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EDUCATION AND ADMINISTRATION

TRANSFUSION

Transfusion camp: A retrospective study of self-reported impact on postgraduate trainee transfusion practice

Katie C. Y. Yeung[1] | Casey Kapitany[2] | Sophie Chargé[2] | Jeannie Callum[3,4] | Christine Cserti-Gazdewich[4,5,6] | Pablo Perez D'Empaire[7,8] | Aditi Khandelwal[2,4,6] | Lani Lieberman[6,9,10] | Christie Lee[11] | Katerina Pavenski[6,12] | Jacob Pendergrast[4,5,6] | Nadine Shehata[6,13,14] | Cyrus C. Hsia[15] | Marianne Lavoie[16] | Michael F. Murphy[17,18] | Oksana Prokopchuk-Gauk[19,20] | Mahboubeh Rahmani[21,22,23] | Jacqueline Trudeau[24] | Michelle P. Zeller[2,25] | Yulia Lin[4,6,10,26]

Correspondence

Yulia Lin, Precision Diagnostics and Therapeutics Program, Sunnybrook Health Sciences Centre, 2075 Bayview Avenue, Room B2-04, Toronto, ON M4N 3M5, Canada.
Email: yulia.lin@sunnybrook.ca

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Abstract

Background: The optimal method of postgraduate transfusion medicine (TM) education remains understudied. One novel approach is Transfusion Camp, a longitudinal 5-day program that delivers TM education to Canadian and international trainees. The purpose of this study was to determine the self-reported impact of Transfusion Camp on trainee clinical practice.

Study Design and Methods: A retrospective analysis of anonymous survey evaluations from Transfusion Camp trainees over three academic years (2018–2021) was conducted. Trainees were asked, "Have you applied any of your learning from Transfusion Camp into your clinical practice?". Through an iterative process, responses were categorized into topics according to program learning objectives. The primary outcome was the rate of self-reported impact of Transfusion Camp on clinical practice. Secondary outcomes were to determine impact based on specialty and postgraduate year (PGY).

Results: Survey response rate was 22%–32% over three academic years. Of 757 survey responses, 68% of respondents indicated that Transfusion Camp had an impact on their practice, increasing to 83% on day 5. The most frequent areas of impact included transfusion indications (45%) and transfusion risk management (27%). Impact increased as PGY increased with 75% of PGY-4+ trainees reporting impact. In multivariable analysis, the impact of specialty and PGY varied depending on the objective.

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Discussion: The majority of trainees report applying learnings from Transfusion Camp to their clinical practice with variations based on PGY and specialty. These findings support Transfusion Camp as an effective means of TM education and help identify high-yield areas and gaps for future curriculum planning.

1 | INTRODUCTION

Blood transfusion is commonly prescribed by physicians across almost all specialties.[1,2] However, research shows that formal training in transfusion medicine (TM) among postgraduate trainees remains deficient, and experts agree there is a need for increased knowledge transfer of TM for trainees, particularly those in non-hematological fields.[3,4] While educational interventions aimed at the early postgraduate training period have been advocated as an effective means of encouraging evidence-based transfusion practices, the optimal method of postgraduate TM education remains understudied.[5] One novel approach to addressing this knowledge gap is Transfusion Camp, an annual longitudinal multispecialty program developed at the University of Toronto in 2012. The program, initially established as a TM curriculum to meet the needs of postgraduate trainees at the University of Toronto, has expanded over the past 10 years to encompass 18 university sites across Canada and the United Kingdom, educating over 400 trainees in the 2020–2021 academic year. Transfusion Camp utilizes centralized didactic lectures followed by interactive locally facilitated team-based learning seminars, delivered over the course of 5 days. While open to all specialties, the program is aimed toward improving transfusion knowledge among postgraduate trainees in non-hematological specialties.[1,6]

