

Research article

Evaluation of a continuing professional development training program for physicians and physician assistants in hospitals in Laos based on the Kirkpatrick model

Hyun Bae Yoon¹, Jwa-Seop Shin^{1*}, Ketsomsouk Bouphavanh², Yu Min Kang³

¹Department of Medical Education, Seoul National University College of Medicine, Seoul, Korea; ²Education Development Center, University of Health Sciences, Vientiane, Lao People's Democratic Republic; ³Center for Public Healthcare Education and Training, National Medical Center, Seoul, Korea

Abstract

Purpose: Medical professionals from Korea and Laos have been working together to develop a continuing professional development training program covering the major clinical fields of primary care. This study aimed to evaluate the effectiveness of the program from 2013 to 2014 using the Kirkpatrick model. **Methods:** A questionnaire was used to evaluate the reaction of the trainees, and the trainers assessed the level of trainees' performance at the beginning and the end of each clinical section. The transfer (behavioral change) of the trainees was evaluated through the review of medical records written by the trainees before and after the training program. **Results:** The trainees were satisfied with the training program, for which the average score was 4.48 out of 5.0. The average score of the trainees' performance at the beginning was 2.39 out of 5.0, and rose to 3.88 at the end of each section. The average score of the medical records written before the training was 2.92 out of 5.0, and it rose to 3.34 after the training. The number of patient visits to the district hospitals increased. **Conclusion:** The continuing professional development training program, which was planned and implemented with the full engagement and responsibility of Lao health professionals, proved to be effective.

Keywords: Continuing professional development; Kirkpatrick model; Korea; Laos; Program evaluation

Introduction

The main health care delivery system of the Lao People's Democratic Republic (hereafter, Laos) is a government-controlled, public system that operates hospitals and health centers. It has a strong vertical structure, which has three levels: central, provincial, and district. Laos suffers from a critical shortage of physicians, physician assistants, nurses, and midwives, with an average of 2.17 per 1,000 members of the population, and a shortage in rural areas that is even more severe. A continuing professional development (CPD) training sys-

tem for health professionals in Laos has not yet been thoroughly implemented [1].

In 2012, under the support of the Korea International Cooperation Agency (KOICA), faculty members from Seoul National University (SNU) College of Medicine in Korea and the University of Health Sciences (UHS) in Laos joined together to launch a "CPD training project to strengthen the capacity of provincial and district hospitals in Lao PDR". One of the objectives of the project was to develop a CPD training program and materials covering the major fields of primary care through the joint efforts of the Korean and Laos medical faculties to improve the quality of medical care provided by the district hospitals in the rural areas of Laos [2].

When the training program and the handbook were prepared after the workshop, faculty members from the UHS and central hospitals provided a 1-week train-the-trainers program

*Corresponding email: hismed1@snu.ac.kr

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for the physicians and physician assistants of the Luang Prabang provincial hospital. Thirty physicians and physician assistants from the provincial hospital participated in this training program as trainers. The trainers then provided a 10-week training program in the provincial hospital for the physicians and physician assistants in Luang Prabang province. The training was conducted 4 times over 2 years, from 2013 to 2014, and 48 trainees from each district hospital participated in all of the training programs. Among the total 48 trainees, 32 of them were females and 16 were males. 35 of them were physician assistants, and the other 13 were physicians. The training was composed of 5 major clinical specialties, including internal medicine, surgery, obstetrics and gynecology, pediatrics, and emergency medicine, and the trainees rotated to a new clinical section every 2 weeks (Appendix 1). This study aimed to evaluate the effectiveness of the program based on the evaluation approach of the Kirkpatrick model.

Methods

Evaluation of the program based on the Kirkpatrick model was carried out for its four levels: reaction, learning, transfer, and results. Transfer is the third level of the Kirkpatrick model, which refers to the behavioral change of the trainees after the training [3,4]. The evaluation was conducted from the beginning of the training program in 2013 until 6 months after the end the training program in the year 2015.

The reactions (Kirkpatrick level 1) of the trainees were evaluated by a questionnaire composed of 14 items with a 5-point Likert scale (1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree). The questionnaire was formulated through the collaboration of faculty members from SNU College of Medicine and UHS based on a literature review [5,6]. In the questionnaire form, there was also a space in which the trainees could write their opinions about the program. The survey was conducted at the end of each clinical section of the training program. The global rating by the trainers with a 5-point Likert scale (1: has knowledge, 2: knows how to do, 3: can do under supervision, 4: can do without supervision, 5: does well) and a log form filled in by the trainees was used to evaluate their own learning level. Before the training, the trainers received instruction about the global rating and the trainees also received instruction about the log form. The trainers assessed the knowledge and skills (Kirkpatrick level 2) of the trainees at the beginning and also at the end of the each clinical section. The trainees filled in the log form whenever they experienced any type of training activity.

