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## Knowledge gain of the non-vascular surgeons after attending a course on traumatic vascular emergencies

Zia Ur Rehman,<sup>1</sup> Muhammad Asad Moosa,<sup>2</sup> Qamar Riaz<sup>3</sup>

### Abstract

**Objective:** To measure the effectiveness of the workshop in enhancing the knowledge and skills of the non-vascular surgeons in dealing with traumatic vascular emergencies.

**Methodology:** It was a Quasi-experimental pre-post design study conducted at Section of Vascular Surgery, Aga Khan University Hospital, Karachi (Pakistan) in February 2019. One-day workshop was conducted to enhance the knowledge and operative skills of the non-vascular surgeons in managing traumatic vascular emergencies. A written test and course evaluation survey were used to evaluate the effectiveness of the course in achieving the desired objectives.

**Results:** Total of 21 participants attended the workshop with mean age of  $29 \pm 6.06$  years. Majority of participants 15 (71%) were surgery residents from different subspecialties. Only 3 (14%) had prior exposure in Vascular Surgery. Mean pretest score was  $11.9 \pm 4.27$  ( $59.52\% \pm 21.3$ ) which improved to  $16.14 \pm 3.69$  ( $81.6\% \pm 16.6$ ). Gain in knowledge was measured using paired t-test and there was 21% of gain in knowledge of the participants compared between the pretest and posttest score. Overall participants found this workshop to be very useful in refining their skills and learning innovative techniques in managing vascular emergencies.

**Conclusion:** Carefully designed workshop improves the knowledge of non-vascular surgeons in dealing with common vascular emergencies.

**Keywords:** Vascular emergencies, Surgical skills, Workshop, Non-vascular surgeons, Trauma. (JPMA 70: S-6 (Suppl. 1); 2020)

### Introduction

Acute limb ischaemia due to trauma accounts for approximately 0.5-4% of total civilian trauma admission.<sup>1</sup> Other than trauma the next common vascular emergency presenting is acute thromboembolic limb ischaemia, the incidence of which being 1.5 cases per 10,000 persons per year globally.<sup>2</sup> Early diagnosis and intervention are paramount in improving the likelihood of a favourable outcome for traumatic and non-traumatic vascular emergencies.<sup>3</sup> To deal these circumstances efficiently, acquisition of relevant knowledge and skills are utmost important.<sup>4</sup> If measures are not taken at an appropriate time, it can result in permanent limb disability and even limb loss.

Increase in demand for vascular surgeons dealing with the threatened limbs has been noticed dramatically worldwide due to rise in the overall aging population, improved life expectancy and increased prevalence of cardiovascular diseases.<sup>5</sup> However, there is a mismatch of demand and supply of Vascular Surgeons and services globally and the situation is more critical in Pakistan.<sup>6,7</sup> It

is one of the emerging specialty in the region with little workforce. There is little formal teaching about vascular diseases at the undergraduate level, and even at postgraduate level, most of the surgical training programme in the country lacks vascular surgery rotations.<sup>8,9</sup> Majority of vascular emergencies are being dealt by the non-vascular surgeons.

There is evidence that non-vascular surgeons can deal vascular emergencies if given the appropriate knowledge and skills set.<sup>10,11</sup> The most commonly used strategies for providing this include simulation based trainings and dedicated workshops<sup>11</sup> however; there is little evidence in local literature on the effectiveness of workshops/short courses. The objective of the present study was to assess the gain in knowledge of non-vascular surgeons about common traumatic vascular emergencies after attending a day's workshop.

### Methodology

This quasi-experimental, one-group pre-test/post-test study was conducted at the section of Vascular Surgery, Aga Khan University Hospital, Karachi, (Pakistan) in a one-day workshop "Emergency Vascular Surgery Course for Non Vascular Surgeons" in February 2019.

The workshop comprised of two parts. Initial part

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consisted of interactive lectures providing theoretical knowledge related to common vascular emergencies such as acute limb ischaemia, peripheral and abdominal vascular trauma and damage control maneuvers in dealing with these emergencies. This was followed by video demonstration and hands-on training on various vascular surgical skills on bovine models. That included vessel exposure and handling, performing arteriotomy and primary closure, performing end-to-end anastomosis, shunt placement as a damage control maneuver, performing embolectomy and doing fasciotomy.

