




Transfusion Camp: The UK experience and its value in improving knowledge of transfusion medicine among postgraduate trainees

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Abstract

Objectives: To report the UK experience of rolling out Transfusion Camp.

Background: Transfusion Camp is a structured education programme developed in Toronto, with the aim of reducing knowledge gaps in transfusion medicine in postgraduate trainees. It consists of didactic lectures viewed online by the participants, then interactive, locally delivered seminars. Since 2015, it has been rolled out in the United Kingdom, and is now available in four centres. Here, we report the UK experience of Transfusion Camp and outcomes.

Methods: Trainees are recruited via the training programme directors in each region. Pre- and post-course assessments are administered using the validated BEST (Biomedical Excellence for Safer Transfusion) test, with possible scores 0–20, and confidence measured on an A–E Likert scale.

Results: Since 2015, 130 trainees have participated in Transfusion Camp in the United Kingdom. Trainees from all specialties significantly improved their BEST-test scores after attending the course (mean score 11.6/20 before the course, compared with 14.3/20 after the course), and confidence in managing transfusion-related issues was also significantly improved.

Conclusion: We recommend that all centres consider offering Transfusion Camp to trainees in haematology and other specialties that frequently use blood transfusions, such as anaesthesia/ICU, Internal Medicine and others.

KEYWORDS

education, postgraduate, transfusion

1 | INTRODUCTION

Blood transfusion is one of the commonest clinical procedures. Whilst potentially lifesaving, blood transfusion can lead to serious morbidity and

mortality.¹ Consequently, it is imperative for medical professionals to have a thorough understanding of evidence-based transfusion practice. However, a recent review highlighted significant gaps in knowledge regarding transfusion practice among trainees across various specialties.²

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To address this knowledge deficit, Transfusion Camp was established at the University of Toronto in 2012. The programme structure includes online lectures delivered by the Toronto team, which are supplemented by seven interactive, locally-conducted seminars in smaller groups. Its primary goal is to enhance transfusion medicine education for trainees, particularly those outside of haematology (Table 1).^{3,4}

Building on this foundation, the programme formed partnerships with institutions such as the Centre for Innovation at Canadian Blood Services and the Ontario Regional Blood Coordinating Network. This allowed the programme to broaden its impact such that, by the 2022–2023 academic year, Transfusion Camp was offered to postgraduate trainees in 16 out of the 17 medical schools in Canada.⁵ The value of Transfusion Camp in enhancing knowledge of transfusion medicine as well as self-reported positive impact on transfusion practice was reported in 2019.³

Outside of Canada, Transfusion Camp has gained traction in the United Kingdom. The University of Oxford was the pioneer in adopting this initiative in 2015. Building on its success, Transfusion Camp has extended its reach to include trainees from two centres in London (Guys & St Thomas's-GSTT, and King's College Hospital) as well as the University Hospitals Birmingham NHS Foundation Trust.⁶

Here, we report the UK experience of delivering Transfusion Camp.

2 | METHODS

2.1 | Recruitment

Eligible postgraduate trainees from a variety of medical specialties are invited to register for Transfusion Camp. In all centres, the programme is advertised by approaching the Training Programme Directors for haematology, emergency medicine, anaesthesia and intensive care, and asking them to inform their trainees. Particular emphasis is placed on recruiting early-stage haematology trainees so that key principles are embedded early and liaison queries may be more easily answered by the trainees.

2.2 | Course format

Transfusion Camp is structured as a combination of 22 centralised didactic lectures over 5 days and seven interactive, locally facilitated seminars. For UK trainees, the pre-recorded lectures are watched during the participants' own time in the week leading up to their seminars. Additional pre-reading materials and reference materials relevant to the topic are provided.

Each modified team-based learning seminar is made up of a series of case studies. Each case is followed by multiple choice questions, on which participants 'vote'. Voting on the questions is conducted by holding up a piece of paper with the answer on to the camera screen, typing in the 'chat' or using online voting systems such as Mentimeter. The questions are designed to stimulate discussion for the group to reach consensus and consolidate the learning from the lectures. The seminar facilitator provides any key learning points not raised in the

TABLE 1 Lectures and seminars delivered for Transfusion Camp.

