

# Effects of Incorporating a Blood Center Tour in the Immunohematology Course

ELEANOR K JATOR

**OBJECTIVE:** To determine the effects of incorporating a blood center tour in the immunohematology course on the confidence and knowledge of students

**DESIGN:** In-class lecture on the major blood center activities and tour of the Red Cross. Pre- and post- tests administered. To compare levels of understanding, confidence and overall tour impact, paired T- test and Chi-Square analyses were performed and frequencies calculated.

**SETTING:** Medical Technology program at Austin Peay State University, Clarksville TN American Red Cross in Nashville TN

**PARTICIPANTS:** Fifteen students who registered in immunohematology course.

**INTERVENTION:** Two phases: First, a brief introduction, description and observation of the donation activities. Secondly, explanations and observation of blood components preparations, labeling, storage, distribution, and quarantine. Both phases included question and answer sessions.

**OUTCOME MEASURES:** Comprehension of blood center activities; self confidence; increase knowledge of job alternative.

**RESULTS:** Students showed an increase in course content knowledge; 62% on the pre-test and 69% on post-test ( $P=0.004$ ). Although the post-test score was better than the pre-test, 69% is not a great score. Students probably did not take the exam seriously since there was no grade involved.

More students felt good (40%) about their confidence in facing the blood bank clinical rotations and ultimately the national certification exam. The tour perfectly complemented lectures. Interaction with other medical technologists was very informative (53%). Levels of understanding of major blood center activities increased ( $P < 0.05$ ) except for the phlebotomy stage ( $P=0.07$ ).

**CONCLUSION:** A blood center tour incorporated into the immunohematology course is a valuable addition to the learning experience of students. Students have the opportunity to interact with employees in their workplace, with potential employers, and they build self confidence in the subject area.

**ABBREVIATIONS:** MT=medical technology

**INDEX TERMS:** Blood center tour, job alternative, confidence

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*Eleanor K. Jator, PhD MT(ASCP), Assistant Professor, Medical Technology Program, Austin Peay State University, Clarksville, TN*

*Address for Correspondence: Eleanor K. Jator, Austin Peay State University, 601 College Street, Allied Health Sciences Department, Clarksville, TN 37044, Phone: 931-221-6498, Fax: 931-221-6452, jatore@apsu.edu*

## INTRODUCTION

Clinical rotations in Medical Technology (MT) programs are an asset to students. Students traditionally rotate through four departments: hematology, blood bank, chemistry and microbiology. These rotation sites, not only expose students to valuable experiences, but also enable them to interact with potential employers and colleagues.<sup>1,2</sup> Clinical rotations have been shown to increase hiring opportunities for students.<sup>2</sup> A high percentage of students eventually work at the sites where they did their rotations.<sup>3,4</sup> One area that has been underexplored by some MT programs is incorporating blood centers rotations into the curriculum. Blood centers screen donors,

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draw donor blood, perform tests, process donor units, label and store these products at appropriate temperatures. These units are then distributed to hospitals. On the other hand, most hospital blood banks, where students do their clinical rotations, purchase the blood products; hence, no extensive processing is experienced.

Often, students are only lectured on blood centers activities as described above, so they can only imagine what happens and answer questions on class exams. As a result, students do not fully appreciate how these processes are conducted. Students only see the already prepared and labeled components in the hospital refrigerators, counter tops and freezers when they complete their hospital blood bank rotation, but they never see how these neatly packaged components are prepared. Hence this study is vital to determine the effects of having a blood center tour on students' confidence and knowledge.

Some university and hospital-based clinical laboratory science programs have their students tour blood or tissue centers. Students in most programs do not tour blood or tissue centers for many reasons including a lack of time in the schedule for extra "field trips", distance and/or lack of cooperation of personnel at the blood center. The MT program at Austin Peay State University is one of those programs that did not incorporate visits to blood centers in its curriculum. It is understandable that carving out the time for rotations to blood centers may be a problem since time is always limited. On the other hand, scheduling a tour to a blood center might be beneficial to students and so it could be "time well spent".. This study examined the effects of incorporating a blood center visit into the immunohematology course.

This study was designed to answer the following questions:

- Will incorporating a blood center tour in the immunohematology course lead to greater comprehension of blood and blood component processing?
- Will this experience increase students' confidence both for their blood bank clinical rotation and for the national certification exams?
- Is this tour able to increase job alternatives?

## MATERIALS AND METHODS

This study was approved by the Austin Peay State University's Institutional Review Board. The blood center chosen was the American Red Cross facility in Nashville, which serves several counties in Tennessee. This blood center was especially chosen because of its proximity to Clarksville, Tennessee. Pre- and post- tests and questionnaires were administered to students.

## Participants and setting

All fifteen students who registered for the immunohematology class participated in the study. They all signed informed consent forms, which were then securely kept in a locked file cabinet in the departmental office.

