Establishing and Upgrading Physical Therapist Education in Developing Countries: Four Case Examples of Service by Japan and United States Physical Therapist Programs to Nigeria, Suriname, Mongolia, and Jordan

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Background and Purpose. Physical therapist (PT) professional (entry-level) education programs are non-existent in most developing countries. The PT professional education programs that do exist in some developing countries may need to upgrade and strengthen their existing curricula. Many of these programs are in significant need of additional PT faculty and advanced education for their existing PT faculty. Efforts to create or enhance PT education programs in developing countries are frequently limited by inadequate human and material resources.

Method/Model Description and Evaluation. This paper describes and discusses 4 models of collaboration and international partnerships in which educators and PT education programs in developed countries with more human and material resources partner with universities in developing countries to help establish or enhance PT education programs. Experiences of PT education programs in the US working with programs in Nigeria, Suriname, and Jordan, and a program in Japan working with a program in Mongolia, are presented.

Outcomes. The models of collaboration between service and host countries resulted in provision of online education to practicing physical therapists, consultation on curriculum, short-term teaching/consulting for existing and developing programs, and PhD education of foreign PTs with the intention that they return to their country of origin as faculty members in PT programs.

Discussion and Conclusion. These case examples of international collaboration serve as models for other PT programs and educators to form similar international partnerships and to develop new models.

Key Words: International, Education, Physical therapy.

BACKGROUND AND PURPOSE

Developing countries carry over 55% of the global burden of disease, but have less than 15% of global health care work force.[1] In contrast, many developed countries carry a lower global burden of disease, but have a relatively higher ratio of the global health care work force. For instance, the United States with 10% of the global burden of disease has 25% of the global health care work force; whereas Africa, which carries 25% the global burden of disease, has less than 4% of the global health care work force.[2-4] The shortage of health care work force in developing countries is exacerbated by migration of health care professionals from resource-poor to resource-rich countries. This concept of migration is known as "brain drain."[2,5-10] Often, health care professionals in developing countries immigrate either for pecuniary reasons, a poor practice environment and infrastructure, or political instability.[7,11-13]

To address this disparity and perennial health care work force shortage, efforts by the World Health Organization (WHO) and governments in developed and developing countries primarily focus on training, retention, and recruitment of health care professionals

in medicine, nursing, pharmacy, dentistry, imaging, and medical laboratory sciences.[14,15] For instance, education and training specific to medical and nursing health care professionals in sub-Sahara African countries have received a tremendous boost in funding, human and material resources, and partnerships with many US academic institutions.[16-18] These initiatives, driven by HIV/AIDS funding, have been funded by the US government through the Medical Education Partnership Initiative (MEPI)[19,20] and the Nursing Education Partnership Initiative (NEPI)[21,22] programs of the National Institutes of Health (NIH) and the US President's Emergency Plan for AIDS Relief.[19,20] Specifically, successful upgrading of nursing education programs through NEPI have been reported for Botswana, Lesotho, Kenya, Malawi, Zambia, Brazil, India, Thailand, and the Philippines.[22]

The Consortium of Universities for Global Health,[23] comprised of over 50 academic institutions in the United States and Canada, and funded by the Bill and Melinda Gates Foundation and the Rockefeller Foundation, currently partner with developing countries and their institutions.[16,17] These efforts to increase global health care work force have largely supported education and training of public health, medicine, and nursing health care professionals in recipient developing countries. In each of the aforementioned programs, initiatives and partnerships between resource-rich countries and developing countries, there is no evidence that education and training of rehabilitation health care professionals such as physical therapists (PTs) received similar or equal levels of global attention, priority, and urgency, accorded to medical and nursing education. Consequently, there are many developing countries today without PTs or PT education programs. To that end, a number of non-governmental organizations (NGOs),[24,25] academic programs,[26,27] and other professional leaders,[28] have an interest in collaborative partnerships to elevate PT practice in these countries. In many developing countries, international collaborations leading to the introduction of PT practice or establishment of PT education programs are first initiated through personal contacts and connections, which may then be followed by institutional, governmental, and non-governmental organization support.

The purpose of this paper is to bring attention to the need for global emphasis on education of the physical therapy health care work force in developing countries, and to describe existing models of program collaborative development, including: (1) establishment of PT education programs where none previously existed, and (2) upgrading and strengthening PT education curricula where training programs already exist. Models of program development or advancement in Nigeria (Africa), Suriname (South America), Mongolia (East/Central Asia), and Jordan (Middle-East) are presented. While they share some commonalities, each program development model is uniquely designed to appropriately address the specific geographic region and cultural characteristics of the individual countries.

