surgical staff. The new pay contract in conjunction with the 'New Deal' has reduced surgical trainees' time in hospital to 56 h.² This has largely been achieved by increased numbers of doctors and reduction of doctors' on-call sessions. The European Working Time Directive (EWTD)^{3,4} further reduced working hours and altered many working patterns for doctors. Reduction in working hours has brought a reduction in training opportunities. Concern has consequently been raised about surgical trainees' experience and competence.

We wished to assess whether pattern and impact of emergency vascular surgical referrals has altered since our previous study and discuss how these changes may affect vascular training and vascular on-call cover in two district general hospitals.

Patients and Methods

A comparative, prospective, 3-month survey of emergency vascular surgical referrals was undertaken. This was performed at two district general hospitals in 2003. In DGH-R, two vascular surgeons (on a 1 in 10 general surgery rota) and three vascular radiologists serve a population of approximately 480,000. In DGH-L, two vascular surgeons (on a 1 in 6 general surgery rota) and three vascular radiologists serve a population of 210,000. Both hospitals received referrals while on-call. In addition, DGH-L received 'next day' referrals in vascular surgery from a smaller hospital, population served 160,000. Results were



compared with a previous study in 1990 at DGH-R, at which time there was one vascular surgeon and three vascular radiologists.

Reasons for patient referral were defined as either acute AAA, acute limb ischaemia, acute on chronic limb ischaemia such as worsening leg ulceration or evolving gangrene, and other (femoral false aneurysm, crescendo TIA, etc.). Details of from whom and to whom referrals were made, patient demographics, and duration of hospital stay (in ITU, surgical and non-surgical beds) were recorded. Details of radiological and operative procedures were assessed.

Data were analysed with Instat (Graphpad software <www.graphpad.com>). Non-parametric data were analysed by Mann-Whitney U-test or chi-squared test, as appropriate.

Results

In 12 years, emergency vascular surgical referrals at DGH-R increased by 51% (53 to 80). The number seen at DGH-R and DGH-L were similar (80 and 77) in 2003. Median patient age was 71 years at both hospitals (range, 23–95 years at DGH-R and 33–89 years at DGH-L). Percentage of men was 54% in DGH-R and 63% in DGH-L.

Reason for referral was not altered from 1990 to 2003 at DGH-R, and was similar between hospitals (Fig. 1). Lower limb ulceration or gangrene were most the common reasons for emergency vascular surgical referral. The source of referrals changed in DGH-R over the 12 years. The number of patients referred from a GP decreased (68% versus 40%; $P = 0.0025$), whilst those referred from other teams

Table 1 Source of vascular surgical emergency referrals at DGH-R in 1990 and 2003, and DGH-L in 2003

Source of referral	DGH-R 1990	DGH-R 2003	DGH-L 2003
General practitioner	36 (68%)	32 (40%)	27 (35%)
Accident & emergency	8 (15%)	18 (23%)	3 (4%)
Another consultant	9 (17%)	28 (35%)	32 (42%)
Another hospital		2 (3%)	15 (19%)
Total	53	80	77

increased (17% versus 35%; $P = 0.0295$). Comparing hospitals in 2003, more cases were referred from accident and emergency in DGH-R (23% versus 4%; $P = 0.0007$), whereas DGH-L received approximately one-fifth of referrals from the smaller 'feeder hospital' (Table 1). There were significantly more out-of-hours referrals in DGH-R than DGH-L (59% versus 35%; $P = 0.0123$).