## Method

Prior to the tour of the Red Cross, the donation, preparatory and storage processes of blood and its components were discussed in class using powerpoint slides with pictures included. Pre- and post- tests and questionnaires were administered to assess comprehension of blood donation, preparation of components, appropriate storage conditions and confidence level of the tour before and after the visit in preparation for the blood bank clinical rotation and the certification exam. The pre- and post-tests each had twenty five multiple choice questions. These questions were designed to assess content knowledge level. Results from pre- and post-tests were then compared to see if there was a significant difference. The questionnaire, which was based on a Likert scale (poor=1, fair=2, good=3, very good=4 and excellent=5), was intended to assess the confidence felt with regards to the donor screening, testing, apheresis, whole blood donation, component preparation and storage processes. The overall impact and experience of the Red Cross tour on the students were also assessed. Letters were assigned to each pre- and post- test questionnaire for anonymity. Each participant was assigned a number linked to the same letter code on both questionnaires. Participants were not asked to include their names or any biographic information. The pre-test was administered two days prior to the tour and after the lecture about blood center activities. The post test was administered three days after the tour. Each student got the same lettered questionnaire and test on the pre- and post-tests. Test and questionnaire results could not be linked back to the student; so there was no way of knowing which letter or number corresponded to which student. The master list was not kept.

## The tour

The tour consisted of two phases: the first phase of the tour included a brief introduction and description of the activities of the Red Cross and importance of blood donation. Students were given an explanation of the donation process which included the information given to donors, health exam/testing, and the actual donation phases. They observed how whole blood and apheresis components were collected into appropriate bags. The second phase of the tour included observations of the following activities: blood components preparations and labeling, storage, distribution, and quar-

antine of all products. Both of these phases were explained and demonstrated by the Red Cross staff. After the tour, students and staff had question and answer sessions. The tour was completed in three hours.

**Data Analysis**

All data entry and statistical analyses were performed using MINITAB version 14.0 (Pearson Education, Inc.). The multiple choice questions were evaluated as either answered correctly or incorrectly. A score, representing the number of correct content knowledge questions out of twenty-five questions was calculated for each student. A pre and post test comparison on the scores was performed using a paired T- test while frequencies with associated percentages were calculated for the Likert scale items. The paired T- test

analysis was performed at a 5% significance level (alpha = .05). A Chi-Square analysis was performed to test whether the students' understanding of donation center's activities before and after the tour differed.

**RESULTS**

The pre-test mean knowledge score was 62% and the mean knowledge post- test score was 69%. The mean percentage difference was 7% (t = -3.03; df: 14; P < 0.004). The pre-test and post-test mean scores showed increased course content knowledge on the processes involved in the donation, processing, and storage of blood and its components. Table 1 shows the percentages of the levels of understanding of some donor center activities. The pre-test results show that 33% of students reported that they fairly comprehended the donor

**Table 1.** Percentages on pre and post levels of understanding

| <u>Variables</u>                                     |      | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Very Good</u> | <u>Excellent</u> | <u>P- values</u> |
|--|------|-------------|-------------|-------------|------------------|------------------|------------------|
| Donor screening process                              | Pre  | 0           | 33          | 53          | 7                | 7                | .03              |
|  | Post | 0           | 6           | 20          | 47               | 27               |                  |
| Pilot specimens testing                              | Pre  | 0           | 60          | 33          | 7                | 0                | .01              |
|  | Post | 0           | 13          | 20          | 67               | 0                |                  |
| Apheresis  | Pre  | 0           | 67          | 20          | 13               | 0                | .02              |
|  | Post | 0           | 13          | 27          | 60               | 0                |                  |
| Actual whole blood Donation (phlebotomy)             | Pre  | 0           | 53          | 20          | 27               | 0                | .07              |
|  | Post | 0           | 7           | 33          | 40               | 20               |                  |
| Components preparation and labeling                  | Pre  | 0           | 73          | 27          | 0                | 0                | .01              |
|  | Post | 0           | 20          | 33          | 40               | 7                |                  |
| Blood and components storage                         | Pre  | 13          | 60          | 14          | 13               | 0                | .03              |
|  | Post | 0           | 20          | 26          | 47               | 7                |                  |
| Confidence in facing blood bank rotation             | Pre  | 20          | 67          | 13          | 0                | 0                | .001             |
|  | Post | 0           | 20          | 26          | 47               | 7                |                  |
| Confidence in facing the national certification exam | Pre  | 7           | 60          | 33          | 0                | 0                | .022             |
|  | Post | 7           | 20          | 40          | 33               | 0                |                  |