METHOD/MODEL DESCRIPTION AND EVALUATION

Nigeria-Michigan Model

Background. Two British-chartered physiotherapists first introduced PT practice to the Royal (now National) Orthopaedic Hospital, Igbobi, Lagos, Nigeria in 1945.[29] The British physiotherapists provided rehabilitation services to Nigerian soldiers returning from World War II, and started a 3-year training program (equivalent to an associate's degree in the US) for assistant physiotherapists. Several of the program's graduates furthered their education in England and became chartered physiotherapists. Eventually, the training program at Igbobi was discontinued, but in 1966, the first cohort of a 4-year program offering a bachelor's of science degree in physiotherapy commenced at the University of Ibadan. In time, 6 additional PT education programs emerged in the Nigerian cities of Lagos, Ife, Enugu, Kano, Maiduguri, and Nnewi. The Nigerian PT education programs underwent curricula upgrades in 1998, leading to the development of a 5-year professional (entry-level) program offering a bachelor's degree in physical therapy (BSPT) or a bachelor's degree in medical rehabilitation. In lieu of a licensure examination, graduates from Nigerian academic PT education programs complete an additional 1-year clinical internship supervised by licensed physiotherapists before being granted a license to practice.

The Nigeria Society of Physiotherapy and the Medical Rehabilitation Therapists Registration Board of Nigeria, desire to upgrade Nigerian baccalaureate-level programs to 6-year doctorate-level programs. This aspiration, however, is fraught with major challenges, including limited human resources and limited expertise in curricular transition. Physical therapist "brain drain" has occurred over the last 2 decades, with significant numbers of talented and experienced Nigerian-trained PTs leaving Nigeria and migrating to the United States, Canada, United Kingdom, and other developed countries, where more opportunities exist for their skill sets.[9,10,30] Developing a collaboration with an established Doctor of Physiotherapy (DPT) degree program could assist the current Nigerian curricula to advance to the doctorate level. The University of Michigan-Flint (UM-Flint) responded to a request by the Nigeria Physiotherapy Network to assist and mentor the Nigerian PT education programs through the transition to professional DPT programs.

Program Development. Okafor and John[31-33] conducted 2 assessment surveys of Nigerian physiotherapists to determine the need for postprofessional education and a professional DPT program in Nigeria. The first needs assessment survey demonstrated an urgent need for both a professional doctorate in physical therapy and clinical specialization.[31,33] The second, more focused, needs assessment survey specifically examined the demand for an online transitional DPT (tDPT) program from a US institution for physiotherapists currently practicing in Nigeria. The survey results revealed that Nigerian physiotherapists had a high level of interest in enrolling in the UM-Flint online postprofessional doctoral degree program.[32]

Based on the findings of the needs assessments, the Nigeria-Michigan Partnership proposed 2 goals: (1) develop and offer an online DPT in a transitional format to currently licensed and practicing Nigerian PTs, and (2) develop a mentorship program to assist Nigerian PT education programs as they transition from a BPT program to a professional DPT program. For the purpose of this paper, a tDPT program is operationally defined as a postprofessional education bridge curriculum designed specifically to upgrade a PT's undergraduate-level knowledge base and clinical practice to a doctorate-level education and competency. To formalize the partnership, a memorandum of understanding (MOU) was developed between Nnamdi Azikiwe University (which is home to the newest Nigerian PT program) and the UM-Flint. The purpose of the MOU was to create an institutional-based relationship and administrative support under which the PT programs of the 2 universities could participate in international collaborations, including student and faculty exchanges.

- Goal #1: tDPT Course Offering. To begin the development of an appropriate tDPT program for licensed Nigerian physiotherapists, tDPT admissions requirements were adapted in consultation with UM-Flint Graduate Programs Office and the International Center. Likewise, English language proficiency requirements for admission were established in consultation with the UM-Flint Office of Extended Learn-

Table 1. The Minimum Acceptable English Language Proficiency Scores for Admission, and the Scores and Score Ranges for Which a Supplemental English Writing Course is Required Upon Admission to the Program

Exam	Minimum Score for Admission	English Writing Course Required IF:
TOEFL PBT and TWE	560 overall	Overall less than 600 **or** TWE less than 5.0
TOEFL iBT	84 overall	Overall less than 101 **or** WR less than 27
IELTS	6.5 overall	Overall less than 7.5 **or** Writing less than 7
MELAB	80 overall	Overall less than 85 **or** Composition less than 85
ECPE	Certificate of Proficiency	Writing score = LP (Low Pass)

ing. Previous experience with educating foreign-trained PTs demonstrated the importance of proficiency in health care writing in English for success in the tDPT. Anticipating that English language proficiency might be a barrier, a supplemental English writing course was developed by the UM-Flint Office of Extended Learning and is required of all students who score below expected levels on various English language proficiency tests (see Table 1).[34]

Based on the needs assessment and discussion with Nigerian educators, a cohort curriculum was developed for delivery via Blackboard™ online course management system. Several courses in the existing tDPT curriculum were adapted to meet the specific needs of the postprofessional Nigerian students. Private practice administration and integument/wound care content were added. A student-designed service learning project requirement was also included. The project could be designed and implemented to meet local workplace needs. A case report of publishable quality, incorporating evidence-based clinical decision making with input from peers was also required (Table 2). To ensure technological compatibility, the team discussed the technology requirements with the Information Technology Office and Office of Extended Learning at UM-Flint and with several physiotherapy educators from Nigerian universities.