Transfusion Camp has been validated as a scalable approach to TM education delivery. A recent study evaluating the program showed that trainees completing the program gained an increase in TM knowledge and fostered a positive attitude toward TM.[1] While the purpose of Transfusion Camp is to equip postgraduate trainees with the necessary evidence-based TM knowledge to aid in making informed transfusion decisions and providing clearer communication with patients, this knowledge can only be useful if applied to their respective clinical practices. As Transfusion Camp is a multispecialty program that includes all levels of PGY training, the requirement for expertise in different areas of TM is expected. Therefore, the knowledge trainees take away from Transfusion Camp to apply to their clinical practice may vary. Recognition of this variation and identification of common themes in the way different specialties translate TM knowledge to clinical practice is critical for informing future iterations of the program. These results will allow the program to better meet a wide range of clinical needs while also identifying gaps for further focus.[7–9]

The aim of this report is to determine the self-reported impact of Transfusion Camp on trainee clinical practice and to evaluate if there is an association between specialty and/or postgraduate year (PGY) level with areas of impact. This research will identify areas of impact in TM teaching, enabling Transfusion Camp to be tailored to meet the needs of postgraduate TM trainees from different specialties and further explore the role of centralized postgraduate TM education programs in improving transfusion care.

2 | METHODS

This was a retrospective analysis of survey responses collected from Transfusion Camp trainees over three academic years from 2018 to 2021. During these years, the Transfusion Camp curriculum spanned 5 days over each academic year (6 h of education per day, approximately every 2 months), each with a specific theme corresponding to the learning objectives (Table 1).

2.1 | Transfusion camp learning objectives

Transfusion Camp is structured around a curriculum comprising 6 core learning objectives labeled A to F. These objectives are further subdivided into 19 subobjectives labeled 1–19 (Table 1). All course lectures and team-based learning activities are associated with one or more of these objectives aimed at building upon the core themes in a longitudinal fashion. Upon completion of the program, attendees' knowledge is evaluated by a validated post-course assessment.[1]

2.2 | Curriculum delivery

The curriculum utilizes both didactic lectures and team-based learning seminars. Lectures are delivered in-person to participants based in Toronto and available live via

TABLE 1 Transfusion camp objectives and subobjectives.

A	**Indications for blood components**
1	Appropriately prescribe components (RBC, plasma, platelets, and cryoprecipitate)
2	Perform a preoperative bleeding history
3	Interpret coagulation testing results
4	Have a reasonable approach to the correction of coagulation prior to procedures
B	**Blood bank testing**
5	Summarize basics about blood bank tests and pre-transfusion compatibility testing
6	Explain the implications of a positive antibody screen
7	Know when to screen patients for platelet alloimmunization
C	**Risks of transfusion**
8	Obtain informed consent for transfusion
9	Prevent, diagnose, manage and report acute and delayed transfusion reactions
10	State the current risks of transfusion-transmitted infections
11	Describe challenges to transfusion safety (getting the right blood to the right patient)
D	**Indications for manufactured blood products**
12	Appropriately prescribe fractionated blood products (albumin, coagulation factor concentrates)
13	State when and how Rh immunoglobulin is administered in pregnancy
E	**Special transfusion situations**
14	Know when to order irradiated blood components
15	Develop an approach to patients with congenital or acquired bleeding disorders (including reversal of common anticoagulants)
16	Safely transfuse a patient with sickle cell disease
17	Manage a massively hemorrhaging patient, including surgical, trauma and obstetric patients, with discussion of hemostatic medications (antifibrinolytics)
F	**Patient blood management**
18	Have a standard approach to the management of pre-operative anemia
19	Apply patient blood management strategies, including for patients who refuse blood on religious grounds

virtual platform or video recording for all other participants. The interactive locally facilitated modified team-based learning seminars are designed to consolidate information learned in the lectures through in-person group discussion. The 2020–2021 program was an exception, which demanded that all programming be delivered virtually due to COVID-19 pandemic restrictions.

