

## A Model for Improving Physician Performance in Developing Countries: A Three-Year Postgraduate Training Program in Laos

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### Abstract

The Faculty of Medical Sciences of the National University of Laos, in partnership with Health Frontiers, an American nonprofit organization, Case Western Reserve University of Cleveland, Ohio, and Khon Kaen University of Khon Kaen, Thailand, administer a postgraduate internal medicine training program for Lao physicians. Begun in 2001, the program admits six participants per year; participants complete clinical rotations in three hospitals in Vientiane, Laos, as well as one other clinical site.

The goal of the program is to prepare a core group of local physicians to deliver

healthcare, and train others according to an international standard of care. The program has two exceptional features. First, the vast majority of the training takes place in Laos. This avoids the "brain drain" that can occur when nationals of developing countries train abroad. In addition, because the training uses personnel, facilities, and technology available locally, graduates are better prepared to serve the needs of the Lao people. Second, the partnership is an all-volunteer model, committed to a long-term undertaking. American-trained specialists who live in Laos are available to work with the participants on a daily basis. Participants have a long period of

time to acquire, reinforce, and be tested in new knowledge and benefit from learning from American colleagues who model an evidence-based approach to medical care, while still working in local conditions. As more Lao physicians receive this level of training, the program will become locally sustainable and help break a cycle of dependency on foreign expertise within the Lao health care sector. Preliminary results suggest that the program is succeeding, and could be replicated elsewhere.

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International organizations spend substantial resources to improve health care in developing nations. Much of these funds are spent on training local health care providers; either professionals, such as physicians, nurses, or pharmacists, or "substitute health workers," such as medical assistants with limited training to recognize and treat specific diseases, surgical or obstetric technicians taught to perform specific procedures,<sup>1</sup> birth attendants,<sup>2</sup> or even family members.<sup>3</sup> These programs usually rely on one of

two strategies: either foreign experts travel to developing nations for brief periods to give short training courses or lectures,<sup>4</sup> or funding is provided for a small number of students from developing nations to travel abroad to get more extensive education. The former programs have been criticized for providing information that is often neither suitable for local conditions nor retained by the participants for an extended period of time. The latter programs have been criticized for promoting "brain drain," in which the best-educated health workers do not return to their country of origin after completing years of training.

The Faculty of Medical Sciences of the National University of Laos has a long-standing relationship with Health Frontiers, an American volunteer nonprofit organization, Case Western Reserve University of Cleveland, Ohio, and Khon Kaen University of Khon Kaen, Thailand (referred to as the Partnership) to develop postgraduate medical education programs within Laos. The goal of the partnership is to prepare a core group of local Lao physicians to deliver, and train others according to, an

international standard of care. The intent is that, as more local physicians receive this level of training, the programs will become locally sustainable and help break a cycle of dependency on foreign expertise within the Lao health care sector.

The partnership's programs are exceptional in two respects. First, they are designed so that the vast majority of the training takes place in Laos. This avoids the "brain drain" that can occur when nationals of developing countries train abroad. In addition, because the training uses personnel, facilities, and technology available locally, the program graduates are better prepared to serve the needs of the Lao people in a manner that is effective and relevant to their situation.

Second, the partnership is essentially an all-volunteer effort, committed to a long-term undertaking, and independent of the funding cycles that constrain most development programs. The partnership provides volunteer American-trained internists and pediatricians, who live in Laos for at least a year and work with the Lao participants on a daily basis. This gives the program participants a long

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period of time to acquire, reinforce, and be tested in new knowledge. It also makes available to them American colleagues who can model an evidence-based approach to medical care, while still working in local conditions and with locally available technologies.

### Background

Laos is a small, poor, landlocked nation in Southeast Asia. It is defined as a least developed nation by the United Nations, ranking 133 of 177 countries on the United Nations Development Programme Human Development Index.<sup>5</sup> According to the most recent Human Development Report, 73% of the population of Laos lives on less than the equivalent of two U.S. dollars per day, with 26% below one dollar per day. Currently, there are 59 physicians per 100,000 people in the country.

Traditionally in Laos, there has been a separation between medical training and the beginning of medical practice. No transition period existed between education and practice as a physician. The slow introduction of increasing patient responsibility over many years of school and residency, as is common in the United States, has been absent. Instead, immediately upon graduating from medical school, a student is assigned a position in the health care system by the Ministry of Health. Young, recent graduates have often found themselves with significant patient care responsibilities but with little or no practical experience and few institutionalized resources to look to for help.