- Goal #2: Develop a mentorship program to assist Nigerian PT education programs as they transition from professional BSPT to DPT degree programs. Two faculty members from Nigerian PT education programs applied for Fulbright Scholarships to visit the UM-Flint PT Department to learn more about the structure and organization of the UM-Flint DPT program and other DPT programs accredited by The Commission on Accreditation in Physical Therapy Education (CAPTE) in the Michigan region. On return to Nigeria, these faculty members will work with their Nigerian faculty colleagues to adapt and formulate a DPT curricula specific to the needs of Nigerians and Africa. In addition, the newest Nigeria PT education program, Nnamdi Azikiwe University (NAU), has agreed to pilot a transitional PT-to-DPT degree program. The NAU and UM-Flint have developed and signed a memorandum of understanding between both partners and the mentorship partnership will commence in fall 2011. Additional potential collaborations to support this goal will be explored during an on-site visit of UM-Flint PT faculty to NAU in late summer 2011.

Outcomes. Attainment of the first goal is in progress with a cohort of a maximum of 20 Nigerian PTs able to enroll in UM-Flint's online tDPT degree program in fall 2011. To date, 16 professionals have been admitted. An orientation to the tDPT degree program and online technology (ie, Blackboard course management system) at UM-Flint was developed for this first cohort of Nigerian students and UM-Flint PT faculty members and an information technology specialist traveled to Nigeria to conduct the orientation in person. At the time of completing this manuscript, outcome data were not available on Goal 2. UM-Flint physical therapy faculty also used the opportunity of their visit to Nigeria to hold further talks on international collaborations with officials of NAU.

Table 2. Preliminary Curriculum for Nigeria t-DPT Students Based on 27 Required Credits

	Winter	Spring/Summer	Fall
Year I 2011			PTP 661 Literature in Evidence-Based Practice (2)
			PTP 624 Systems Review and Screening in Clinical Decision Making (2)
Year II 2012	PTP 623 Introduction to Musculoskeletal Imaging (1)	PTP 625 Advanced Medical Imaging for Diverse Populations (1)	PTP 761 Evidence-Based Practice Patterns (1)
	PTP 512 Neuroscience (2)	PTP 546 Pharmacology (3)	PTP 770 Assistive Technology (1)
		PTP 581 Teaching, Learning and Health Education (2)	Integumentary (2)
Year III 2013	PTP 732 Pediatric Exam and Intervention (3)	PTP 783 Geriatrics in Practice (2)	
	PTP 792 Management in PT Practice (3)	PTP 794 Professional Service Learning II (1)	
	PTP 694 Professional Service Learning I (1)		

Suriname-HVO Model

Background. In the 1970s, the physical therapy work force in Suriname progressively increased as more Surinamese PTs, trained in the Netherlands, returned to their home country to practice. Prior to 1980, there were about 36 PTs practicing in Suriname.[12] However, political instability and a declining economy in the early 1980s decimated the Surinamese physical therapy work force. By 1983, the majority of PTs had immigrated to other nations, leaving only 9 practitioners who endured multiple challenges in providing clinical services to a nation of over 360,000 people at the time.[12,35] The PTs who remained in Suriname had limited professional development opportunities to encourage their persistent commitment to the profession and the local community.[36] Attempts at mitigating the depleted work force by recruiting foreign PTs from the Netherlands were complicated by a poor economy and declining exchange rate.[12]

In response to calls from the Suriname Physical Therapy Association (Surinaamse vereniging voor Fysiotherapy), the Surinamese Ministry of Health requested the Faculty of Medical Science at the Anton de Kom University of Suriname (AdeKUS) to initiate the process of establishing a PT education program in Suriname and a 4-year Bachelor of Science in Physical Therapy (BSPT) program was started in 1996.[12] However, the new PT education program soon ran into difficulty due to an unexpected budgetary shortfall detrimentally affecting recruitment of core physical therapy faculty. It was at this point in 1998 that contacts were made and collaborations initiated between the Health Volunteers Overseas (HVO) and the AdeKUS PT education program. The arrival of the first HVO volunteer in May 1999 can be considered the turning point and "new" official start date of this rejuvenated program.

Founded in 1986, the HVO, a non-governmental organization, is a network of health care professionals, organizations, corporations, and donors united in a common commitment to improving global health through education. Through the HVO, opportunities exist for PT clinicians and faculty volunteers to provide a variety of services to many sites around the world, including the site in Suriname. The HVO's partnership project in Suriname includes arranging for volunteer PT experts from different nations, especially the United States, to serve as temporary (2-4 weeks) faculty in the AdeKUS PT program.[12,24,36,37]

Typical HVO program objectives to be accomplished by a volunteer faculty to the AdeKUS PT education program include up-

Figure 1. Professor Lucinda Pfalzar Gives a Presentation to the Nigerian DPT Students During the Orientation Program

UM Flint PT faculty members and an IT specialist traveled to Nigeria late August 2011 prior to fall 2011 to conduct the orientation in person.

