International student exchange and the medical curriculum: evaluation of a medical sciences translational physiology course in Brazil

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1Department of Pharmacology and Toxicology, Boonshoft School of Medicine, and 2Ohio Center for Urban and Public Affairs, Wright State University, Dayton, Ohio; 3Department of Morphology, Stomatology, and Physiology, University of São Paulo Faculty of Dentistry, and 4Department of Physiology, University of São Paulo Faculty of Medicine, Ribeirão Preto, Brazil; 5Departments of Internal Medicine and Physiology and Biophysics, University of Iowa Carver College of Medicine and Veterans Affairs Medical Center, and 6Department of Psychology, University of Iowa, Iowa City, Iowa; 7Department of Physiology, Federal University of Rio Grande do Sul, Porto Alegre; 8InCor Heart Institute, São Paulo; and 9Hypertension Unit, São Paulo Medical School, and 10Department of Physiology and Biophysics, Biomedical Sciences Institute, University of São Paulo, São Paulo, Brazil; and 11Department of Biological Sciences, College of Sciences and Mathematics, Wright State University, Dayton, Ohio

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Morris, Mariana, T. David Jones, Maria Jose Alves Rocha, Rubens Fazan, Jr., Mark W. Chapleau, Helio C. Salgado, Alan Kim Johnson, Maria Claudia Iriogoyen, Lisete C. Michelini, and David L. Goldstein. International student exchange and the medical curriculum: evaluation of a medical sciences translational physiology course in Brazil. Adv Physiol Educ 30: 119–123, 2006; doi:10.1152/advan.00004.2006.—The objective of the present study was to conduct a short-term international course on translational physiology for medical students from Wright State University and the University of Iowa. The goals were to 1) provide students with an exposure to the academic, cultural, and medical environments in Brazil; 2) promote awareness of the global medical community; and 3) provide an academic course focused on translational physiology. An evaluation of the students was conducted to determine whether such a short-term course might be useful in the medical curriculum. The 2-wk course was held in the summer of 2005 at the University of São Paulo School of Medicine in Ribeirão Preto, Brazil, for 23 American students. The program included presentations of basic and clinical topics, meetings with medical students, and clinical presentations. The program finished with student attendance at a scientific meeting sponsored by the Brazilian Society of Hypertension. Student surveys evaluated issues related to perceived treatment, Brazilian medical school environment, culture and personal attributes, and career aspirations. The international Medical Sciences Translational Physiology course for medical students provided a brief, but intense, experience. It gave students a picture of the medical environment in Brazil and an appreciation for the differences and similarities in cultures. Most students reported that it was a positive experience that would be beneficial to their careers. In conclusion, a short-term international course provides an efficient means for medical students to experience aspects of global medical science.

medical education; globalism; Latin America

Modern biomedical research is an international affair. For students entering careers in medicine, involvement in international aspects of biomedicine can serve a variety of functions. Some of these include an introduction to an expanded community of colleagues; an exposure to novel ideas, methods, and situations (health care systems, common diseases, etc.); and a broadening of cultural awareness and perspectives. To accomplish those objectives, we designed a series of exchange programs involving students from universities in the United States (Wright State University in Dayton, OH, and the University of Iowa in Iowa City, IA) and Brazil (the University of São Paulo in São Paulo and Ribeirão Preto and the Federal University of Rio Grande do Sul in Porto Alegre, Brazil). Some of these activities involved long-term (several months) exchanges in which students participated in laboratory research and academic courses in the host country. To expand the interchange between the United States and Brazil, we designed a short-term program in which a group of American students visited Brazil for 2 wk to participate in a course entitled Medical Sciences Translational Physiology. The theme of translational physiology is defined as the interacting contributions of clinical and laboratory research in advancing the understanding of normal and pathological physiology. The idea is to take a research program “from bench to bedside,” an area that is receiving increasing support (2). The present report describes the design and evaluation of that short-term exchange program. The goals of the course were to 1) provide students with an exposure to the academic, cultural, and medical environments in Brazil; 2) promote awareness of the global medical community; and 3) provide an academic course that focused on interactions between basic and clinical science.

The series of exchange programs was supported by coordinated grants from the Fund for Improvement of Postsecondary Education (FIPSE)/Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) United States-Brazil Higher Education Consortia. FIPSE and CAPES are federal educational organizations in the United States and Brazil, respectively. Our initiative was 1 of 42 grants awarded by this
program between 2001 and 2004, supporting the exchange of >800 students between the United States and Brazil. These grants supported efforts ranging from social science and public policy to natural sciences and engineering.

