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INSTRUCTIONAL DESIGN AND ASSESSMENT

Health Promotion Integrated Into a Thai PharmD Curriculum to Improve Pharmacy Practice Skills

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ABSTRACT

Objective

To implement and evaluate 5 integrated teaching modules in the fifth-year doctor of pharmacy (PharmD) curriculum to increase students' ability to promote patients' health as part of their pharmacy practice.

Design

Activity-based learning was added to each module: (1) a practice experience in which students provided health information and counseling to the public; (2) academic debates on current issues in pharmacy (3) journal clubs on articles from the pharmacy literature; and (4) research projects relating to ongoing faculty research on diabetes. Students on 12-week practice experiences had visits to patients in inpatient wards, outpatient clinics, and either primary care units or community pharmacies.

Assessment

Practice examinations at the end of the first semester, the average student score was above 80% as determined by preceptors in experience sites and from faculty members. Group interviews found that students were positive about the benefits of integrated teaching.

Conclusion

The integration of the teaching between modules in the same semester is possible and greatly benefits student learning.

INTRODUCTION

Only 6 of the 15 universities with pharmacy programs in Thailand offer the 6-year PharmD curriculum.[1-6] The standard requirements for the PharmD curriculum has/have been published by the Ministry of Education. [7] The Faculty of Pharmacy, Mahasarakham University, was the second university in Thailand to establish the 6-year PharmD program. We accepted our first students into the program in 2000. The current PharmD curriculum requires 240 credits including 30 credits in general education, 30 credits in basic sciences, 87 credits in professional health sciences, 65 credits in clinical pharmacy, 18 credits in research, and 10 credits in elective subjects. The curriculum includes lecturing and active learning in the first

through fifth years, and practice skills in hospitals and community pharmacies in the second through sixth years (year 2 = 48 hours, year 3 = 80 hours, year 4 = 400 hours, summer of year 5 = 150 hours, and year 6 = 5 practice experiences of 225 hours each. [1]

Teaching of pharmacy modules in Thailand is generally delivered independently for each specialty. Students have been taught many different modules without any strategy to help them conceptually apply their knowledge to promote people's health in their pharmacy practice. Since health promotion is an important issue throughout Thailand, the Pharmacy Network for Health Promotion (PNHP) in 2004, led by Associate Professor Dr. Jiraporn Limpananont, introduced the idea of health promotion being included in the Thai pharmacy curriculum of all 15 universities offering a pharmacy degree.[8] The aim of the PNHP was for pharmacy students to become pharmacists who were up-to-date in global health matters and who could play a role in the rational use of medicines and health promotion. [8] Competence in health promotion is expected at the level of personal skill defined by the World Health Organization (WHO). [9] Academic staff members of the Faculty of Pharmacy, Mahasarakham University, have applied this concept to teaching modules since 2004, resulting in continuous quality improvement as documented in annual faculty reports. [10] We began to organize active learning using the concept of health promotion with 8 modules in 2004 and 15 modules in 2005. Difficulties resulted from the large number of active-learning activities contained in each semester and no previous integration between modules. In 2006, all 44 modules were starting to be integrated into the teaching modules in the fifth-year curriculum. The integration of teaching across the modules is challenging for Thai pharmacy faculties, and even more so when the teaching method has to follow the theme of health promotion. Our faculty members have been leaders in introducing this teaching method for this subject area for the past 3 years.

We continued to improve the integration of the 5 modules in the fifth year. Active learning was incorporated into 5 activities to achieve the objectives of every module. The health promotion activities covered individual counseling for the rational use of medication and lifestyle modification; group or individual counseling for education on how to use medication correctly and methods of self-care; screening for chronic diseases in high-risk people; and activities for up-to-date global health information. We expected that our integrated teaching modules would reduce students' workload, give them greater understanding, help them gain more skills, help them develop good attitudes to the profession, and help them be leaders in health promotion by active-learning activities. These activities are different from those in the sixth year, since the fifth year has a shorter time for practice (150 hours for year 5; 1,125 hours for year 6); different modules integrated (5 different modules integrated in year 5, but only practice modules in year 6), and different active-learning activities (practice experience, case report and presentation, journal club, debate and research project in year 5; an advanced practice experience , case report, journal club, and academic educating service during year 6).