In 1991, the Faculty of Medical Sciences of the National University of Laos (FMS-NUOL) began a partnership with Case Western Reserve University (Case) through Health Frontiers, a small, American, nongovernmental organization. The initial focus was on faculty development and medical student training in Laos. In 1992, the dean of the FMS-NUOL requested assistance in the development of a three-year pediatric training program. The planning process for this, including approvals from the Lao government, took five years. The initial program was launched in 1997; its history has been described previously.<sup>6</sup> During this time, the Faculty of Medicine of Khon Kaen University (KKU) became a

partner in the program and has been actively involved in its implementation since. Due to the success of the pediatric training program, a second program was started in 2002 to train physicians in internal medicine. Six participants started training in the spring of that year, and graduated three years later, in May 2005. Approximately six new residents have been accepted into the program each year since, resulting in 17 future internists being in years 1, 2, or 3 of the program as of 2005. The next class of participants will graduate in May 2006.

### The Internal Medicine Residency Program

Education programs for health professionals in Laos suffer from many fundamental inadequacies. These inadequacies are so severe that many doctors graduating from the FMS-NUOL are unable to provide basic medical care, let alone respond to complex health care needs. Until the establishment of the partnership's training programs, there were no opportunities for physicians to pursue ongoing postgraduate medical training in the country after finishing medical school.

Designing an internal medicine program in Laos presented unique challenges. At the time of the program's conception, there was no concept of internal medicine in the country, and there were no "internists." Each ward of a hospital had an assigned specialty such as cardiology or gastroenterology, and upon graduation from medical school, a physician would be assigned to one of these wards. The new physician did not receive any specific training in that specialty, unless an outside organization provided it. Prior to 1990, a few foreign governments had provided opportunities and funding for a small number of Lao doctors to receive medical training abroad, notably in the former Soviet Union, Eastern Europe, and Cuba. Recently, opportunities have been more limited, usually consisting of funding to attend short courses in other countries in the region, such as Thailand or Vietnam.

#### A training-based model

The partnership helped the FMS-NUOL design a model of postgraduate education based on supervised and evaluated training to allow participants to safely get experience treating patients while

limiting their actual patient responsibility. The hope was to create a postgraduate education system that could mimic the United States' residency model of slowly increasing patient responsibility as the participants proved their ability and progressed through the three years of the program.

The faculty of the FMS-NUOL selected a planning committee to implement the program. The members were drawn from senior physicians at the three Lao hospitals that would be used as training sites, and from the administrative faculty of the medical school. Three Lao physicians with previous international training lead the team and continue to provide principal oversight. The committee designed a merit-based system for selecting program participants. The first six participants were chosen in the fall of 2001, and they began their training the following spring. Each month, the participants rotate to one of seven wards spread over four clinical training sites. The capital of Laos, Vientiane, is host to three of the sites. These are the three largest hospitals in the capital: Mahosot, Mittaphab, and Setthatirat hospitals. At Setthatirat hospital, the participants work on a general medicine ward. This ward was created for the program by merging smaller wards that had previously been assigned subspecialties. At Mittaphab hospital, participants work on both a general medicine ward and the intensive care unit. At Mahosot hospital, they work on the gastrointestinal, infectious disease, and cardiology wards, as well as in the radiology department.

The fourth clinical site is Khon Kaen University hospital. The participants spend six months of their three years training in Thailand, working for two months in general medicine and completing three- or four-week rotations in hematology, rheumatology, endocrinology, pulmonology, and dermatology. This gives the participants experience in medical subspecialties not yet available in Laos, in a setting in which a wider array of medical testing and technology is available than in Laos.

Another part of the structure of the program has been to put a medical teaching unit in place in each hospital. Such a unit includes a rotating staff of attending physicians who supervise a team of doctors; the hierarchy of the unit

emphasizes individual learning and graded supervision. As each year of the program passes and six new "junior" doctors enter the program, earlier classes gain in seniority and responsibility. Through this structure, first-year participants get experience treating patients, while having minimal decision making responsibilities. As they progress to the third year, both their responsibilities toward the patients and their responsibilities to teach the less experienced program participants increase.