2.3 | Survey distribution

At the end of each day, trainees are asked to voluntarily complete an anonymous survey providing demographic data (specialty, PGY level), speaker evaluations, and evaluating their experience. On Days 2 to 5, trainees are asked "Have you applied any of your learning from Transfusion Camp into your clinical practice?". The proportion of trainees who reported an impact on their clinical practice was recorded in relation to their specialty, and PGY level. If respondents answered yes, they were asked to provide an example through a free-text response. The survey was open for 10 days with reminders issued at days 3 and 7. Through an iterative process, open-ended free-text responses on trainee self-reported impact were grouped and categorized according to the predetermined Transfusion Camp learning objectives and subobjectives (Table 1). Research ethics board approval was obtained from the University of Toronto and Canadian Blood Services.

2.4 | Trainees

Postgraduate trainee specialties were divided into four distinct groups: (1) ANESTH: anesthesiology; (2) HEME: hematology-based including hematology, pediatric hematology. and TM; (3) LAB: anatomic pathology, general pathology, and hematopathology; and (4) OTHER: clinical non-hematology specialties including critical care medicine, emergency medicine, obstetrics, pediatrics, medical oncology, internal medicine, surgery, and family medicine. Groups were categorized based on clinical versus non-clinical practice and the number of participants (with ANESTH and HEME being the predominant groups). PGY levels were grouped into three groups: (1) PGY 1; (2) PGY 2–3; and (3) PGY 4+ to facilitate analysis. Transfusion Camp attendees included both new and less frequent, repeat participants from previous years.

2.5 | Outcome measures

The primary outcome measure of this study was to describe the self-reported impact of Transfusion Camp on trainee transfusion clinical practice. This involved determining the percentage of trainees reporting impact, as well as determining which transfusion objectives were more commonly applied to clinical practice. The secondary outcome measures were to determine whether there was an association between PGY level and/or specialty and specific transfusion objectives and their reported effect on transfusion practice.

TABLE 2 Number of trainees who reported applying teaching to clinical practice.

	N (%)
By transfusion camp day ($N = 485$)	
Day 2	97 (51)
Day 3	126 (68)
Day 4	120 (70)
Day 5	142 (83)
Overall impact over days	OR 1.58 (95% CI 1.37–1.84); $p < .0001$
By transfusion camp year ($N = 485$)	
2018–2019	81 (65)
2019–2020	168 (66)
2020–2021	236 (69)
Overall impact over years	$p = .63$
By trainee specialty ($N = 484$)	
ANESTH	139 (64)
HEME	145 (81)
LAB	35 (39)
OTHER CLINICAL/NON-HEME	165 (72)
Overall impact of specialty	$p < .0001$
By trainee PGY level ($N = 484$)	
PGY 1	73 (61)
PGY 2–3	180 (63)
PGY 4+	231 (75)
Impact of increasing PGY Level	OR 1.44 (95% CI 1.16–1.78); $p = .0009$

As the survey was anonymous and analysis done retrospectively, it was not possible to link responses from the same trainees. This meant that in some cases, the same trainee may have responded more than once during the academic year. Therefore, results from Day 5 alone were also analyzed separately, in order to encompass the cumulative experience from participating in Transfusion Camp over the academic year. In addition, a post-hoc analysis was performed to see if there were any differences in the final academic year of 2020–2021 when all of Transfusion Camp was delivered virtually due to COVID-19 pandemic restrictions compared with prior years.

2.6 | Statistical analysis

Descriptive statistics were used to describe the cohort. To determine the proportion of trainees that had a self-reported impact of Transfusion Camp on clinical practice, a generalized linear regression analysis was performed with binomial distribution and logit link function. To determine the impact of specialty or PGY level on trainee-reported impact, a multivariable generalized linear regression analysis was performed. In each of the multivariable models, the independent factors included categorical variables of specialty groups (ANESTH, HEME, LAB, or OTHER) and PGY Levels (1, 2–3, or 4+). The outcome was the binary variable of the reported impact of each objective A to F (yes vs. no). All analyses were conducted using Statistical Analysis Software (SAS version 9.4, Cary, NC). p-value $< .05$ was considered statistically significant.