Lectures and seminars delivered	
Day 1	Red cell transfusion Platelet transfusion Basic blood bank testing Albumin Plasma, prothrombin complex concentrates and fibrinogen replacement Seminar A: RBC and platelet transfusion cases Seminar B: Plasma, PCC and fibrinogen cases
Day 2	Acute non-infectious reactions Informed consent Sickle cell disease: perioperative and acute transfusion Seminar A: Transfusion reactions Seminar B: Sickle cell disease
Day 3	Pre-operative patient blood management Intra-operative patient blood management- tranexamic acid, salvage and triggers Congenital coagulation disorders- bleeding history, von Willebrand's disease, haemophilia Reversal of antiplatelets and direct anticoagulants Seminar A: Patient blood management Seminar B: Advanced haemostasis testing and management
Day 4	Massive haemorrhage—pathophysiology and evidence-based management Massive haemorrhage protocols—real world application New updates in transfusion Ask the experts Q&A and review Seminar: Major haemorrhage

discussion. The course material was not altered for a UK audience. Any differences in practice were discussed in the interactive sessions.

In Oxford, three dates are offered for each interactive seminar to accommodate for rota constraints. Initially all seminars were delivered by one facilitator, but now seven facilitators lead one seminar each. The seminars were initially in person, but were switched to online in 2020 due to the Covid-19 pandemic, and have remained online since then. In other centres, there is a single facilitator so one date is offered for each seminar.

Table 1 demonstrates the lecture and seminar topics included in Transfusion Camp.

2.3 | Outcome measures

Pre- and post-course knowledge assessments were administered using the validated multiple-choice exam developed by the Biomedical Excellence for Safer Transfusion (BEST) collaborative to measure the change in transfusion medicine knowledge.⁷ Possible scores for this test are 0–20. The original BEST test was used until 2019–2020. The test was modified to be more specific to Transfusion Camp for 2020–2021, and was validated by the Toronto team.⁵

TABLE 2 Characteristics of Transfusion Camp attendees.

	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22	2022–23	Total
Centre								
Oxford	13	9	14	15	20	15	12	98
Birmingham						6	11	17
GSTT						6	4	10
Kings							5	5
Specialty								
Haematology	8	3	9	3	10	8	15	56
Anaesthesia/ICU	5	6	5	8	9	12	7	52
Internal medicine				1		6	8	15
Emergency medicine				1			1	2
Obstetrics						1		1
Oncology							1	1
Surgery				2				2
Other					1			1
Total	13	9	14	15	20	27	32	130

Self-reported confidence in eight specific transfusion-related scenarios and overall confidence was gauged with a survey administered before and after the course, each question being answered on an A-E Likert scale.

Participant feedback is in the early stages of collection, with data from only three sessions so far. Trainees are asked to rate each lecture and small-group session, and to answer general questions about their experience of Transfusion Camp.

Informal verbal feedback was collected from UK facilitators in all regions for this publication with regard to recruitment of attendees and their experience of delivering Transfusion Camp.

2.4 | Statistical methods

Statistical analyses were conducted to evaluate the effectiveness of the Transfusion Camp on improving students' knowledge (measured by test scores) and confidence levels (measured by self-reported ratings on an A-E Likert scale).

Descriptive statistics, including means, standard deviations and frequencies, were used to summarise the test scores and self-reported confidence levels. To compare the mean test scores and confidence levels by speciality, Student's *T*-tests were conducted. The significance level was set at 0.05.

Trainees who registered but did not attend any sessions were excluded from the final analysis.

3 | RESULTS

3.1 | Attendees

Between 2016 and 2023, 130 postgraduate trainees attended Transfusion Camp in the United Kingdom. 56/130 (43%)

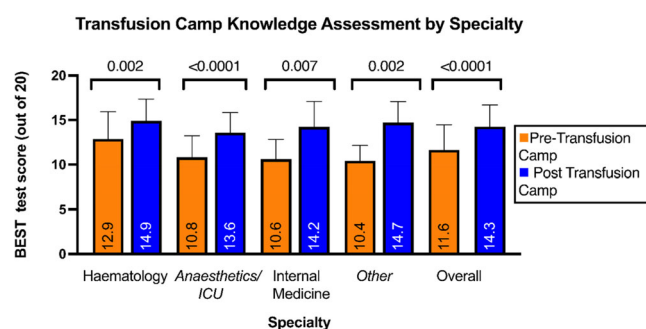


FIGURE 1 Pre- and post-test scores for trainees by specialty. Orange bars represent the pre-Transfusion Camp scores, and the blue bars show the post-Transfusion Camp scores. The number on the bar shows the mean. Specialties in 'other' include emergency medicine, obstetrics and surgery.

were from haematology, 52/130 (40%) from anaesthetics/ICU, 15/130 (11.5%) from internal medicine and 7/130 (5.3%) from other specialties, including oncology, obstetrics, emergency medicine and surgery. Table 2 shows the characteristics of attendees.

3.2 | Knowledge

In the pre-course questionnaire, 51% of attendees rated themselves as a 'beginner', and 46% 'intermediate' with respect to Transfusion Medicine (Figure 1).