METHODS

We designed a short-term international course in translational physiology for medical and premedical students. The 2-wk course was held in Brazil at the University of São Paulo Faculty of Medicine in Ribeirão Preto. The American students (n = 23) and faculty members (n = 5) came from Wright State University and the University of Iowa. There were 12 Brazilian faculty members from the University of São Paulo in Ribeirão Preto who also participated in the program. The course, entitled Medical Sciences Translational Physiology, included lectures, clinical demonstrations, basic and clinical laboratory sessions, and meetings with Brazilian medical students. There were also opportunities for social interactions with Brazilian students and American and Brazilian faculty and an optional weekend beach trip. The program concluded with attendance at the Brazilian Society of Hypertension’s National Meeting, which was held in Ribeirão Preto, Brazil. Several of the students gave poster presentations at the meeting. The course was evaluated using survey instruments designed by one of the Wright State University team members (T. D. Jones).

Selection of Students and Pretrip Activities

Students were recruited from medical and premedical students at Wright State University and the University of Iowa. These are the collaborating universities in the FIPSE grant (United States-Brazil Higher Education Consortia). Students were recruited via e-mail announcements and posters. They were asked to complete application forms, which included information on academic status as well as statements of interest and career goals. Applicants were selected by faculty review committees at the respective United States universities. Most of the students who expressed interest in the program had experience with foreign travel or other exchange programs. However, none of the students had traveled to Brazil before this experience. Students were asked to sign a participation agreement and required to pay a $100 good-faith deposit. Language training in Portuguese was provided on a limited basis (~14 h) as well as information on Brazilian culture and the logistics for travel. The final student population included 18 students from Wright State University and 5 students from the University of Iowa, with the majority of students being incoming second-year medical students.

Program Organization and Support

The program was organized by a committee composed of United States and Brazilian faculty. Communications were maintained by conference calls and e-mail. The program was partially supported by a FIPSE grant, which paid for student and faculty travel and housing. Students were housed together in a student dormitory near the campus where they were intermixed with Brazilian students. The program was organized to include a variety of didactic and clinical/laboratory activities. Brazilian and American professors participated in the program. As professors in medical schools, they were familiar with the academic level of second-year medical students and presented appropriate material. The lecture and clinical topics were chosen based on the interests of the participating faculty members with an emphasis on translational biology. Examples of the basic aspects of biomedicine included animal models for disease-oriented research, hypertension, autonomic control of the circulation, immunobiology, and others. Some of the clinical issues were those issues less likely to be encountered in United States medical training, i.e., problems associated with reusing medical supplies in hospitals, efforts to improve health care delivery in a rural clinic, and the etiology and treatment of tropical diseases like Chagas and dengue. Basic science lectures/discussions and clinical experiences were integrated to emphasize the importance of translating knowledge gained through basic research to the clinic. For example, the topic “Epilepsy, Brain Structure, and Clinical Treatment” included a basic science lecture and discussion on experimental models of epilepsy in the morning (Dr. Norberto Cai-rasco, Professor of Physiology), followed by a discussion of treatment of seizures in patients and a visit to the Neurological Treatment Center at the University of São Paulo Hospital in the afternoon (Dr. João Leite, Professor of Neurology). Students were able to talk with the patients, hear a clinical presentation, and observe doctor-patient interactions. The last part of the program was a participation in the Annual Meeting of the Brazilian Society of Hypertension. This provided an opportunity for the students to see some of the top clinical and basic scientists in Brazil. Another important aspect of the program was the interactions between American and Brazilian health science students. This provided a forum for casual meetings and an exchange of information. At the end of the program, there was a dinner and award of certificates.

Program Evaluation

Pre- and posttrip surveys were completed by participants. The goals were to measure 1) student satisfaction with specific aspects of the program; 2) the students’ perceptions of Brazil, specifically, the medical school environment; 3) the effect of the program on cultural and personal attributes; and 4) the impact of the trip on student career aspirations. Twenty students (15 students from Wright State University and 5 students from the University of Iowa) responded to the survey.

Data Analysis

The results of the surveys were quantified, and the data are presented as means or means ± SE. Given the sample size of the students (n = 20), this method of analysis was chosen to show the degree of variability in survey responses, not to measure statistically significant differences. To measure changes in opinions as a result of the trip, a two-way analysis of means was conducted on key ranking questions. On these questions, students were asked to rate what they believed would be, for example, the quality of school and hospital facilities in Brazil on a Likert scale. A comparison of pre- and posttrip results allowed researchers to examine the impact of the course and stay in Brazil on the students’ opinions of various topics.

RESULTS AND EVALUATION

General observations. General observations were made from the data. First, before leaving for Brazil, most students were excited about the opportunity of traveling to Brazil, but many thought that they were unprepared for what they might encounter. One fear was related to language and the ability to communicate. Although some students took a short survival course in Portuguese, their overall language skills were minimal. Before leaving for Brazil, 22% of the students felt that they could communicate effectively while in Brazil. However, when asked this question upon returning to the US, almost half of the students indicated that their communication skills were adequate for communication with students and faculty members. It should be noted that most people in the academic community of Brazil speak English, making it a comfortable environment for the students. In general, students were not concerned with the effects of recent world events. However, before the trip, 26% of the students indicated that they had...
fears or reservations about foreign travel as a result of recent events at home and abroad. After the trip, only 15% of the students indicated that they felt uncomfortable at some point while in Brazil.