The program also provides participants with weekly English language classes and instruction in using computers and the Internet. They are also given a yearly stipend with which they can purchase medical textbooks for their personal use. The doctors continue to receive their normal salary from the hospitals for which they worked prior to entering the program, in exchange for a promise to return to their prior positions upon completion. They are also given a small monthly stipend from Health Frontiers to help defray the extra costs associated with attending the program.

#### Curriculum development

The curriculum development process for the internal medicine program involved many steps. The goal was to create a curriculum that would meet the specific needs of the Lao people, while being consistent with international standards. The diseases in Laos that cause the greatest health care burden are different than those in other parts of the world, and can vary in different regions of the country. Due to poverty, the rural population has difficulty traveling to the capital, and thus often present at the central hospitals with more advanced disease. The lack of specialists necessitates that an internist be trained to handle a wider array of medical problems, but the lack of diagnostic and treatment options, and the general poverty of the people, makes the risks, benefits and cost-effectiveness of each decision different than elsewhere in the world or even the region.

The planning committee reviewed curricula from the Lao pediatric training program, Case, KKU, Calgary University, and other institutions, selecting and adapting components from each. The team leadership made site visits to

observe the internal medicine residency program at KKU. In 2000, internists and medical education specialists from KKU led an interactive workshop in Laos for the members of the planning team. The workshop was designed to teach the key elements of a postgraduate training curriculum, and during this workshop the participants created the first draft of the curriculum for the program. The residency program director and vice chairman of internal medicine at Case visited the country in 2001 to review and comment on it.

In preparation for becoming teachers, the Lao physicians participated in several workshops on how to do both bedside and didactic teaching, how to evaluate trainees, how to write examination questions, and how to give constructive feedback. KKU faculty led these workshops in the Thai language, which is similar to the Lao language, making it easier for the Lao physicians to understand and participate than if the workshops had been held in English. In addition, eight Lao physicians participated in four-month clinical rotations at KKU, with two participants each in the specialties of infectious diseases, gastroenterology, rheumatology, and nephrology. These rotations were funded by the Thai government.

The decision to launch the internal medicine program came after a commitment from the Department of Medicine at Case to provide Health Frontiers with partial financial support for its first year. Under this arrangement, Health Frontiers would be responsible for the daily administration of the program in-country and the remaining direct costs. The program began with no guarantee of financial assistance after the first year. Subsequently, partial support was provided by the Association Liaison Office for University Cooperation in Development, funded by the United States Agency for International Development, to help firmly establish the fledgling program and develop an overall vision for postgraduate education and research in Laos from 2002 to 2004. The primary contribution of all of the partners to the training program has always been the value of donated faculty time. This includes not only the value of volunteers provided by Health Frontiers and Case, but also the value of the faculty and facilitators provided by the Lao

government and the tuition-free training rotations at KKU.

#### Program Evaluation

Lao, Thai, and American colleagues involved with the internal medicine program have reported improving patient care by the Lao program participants. Demonstrating a change in physicians' practices or improved patient outcomes associated with this program, though, is very difficult, as it is in all international health personnel training programs. We have attempted to quantify the effects of the program by analyzing multiple-choice question (MCQ) exams and objective structured clinical exams (OSCEs) taken by the program participants. Each participant takes a one-hundred question MCQ exam and an OSCE four times during their time in the program: once prior to admittance, and once more at the end of each year of training. These tests include questions on infectious disease, rheumatology, cardiology, neurology, endocrinology, gastroenterology, pulmonology, hematology, and nephrology. The tests are administered in Lao and are written and graded by the senior Lao physician in each department.

For the first class of program graduates (2005), we did a paired *t* test to compare participants' scores on the MCQ examination and OSCE taken before the start of the program to their scores on the exams taken three years later, at the end of the program. We also used a paired *t* test to compare their scores on the tests taken each year to their scores from the previous year.

In addition, we performed a semistructured interview with each first-year participant at the end of the program. The physician participants were asked to discuss if and how the program had affected their confidence as a doctor, their understanding of the uses and limitations of diagnostic tests, which medications they prescribed, and what recommendations they would make to improve the program. If the participant initially gave a minimal response, the interviewer followed-up with further questions in order to elicit as much feedback as possible. These interviews added a qualitative component to our data and were collected in order to gain a better understanding of the participants'

Table 1

**Characteristics of First-Year Participants in a Postgraduate Internal Medicine Training Program, Faculty of Medical Sciences of the National University of Laos, Vientiane, Laos, 2001**

Participant	Gender	Age	Previous practice (years)	International training experience
1	Male	33	4	None
2	Male	35	11	None
3	Male	45	10	1-month course in Thailand
4	Male	48	17	7 years of medical school in Mongolia 6-month course in former U.S.S.R.
5	Female	34	7	3-month course in Vietnam
6	Female	42	12	2-week seminar in Thailand

experiences of being in the three-year program.