As studies in other countries have shown, the knowledge and skills developed by pharmacy students in these areas during advanced experiences result in improved patient care,[11,12] and many universities have developed and promoted this teaching to quantify students' abilities through pharmacy service-learning programs for health promotion in community pharmacies, communities, and hospitals. [13-16] We describe experiences and lessons learned from this integrated teaching in the fifth-year modules.

DESIGN
Description of the Integration of the Five Modules

We first developed teaching in the practice experience following the initiation of the collaboration with a 550-bed provincial hospital in the city of Maha Sarakham, which is 8 kilometers from the university. University pharmacy staff members, hospital pharmacists, nurses, and the hospital director, who was a physician, discussed the goals of the program, the activities for students in each experience, the supervision by hospital pharmacists, and the collaboration of nurses and physicians on each rotation.

The 5 module directors, who were all faculty members, discussed the activities that students need to complete during the 15-week semesters to achieve the learning objectives of each module. The modules were approved by Mahasarakham University as part of the curriculum of the 6-year PharmD program.

Integrated Experiences From Five Modules

To produce pharmacists who stay up to date with global health issues, use medicines rationally, promote good health, and have strong patient communication skills,[8,9] it was necessary to design active-learning activities for each module that promoted these attributes (Table 1). Each of the experiences required students to complete a case report and

presentation, attend a journal club meeting, participate in an academic debate, and complete a research project. The learning schedule of fifth-year students in 2007 is described in Table 2 and Appendix 1.

The practice experience. The practice experience was aimed at developing students' experience in pharmaceutical care and encouraging them to provide health promotion to patients in all clinical settings. These rotations were arranged for a class of 53 students for 12 weeks between June and October 2007. The schedule for 27 groups of 2 students was agreed upon.

The rotations took place in 3 main settings: rotation 1 was in the inpatient wards; rotation 2 was in the outpatient clinics and pharmacies at Mahasarakham Hospital; and rotation 3 was in a variety of patient care settings, including 3 primary care units and 4 pharmacies.

The 9 inpatient wards consisted of 3 medical wards, a chemotherapy ward, a chemotherapy pharmacist unit, an orthopedic ward, 2 children's wards, and a hemodialysis unit. The 9 outpatient settings consisted of 2 human immunodeficiency virus (HIV) clinics for adult and pediatric patients, a pediatric asthma clinic, a diabetic clinic, a warfarin clinic, a tuberculosis clinic, a psychiatric/seizure clinic, a drug information center, and a pharmacy counseling unit. The 7 primary care practice settings consisted of 3 primary care units and 4 pharmacies.

The 28 faculty members were divided into 3 groups. Twelve faculty members who worked in the clinical settings, supervised rotations 1 (the inpatient wards) and 2 (outpatient clinics). The group included 7 faculty members with a PharmD degree, 2 with a master of science (MS) degree in a clinical area, and 3 with a PhD degree in clinical areas. Only at the HIV clinic did the 5 faculty members with an MS or PhD in pharmacy science supervise students in group education on alternative therapies. The other group was in rotation 3, which took place in primary care settings. Six pharmacy faculty members who lectured in social pharmacy and the university pharmacist manager were assigned to coordinate the student supervision with the pharmacists working in the primary care settings.

Each of the faculty members supervised 2 to 4 students. For example, 1 faculty member supervised 2 students in the male medical ward, then another 2 students in the diabetic clinic on the same day. Faculty members supervised rotation students at least 2 days a week. Active-learning activities were scheduled so that hospital pharmacists and faculty members were working together/supervised students together in each rotation setting.

In order to achieve all of the goals of the modules, the students had to assist pharmacists and other health care providers to dispense medicines and counsel patients either in groups or individually in primary care units, outpatient clinics, and community pharmacies. Students were required to discuss patient cases with practitioners to show they could apply their ideas and knowledge to improve the health of patients. Case presentations were scheduled on Wednesday afternoons 1 or 2 times a month. Each student was required to present 1 case.

Health promotion activities. During the rotations, students had assessed patients' health, plan for their care/treatment, and report this information to faculty members and practitioners. Active-learning activities were scheduled during the introductory meeting with hospital pharmacists and were designed to give students an overview of the program. Group activities on the wards included providing discharge counseling, monitoring medication errors, and checking dosages, especially those for drugs with narrow therapeutic indexes. The group activity in the clinics was conducting group counseling with patients such as diabetic patients who presented at the clinic with a blood sugar level/reading of at least 200 mg/dL. In the adult HIV clinic, the group counseling and education about alternative therapies was supervised by the basic science faculty members or the PhD and MA faculty members. In the primary care settings, students screened patients to identify those at high risk for cardiovascular disease, diabetes, depression, and asthma, and provided counseling to encourage lifestyle modifications. Students identified patients who needed home visits and faculty members encouraged the students to make the visits with practitioners.