Figure 2. University of Michigan-Flint (USA) and Nnamdi Azikiwe University (Nigeria) Officials Meet in Lagos, Nigeria, for Further Talks on International Collaborations

From left to right: Professor Charles Esimone, Professor Lucinda Pfalzer, Col (Dr.) Paschal Mogbo (Rtd), Professor Donna Fry, Dr Joseph Nwankwo (chair of NAU's PT program), Jason Gooding (senior IT specialist from UM-Flint), and Professor Ifeoma Beatrice Enweani.

grading content in the curriculum, improving curriculum evaluation, upgrading host site faculty teaching skills, and delivering some physical therapy content lectures.[12,36,37] In order to further advance PT education in Suriname, there was a plan for the AdeKUS PT program to upgrade to a 5-year master's degree in physical therapy (MPT) program in the 2009–2010 academic year.

Program Development. The HVO usually advertises requests for consultation or clinical practice and education from volunteer PT experts with a stated purpose to meet the specific needs of the host PT education program, which is expected to benefit students, faculty, clinicians, and administrators.[36,38] In July 2009, Glickman[36] responded to such a request, and was invited by the HVO to Suriname as a consultant. During a 2-week on-site visit to the AdeKUS PT education program in January 2010, Glickman provided consultation and education as requested in the original call from HVO. The goals were to teach a brief business management course to the BSPT students, consult with the program administrators and faculty about the pros and cons of learning management systems, analyze and provide suggestions for developing professional MPT and MPT in transitional format (tMPT) programs based on a content gap analysis, and provide clinical advising in the form of a continuing education course for practicing PTs on evidence-based practice. The tMPT program to be offered for a few years is a postprofessional education bridge curriculum designed specifically to upgrade a PT's knowledge base and clinical practice to a master's degree-level of education and competency.

While the language of instruction in Suriname is English, PTs, faculty, and students frequently revert to their more familiar, native language of Dutch. Most HVO volunteers, unfamiliar with the Dutch language, face additional challenges in more complex communications, such as trying to analyze curricula and working with students and clinicians on materials requiring critical analysis.

Glickman's HVO/AdeKUS consultation model highlights 3 core areas: teaching, consulting, and clinical advising. As described in Tables 3A and 3B, each core area has 3 phases: preparation, implementation, and follow-up, with specific strategies within each phase that includes the actual steps utilized by the consultant with her follow-up activities. For example, in the area of clinical advising, the consultant provided 6 hours of continuing education on integrating evidence into practice. Using the teaching facility's computer lab, the clinical instructors learned efficient techniques for searching databases for litera-

Figure 3. Dr. Leslie Glickman Poses With Surinamese Physical Therapy Students in January 2010

Table 3A. Three Core Areas of the HVO/AdeKUS Consultation Model With Key Phases and Strategies

	Teaching	Consulting	Clinical Advising
Three Core Areas (Overview)	Business management course content for BPT students: 1. Prepare for entering job market 2. Learn basics of clinical program development (emphasis on personal and program marketing) 3. Develop rationale for clinical program based on evidence	Part 1: Analysis of learning management systems (LMS) for PT faculty with recommendations: 1. Basic structure of LMS; pros/cons 2. Demonstration of Blackboard (BB) 3. Comparisons between Moodle (their system) and BB 4. Discussion of their comments Part 2: Draft transitional Master's Degree curriculum (tMPT): 1. Gap analysis between current BSPT curriculum and planned MPT curriculum 2. Potential courses for projected tMPT program 3. Content overview for each course 4. Intergenerational approach to student learning needs and strategies 5. Challenges and opportunities	Continuing education course on integrating evidence into practice for PT Clinical Instructors (CI) 1. Background on evidence-based practice 2. Creating problem statements and PICO components 3. Searching the literature 4. Appraising the literature 5. Integrating literature with their clinical questions

Table 3B. Key Phases and Strategies for Each of the 3 Core Area of the HVO/AdeKUS Consultation Model