3 | RESULTS

Over the 2018–2021 academic years, 757 anonymous survey results were obtained. Thirty-eight survey responses with "N/A" impact were excluded. The total number of survey respondents increased year over year, while response rates remained generally consistent (2018–2019: $n = 124$ (22%); 2019–2020: $n = 254$ (32%); and 2020–2021: $n = 341$ (27%)) (Table 2). Response rate was 27% to 30% for each of Days 2–5.

3.1 | Self-reported impact of transfusion camp on clinical practice

Overall, 68% of trainees responding to the survey reported applying Transfusion Camp learning to their clinical practice. This increased over the 4 days (OR 1.58; 95% CI 1.37–1.84) with the highest proportion of trainees (83%) reporting impact on day 5, representing cumulative learning over time. When examined over three academic years, the proportion of trainees with a self-reported impact was similar every year even with the transition to virtual learning due to the COVID-19 pandemic in 2020–2021 ($p = .63$) (Table 2).

The specific learning objectives applied by trainees into clinical practice are described in Table 3. Of the 485 respondents that reported a clinical impact, the most frequently reported objective was objective A (indications for blood components) (45%). In contrast, objective B (blood bank testing) was the least frequently reported each day and overall (1%). The 6 core objectives were further broken down into 19 subobjectives that represent distinct areas of TM as defined in Table 1. The 5 most reported subobjectives to have a clinical impact were appropriately prescribe components (24%); prevent, diagnose, manage, and report acute and delayed transfusion reactions (10%); obtaining informed consent for

TABLE 3 Specific objectives applied in practice as reported by trainees (from most common to least reported).

Learning objective (*N*, %)	Day 2 (*N* = 97)	Day 3 (*N* = 126)	Day 4 (*N* = 120)	Day 5 (*N* = 142)	All days (*N* = 485)
(A) Indications for blood components	42 (43)	58 (46)	60 (50)	60 (42)	220 (45)
(C) Risks of transfusion	33 (34)	28 (22)	31 (26)	37 (26)	129 (27)
(F) Patient blood management	15 (16)	15 (12)	39 (33)	30 (21)	99 (20)
(E) Special transfusion situations	16 (17)	23 (18)	22 (18)	36 (25)	97 (13)
(D) Indications for manufactured blood products	3 (3)	4 (3)	2 (2)	12 (8)	21 (4)
(B) Blood bank testing	0 (0)	4 (3)	1 (1)	2 (1)	7 (1)

Note: <16%, □; 16–30%, □; 31–45%, □; >45%, □.

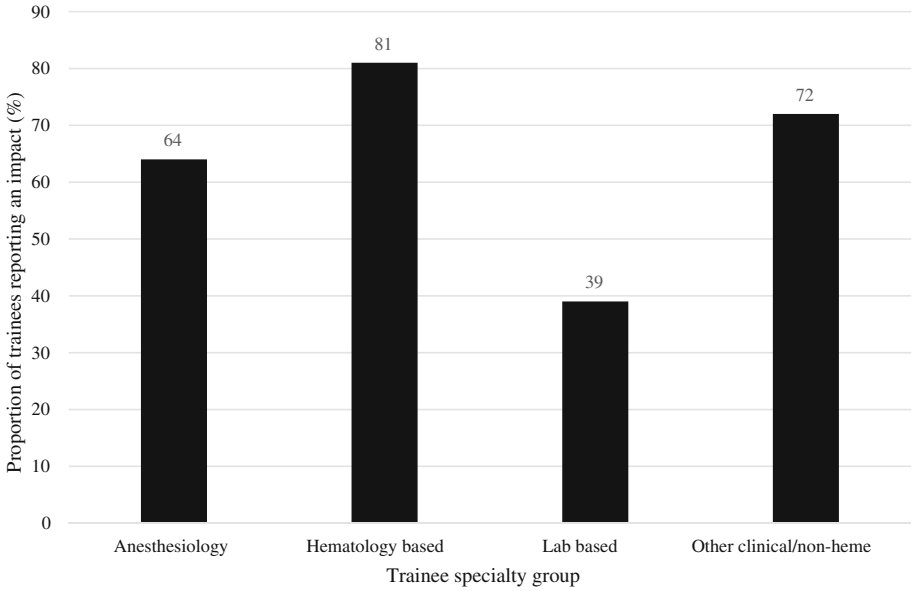

FIGURE 1 Proportion of trainees who reported "Yes" to impact on clinical practice by specialty group.