The transfer (Kirkpatrick level 3) of the trainees was evaluated through the review of medical records and 360-degree evaluation of the trainees. A total of 354 medical records writ-

ten by 46 trainees before and 3 months after the training program were collected. A checklist and global rating, both using a 5-point Likert scale, were used for the evaluation. The checklist was formulated collaboratively by faculty members from the SNU College of Medicine and UHS based on a literature review [7,8]. Twenty-five trainers participated in a half-day workshop before assessing the medical records, and they practiced with some pilot medical records and received feedback during the workshop. The medical records were randomly distributed to the trainers without any personal information or details on the time of completion. All the medical records were assessed separately by two different trainers. More than 3 months after each batch of training, a survey was also conducted on 35 trainees and 98 colleagues of the trainees for the 360-degree evaluation. The evidence of changes that occurred in the central, provincial, and district hospitals (Kirkpatrick level 4) after the training program was collected through six group interviews with a total of 30 health professionals in those hospitals. Some key indicators of health service delivery outcomes including number of patient visits and number of admissions were also collected and analyzed.

Statistical analysis

The difference in the average score between the global ratings at the beginning of the training and those at the end was analyzed by t-test. The difference in the average score between the medical records written before the training and those written after the training was also analyzed by t-test.

Ethics statement

The institutional review board of Seoul National University College of Medicine and Seoul National University Hospital exempted this study from review since it was an analysis of de-identified data (IRB No. 1507-026-686).

Results

The trainees were satisfied with the training program according to the results of the questionnaire, in which the average satisfaction score was 4.48 out of 5 (Table 1). Most of the comments about the training program were positive. However, some trainees suggested that there should be more practice in the training program, especially in the early period of the training. The average score of the trainees' performance at the beginning was 2.39 out of 5, which improved to 3.88 at the end of each clinical section. There was a significant increase in performance scores in every clinical section (Table 2). Lecture, observation, and medical practice were evenly used for the training according to the content of the log forms (Table 3). The average score for the medical records written before the

Table 1. Survey results of the reaction of the trainees to the training program (N = 48)

Questionnaire (in English)	Average score ^{a)} ± standard deviation
The program's goals and objectives were clearly stated.	4.50 ± 0.65
The material in the program was relevant to clinical practice at the district level.	4.70 ± 0.52
The material in the program was well organized.	4.10 ± 0.69
The instructor was knowledgeable of the subject matter.	4.77 ± 0.45
The instructor was an effective communicator.	4.58 ± 0.59
The instructor was well prepared.	4.50 ± 0.59
The method of instruction was appropriate for this program.	4.54 ± 0.63
There was sufficient opportunity for discussion and interaction.	4.08 ± 0.67
There were enough practical sessions (bedside teaching) in the training program.	4.18 ± 0.82
The handbook will be helpful to me.	4.87 ± 0.38
The facilities were suitable.	4.29 ± 0.68
The schedule was suitable.	4.29 ± 0.63
I will be able to apply much of the material to clinical practice at the district level.	4.59 ± 0.54
I feel that the program will help me improve my clinical practice at the district level.	4.75 ± 0.44
Total	4.48 ± 0.37

^{a)}Five-point Likert scale: 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree.

Table 2. Global rating^{a)} results of the trainees' performance in five fields at the beginning and the end of the training program (N = 48)

	Beginning of each section	End of each section	Difference of average ^{b)}
Internal medicine	2.43 ± 0.81	3.93 ± 0.96	1.49
Surgery	2.42 ± 0.81	3.75 ± 0.68	1.33
Obstetrics and gynecology	2.32 ± 0.70	3.90 ± 0.64	1.58
Pediatrics	2.53 ± 0.50	4.26 ± 0.52	1.73
Emergency medicine	2.22 ± 0.70	3.56 ± 0.54	1.33
Average	2.39 ± 0.74	3.88 ± 0.86	1.49

^{a)}Five-point Likert scale: 1: has knowledge, 2: knows how to do, 3: can do under supervision, 4: can do without supervision, 5: does well; ^{b)}P < 0.01 for all items.