Factors influencing treatment in Brazil. In the first section of the evaluation, students were asked to rate the factors that they perceived to be important in the way they would be treated in Brazil (Table 1). Students were presented with a list of statements and were asked to rank each statement from 1 to 7, with 1 being the most important factor and 7 being the least important factor that would influence the way they were treated in Brazil. Before the course, students indicated that language (mean of 2.1) would be the factor that most influenced how they were treated in Brazil. Their identity as an American followed closely behind, with a mean score of 2.6. Posttrip analysis showed that the students’ language and identity as an American were still the top two factors that influenced the way students perceived as being treated. In the posttrip analysis, physical appearance replaced gender as the third most important factor that influenced how students were treated (3.6), followed by their status as a minority (4.4) and ethnicity/heritage (4.8). In both surveys, students did not perceive religion to be an important factor.

Medical and academic environment. The second aspect of the evaluation was related to the quality of the academic environment in Brazil (Table 2). The goal was to determine the nature of preconceptions and how each of these preconceptions were altered by the course and experience. In the pretrip survey, students were asked to rate six topics from 1 to 4, with 1 as excellent and 4 as poor. The topics presented were university facilities, hospital facilities, academic content, faculty/student quality, and faculty-student interactions. Pretrip results showed that students were generally favorable toward each topic, with mean scores ranging between 1.5 and 2.1. Students believed that the quality of Brazilian students and faculty would be high, whereas the lowest rankings were given to university and hospital infrastructure and facilities. In the posttrip survey, assessments were more favorable, with mean scores ranging from 1.3 to 2.1. Similar to the pretrip assessment, the quality of faculty/students received the highest scores, whereas the quality of university and hospital facilities received the lowest marks. Additional analysis was conducted to measure changes in attitude from pretrip to posttrip assessment. A two-way analysis of means showed that the university facilities, academic content, and quality of faculty/students exceeded the expectations of students, with a decrease in mean ranking. Faculty-student interactions showed an increase in the mean, indicating that this variable did not meet student expectations. This was likely related to problems with interpersonal relationships between some of the faculty members and students. A look at the individual scores showed that many students rated faculty-student interactions as excellent, whereas two students rated it as poor, citing specific incidents with faculty members that led to their dissatisfaction.

Cultural and personal attributes. The third aspect of the evaluation concerned general issues such as objectiveness, interest in travel, empathy, etc., and how these were affected by the international experience (Table 3). Students were asked to rank the topics from 1 to 5, with 1 indicating no change in their views and 5 indicating that their views had changed significantly after the trip. These questions were asked only after the trip, so an analysis between pre- and posttrip surveys was not possible, as in previous questions. The students’ desire to travel, interest in world affairs, and cultural assumptions were thought to have changed the most as a result of the study abroad. The students’ comfort level with those who are different and their objectivity changed the least as a result of the experience.

Evaluation of career aspirations and impact. More than one-quarter of the students (26.3%) indicated that their career aspirations had changed as a result of the Brazil program. When asked if the trip made them more or less interested in their experience in Brazil.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Postprogram</th>
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<tbody>
<tr>
<td>Desire to travel</td>
<td>3.3 ± 0.3</td>
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<tr>
<td>Interest in world affairs</td>
<td>3.1 ± 0.3</td>
</tr>
<tr>
<td>Cultural assumptions</td>
<td>3.1 ± 0.2</td>
</tr>
<tr>
<td>Desire to help others</td>
<td>3.0 ± 0.3</td>
</tr>
<tr>
<td>World mindedness</td>
<td>3.0 ± 0.2</td>
</tr>
<tr>
<td>Empathy for other human groups</td>
<td>2.8 ± 0.3</td>
</tr>
<tr>
<td>Personal goals</td>
<td>2.7 ± 0.3</td>
</tr>
<tr>
<td>Academic goals</td>
<td>2.6 ± 0.3</td>
</tr>
<tr>
<td>Tolerance for difference</td>
<td>2.6 ± 0.3</td>
</tr>
<tr>
<td>Comfort with people who are different</td>
<td>2.5 ± 0.3</td>
</tr>
<tr>
<td>Objectivity</td>
<td>2.4 ± 0.2</td>
</tr>
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Data are means ± SE of scores given by students to describe the extent that each area had changed as a result of their experiences in Brazil. Students completed this portion of the assessment after the program, where 1 indicated no change and 5 indicated a large change.
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research or if there had been no change, 78.9% indicated that there had been no change. With regard to program impact, the pretrip survey showed that all students believed that the experience would help them achieve their professional and/or academic goals. When asked this same question upon returning, only 13 of 19 respondents answered yes. The reason for the decrease may be that because the course was finished, there was no longer the element of the unknown. However, the majority of the students still felt that they had been changed by the international exchange experience.