transfusion (10%); apply patient blood management strategies (10%); and have a reasonable approach to the correction of coagulation prior to procedures (6%). Common free-text examples of the "appropriately prescribe components" subobjective included reports of trainees avoiding red blood cell (RBC) transfusion for asymptomatic patients with Hb >70 g/L and avoiding plasma transfusion for a mildly elevated INR (<1.8).

As Day 5 was the final day of Transfusion Camp, trainees had the opportunity to apply their cumulative learning across the academic year. A separate analysis of day 5 results was conducted with appropriately prescribe blood components remaining the most frequently reported (32%).

3.2 | Association of specialty with impact as reported by trainees

Overall, different specialty groups reported significantly different percentages of impact on clinical practice ($p < .0001$). Compared to anesthesiology as the reference group, trainees in hematology-based specialties are more likely to report an impact (OR = 2.42, 95% CI: 1.52–3.86; $p = .0002$), lab-based trainees were less likely to report an impact (OR = 0.36, 95% CI: 0.22–0.60; $p < .0001$), and there was no difference compared to trainees in other clinical/non-hematology specialties ($p = .07$) (Figure 1). Table 4 shows differences in reported objectives by specialty group.

3.3 | Association of PGY level with impact as reported by trainees

Trainees reported increased impact with increasing PGY level ($p = .001$), with PGY 4+ trainees being more likely to have a higher proportion reporting an impact (75%), compared to PGY 1 or 2–3 (61%, OR = 1.91; 63%, OR = 1.78) (Table 2). While there were differences in the proportion of trainees from each PGY group reporting

TABLE 4 Trainees reporting impact by specialty group and objective.

Learning objective (*N*, %)	ANESTH (*N* = 139)	HEME (*N* = 145)	LAB (*N* = 35)	OTHER (*N* = 165)	Overall (*N* = 484)
(A) Indications for blood components	74 (53)	49 (34)*	10 (29)*	87 (53)	220 (46)
(E) Special transfusion situations	40 (29)	29 (20)	3 (9)*	25 (15)*	97 (20)
(F) Patient blood management	33 (24)	19 (13)*	4 (11)	43 (26)	99 (21)
(C) Risk of transfusion	22 (16)	44 (30)*	2 (6)	61 (37)*	129 (27)
(D) Indications for manufactured blood products	12 (9)	4 (3)	1 (3)	4 (2)	21 (4)
(B) Blood bank testing	1 (1)	5 (4)	0 (0)	1 (1)	7 (2)

Note: <16%, □; 16–30%, □; 31–45%, □; >45%, ■. ANESTH = anesthesiology; HEME = hematology-based including hematology, pediatric hematology, and transfusion medicine; LAB = lab-based including hematopathology and general pathology; OTHER = clinical non-hematology including critical care medicine, emergency medicine, obstetrics, pediatrics, medical oncology, internal medicine, surgery, and family medicine.
*Denotes statistical significance with *p*-value < .05. Anesthesiology is the reference group.

each subobjective (1–19), subobjective 1 (appropriately prescribe blood components) was consistently the most commonly reported across all PGY level groups. When looking at association between PGY level and reported impact, there were two notable findings. First, a significantly higher proportion of PGY 4+ trainees reported applying teaching on transfusion reaction management compared with PGY 1 ($p = .03$; OR = 2.38; 95% CI 1.09–5.21) or PGY 2–3 ($p = .006$; OR = 2.16; 95% CI 1.25–3.72). Common free-text examples included improved prevention of transfusion reactions such as awareness of the potential need for diuretics. Second, PGY 1 trainees reported applying teachings on the management of preoperative anemia significantly more frequently than PGY 2–3 ($p = .01$; OR = 0.25; 95% CI 0.08–0.75) and PGY 4+ ($p = .0007$; OR = 0.13; 95% CI 0.04–0.43).