Academic Debates. Academic debates in which 4 or 5 students spoke in support of a motion and 4 or 5 spoke against it were held on Wednesday afternoons 1or 2 times a month. After each debate, the audience (the rest of the rotation students) voted on whether the motion should be carried or lost. Students were given 5 discussion topics on current pharmacy issues and sources of information on each (eg, journal articles

1. (1) Should Celebrex be included in the National Drug List?

2. (2) Should bisphosphonate be included in the National Drug List?

3. (3) Is the compulsory licensing of clopidogrel suitable for Thailand?

4. (4) Can antibiotic resistance be reduced by pharmacists providing health education to customers?

5. (5) Which is better therapy, multiple or single doses of aminoglycoside?

This activity encouraged students to become involved in discussion and to apply evidence learned from pharmacy publications to routine practice situations.

Journal Club. Journal club meetings were held 1 or 2 Wednesday afternoons each month at one of the placement locations or at the faculty of pharmacy. Each group of 2 students was assigned an advisor to support them in discussing the topic, answering questions, and following journal club protocol. The purpose of the journal club was to familiarize students with the latest evidence on cardiovascular disease, HIV, and pharmacy practice. An example of a journal club topic is "High-Dose Atorvastatin after Stroke or Transient Ischemic Attack."[17]

Research Projects. Research projects were assigned to 4 groups of 13 to 14 students each. The research topics were designed to support faculty research on the topic "Outcomes of health promotion in diabetic patients at primary care settings in the Thai Health Insurance System." The research projects were conducted in 4 settings: the diabetic clinic in the hospital, a university pharmacy, and 2 primary care units. Students were given 3 weeks of intensive lectures prior to starting rotations to provide them with the basic knowledge needed to undertake the research projects, and continued to receive lectures in the afternoons for the rest of the semester. Students learned techniques to help them with interviewing, collecting data, analyzing data using SPSS software (SPSS, Inc, Chicago, IL), and discussing interventions with the course director to improve the research.

EVALUATION AND ASSESSMENT

The students' ability was evaluated in 5 activities by 2 methods which were (1) examinations measuring knowledge and practice skills in relation to the objectives of the modules and (2) students' attitudes for the teaching module as shown in Table 3. The examinations to evaluate active-learning assignments, case reports, bedside case discussions, case presentations, health promotion activities, journal clubs, debates and a research project, were of the same standard covering the knowledge of each module, attitudes, and practice skills. The possible score for each module was 100%, with the grade on each module contributing to the overall course grade as shown in Table 1.

A group evaluation of 53 students, 5 pharmacists, 9 nurses, and the faculty members was conducted to obtain feedback on the active-learning activities. Open questions were used to solicit participants' views on the pros and cons of the activities and suggestions to improve each. In-depth interviews consisting of 5 open questions of pros and cons, impact to him/her or the organization, impressions and suggestions were taken by 9 faculty members and 2 community pharmacists and 2 new staff members. The after action review (AAR) was used to analyze all information and to learn lessons in order to make improvements.

Practice Experiences. Five components were used to evaluate students' performance on the rotations: (1) the daily log that each student maintained; (2) a rotation evaluation form, which covered 3 dimensions of the student's personality, knowledge to approach and provide care to patients, and an overview of the student's performance. Open questions for the faculty member or practitioner to provide feedback were also included. Scoring for the first 2 dimensions was based on a 5-point scale. The faculty members, pharmacists, physicians, and/or nurses who worked with the student while on the rotations evaluated the students' performance and sent the form back to the faculty coordinator. (3) A patient evaluation case report, was sent to the faculty members every 2 weeks to evaluate and mark 210 scores on 18 topics.[18] Six reports were received for each student (2 for each of 3 rotations). (4) a case presentation evaluation form was constructed by the faculty member and used for 3 years; it assessed the students' ability to provide a care plan, search for data, make a presentation, and show comprehension. (5) A bedside evaluation form, which was rated on a scale of fair, good, and best covering students' performance in the patient care wards and their general knowledge. An open question on self-evaluation in their involvement in each ward was included. The students' attitude evaluation, which was not in the grading, involved writing a page of impressions gained during the time in rotations. Six faculty members selected the 4 best stories to share with the other students and a prize was awarded for the best story.

