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The impact of trainer behaviour on trainee cognitive load and performance during vascular surgery simulation

Submission date
05/01/2026

Recruitment status
No longer recruiting

Registration date
07/01/2026

Overall study status
Completed

Last Edited
06/01/2026

Condition category
Surgery

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[X] Record updated in last year

Plain English summary of protocol

Background and study aims
It is well established that incivility remains a significant issue in surgery around the world, resulting in staff burnout and risk to patient safety. The aim of this study was to see if different surgical trainer behaviour impacts the cognitive load (mental resource required to meet the demands of a task) and performance of surgical trainees in a simulated operating theatre.

Who can participate?
Vascular surgery trainees aged 20 to 50 years with a National Training Number

What does the study involve?
We wanted to assess whether a rude and uncivil trainer caused higher cognitive load and poorer performance compared to a pleasant and supportive trainer. To do this we allocated vascular surgery trainees to one of two groups: half the trainees completed a simulated task with a rude trainer, and half did so with a supportive trainer. We assessed cognitive load using digital sensors, which measure things like brain wave activity and changes in heart rate, and the participants also completed surveys to give insight into how they were feeling during the simulation. Expert surgeons and academics watched videos of the simulations to see how well the participants performed in their ability to suture and tie knots (technical skills), as well as their communication and teamwork (non-technical skills).

What are the possible benefits and risks of participating?
We anticipate that the results of this research can provide an evidence base to eliminate destructive training dynamics, improve staff wellbeing and enhance patient safety.

Where is the study run from?
This study was run organised by the Surgical Sabermetrics Laboratory at the Usher Institute within the University of Edinburgh and took place in Newcastle, Cambridge, and Edinburgh in simulated operating theatres.

When is the study starting and how long is it expected to run for?
Data collection spanned from September 2024 to September 2025

Who is funding the study?
The study is part of a PhD funded by the Royal College of Surgeons of Edinburgh (RCSEd), the Vascular Society of Great Britain and Ireland (VSGBI) and the Circulation Foundation. Grants from the Faculty of Surgical Trainers (FST) and the Association for the Study of Medical Education (ASME) also partially funded this research.

Who is the main contact?
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Contact information

Type(s)
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Additional identifiers

Integrated Research Application System (IRAS)
337352

Study information

Scientific Title
Utilizing a surgical sabermetrics framework to assess the impact of trainer behaviour on trainee cognitive load and performance during vascular surgery simulation

Study objectives
To assess the impact of different trainer behaviours on surgical trainee intraoperative cognitive load, technical skills and non-technical skills in the simulated operating room.

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 08/01/2024, Health Research Authority (2nd Floor, 2 Redman Place, Stratford, London, E20 1JQ, United Kingdom; +44 (0)207 104 8000; contact@hra.nhs.uk), ref: 337352

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Open (masking not used)

Control
Placebo

Assignment
Parallel

Purpose
Prevention

Study type(s)

Health condition(s) or problem(s) studied
Surgical trainee intraoperative cognitive load, technical skills and non-technical skills

Interventions
This study used a parallel-group, two-arm randomized controlled trial (RCT) to assess the impact of trainer behaviour on surgical trainee cognitive load and performance during high-fidelity vascular surgery simulation using a Surgical Sabermetrics Framework (Yule et al., 2021). Vascular surgery residents who met inclusion criteria were assigned in a 1:1 ratio to either a friendly and supportive trainer or a rude and uncivil trainer whilst completing a routine standardised vascular anastomosis in a simulated operating room. Randomization was performed using a computer-generated random sequence. Participant blinding was not feasible given the intervention.

Participants were briefed that they needed to complete a femoral anastomosis, and watched a video demonstrating how to do this, but they did not receive any instructions regarding trainer behaviour. Following the initial simulation, senior trainees (ST6 and above) were called back to the operating room to find that the trainer had left a junior surgeon to close and a major bleed had occured in the same simulation patient. Residents would then have to manage the bleeding until the trainer returned, 5 minutes later.

Technical and non-technical skills were retrospectively assessed by expert raters from audiovisual recordings, using validated scoring systems. Cognitive load was assessed by a self-assessment survey and by utilising physiological sensors (heart-rate variability, electrodermal activity, electroencephalography), data from which act as valid and reliable proxies of cognitive load (Dias et al., 2018). Physiological metrics were measured during a 5-minute presimulation rest phase, and during the simulation itself. Following the simulation, participants completed the SURG-TLX survey to self assess cognitive load (Wilson et al., 2011).

Full ethical approval was obtained and the the trial was conducted in compliance with CONSORT guidelines for randomized controlled trials (Hopewell et al., 2025).

Intervention Type
Behavioural

Primary outcome(s)
1. Surgical trainee cognitive load measured using subjective surveys (SURG-TLX) and Physiological Sensors (heart-rate variability, electrodermal activity, electroencephalography) at baseline and during the simulation

Key secondary outcome(s)
1. Surgical resident technical skills measured using expert raters utilising the Objective Structured Assessment of Technical Skills (OSATS) tool at the time of the simulation

2. Surgical resident non-technical skills measured using expert raters utilising the Non-Technical Skills for Surgeons (NOTSS) taxonomy at the time of the simulation

Completion date
30/09/2025

Eligibility

Key inclusion criteria
Vascular surgery residents based in the United Kingdom or Ireland with a National Training Number

Healthy volunteers allowed
Yes

Age group
Adult

Lower age limit
20 Years

Upper age limit
50 Years

Sex
All

Total final enrolment
58

Key exclusion criteria
1. Residents with pre-exisiting personal relationships with any of the actors in the simulation
2. Vascular trainees without a National Training Number

Date of first enrolment
23/09/2024

Date of final enrolment
30/09/2025

Locations

Countries of recruitment
United Kingdom

England

Northern Ireland

Scotland

Wales

Ireland

Study participating centre
Annual SPecIalist Registrar Educational Programme (ASPIRE) 4
Cambridge Surgical Training Centre, The Quorum, Barnwell Road
Cambridge
England
CB5 8RE

Study participating centre
Annual SPecIalist Registrar Educational Programme (ASPIRE) 6
Cambridge Surgical Training Centre, Freeman Hospital, Freeman Roadd, High Heaton, Newcastle upon Tyne
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NE7 7DN

Study participating centre
Royal Infirmary of Edinburgh at Little France
51 Little France Crescent
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Sponsor information

Organisation
Academic and Clinical Central Office for Research and Development (ACCORD)

Funder(s)

Funder type

Funder Name
Royal College of Surgeons of Edinburgh

Alternative Name(s)
The Royal College of Surgeons of Edinburgh, RCSEd

Funding Body Type
Private sector organisation

Funding Body Subtype
Associations and societies (private and public)

Location
United Kingdom

Funder Name
Vascular Society

Alternative Name(s)
Vascular Society of Great Britain and Ireland, Vascular Society of GB&I, Vascular Society for Great Britain and Ireland, Vascular Society of Great Britain & Ireland, VSGBI

Funding Body Type
Private sector organisation

Funding Body Subtype
Associations and societies (private and public)

Location
United Kingdom

Funder Name
Association for the Study of Medical Education

Alternative Name(s)
The Association for the Study of Medical Education, ASME

Funding Body Type
Private sector organisation

Funding Body Subtype
Associations and societies (private and public)

Location
United Kingdom

Funder Name
Circulation Foundation

Alternative Name(s)
The Circulation Foundation, The Vascular Society, Circulation Foundation The Circulation Foundation, CF

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
United Kingdom

Funder Name
Faculty of Surgical Trainers (FST)

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Data sharing statement to be made available at a later date