3.4 | Multivariable analysis

To determine whether PGY level and specialty were independently associated with trainee-reported impact, multivariable analysis was performed. For objective A (indications for blood components), lower PGY level was strongly associated with impact ($p = .003$) with less difference in impact based on specialty group ($p = .05$). For objective E (special transfusion situations) and F (patient blood management), specialty group was associated with impact ($p = .003$ and $p = .02$, respectively) whereas PGY level was not ($p = .31$ and $p = .55$, respectively). There was no clear association between objectives B, C, and D.

4 | DISCUSSION

Overall, 68% of trainees responding to the survey reported that Transfusion Camp had an impact on their practice, increasing each day from 51% on day 2 to 83% by day 5. The most frequently reported areas of impact included transfusion indications (45%) and transfusion risk management (27%). Trainees in hematology-based specialties were the most likely to report positive impacts, while trainees in the laboratory specialties group were the least. Impact increased with increasing PGY level, with 75% of PGY 4+ trainees reporting impact. The impact of specialty and PGY varied depending on the transfusion objective.

The increase in self-reported impact over the course of Transfusion Camp was expected as the curriculum is taught over 5 days throughout the academic year, with each day centred on a new core theme with information building upon principles delivered on the previous day. This is a particular strength of the Transfusion Camp program which is longitudinal over the course of the academic year to allow learners to have an opportunity to apply their newly acquired knowledge, as well as an opportunity to check-in during seminars with local faculty, although the latter was not formally assessed. This is supported by literature suggesting that a longitudinal strategy for medical education can improve clinical knowledge acquisition, consolidation, and retention when compared to intensive courses delivered in one session.[10,11]

While Transfusion Camp has expanded over the three academic years to include a larger number of participants, the core curriculum and structure of the program have remained largely unchanged. The proportion of trainees with self-reported impact remained consistent over time. This suggests that the centralized curriculum consisting of didactic lectures and small group learning is effective in delivering TM education in a way that is clinically applicable. An increase in the number of university sites and participants did not adversely impact the learner's ability to apply the teaching to their respective clinical practices.

The program also switched to virtual delivery for the 2020–2021 academic year due to the COVID-19 pandemic, with the migration of all didactic sessions to virtual webinars and all seminars to virtual small-group learning sessions. Despite these changes, there was no statistically significant difference in how attendees reported their clinical impact in 2020–2021 compared to the previous two academic years. This suggests that the virtual format is an effective method of delivering the centralized Transfusion Camp curriculum without compromising the self-reported impact on transfusion practice. This finding supports the potential for ongoing virtual delivery of the Transfusion Camp in the future. Benefits include delivering content to smaller university sites or inclusion of programs lacking the resources necessary to organize in-person seminar sessions and increased outreach to international sites where virtual delivery of didactic content has been adopted.

When looking at the association between specialty groups and the proportion of trainees reporting a clinical impact, a highly significant difference was found. Trainees in lab-based specialties were consistently the least likely to report an impact compared with their clinical counterparts. This may be attributed to the different responsibilities of different trainees with lab-based specialties less likely to be at the bedside making clinical decisions for patients. More clinically oriented specialties may have greater exposure to clinical situations where Transfusion Camp knowledge can be integrated. Similarly, when looking at the association between PGY level and impact, there was a significantly higher proportion of PGY4+ trainees that reported applying Transfusion Camp knowledge in the prevention or management of transfusion reactions than other PGY levels. Typically, trainees from hematology-based specialties have completed prior internal medicine training and make up most of the PGY 4 trainees. The hematology-based specialties are also most likely to encounter transfusion reactions in clinical practice and have more opportunities to apply these learnings (such as during their mandatory TM rotations or in the care of heavily transfused populations). In contrast, PGY 1 trainees were found to be more likely to apply knowledge on how to perform a preoperative bleeding history and manage preoperative anemia. This is likely because of the large number of anesthesiology residents in the PGY 1 group. Overall, it is challenging to determine from the data whether these differences are attributed to PGY level, specialty, or both. The specific differences in the type of transfusion knowledge applied by different specialties highlight the challenge of tailoring the Transfusion Camp curriculum to specific trainees while ensuring a foundational knowledge of TM for multiple specialties. This finding may support the increased implementation of a case-based format, adapting the teaching to the specific clinical responsibilities of the participants.