	Teaching	Consulting	Clinical Advising
Preparation Phase	1. Reviewed preliminary written program needs agenda; discussed potential plan with key program faculty 2. Organized personal teaching files with potential information 3. Developed slide presentation and resources 4. Confirmed room and audiovisual equipment resources	Part 1 (LMS): 1. Met with IT administrator to learn about Moodle (Dutch version) 2. Discussed features of Moodle compared to Blackboard 3. Prepared slide presentation and resources 4. Confirmed Internet access for presentation Part 2 (tMPT): 1. Met with key faculty and administrators individually on perceived needs 2. Learned about current BPT program and proposed MPT Program 3. Created draft gap analysis between the 2 programs 4. Identified potential recommendations for tMPT curriculum 5. Discussed ideas with Program Director for feedback 6. Developed slide presentation and resources	1. Met with key clinical instructors and faculty to better understand perceived needs and expectations 2. Reviewed resources relevant to an international PT program 3. Developed slide presentation and resources 4. Confirmed on-site computer lab arrangements 5. Visited on-site library to understand resources
Implementation Phase	1. Finalized planned teaching content 2. Provided lecture and discussion for BPT students based on core areas 3. Made note of ideas for follow up (gaps, reinforcing information, next steps)	Part 1: 1. Provided presentation on LMS, using BB as an example 2. Compared Moodle to BB 3. Discussed pros and cons to implementation 4. Reviewed potential next steps Part 2: 1. Provided presentation on gap analysis and recommendations based on core areas 2. Discussed information with Program Director and faculty 3. Reviewed potential next steps	1. Provided presentation with discussions based on core area 2. Reviewed potential next steps
Follow-up Phase	1. Edited presentation materials based on actual teaching content 2. Provided feedback to Program faculty and Director on actual implementation and follow-up ideas 3. Supplied course content electronic materials to Program Director 4. Created personal journal entries for official HVO visit report 5. Completed HVO visit report based on HVO requirements; sent to HVO	Parts 1 and 2: 1. Supplied presentation content electronic materials to Program Director 2. Created personal journal entries for official HVO visit report 3. Completed HVO visit report based on HVO requirements; sent to HVO	1. Supplied presentation content electronic materials to Program Director 2. Followed up on questions from clinical instructors related to additional resources 3. Created personal journal entries for official HVO visit report 4. Completed HVO visit report based on HVO requirements; sent to HVO

ture, evaluating the literature, and applying evidence from the literature to one of their personalized clinical questions.

Outcomes. Evaluation of the HVO/AdeKUS model occurred formally and informally with feedback from the host program, the HVO organization, and self-assessment by the consultant. The consultant produced a detailed and structured report, including photos documenting program-related activities, comparisons between requested tasks and actual execution, the identification of major contributions and deliverables, a description of program assessment, overall impressions, and recommendations for follow-up.

Based on the evaluation by the multiple stakeholders, the consultative program was extremely effective and led to Glickman's subsequent appointment as the new HVO Program Director for Suriname in July 2010. Future plans include implementation of the consultant's recommendations, fostering cultural competency opportunities for US and Suriname student PTs through exchange programs, exploring research opportunities between US sites and Suriname, and establishing a clearer understanding of potential development opportunities beyond the current horizons. In November 2010, transition began from the 4-year, professional BSPT to a 5-year, professional MPT curriculum. The tMPT program designed for clinician PTs is under discussion for potential future implementation.

Key requirements for this type of international, collaborative activity include: (1) clear communications (listen, ask questions, confirm understanding); (2) written communications regarding program needs and rationale; (3) matching of volunteer expertise and program needs; (4) staying connected electronically and in person; (5) quickly developing trust and relationships with the key leaders; (6) sensitivity to cultural and diversity topics; (7) flexibility and adaptability to environment, agenda, and expressed needs; (8) knowledge of and access to a variety of applicable resources; and (9) personal confidence.

Lessons learned reinforce the notion that business and academic consulting skills, beyond a more traditional approach, have great value, particularly when customized to meet the needs of a unique culture. Exploring international opportunities, such as those through HVO, provides a platform for international collaborations and the use of volunteer expertise for under-resourced communities to reinforce their own professional growth and satisfaction. When language barriers exist between programs, it is very important to listen carefully, ask questions, and clarify understanding. It is also important to follow the rules of the culture, host, and sponsoring organization. Planning and preparing requires flexibility to make impromptu changes, and identify and use resources wisely. Technological advances expand horizons for communication and delivery beyond immediate borders. Volunteer organizations may provide some sources of funding, match experts with programs, and create unlimited opportunities for professional development. In this process, professional and personal experiences become entwined as the collaboration evolves and the consultant becomes immersed in the host culture and its people.

Mongolia-Japan Model

Background. In another model, PTs in more resource-rich, developed countries are working to help establish PT education programs in countries where there is no previous history of PT education.[39] Prior to 2007, Mongolia, a country of over 3.1 million people and the second largest landlocked country in the world, had very few Mongolian or non-Mongolian practicing PTs and did not have PT education programs. A few NGOs and charity organizations made attempts to fill the gap by sponsoring PTs and PT students from other nations for short-term international internship placements in Mongolia.[40-42] In 2007, the National Gunma University (NGU) in Maebashi, Japan, worked jointly with the Health Science University in Mongolia (HSUM) to initiate a 4-year BSPT program. NGU has a policy to support development of international relationships. This partnership began when Batgerel Oidov, MD, a physician who graduated from the HSUM, attended NGU in Japan to obtain a physical therapy degree. He met Masaaki Sakamoto, PT, PhD, chair of the NGU physical therapy department, and through this NGU connection, developed a proposal to work jointly with HSUM to initiate a PT education program at HSUM. Oidov facilitated the interchange between the universities and continues to serve as an interpreter for the program, translating Japanese lectures into Mongolian for the students. Sakamoto coordinates the Japanese PT teaching faculty in the program.