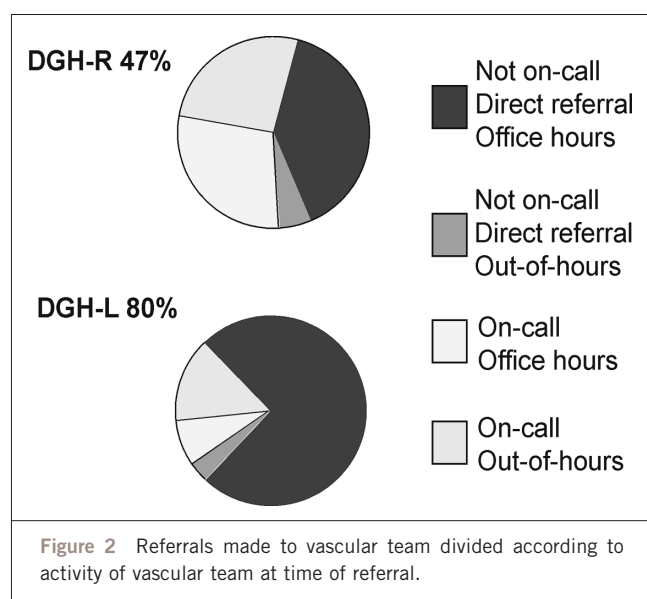
Management of referrals differed between DGH-R and DGH-L. Referrals were more likely to be seen initially by the vascular trainee at DGH-L than DGH-R (80% versus 47%; $P < 0.0001$; Table 2). In both centres, most referrals made direct to the vascular team occurred when that team was not on-call (Fig. 2). This was more frequently the case in DGH-L, compared with DGH-R (77% versus 45%; $P = 0.012$), and reflected 'next morning' referrals from the 'feeder' hospital.

Workload generated by emergency vascular referrals was significant. At DGH-R, the number of radiological investigations increased, but this was not statistically significant (19 to 42; $P = 0.0757$). The majority (27) were lower limb intravenous angiograms (IVDSA) and performed in office hours. Out-of-hours radiology included five CT scans

Table 2 Pattern of vascular surgical emergency referrals at DGH-R in 1990 and 2003, and DGH-L in 2003.

Referrals are divided according to time made and to which team they were initially referred

Referrals	DGH-R 1990	DGH-R 2003	DGH-L 2003
To vascular team	45 (85%)	38 (47%)	62 (80%)
To on-call team	9 (15%)	42 (53%)	15 (20%)
During working hours		33 (41%)	52 (65%)
Out-of-hours		47 (59%)	25 (35%)
Total	53	80	77



for AAA and one angiogram for upper limb ischaemia. A similar number (44) and pattern of radiological procedures were performed in DGH-L, except duplex scanning was used instead of IVDSA for lower limb diagnostic investigation. Therapeutic intervention by angioplasty was rarely used (three patients in both centres).

Many referrals required operation (39 at DGH-R in 1990; in 2003, 44 at DGH-R and 31 at DGH-L in). Of these, 14 at DGH-R (32%) and 6 at DGH-L (19%) underwent emergency operation in 2003. The remainder underwent scheduled urgent operation, which frequently resulted in cancellation of elective cases (17 at DGH-R in both 1990 and 2003, and 18 at DGH-L).

Overall case mix of operations performed did not vary from 1990 to 2003 at DGH-R and was similar to DGH-L. Embolectomy or AAA repair were the most common indications for emergency operation. Arterial bypass procedure and amputation (minor and major) were the most common indications for urgent operation.

The number of beds in DGH-R occupied by vascular emergencies at any one time increased from 1990 to 2003 (median 8 beds per day [range, 3–20 beds/day] from 5 beds per day [range, 2–10 beds/day] in 1990; $P < 0.0001$). Median in-patient stay remained the same (9 days; range, 0–41 days). Comparing DGH-L with DGH-R in 2003, bed occupancy was similar (median, 10 beds; range, 1–16 beds) as was median in-patient stay (median 11 days; range, 1–70 days).

Discussion

The EWTD has reduced doctors' working hours. The definition of 'on-call' has been questioned; currently, SiMAP⁵ ruling states that a trust must guarantee 11 h

continuous rest away from the work place in any 24-h period. Consequently, to provide out-of-hours emergency cover, most surgical trainees now work a shift system. The number of trainees, at both senior house officer and registrar level, has increased significantly. Hours spent on-call has reduced and, therefore, exposure to emergency referrals has also reduced. At night, NCEPOD guidelines remain⁶ and little operating is undertaken, with cases undertaken on dedicated emergency lists the following morning. Consequently, trainee exposure to emergency operations is further reduced. This situation prompted Watkin and Layer⁷ to suggest that specialist registrars should be off duty at night, when there was little training. Furthermore, the effect of reduced hours and shift work on training is compounded during working hours. Increased numbers of trainees compete for the same number of theatre and clinic sessions. Trainees have reported significant reduction in theatre training time^{8,9} and significant discontent in current EWTD-compliant working patterns.¹⁰ In summary, recent changes in hours and working patterns have significantly reduced trainees' exposure to emergency referrals and emergency operations.