The initial participants in the program were four men and two women, whose ages ranged from 33 to 48 years old (see Table 1). They had between 4 and 17 years of medical practice before they entered the residency program. Four participants had undergone some training outside of Laos. For three of the participants, this experience was limited to short seminars or training courses ranging from two weeks to three months. One resident had undergone seven years of medical schooling in Mongolia, followed by a six-month postgraduate training program in the former U.S.S.R.

The average score on both the MCQ exam and the OSCE was significantly higher at the end of the program than at the beginning (see Table 2). The MCQ exam score increased an average of 26.5 points and the OSCE score increased an average of 14.8 points.

Furthermore, participants' scores on the MCQ exam improved overall in all three years of the program (see Table 3). The average score on the OSCE improved in the first two years before slightly

decreasing on the final exam, from an average of 77.74 points to an average of 77.32 points. For the MCQ exam, the rise in score reached significance between participants' initial test and the test taken in April 2003. For the OSCE, the rise in average score reached significance between the tests taken in April 2003 and April 2004. The one decrease in average score was nonsignificant.

On the qualitative assessment, all six participants said that compared to the start of the program, they felt more confident as physicians and had a better understanding of the uses and limitations of both diagnostic tests and medications at the end of the program. Three of the participants said that prior to the program, they had been taught to order a standard battery of blood tests that were not specific to the patient. Two participants stated that prior to the program, they often ordered blood tests knowing they would not be able to interpret the results.

When talking about medications, two participants stated that prior to the program they had never tried to make a clinical diagnosis before choosing a treatment, but instead had chosen

medications solely to treat symptoms. One participant said that she had never before been taught about the risks or side effects of medications. One participant said that he particularly appreciated lectures that gave current evidence on the use of newer medications, information not easily available in Laos.

Most of the suggestions for improving the program involved increasing the amount of teaching by foreign experts, especially in areas where there are currently no specialists in Laos, such as endocrinology and rheumatology. Two participants stated that the training needed to be more rigorous. Two participants suggested that having only one long-term foreign physician on the faculty was not enough. One participant stated that the program had taught her how to access new information from journals, but she found it difficult to translate this information into practice in Laos. She suggested more focus in this area.

At the end of the program, five of the six participants stayed in Laos and returned to the hospital at which they worked prior to beginning the training. One participant received a two-year scholarship to attend fellowship training in neurology in Kuala Lumpur, Malaysia. He has received permission from the director of his hospital to pursue this opportunity in exchange for promising to return to his position in Laos after he completes it.

## Discussion

When the partnership designed the internal medicine program, the goal was to provide Laos with a core group of well-trained internists who could address the overwhelming health care needs of the Lao people. Our evaluation suggests that the physicians who complete the program gain increased knowledge, skills, and confidence from their participation. MCQ exams have been shown to be an objective measure of residents' medical knowledge, and increasing in-service scores during three years of a residency program has previously been interpreted as an increase in the test takers' knowledge base over time.<sup>7</sup> The OSCE complements an MCQ exam by testing components of clinical competence, data interpretation, and patient interaction not easily evaluated by other means.<sup>8</sup> An

Table 2

**Changes in Scores between Entrance Examinations (2001) and Final Examinations (2005) for Six Initial Participants in a Postgraduate Internal Medicine Training Program, Faculty of Medical Sciences of the National University of Laos, Vientiane, Laos**

Examination	Mean score December 2001	Mean score May 2005	Mean change	p value*
Multiple choice exam	46.33	72.83	26.50	<.01
Objective structured clinical exam	62.50	77.32	14.82	.03

\* Statistically significant result for both exams.

Table 3

**Change in Yearly Test Scores for Six Initial Participants in a Postgraduate Internal Medicine Training Program, Faculty of Medical Sciences of the National University of Laos, Vientiane, Laos**

Date	Multiple choice exams			Objective structured clinical exams		
	Mean	Mean change from previous exam	p value	Mean	Mean change from previous exam	p value
12/2001	46.33			62.50		
04/2003	59.17	+12.83	.02*	71.68	+9.18	.09
04/2004	62.92	+3.75	.43	77.74	+6.06	.01*
05/2005	72.83	+9.92	.08	77.32	-0.42	.79

\* Statistically significant result.