Program Development. In order to develop the program proposal, NGU faculty members sought advice from the Health Project of Millennium Challenge Account Mongolia, a Mongolian governmental agency, regarding licensure authorization for PTs in Mongolia. Faculty from NGU and HSUM gathered for 3 workshops to develop curriculum for the PT education program. The primary structure of the curriculum was based on the existing curricular structure at NGU. The PT program went through an accreditation process and is currently accredited through the Ministry of Education in Mongolia.

Three faculty members from HSUM provide courses in basic medicine, clinical sciences, and clinical physical therapy. Two of the HSUM faculty members were physicians who studied physical therapy for 11 months at NGU. NGU faculty members provide courses specific to physical therapist practice on the HSUM campus, including: introduction to physical therapy, introduction to problem-based learning, kinesiology, clinical kinesiology, multiple courses of clinical physical therapy, and 2 practicums of early exposure to clinical physical therapy. NGU sends 2 faculty members to Mongolia twice each year for an intensive week-long series of lecture and laboratory sessions to teach this content. Online instruction is being considered for use in the future.

For the Japanese lectures, an interpreter is used to translate lectures from Japanese to Mongolian and to assist with interpreting student questions and classroom discussion. Instruction handouts related to reading scientific papers are provided in English. Some students do not know English, but in the future will be encouraged to learn English since a large portion of medical and physical therapy literature is published in the English language.

Funding for this program is provided by HSUM and NGU, with some grant support from the Japanese Student Support Organization on the NGU campus and the Japanese Mizuho International Federation. HSUM supports salaries of the HSUM faculty as well as travel costs of the visiting NGU faculty members. NGU supports faculty salaries for the NGU faculty involved in this project.

Outcomes. The first class of 14 students graduated from the HSUM program in May 2011 with BSPT degrees. Twelve of these students obtained positions in general and rehabilitation hospitals. At least 2 of the students plan to begin graduate school for advanced degrees. HSUM now admits 30 students per year to the program and in 2010-2011 had a total enrollment of approximately 100 students.

Students from both NGU and HSUM have benefited from this collaborative relationship. Two PT students from HSUM received funding from the Japanese Student Support Organization at NGU to study for 11 months at NGU. In addition, 50 students from the HSUM program were able to visit the NGU program in Japan for 10-14 days in a student exchange program. Twelve students from the NGU program have also visited the HSUM program for 7-10 days in Mongolia. For all students involved, this student exchange has

facilitated a greater consciousness of international physical therapy.

Faculty also have benefited from this collaborative relationship. Two physicians from HSUM who teach in the HSUM program were able to study physical therapy at NGU for 11 months. Discussion of potential collaboration on research projects has also begun. Since the PT education program was developed in 2007, NGU has been involved in working collaboratively with HSUM to initiate programs in other areas of health care as well, including nursing and medical laboratory sciences.

Jordan-Kansas Model

Background. Jordan is a middle-eastern country with a conservative and religious culture. Since few Jordanian PTs exist, physical therapy is commonly provided by foreign-trained and non-Jordanian PTs.[43] Challenges arise in providing culturally competent physical therapy service.[44,45] For example, as is common in many Arabian and Islamic cultures, patients must be segregated by male and female to receive care, and the care must be provided by a same-sex health care provider.[44,46] In recent years, a number of Jordanian universities have established professional BSPT programs to train Jordanians to be physical therapists. Jordanian PTs will be best equipped to provide needed, culturally competent physical therapy care to the Jordanian people.

The Jordan University of Science and Technology (JUST) is one Jordanian university with a PT education program. The mission of JUST is to graduate qualified students prepared to meet the needs and demands of the labor market and compete regionally, nationally, and internationally. JUST has over 23,000 students in graduate and undergraduate programs of study. To enrich and facilitate the science of rehabilitation, JUST sponsors their scholars and faculty to attend reputable rehabilitation schools and institutes all over the world with the expectation that they will return to JUST and strengthen the academic and health care work force.

JUST has offered a BSPT degree since 2006. The BSPT is 133-credit hours and follows a curriculum designed after the previous CAPTE-approved general criteria for BSPT curricula in the US. Physical therapist education at JUST is delivered within the cultural context of a predominately Islamic nation. For example, laboratory sessions that involve close physical contact occur in classrooms segregated by male and female. Because of the paucity of female PT faculty members, female students lack the appropriate mentorship in these experiences. Female students constitute approximately 50% of the JUST BSPT program.

Based on the current status of PT education in Jordan, the current national PT educational priorities are 2-fold: (1) increase the number of Jordanian PTs through development of qualified Jordanian faculty, and (2) increase the number of female faculty who can teach females PTs who will be able to provide services for female patients. In support of these needs, a partnership between the University of Kansas Medical Center (KUMC) and JUST began in 2000. KUMC offers a professional DPT, a postprofessional DPT, and a PhD in Rehabilitation Science. The PhD program is a multi-disciplinary program designed to produce academicians for leadership positions in research and education in medical rehabilitation. The common goal between both academic institutions was to prepare academic faculty to return to Jordan to meet the growing need for the education of PTs and to advance rehabilitation research in that region.