The mean pre-test score was 11.6 (out of 20). Better pre-test scores were associated with haematology trainees, with a mean of 12.9, compared with a non-haematology average of 10.7 (SD 2.3, $p = <0.001$).

The mean post-test score was 14.3 out of 20, 2.4 points greater than the pre-test scores (SD 2.4, $p < 0.0001$). The pre- and post-test scores demonstrated significant improvements in knowledge after attending the Transfusion Camp across all specialties. There was no statistically significant difference between specialties in the post-test results.

3.3 | Attitudes and confidence

At the end of Transfusion Camp, 73/75 (97%) of trainees who completed the confidence survey rated their overall confidence in managing transfusion medicine-related patient issues as 'intermediate', 'advanced' or 'expert', compared with 40/95 (42%) before the course.

All trainees felt they could adequately consent a patient for transfusion at the end of the course, compared with 67% beforehand.

3.4 | Participant feedback

Feedback data is available for 3 'days' in total (i.e., lectures and associated small group sessions). All lectures were rated 'Good' or 'Excellent' by those who had watched the session. Of the 20 participants surveyed, 100% of them would recommend Transfusion Camp to colleagues. 13/15 participants felt that they had applied learning from Transfusion Camp in their clinical practice by the end of the course.

4 | CONCLUSION

This study demonstrates that Transfusion Camp was applied in the United Kingdom with comparable increases in attendee knowledge and confidence in managing transfusion-related problems to those found in Canada.^{3,4} The material is broadly applicable to both health systems and training structures.

In the United Kingdom, transfusion medicine training is currently offered to haematology trainees by NHS Blood and Transplant (NHSBT) in the form of 'Essential' and 'Intermediate' Transfusion Medicine courses. These focus on the laboratory and theoretical aspects of transfusion medicine. Hospital-based training varies by region. Transfusion Camp complements existing training for early-stage haematology trainees, offering knowledge on practical aspects of transfusion medicine. For other specialties, there is no standardised teaching on transfusion medicine in the United Kingdom.

As demonstrated in Figure 1, trainees in all specialties improved their scores on the BEST questionnaire after attending Transfusion Camp. The improvement was comparable to that seen in the Canadian data.³ This structured educational programme goes some way to address the knowledge gaps within transfusion medicine across all specialties. However, some deficits in knowledge of transfusion persist, and additional efforts are needed to address these, perhaps in changes to the course format or further educational initiatives. These

need to be backed up by continuing education and training and monitoring of compliance with good transfusion practice with feedback to individual physicians and clinical teams.

The most robust outcome data would include long-term evidence of knowledge retention and changes in practice. This is challenging data to collect, but we may be able to tackle this going forward.

Feedback from facilitators has been that Transfusion Camp is 'user friendly' with excellent, informative resources provided, minimising the preparation time required for each session. The online format has some challenges (such as technical issues and equipment availability), but enables attendance for those working in multiple hospitals in a region.

Some attendees have given informal feedback that they have particularly enjoyed being in sessions with trainees from other specialties to understand their perspective. This does not often occur in daily clinical practice, and facilitates an understanding of how different specialties may evaluate the same clinical case, in addition to fostering relationships between trainees who may work together in the same region.

There have been challenges with recruitment to the course in the centres most recently offering Transfusion Camp, particularly from specialties outside of haematology. This may represent an increasingly short-staffed system with low staff morale,⁸ in which people are less willing to commit significant periods of time to optional training outside of their working hours. There may also be a lack of awareness of the complexities of transfusion practice outside of haematology, and so trainees in these specialties may feel that further training is not required.

A factor that may limit the ongoing rollout of Transfusion Camp in the United Kingdom, as has been done in Canada, is the availability of transfusion specialists in each region to facilitate these sessions. The Oxford experience of Transfusion Camp has been presented at regional and national transfusion committee meetings but as can be seen from this report the rate of uptake of courses outside Oxford is very slow.

We advocate that Transfusion Camp should be implemented in all centres within the United Kingdom. There is clear benefit not only to haematology trainees but also those in other specialties such as ICU/anaesthetics and internal medicine.

AUTHOR CONTRIBUTIONS

AA wrote the manuscript. AA and KK analysed the data. SM, AD, KG and SR led transfusion camp in their hospitals. CK, SC and YL designed and implemented Transfusion Camp in Canada, and collated the data from all attendees. AA, MD and MFM designed the study. All authors critically reviewed the manuscript.

CONFLICT OF INTEREST STATEMENT

The authors have no competing interests.

DATA AVAILABILITY STATEMENT

Available on request.

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