This study has three main strengths. Firstly, the results of this study extend beyond trainee attitudes and TM knowledge, assessing whether the education from Transfusion Camp is applied in practice.[5] Although it is not a direct observation of trainee behavior, this evaluation confirms that trainees are able to describe appropriate transfusion principles that they have applied to their transfusion practice and builds upon the findings from a previous paper published in 2019 that found that Transfusion Camp increased TM knowledge and fostered a positive attitude toward TM.[1] Moreover, the use of self-evaluation as a tool for formative feedback vs. direct assessment of applied knowledge can be valuable as trainees themselves would be most familiar with how their own clinical decision-making has changed as a result of Transfusion Camp. In contrast, external assessors may not recognize whether a change in a trainee's TM clinical decision-making resulted from Transfusion Camp or from other sources of teaching. Secondly, survey responses were analyzed over three academic years allowing evaluation of the impact of expansion to additional sites and virtual delivery. While the difference in reported impact between trainees at local in-person sites vs. external remote sites was not directly compared, the finding that there was no change in self-reported impact for trainees in 2020–2021 demonstrated the adequacy of virtual delivery. Third, the impact on transfusion practice was categorized into predetermined learning objectives (Table 1) designed to encompass all the core themes of TM, enabling a more comprehensive understanding of how TM knowledge is being translated into clinical practice across different specialties. This knowledge may be used to inform decision-making not only for Transfusion Camp but other TM educational initiatives, factoring in the clinical needs of trainee specialties in attendance. Potential approaches may include: (1) modifying the existing curriculum to more closely align with the clinical practice needs of the more heavily represented groups (e.g., PGY 1 trainees; anesthesiology trainees), or (2) running separate sessions for different specialties (e.g., a version of Transfusion Camp designed specifically for lab-based specialties). Drawbacks of running increasingly specialized programs include resource limitations (e.g., faculty, administrative support, space), funding limitations, and the risk of prioritizing the clinical needs of more heavily represented specialties and/or PGY levels over the less represented groups. Moreover, not all learners may be aware of their own limitations, therefore, if the program is tailored to expressed clinical needs, there may be missed opportunities to educate trainees in underrecognized but important areas of TM.

This study had a number of limitations. The low survey response rate may not reflect the views of the majority and the most engaged trainees may have been more

likely to respond. In addition, the survey responses were anonymous and the same trainees may have responded on each of the 4 days whereas other trainees may not have responded at all. As a result, there may be repetition in the responses and in their reported impact. As some trainees attended for more than one of the 3 years this may lead to repetition in their responses, although typically the number that repeats Transfusion camp is small, less than 14% per year. Moreover, the responses were largely consistent from year to year, suggesting that certain learning objectives are consistently reported even when the participant pool changes annually. Additionally, the survey was structured such that respondents were asked to provide examples of their clinical application in free-text; thus, respondents may have not listed all the ways in which Transfusion Camp has impacted their practice. Instead, they may have listed only the most recent application of TM knowledge or the most frequent impacts. Therefore, the objective frequency derived from these responses may not be comprehensive. Moreover, as the survey question was specifically designed to look for impact on trainee clinical practice, this may have led to selection bias against the less clinically oriented objectives such as "blood bank testing", as reflected in only 1% reporting an impact. At the same time, free text responses allow mitigation of bias from pre-selected options. As the final survey was administered at the end of day 5, it is possible that the impact of day 5 topics (trauma, massive transfusion protocols, and controversial entities) was underestimated as trainees are yet to apply their learnings to practice prior to the final survey. Moreover, due to the anonymous nature of the survey, it was not possible to correlate self-reported impact with other Transfusion Camp outcome measures such as end-of-course test scores, and determine if scores were associated with the likelihood of applying TM skills to patient care.