OSCE has "face validity," since the skills and behaviors being evaluated are intrinsic to clinical practice. For our program, participants' significant increase in OSCE scores in parallel with the increase in MCQ exam scores suggests not only that physicians' knowledge has increased during the program, but that this increased knowledge is manifesting as improved clinical performance.

The semistructured interviews show that the gain in knowledge and skills has been accompanied by a subjective increase in the participants' confidence. All of the physicians in the program felt they had a better understanding of how to use diagnostic tests and medications, and generally felt more confident as doctors.

There are some significant limitations in our attempt to evaluate this program. Other authors have noted the difficulty of creating reliable and valid instruments for testing the knowledge of health workers in developing nations.<sup>2</sup> In Laos, there is limited availability of diagnostic and radiologic tests, medications, and interventions. Few instruments are designed to assess how health care is provided under these conditions. Within the developing world, conditions vary widely, so there are no universal standards as to what constitutes "correct" medical care. The risks, benefits, and cost-effectiveness of medications and interventions vary depending on local conditions. Relying on Lao physicians to write questions for the tests has the advantage of creating instruments relevant to local conditions, but there is no way to validate these exams. Currently, there are no validated exams available in the Lao language, and there are few people who are qualified to

translate a medical exam. Having an instrument translated would introduce another forum for potential error.

A second part of the program's goals was to provide a group of well-trained internists who would stay and work in Laos. Five of the first six graduates have stayed in the country, and the sixth is likely to return after a two-year fellowship. All six participants came from one of the hospitals that are used as training sites for the program, meaning that they will continue to be available to teach future program participants and other Lao medical staff. In exchange for their salary continuing to be paid by their hospital of origin during the three years they attended the program, they have all promised to stay in their current positions for a significant length of time.

We have not addressed the cost-effectiveness of this program as compared to other programs to improve physician knowledge. The frequent assumption that a long-term training program is too expensive to be cost-effective is not necessarily correct. One of the most expensive aspects of working in developing nations is the cost of sending physicians or employees to the project site, or bringing doctors from the developing nation back to the United States or Europe. For a short training course or seminar, this is often required multiple times a year for multiple people. In contrast, supporting a physician to live in the developing world is surprisingly inexpensive due to the low cost of living in these countries. Therefore, the model used by the FMS-NUOL may be more cost-effective than other commonly used strategies to train doctors in the developing world.

Likewise, it is also often assumed that it is more cost-effective to train substitute medical workers such as medical assistants or surgical technicians than physicians in the developing world. Currently, programs to train substitute medical workers are more common, since the training they need is generally shorter and requires less complex knowledge and curricula.<sup>1</sup> Also, the people needed to train substitute workers require shorter and simpler education themselves.

Yet there are advantages to training physicians in developing countries. Physicians, given their deeper and more complex understanding of disease, can handle a wider variety of health concerns. Physicians are better prepared to adapt to changes in the medical environment, such as changes in the disease burden of a country or advances in diagnosis or treatment that may become available over time. In a hierarchical society such as Laos, physicians are more likely than other health professionals to be heeded as advocates for the needs of the population by the government and by United Nations agencies. Finally, a program to educate physicians can provide a country with a pool of well-trained, native educators who in turn are prepared to train other physicians or substitute medical workers.

The FMS-NUOL, in partnership with Health Frontiers, Case, and KKKU, has set up a novel program to train Lao physicians who are likely to stay to help improve local health care. This training program has demonstrated the ability to recruit highly qualified foreign specialists who are willing to devote a year or more of their professional lives to working in Laos on living stipends that are a small fraction of their earning potential. Their

day-to-day collegiality with Lao faculty and residents has been essential to the success of this program. However, the expectation is that, within a few years, they can begin to phase out as Lao faculty replace them and the program becomes locally sustainable.

Most graduates of this program will eventually participate in creating government health care policy, either on the local or national level, simply because they will be the best trained medical professionals in the country. Ideally, the experience of having gone through this training will strengthen the graduates' desire to be both lifelong learners and educators for the benefit of the Lao people. Although well-designed studies to prove both improved health care

outcomes and cost-effectiveness are needed, the promising preliminary results suggest that this approach is working, and could be successfully replicated elsewhere.

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