Table 3. Log form results of the trainees during the training program with percentage of each training activity (N = 48)

	Lecture (%)	Observation (%)	Practice under supervision (%)	Practice without supervision (%)	Total activity (%)
Internal medicine	31	34	18	17	100
Surgery	29	32	25	13	100
Obstetrics and gynecology	31	38	17	14	100
Pediatrics	29	32	20	19	100
Emergency medicine	23	31	25	22	100
Average	28	33	21	17	100

training was 2.92 out of 5, and it rose to 3.34 after the training. There was a significant increase in scores on every checklist item except the "diagnostic testing" (Table 4). According to

Table 4. Results of the review of the medical records that trainees wrote before and after the training program according to five point Likert scale^{a)}

	Before the training (N = 176)	After the training (N = 178)	Change in average ^{b)}
Current medical history	3.22 ± 0.89	3.61 ± 0.87	0.38
Past medical history	2.89 ± 0.90	3.35 ± 0.91	0.46
Physical examination	3.01 ± 0.86	3.58 ± 0.95	0.56
Diagnostic test	2.46 ± 1.03	2.67 ± 0.94	0.22 ^{c)}
Diagnosis	3.23 ± 0.90	3.55 ± 1.05	0.32
Treatment	3.25 ± 0.88	3.58 ± 0.94	0.33
Discharge plan	2.03 ± 1.10	2.57 ± 1.25	0.53
Average score	2.92 ± 0.73	3.34 ± 0.84	0.41
Global rating	2.51 ± 0.92	3.05 ± 0.94	0.54

^{a)}Five-point Likert scale: 1: poor, 2: below average, 3: average, 4: good, 5: excellent; ^{b)}P < 0.01 for all items except "Diagnostic test"; ^{c)}P = 0.072.

Table 5. Results of the 360° evaluation of the trainees after the training program

Questions	Trainees (N = 35)	Colleagues (N = 98)
Are the trainees doing the following activities after the training?	Yes (%)	Yes (%)
<i>Applying new knowledge and skills</i>	31 (88.6)	84 (85.7)
<i>Adopting new guidelines</i>	32 (91.4)	67 (68.4)
<i>Teaching colleagues</i>	23 (65.7)	60 (61.2)
<i>Improving the hospital system</i>	14 (40.0)	47 (48.0)

the 360-degree evaluation of the trainees, most of them were applying new knowledge and skills to their practice and adopting guidelines, and some of them were also teaching their col-

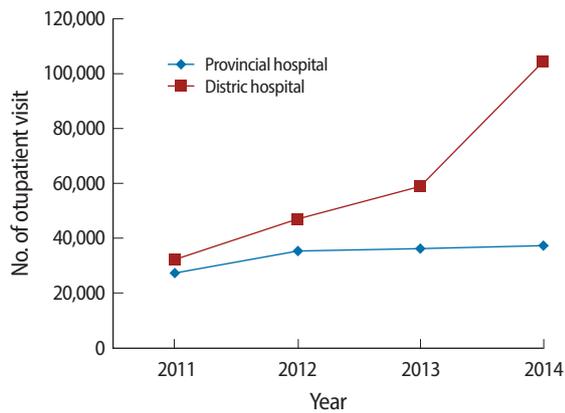


Fig. 1. Changes in number of outpatient visits in district and provincial hospitals in Laos after training of physicians and physician assistants in district hospitals in 2013.

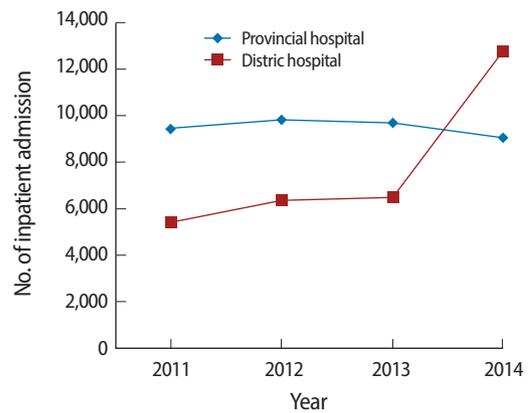


Fig. 2. Changes in the number of inpatient visits in the district and provincial hospitals in Laos after training of physicians and physician assistants in district hospitals in 2013.

leagues and improving the hospital system. There was little difference between the self-assessment of the trainees and the assessment from their colleagues except on the item “adopt new guidelines” (Table 5).

The medical practice in the district hospitals, specifically, history taking, physical exam and procedural skills, and diagnostic skills, was improved. Trainees were able to apply guidelines to their medical practice. The training system and capacity were also strengthened. Competent trainers were trained in central and provincial hospitals, and now they were improving the education and training in their hospitals. Trainees taught new knowledge and skills to their colleagues in the district hospitals and new training programs were started for the medical professionals working at health centers. The facilities of the district hospitals were renovated to catch up with the improved medical practice and the relationship among the central, provincial, and district hospitals also improved. While the number of patients served by the provincial hospitals was stable throughout the period, the number of outpatient visits and inpatient admissions in the district hospitals increased after the training program started in 2013 (Figs. 1, 2).

Discussion

The plan for the program evaluation was designed from the beginning of the project, and was shared with the all the participants. The whole evaluation process was conducted by the Lao faculty from UHS and the provincial hospitals under the guidance and support of faculty members from Korea.