DISCUSSION AND CONCLUSIONS

Globalism is a part of all workplaces, including medicine. However, in the medical curriculum, there is generally little chance for exposure to international experiences. This is likely related to a variety of factors, including constraints of curricular schedules, expenses, difficulties in obtaining academic credit, and possible lack of faculty interest. In view of the proposed benefits of international exposure in terms of cultural awareness and academic knowledge, an experience during the medical school years could be advantageous. We tested this supposition by conducting a short-term course entitled Medical Sciences Translational Physiology at a medical school in Brazil. The advantage of Brazil is that it offers a modern, up-to-date medical and university infrastructure as well as some aspects of a third-world environment. Another advantage was the availability of a federal grant program that supports student interchanges between Brazil and the United States (FIPSE, United States-Brazil Higher Education Consortia).

This student exchange program was begun via the acquisition of a federal grant from FIPSE (Department of Education) in the United States and CAPES in Brazil (equivalent national education organization). The academic partners were Wright State University and the University of Iowa Carver School of Medicine in the United States and the University of São Paulo in São Paulo and Ribeirão Preto, Federal University of Rio Grande do Sul, and InCor-Heart Institute in Brazil. The focus was on biomedical sciences in the medical school environment. The student interchange between Brazil and the United States was relatively easy to establish. There was a plethora of good Brazilian students who were interested in studying in the United States. Over the four-year grant period, we hosted >30 students with backgrounds in medicine, biomedical sciences, physical therapy, and others. The program was very successful, and tangible results of the students’ success in research were seen by their presentations at national meetings and publications. The exchange between the United States and Brazil was more difficult to implement because of the language barrier, scheduling difficulties, and the unwillingness of American students to spend extended periods in Brazil. In addition, many students in the Midwest have limited experience with international travel. For all of these reasons, we hypothesized that a short-term exchange program would provide a beneficial introduction to international travel and global medicine and might act as a catalyst to promote future exchanges.

A detailed evaluation was conducted to quantify some of the issues associated with the international experience. The results clearly indicated the positive impact that the program had on students, improving their perceptions of the Brazilian academic and medical environment. We suspect that the misconception of those facilities was shaped by the stereotype of Brazil as a poor country with relatively primitive infrastructure. Instead, the students found modern hospitals and well-trained students and faculty. They were able to visit clinics and see patients who in many cases were underprivileged and served by the university hospital in Ribeirão Preto. They were also able to observe the differences in the style of interactions between basic and clinical faculty. The structure of the biomedical science community in Ribeirão Preto served as an excellent model of translational physiology. The basic science and clinical faculty interact closely, and many of the medical students have an interest in research that is fostered by fellowship support from the federal or state government.

Our experience also points to some of the difficulties in conducting a program such as this. Language barriers can be a real or perceived obstacle. The coordination of time tables, particularly between Northern and Southern Hemisphere academic programs, can be a challenge. Difficulties in individual interpersonal relations can color the perception of the trip. Nevertheless, we believe that these challenges are inherent in any student trip and that the benefits (expanded horizons, interactions between students, and exposure to research and to the value of translational physiology) are worth the effort. Moreover, even a 2-wk expedition can significantly influence the perceptions of students across this diverse range of elements.

Because of the acceleration of globalization in medicine, there has been an increasing interest in the use of electives for international training of medical students (1, 3). The idea is that such training will enhance cultural awareness and the students’ ability to deal with different patient populations. Indeed, medical students have often led the charge to add global health issues to the curriculum. This may occur via a physical exchange of students or programs on the home campuses to facilitate this movement. For example, at Wright State University, medical students organized a Global Health Organization with the idea of supporting students who have an interest in an international experience. This led to the development of a Global Health Track, which will supplement the standard medical curriculum. All of these types of programs will benefit students if they result in a broadening of their horizons, away from a singular local or national perspective. Indeed, the positive comments of one of the Wright State participants echoes the benefits of such an exchange programs:

“I was able to interact with people from Brazil. I engaged in numerous conversations with Brazilian medical students about perceived differences and similarities in our educational systems. Every opportunity that allows me to further interact with people of very different backgrounds than myself strengthens my clinical skills. What better way to encourage the development of both the scientist and humanitarian in me than the FIPSE exchange program.”

In conclusion, we tested a novel means to promote global education for medical students. Using a short-term course focused on clinically relevant topics, we were able to provide the students with new perspectives on globalism in the medical environment.
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GRANTS

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REFERENCES