A single-group, pretest/posttest design was used to evaluate the improvement in knowledge of the course participants. The test consisting of 20 one-best type multiple choice questions (MCQs) which were developed by one of the course faculty to be used both as pre and the post-test. The questions were carefully constructed to assess the clinical judgment, application, and synthesis of knowledge related to content of the workshop. The questions were reviewed for clarity and agreement on key by another faculty member. An example of one-best type MCQ is given below:

Q: A 35 years old lady, presented with Glasgow Coma Score (GCS) of 10 after a road traffic accident. She remained hypotensive despite fluid resuscitation. Her left lower leg was severely mangled with obvious open fractures and extensive soft tissue injury. The patient could not move the limb, pulses were absent, and the limb was cold on touch. What was the best way to manage the injured limb?

- Externally fixate the fractures followed by revascularization
- Revascularize the limb, then externally fixate
- Amputate the injured limb
- Reduce fracture and stent across vascular injuries

A 5-point Likert-type survey was also administered to measure participants' satisfaction with the workshop. Verbal informed consent was taken from all the participants.

Descriptive analysis including mean, percentages, and standard deviation (SD) were calculated using IBM Statistical Package for the Social Sciences (IBM SPSS Statistics; Armonk, NY, USA) version 20.0. Gain in knowledge was defined as difference between the post-test and the pre-test scores and was taken as a measure of course effectiveness and calculated using paired samples t-test. One-way ANOVA was used to measure difference in test scores across groups. A p-

value of  $<0.05$  was taken as significant.

## Results

A total of 21 participants attended the workshop. All the participants were surgeons interested in dealing with vascular emergencies. Of these 15 (71.5%) were residents at different levels in different surgical specialties. Majority of the participants (95%) were from within the city while only one participant was from outside the city. The mean age of the participants was  $29 \pm 6.06$  years. Of the participants 12(57%) were males and rest were females. Two participants were practicing independently while the rest were working in different teaching hospitals. The experience of the participants ranged from 6 months to 5 years. One of the participants had a vast surgical exposure of 25 years as he had been practicing General Surgery throughout this time. Only 3 participants had some prior formal experience or exposure in vascular surgery. Demographic data of the workshop participants is given in Table-1.

Mean pretest score was  $11.9 \pm 4.27$  ( $59.52\% \pm 21.3$ ) which improved to  $16.14 \pm 3.69$  ( $81.6\% \pm 16.6$ ). Mean gain in knowledge measured using paired t test was 5.99 ( $p < 0.0001$ ; 95% CI: 5.97-2.89) (Table-2). Mean gain in knowledge taken as difference between post-test and

**Table-1:** Demographics of the course participants.

	N (%)
<b>Gender</b>	
Male	12 (57.2)
Female	9 (42.8)
<b>Speciality</b>	
General surgery	10 (47.6)
Paediatric surgery	2 (9.5)
Orthopaedics	4 (19)
Neurosurgery	1 (4.8)
<b>Participants Level</b>	
Consultant	3 (14.3)
Resident	15 (71.5)
Intern	4 (19.1)
<b>Experience level</b>	
Less than 1 year	7 (33.3)
1-3 years	9 (42.8)
More than 3 years	5 (23.8)
<b>Practice type</b>	
Private practice	2 (9.5)
Teaching institute	16 (76.2)
<b>Location</b>	
Within Karachi	20 (95.2)
Outside Karachi	1 (4.8)
<b>Previous experience in vascular surgery</b>	
Yes	3 (14.3)
No	18 (85.7)

**Table-2:** Test scores and gain in knowledge of the course participants.

	Mean ± SD	% ± SD	Min.	Max.
Pre test scores	11.90 ± 4.27	59.52 ± 21.3	6	18
Post test scores	16.33 ± 3.34	82.14 ± 16.7	8	20
Difference in scores (gain in knowledge)	4.43 ± 3.38	22.6 ± 16.4	0	12

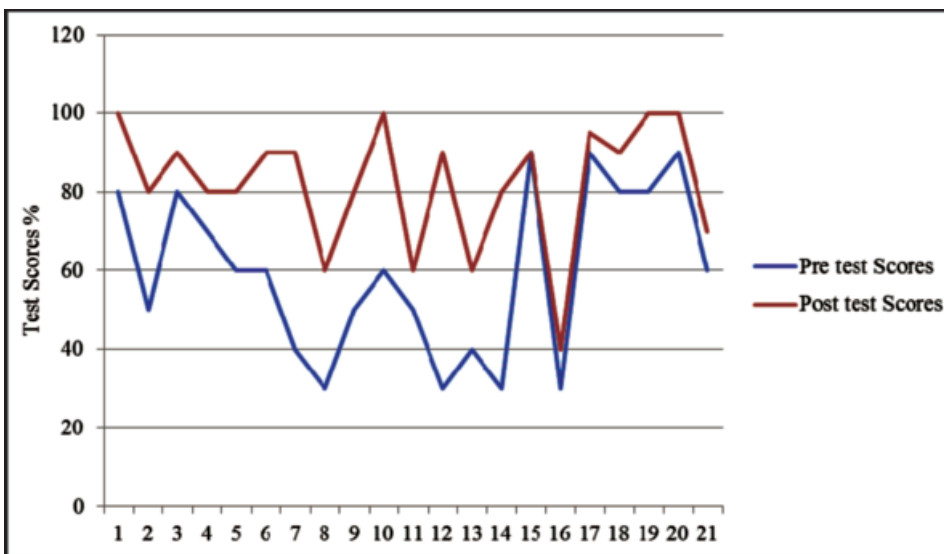
\*p<0.001. SD: Standard deviation; Min: minimum; Max: maximum.