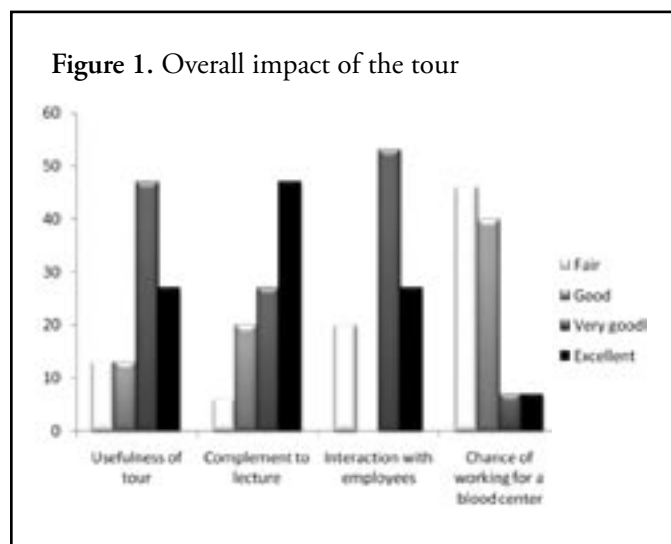
screening process with only 7% reporting excellent comprehension. The post-test results on this item showed opposite results, with 27% reporting excellent comprehension and only 6% reporting a fair comprehension of the screening process (P= 0.03). The P-values for the Chi-Square analysis for level of understanding of the donor screening, testing, apheresis, component preparation and storage processes were significant at alpha =.05 (P<.05) except for the whole blood donation (Table 1).

On confidence level, at least 73% of students felt good or very good on their confidence in facing blood bank clinical rotations and national certification exams after the tour compared to at least 33% before the tour. The pre-tour results on confidence in facing the national certification exam showed that 60% of the students felt fairly prepared and 33% felt good on their preparedness level with no student reporting feeling very confident (Table 1). After the tour, 33% of the students reported that they felt very good, 40% reported that they felt good and 20% reported that they felt fairly prepared for the national certification exam. There was a significant increase (P=0.022) in confidence level after the tour. Those who felt very confident in facing the exam increased from 0% to 33% and those who felt good increased from 33% to 40%. On confidence in facing their blood bank clinical rotations, 40% reported that they felt very good in their confidence post-tour compared to 0% pre-tour (Table 1). In addition, 67% of the students reported that they were only fairly confident pre-tour with a drop to 20% post-tour on confidence in facing the blood bank clinical rotation.

Forty-seven percent of the participants reported that the tour was an excellent complement to lectures, while only 6% reported it was a fair complement to lecture. Fifty-three percent of participants reported that their interactions with other medical technologists were very good, 27% reported excellent interactions, while 20% reported fair interactions. On working for a blood donation center, 46% reported a fair chance and 40% reported a good chance they might work for a blood center (Figure 1). The overall tour experience was positively rated with 47% of the students rating the tour as being very useful and informative and 27% reporting that the tour was an excellent experience.

**DISCUSSION**

This study revealed that students' levels of confidence in facing blood bank clinical rotation and national certification examination increased after the blood center tour. Confidence is a very important factor when facing the unknown and being able to succeed. It was observed that students were more knowledgeable on the activities of the Red Cross after the tour since there was a significant difference in the pre- and post- test scores (P=0.004). The pre-test mean score of 62% compared to 69% post-test score showed that the students were less knowledgeable on certain concepts before the tour. This increase in knowledge is confirmed by studies which reported on the benefits of educational interventions in teaching important concepts.<sup>5,6</sup> Students were more likely not to work for a blood center compared to those who would consider working for a blood center (see Figure 1). Most of them probably want to gain some experience in a hospital setting before working for a blood center. It is not surprising that hospital settings have been the desired sites both for clinical rotations and employment.<sup>1</sup>



Overall, students were very satisfied with the tour and acknowledged that it was a beneficial addition to lectures except for observing the actual whole blood donation (P=.07). This is probably because they have observed other students, friends and family members donate blood without being involved in the processes prior to the actual blood donation. Additionally, these students perform phlebotomy on each other during laboratory sessions, so they do not see anything extraordinary in whole blood donation that they have not already learned in their phlebotomy class.

Many students rated their interaction with medical technologists as very useful and informative while very few students felt their interaction with staff at the Red Cross was fair. Students did not only ask questions about employment pros-

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pects, job vacancies, and other employment requirements, but they became aware of what the jobs entail and what a potential working environment looks and feels like.<sup>1</sup> It is especially important to have an idea of the working atmosphere such as level of independence and level of interaction with other employees before employment decisions are made.<sup>2</sup>

## CONCLUSION

This study confirms that blood center tours complement lectures. MT programs that have not incorporated a tour or rotation through a blood center need to be aware of the benefits to students. Tours not only expose students to a working atmosphere that is different from hospitals, but also give students the opportunity to interact with potential employers and other medical technologists, increase their confidence for their blood bank clinical rotations and subsequently the national certification exam.

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