Program Development. A Jordanian doctoral degree student in audiology at KUMC seeded the collaboration between JUST and KUMC by initiating discussions between administrators of both institutions about offering doctoral training for JUST Health Sciences faculty. In 2000, 3 KUMC administrators traveled to Jordan to establish a formal relationship to facilitate doctorate-level training (PhD) of JUST faculty in the audiology, occupational therapy, physical therapy, and nursing programs. JUST provides financial support for faculty through JUST scholarships that include an initial stipend to cover basic housing, tuition, and fees. The scholarship program is intended to develop research and teaching faculty with an advanced degree. When possible, KUMC departments support the PhD students through graduate teaching assistantships and graduate research assistant salaried positions that carry a tuition and fee benefit.

The KUMC Rehabilitation Science PhD curriculum is tailored to meet the needs and goals of individual PhD students and provides numerous mentored teaching experiences with multiple faculty members. Through the course of the curriculum, the PhD student progresses toward independence in instructional planning, teaching, and student assessment. The research requirement is ideally met through a project that the Jordanian faculty member could continue or extend upon returning to Jordan. Many of the JUST PhD students also enroll in clinical practicums encompassing various practice settings such as orthopedics, neurologic rehabilitation, pediatrics, and administration. JUST PhD students also rely on the support of peers in the KUMC Physical Therapy and Rehabilitation Science PhD program, a global microcosm with PhD students representing 9 countries.

Although, except for the first PT-PhD student who had intensive clinical training, JUST-sponsored faculty members enroll in only the PhD program and do not complete clinical coursework; they have the opportunity to develop clinical skills and knowledge through mentored teaching experiences in the DPT clinical curriculum. The DPT curriculum emphasizes evidence-based practice and prepares students for direct access practice. This level of instruction is a contrast to more typical Jordanian physical therapist practices which can be tightly controlled and dictated by physicians and emphasizes technical delivery of select interventions rather than critical thinking and creative problem solving. Similar to practice advancements in the US, participating JUST faculty members recognize educational changes as the catalyst to support changes in practice.

Outcomes. To date, KUMC has enrolled 5 Jordanian PhD students, including the first faculty member who graduated with dual degrees (MPT and PhD). The first female Jordanian student is currently enrolled. The broader collaboration between the 2 universities include 4 students in the PhD program at the KUMC's School of Nursing, and 3 Jordanian students enrolled in the Therapeutic Science PhD program housed within the Department of Occupational Therapy Education, including a female student, who returned to JUST with a PhD in occupational therapy education.

The first Jordanian graduate of the PT-PhD programs currently serves as the chair of the PT education program at JUST and has published 13 peer-reviewed scientific articles. He obtained 2 USAID-funded grants totaling $288,000, along with 2 additional grants from The European Commission and USAID.[47] These grants not only support teaching and research at JUST but also have had a great impact on the quality of life for the people of north Jordan where JUST is located.

An implicit, yet additional outcome of this exchange has been the mutual benefit of enhanced cultural competency for both the JUST PhD students and the KUMC DPT students. The DPT students learn about the Jordanian culture, such as the distinct gender preferences for the administration of health care, and the Jordanians gain greater understanding of US culture as they interface with the US DPT students.

DISCUSSION

This paper highlights models of international collaborations designed to establish, upgrade, and/or strengthen PT education programs in developing countries around the world. Three of the described models purpose to advance physical therapist practice and education where a professional education already exists (Nigeria, Suriname, and Jordan). The fourth model serves to establish professional PT education where none previously existed (Mongolia). Together, these models showcase a variety of means by which PT educators and institutions in resource-rich, developed countries can assist PT education programs and institutions in resource-poor, developing countries.

The models also depict how programs can be developed to meet the specific professional or cultural needs within each developing nation's PT education program system. A "one-size fits all" approach of exporting PT education to developing countries will likely be fraught with many challenges that may limit success as previously demonstrated in other forms of education and projects executed in developing countries.[48,49] International collaboration efforts should be customized based on the specific and unique needs of the host country.

All of the PT international collaborative educational models reported in this paper utilized approaches with intention to sustain enhancement of PT education and services over time. Some models placed emphasis on developing native physical therapy manpower within the host nation, while others focused on advancing the education of native physical therapy faculty committed to returning to their home country as educators and researchers. It is expected that approaches such as those used in the models reported in this paper will minimize the impact of "brain drain"[5,9,30] within the developing countries. The merits, specific impacts, and valuable components for each model are further discussed below.