The evaluation responses, including the comments from the trainees, were shared with the trainers at the end of each batch of training to continuously improve the training program. Global rating, which was used for the evaluation of learn-

ing of the trainees, is widely used in medical education and clinical training because it is easy for the raters to understand and apply it [7]. In this study, instruction was provided to the trainers to improve the reproducibility of the rating. Trainers also received a half-day workshop before assessing the medical records, and they practiced with some pilot medical records and received feedback during the workshop to improve the reproducibility of the rating and reliability among the raters. There was significant improvement in the scores on every checklist item except the “diagnostic test”, which might be explained by the fact that the district hospitals are still not well-equipped enough to accommodate running the appropriate diagnostic tests. The results of the 360-degree evaluation revealed that there was little difference between the self-assessment of the trainees and the assessment from their colleagues. Both qualitative and quantitative data was collected for the evaluation of the outcomes of the training program. Even though some of the statistical data from the district level was not reliable enough to analyze, it was certain that the number of outpatient visits and inpatient admissions in the district hospitals greatly increased after the training program started in 2013, while the number of patients served by the provincial hospitals was stable throughout the period. This may reflect the increase in patient satisfaction due to the higher quality of health care services provided by the district hospitals.

According to the program evaluation results, the satisfaction and achievement of the trainees were high, the trainees were transferring what they had learned, and there was a significant change in the central, provincial, and district hospitals after the training program. There may be several key factors that contributed to this successful outcome: first, the full engagement and responsibility of the Laos medical professionals; second, a focus on the sustainability of the project; third, a com-

munity-based approach to meeting the needs of the Laos health system; and fourth, system strengthening for the cooperation among central, provincial, and district hospitals.

Recently, the World Health Organization emphasized a new goal for global health: universal health coverage and competent health care human resources to deliver qualified health care services [8]. The developing countries are striving to strengthen the capacity of their health professionals with the support of many development partners. However, concerns always remain about the sustainability of the education and training of health professionals in developing countries [9]. The full engagement and responsibility of the Laos government and health professionals in this project also contributed to the effort to achieve sustainability of the CPD training.

The CPD training program was planned and implemented with the full engagement and responsibility of Laos health professionals to achieve the sustainability of the program. According to the program evaluation results, the satisfaction and achievement of the trainees were high, the trainees were transferring what they had learned, and there was a significant increase in the number of outpatient visits and inpatient admissions in the district hospitals after the training program. As the program proved to be effective, we can expect that it would be possible to expand this training program to other rural areas in Laos.

ORCID: Hyun Bae Yoon: <http://orcid.org/0000-0003-4367-5350>; Jwa-Seop Shin: <http://orcid.org/0000-0002-6251-3616>; Ketsomsouk Bouphavanh: <http://orcid.org/0000-0002-6485-0763>; Yu Min Kang: <http://orcid.org/0000-0002-4368-9878>

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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Supplementary materials

Audio recording of the abstract.

Raw data of the response to questionnaires.

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Appendix 1. Topics of the 2013-2014 continuing professional development training program in Lao People's Democratic Republic

Subject	Specific topics
Internal medicine	Chest pain, Hypertension, Arrhythmia, Hemoptysis, Pleural effusion, Acute fever, Rickettsia, Dengue fever, Typhoid fever, Anemia, Diabetes mellitus, Hyperthyroidism, Arthralgia, Epilepsy, Stroke, Gastrointestinal bleeding, Peptic ulcer, Irritable bowel disease, Urinary tract infection, Acute renal failure, Nephrotic syndrome, nephritic syndrome
Surgery	General surgical procedure, Acute appendicitis, Peritonitis, Intestinal obstruction, Abdominal trauma, Calculous cholecystitis and cholangitis, Acute urinary retention, Fracture, Dislocation and sprain, Head injury, Chest injury, Surgical infection
Obstetrics and gynecology	Operative care principles, Vaginal bleeding in early pregnancy, Fetal distress during labor, Fever during pregnancy, Normal labor, Partograph, Newborn care principles, General principles, Prolapsed cord, Labor with an over-distended uterus, Fetal malposition, Shoulder dystocia, Pre-eclampsia, Postpartum fever, Unsatisfactory progress of labor, Rapid initial assessment, Shock, Placental abruption, Placenta previa, Vaginal bleeding after childbirth
Pediatrics	Convulsion, Pneumonia, Acute diarrhea, Dengue fever, Birth asphyxia, Neonatal jaundice, Illness in infants up to 2 months, Urinary tract infection, Infantile beriberi, Asthma attack, Measles, Meningitis, Malnutrition, Abdominal pain, Anemia
Emergency medicine	Shock, Oxygen therapy, Multiple trauma management, Coma, Intoxication, Acute pulmonary edema, Animal bite, Burn, Electrical shock and burn, Acute asthma attack, Acute respiratory distress syndrome, Upper airway obstruction