The introduction of *Modernising Medical Careers*¹¹ aims to train surgeons to become general consultants. The question remains as to what this position will involve and, importantly, what will the future general surgeon be capable of doing? With regard to specialist training, more questions remain unanswered. How will entry to specialist training be gained? Where will specialist training be gained and how? Where will research feature?

Data from this audit show that emergency referrals for vascular disease have increased. This is in keeping with other studies, which show similar increases in vascular admissions and arterial reconstructions.^{12–14} In this study, both centres received a significant number of referrals from other surgical teams, a pattern that increased from 1990 to 2003 at DGH-R. This suggests a reluctance of 'general surgeons' to undertake vascular cases and an increased trend for surgical subspecialisation. More referrals were out-of-hours at DGH-R. At DGH-L, the feeder hospital had reduced out-of-hours referrals by acting as a holding centre with referrals being made the next day. At DGH-L with this pattern of delayed referrals, a trainee was more likely to gain direct experience in emergency vascular referrals during office hours.

The finding that few emergency referrals required emergency intervention is in keeping with the study by Campbell *et al.*¹⁵ suggesting, on average, a UK district general hospital may only see one case per week. Many cases referred as emergencies are, in fact, urgent, requiring treatment within 24 h. It also supports the possibility that these patients could be transported to regional centres for treatment¹⁶ as at DGH-L where cases were admitted overnight at the feeder hospital before transfer.

Although the number of radiological interventions increased in the last decade, these were predominantly diagnostic and involved lower-limb assessment. A surprising finding was that therapeutic interventional radiology had not increased. Many cases instead required operation urgently. The need for urgent operation had significant impact on elective cases. Again, this reflects the urgent, but not necessarily emergency, nature of many of the vascular emergency referrals seen.

With the increased number of emergency referrals seen, bed occupancy rates increased. While this increased workload has a negative impact on service provision, paradoxically it may be of benefit to surgical training. A trainee on a shift system who has an interest in vascular surgery may rarely see an emergency referral and, more rarely, emergency vascular intervention at DGH-R. Similarly, it is unlikely with reduced experience of trainees that they will be capable of operating on these cases. However, at DGH-L where vascular emergencies are kept overnight and referred in-hours, a trainee may have increased exposure to vascular referrals. A trainee may, therefore, gain more experience and exposure to emergency vascular referrals in the type of arrangement in DGH-L compared with DGH-R.

These data do not necessarily support centralisation of emergency vascular referrals^{11,16} but do support centralisation of vascular trainees. General surgical trainees in smaller hospitals may receive emergency vascular referrals. Triage could identify those requiring emergency intervention before transfer to a larger vascular unit. Otherwise, cases can be stabilised and undergo investigation and/or intervention the following day – a model enlarged but comparable with DGH-L. For training of specialist vascular surgeons, this model supports centralisation of on-call facilities in vascular surgery. The mechanism of ‘holding’ vascular emergency referrals with next-day transfer to a vascular unit, seen in DGH-L, would benefit a trainee in vascular surgery. Thus, at a main centre, a trainee would gain more experience and management of emergency referrals. Furthermore, as most cases would be seen in ‘office hours’, a trainee could remain on a 24-h non-resident rota, compliant under the ‘New Deal’ and EWTD.

Conclusions

This model supports the need for vascular surgery to remain in core general surgical training in order that a trainee may be able to recognise and triage vascular emergencies. However, what is

clear from the introduction of reduced hours and altered working patterns is that doctors are receiving reduced training in emergency referrals and operations. In order to obtain adequate training in emergency vascular surgery, trainees would benefit from being located in a large vascular unit with centralised referrals from smaller hospitals.

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