5 | CONCLUSION

Transfusion Camp is an education program designed with the intent of improving trainee transfusion clinical practice. The analysis between specialty and topics will allow future iterations of the program and other TM education initiatives to better meet the wide range of clinical needs and optimize transfusion practice. This study showed that Transfusion Camp's centralized curriculum remains an effective means of delivering TM knowledge and impacting clinical transfusion practice despite a shift to virtual delivery of the entire curriculum due to COVID-19. Overall, the findings of this study support the ongoing implementation of Transfusion Camp as an impactful program to deliver TM education on a broad scale. Future studies are required to measure the impact of Transfusion Camp on observed clinical practice and patient care outcomes.

AFFILIATIONS

[1]School of Medicine, Queen's University, Kingston, Ontario, Canada
[2]Canadian Blood Services, Ottawa, Ontario, Canada
[3]Department of Pathology and Molecular Medicine, Kingston Health Sciences Centre and Queen's University, Kingston, Ontario, Canada
[4]Education and Safety in Transfusion (QUEST) Research Program, University of Toronto Quality in Utilization, Toronto, Ontario, Canada
[5]Blood Transfusion Laboratory (Laboratory Medicine Program) and Blood Disorders Clinic (Division of Medical Oncology and Hematology), University Health Network, Toronto, Ontario, Canada
[6]Department of Laboratory Medicine and Pathobiology, University of Toronto, Toronto, Ontario, Canada
[7]Department of Anesthesia, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada
[8]Department of Anesthesiology and Pain Medicine, University of Toronto, Toronto, Ontario, Canada
[9]Department of Clinical Pathology, University Health Network, Toronto, Ontario, Canada
[10]Precision Diagnostics and Therapeutics Program, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada
[11]Interdepartmental Division of Critical Care Medicine, Department of Medicine, University of Toronto, Toronto, Ontario, Canada
[12]Department of Laboratory Medicine, St. Michael's Hospital-Unity Health Toronto, Toronto, Ontario, Canada
[13]Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario, Canada
[14]Mount Sinai Hospital, Toronto, Ontario, Canada
[15]Division of Hematology, Department of Medicine, London Health Sciences Centre, London, Ontario, Canada
[16]Department of Medicine, CHU de Québec-Université Laval, Québec City, Québec, Canada
[17]NHS Blood & Transplant and the Oxford University Hospitals, Oxford, UK
[18]Department of Medicine, University of Oxford, Oxford, UK
[19]Department of Pathology and Laboratory Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
[20]Saskatchewan Health Authority, Saskatoon, Saskatchewan, Canada

[21]Division of Hematopathology, Department of Pathology and Laboratory Medicine, Dalhousie University, Halifax, Nova Scotia, Canada
[22]Department of Pathology and Lab Medicine, Queen Elizabeth II Health Sciences Centre, Halifax, Nova Scotia, Canada
[23]Beatrice Hunter Cancer Research Institute Halifax, Nova Scotia, Canada
[24]Departments of Anesthesiology, Pharmacology and Therapeutics and Pathology and Laboratory Medicine, University of British Columbia, Vancouver, British Columbia, Canada
[25]McMaster McMaster Centre for Transfusion Research, McMaster University, Hamilton, Ontario, Canada
[26]Department of Laboratory Medicine and Molecular Diagnostics, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada

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CONFLICT OF INTEREST STATEMENT

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ORCID

Katie C. Y. Yeung https://orcid.org/0000-0003-3629-9131
Christine Cserti-Gazdewich https://orcid.org/0000-0002-5297-6406
Pablo Perez D'Empaire https://orcid.org/0000-0001-6448-0582
Lani Lieberman https://orcid.org/0000-0002-3633-0728
Michael F. Murphy https://orcid.org/0000-0002-2375-7503
Oksana Prokopchuk-Gauk https://orcid.org/0000-0003-2758-714X
Yulia Lin https://orcid.org/0000-0002-5562-9020

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