The Nigeria-Michigan Model: Advocacy of US-Based Nigerian Physical Therapists

The needs assessment and joint discussions for the development of the cohort tDPT program for Nigerian physiotherapists including the English proficiency and other curricular requirements may serve as a model for other countries considering a transition to master's degree or doctoral degree professional PT education. Online education allows for interactive, creative, experiential, post-qualifying learning that moves PTs forward to evidence-based practice, necessary for a doctoring profession. Fully online education is accessible worldwide through the Internet, thus breaking down barriers to educational access. The fully online tDPT program for cohorts of Nigerian physiotherapists provides an opportunity to advance both clinical practice and provide potential faculty for transitioning to a professional doctoral degree requirement of the Medical Rehabilitation Therapists (Registration) Board of Nigeria. The partnership with Nnamdi Azikiwe University will help Nigerian PT programs begin the conversion from the BSPT to a DPT.

The initiation of the Nigeria-Michigan model highlights the importance of advocacy of PTs in developed countries who are citizens of developing countries. The Nigeria Physiotherapy Network is a global network of Nigerian-trained PTs who advocate for the advancement of physical therapist practice and education in their home country. These professionals, whose skills have been further honed outside their country, are familiar with the specific and unique needs and culture of physical therapist practice and education in their home country as well as the current advances in physical therapy. Individuals and groups such as this are well positioned to serve as facilitators for initiating international partnerships and collaborations discussed in this paper.[50]

The Suriname-HVO Model: The Role of Non-governmental Organizations

The model of HVO in Suriname to advance PT practice has been very successful. The HVO-AdeKUS partnership and collaboration is an example of a model that brought a troubled PT education program in a developing country from crisis status to stability. It was inconceivable some years ago that the Suriname PT program would be advancing their education and practice to a professional MPT program. Efforts supporting PT education programs in Suriname have contributed to the number of PTs being increased from 9 after the mass immigration of PTs in 1983 to about 55 as of July 2011 (Frits Hunsel, PT,[50] personal communication, July 22, 2011). The 33 graduates of the AdeKUS PT program account for a significant portion of this addition to the number of PTs in Suriname (Tony Chang, PT, PhD, AdeKUS PT Program Director, personal communication, August 1, 2011).[12]

With the current global economic recession and reduced donor funds, new innovative ways of assisting the AdeKUS program via distance education utilizing low-level technology was introduced by the HVO. Neurological treatment curriculum—lectures and labs—were presented online from the US to Suriname utilizing free software.[37] This was shown to be very successful and cost effective. Other institutions and educators in developed countries can utilize similar free online low-level technology[51] in situations where volunteer faculty time is limited and funding for physical travel is scarce.

The HVO program advancement in Suriname and other sites around the world underscores the critical roles being filled by NGOs, especially when efforts of governments in developing nations are lacking. Many NGOs have developed reputations for advancing PT practice and education around the world.[25,52] Some professional organizations, such as the World Confederation for Physical Therapy and its designated regional affiliates, are also championing the advancement of PT education and practice around the world.[53,54]

The Mongolia-Japan Model: Partners Contributing to Initiating New PT Program in Mongolia

Initiating PT education in a country where no PT programs exist is very challenging. HSUM in Mongolia was able to partner with NGU in Japan to accomplish the difficult task of establishing the first PT program in Mongolia. In this case, a physician from HSUM enrolled in the PT education program at NGU and then initiated discussion regarding joint development of the new PT program. Other Mongolian physicians who also received PT education from NGU were then able to work collaboratively with faculty from NGU to deliver the BSPT program at HSUM. Establishing the program at an existing Mongolian university that houses other medical professions enabled this collaboration to be successful.

Many on-going challenges exist for Mongolia to sustain its PT education programs and develop the profession within Mongolia. NGU continues to provide face-to-face education to students at HSUM. Development of additional Mongolian physical therapy faculty is necessary to fully sustain PT education in Mongolia. There will also be opportunities to advance professional development and develop a professional physical therapy organization in Mongolia.

The Jordan-Kansas Model: Potential Benefits for PT Programs in Developed Countries

The JUST-KUMC collaboration uniquely meets the needs of the Jordanian PT profession. Collaboration has continued between KUMC's Physical Therapy and Rehabilitation Science (PTRS) Department and JUST to support the JUST faculty in data analysis and preparation of manuscripts for publica-

tion. Graduates are encouraged to maintain ties to their US alma mater for continued professional development and research collaboration. The JUST students have enriched the KUMC PTRS department through their research endeavors, their contribution in the DPT classrooms and labs, and in their involvement in the KUMC campus community. The JUST PhD students described the necessity of education as an avenue to a stable and secure lifestyle in Jordan. Within the next 2 years, JUST will benefit from its investment with 3 PhD-prepared PT faculty members, including 1 female faculty. The benefits to the Gulf region in advancing rehabilitation research and the quality of rehabilitation services may be immeasurable.

CONCLUSION

This paper showcases 4 different models of international collaborations and partnerships between PT programs in developed and developing countries. Each educational partnership was uniquely suited to the host country's needs. As physical therapy continues to advance globally, more PT education programs in developed countries should assist the efforts in developing nations to either establish new PT education programs or upgrade or strengthen existing programs and curricula. Improving the provision of direct patient care in developing countries is very important, but long-term, sustainable progress in addressing the physical therapy health care needs in developing countries will be most effectively addressed through enhancing the PT education systems in these countries.

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