**Table-3:** Course evaluation by participants.

	Excellent	Very Good	Satisfactory
Overall Assessment of the workshop	12 (57.2%)	7 (33.3%)	2 (9.5%)
Knowledge sufficient to improve practice	11 (52.4%)	9 (42.9%)	1 (4.8%)
Was the workshop useful	11 (52.4%)	7 (33.3%)	3 (14.3%)
Will you recommend to your colleagues	15 (71.4%)	5 (23.8%)	1 (4.8%)

pre-test scores was 22.6%. An increase in scores of 30% or more was observed in 8 (40%) participants while 12 (60%) participants showed a ≥ 20% increase in scores. The test scores are shown in Figure. The improvement in mean test scores (gain in knowledge) was observed across the whole group in the subgroup analysis and no significant difference was observed on the basis of difference in age, gender, speciality and prior experience.

A short survey using 5-point Likert type questionnaire was conducted at the end of the activity to assess participants' self-perceived satisfaction with acquisition of skills. Participants found workshop useful in improving their knowledge and skills in managing vascular emergencies.



**Figure:** Comparison of participants' pre and post test scores.

Majority of the participants graded the activity as very good or excellent. Evaluation scores (%) are given in Table-3.

**Discussion**

Workshops/short courses on situations dealt on a regular basis by medical professional give them a good opportunity to share their difficulties in dealing these situations and refine their skills. This was reflected by the increase in knowledge by 22.6% of participants as observed in this study by a pretest and posttest evaluation, and also an ample amount of the trainees (71.5%) who attended this workshop felt the need of orienting themselves with the vascular emergencies as there has been a recent rise in these emergencies and issues of their timely referrals. This was also observed in another local study by Khan A R et al,<sup>12</sup> who found that among various reasons, inability of the primary care physician to diagnose an ischaemic limb and to timely refer to a vascular surgeon was the leading cause of delayed presentation to a vascular surgeon and resultant limb loss.

General surgeons and emergency physicians are often the first or the only contact for patients in case of trauma and vascular emergencies so this requires devising a protocol for non-vascular surgeons working in peripheries. Imparting knowledge and skills of managing peripheral vascular injuries to non-vascular surgeons can fill the "expertise gap". Conveying basic limb saving maneuvers of vessel handling, getting proximal and distal vessel control, performing embolectomy and fasciotomy can make a lot of difference in managing these patients. Literature suggests different strategies including simulation for teaching surgical skills however, cadaveric based workshops are considered to be the most beneficial method of teaching anatomy and improving operative skills.<sup>13</sup> Using this mode of refining skills has been one of the strength of this course. Short and focused discussions and skill sessions on such workshop platforms bridge the gap of lack of formal training and management of such emergencies during the training period of the participants.<sup>14</sup> This was also

evident from our study where there was an improvement in the knowledge and self-perceived satisfaction with the improvement in operative skills as a result of the course. It is needed that more of these workshops are organized on regular basis.

One of the best things about this workshop was that it was attended by surgeons and trainees of variable ages as shown in the results and from different sub-specialties. We propose arranging such workshops in collaboration with other developed vascular centers in the country and also with the College of Physicians and Surgeons (CPSP) in different cities and in peripheries and thrive for better outcomes in patients with vascular emergencies. There are a few limitations to our study. The efficiency of the workshop in improving the knowledge and skills was gauged using written pre and posttest and participant satisfaction respectively, the improvement in post-test scores is a reflection of the immediate learning only and measures the participants' ability to retain and recall the facts learnt during the course. Similarly use of satisfaction index is although the most commonly used method, yet, is only considered to be a level 1 evaluation<sup>15</sup> of any continuing medical education (CME) activity as it does not indicate any change or improvement in practice and patient outcomes.

## Conclusion

Carefully designed workshop improves the knowledge of non-vascular surgeons in dealing common vascular emergencies.

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**Conflict of Interest:** Nil

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