Journal Clubs. The journal clubs were evaluated by 2 faculty members and/or 1 hospital pharmacist, as students presented both in the classroom and in the hospital. The journal club evaluation form was constructed to evaluate students'

ability; 80% of the grade was based on searching, summarizing, presenting, and appraising a current paper related to their rotation practice, and 20% was based on students' discussions with their faculty advisor (Table 3).

Academic Debates. Academic debates were assessed by 5 faculty members in the classroom. The evaluation form had 8 items, 6 of which assessed students' performance in searching and explaining the evidence, and the other 2 items, which assessed the performance in the debate. Scoring was based on their performance in the debate (70% of the grade), and their meeting with the staff supervisors (30%) as shown in Table 3.

Research Projects. Projects were graded in groups from 3 presentations and a final report. Two presentations were made while the project was in progress and the final presentation concerned the intervention they recommended based on their finding. The proportions for scoring are shown in Table 3.

Student Performance

Students achieved good scores on their 5 activities, such as in module 1, “Introduction to Clinical Pharmacy,” where students achieved 82.3% on average (minimum-maximum scores: 80.2%-85.9%) as shown in Table 1.

The Practice Experience. Students were assigned to keep their daily log and have it signed by the faculty member on their rotations, or by the hospital pharmacists or nurses who supervised them. Students received an average score of 88.8% (range: 74.8%-99.0%) for their clinical rotation. The average score on the case report and presentation was 84.6% (range: 74.9%-90.2%). Each student provided pharmaceutical care to 5 patients and made verbal case presentations to hospital pharmacists or faculty members at the rotation site. The 53 students provided care to 318 patients (6 case reports/student) during their 12-week rotation. There were 457 high-risk patients who were screened for diabetes and hypertension. The full results have been reported elsewhere.[19]

Health Promotion Activities. The student activities were divided into 2 types, 1 promoting rational use of drugs and 1 promoting health. The first type was about individual care to help patients to get the best and reasonable use of medications by identifying, resolving, and preventing drug-related problems. The following are examples: (1) a PharmD student helped a pharmacist practitioner to correct D5W to a normal saline infusion in a diabetic cancer patient; and (2) a PharmD student made a complete medication history which helped a doctor with psychiatric medications during the patient admission. In both cases the doctors agreed to change as recommended. The second type of activity was to promote health to the patients and people. The PharmD students helped the parents of a child patient to understand that transmission of dengue hemorrhagic fever was from the mosquito bites and not from taking a bath with water containing mosquito larvae. The practice experience in the community pharmacies for screening and counseling high-risk people for hypertension and diabetes was used in another module in the second semester to do the same screening in a rural community. Students had confidence in friends who were already trained from the practice experience.

Journal Clubs and Debates. Students received an average score of 82.6% (range: 61.2%-96.8%) for their journal club presentation and 84.5% (range: 77.2%-94.4%) for their academic debate. The faculty members thought that the debates in the fifth year showed that the students had made big improvements in searching for information, discussing methodology, and explaining and discussing the results compared with their performance in the fourth year. Although most students felt the 5 debates were lively and entertaining, some groups were disappointed with faculty members' feedback. Students suggested they would like to gain more experience by discussing topics with students from other faculties such as the medical faculty.

Academic Projects. The average score on the academic projects was 80.2% (range: 68.8%-86.1%). The projects were to access diabetic care in 4 settings in the city of Maha Sarakham including a community pharmacy, a hospital, and 2 primary care units. The students achieved the objectives of the project, but they thought that collecting data in the rural community was too difficult. The students felt they gained more confidence in their knowledge of pharmacy through giving presentations, working in the community, and learning specific research techniques.

All active-learning activities from students' group evaluations showed the benefits they gained from the integrated module activities. For example, they were able to see the logic of the integration between modules and that meant the workload was reduced. The activities in the rotations encouraged them to be alert and learn from each rotation. As there were both faculty members and hospital pharmacists evaluating their capability in the practice site, they complained that there were different standards of evaluation. Overall, they had difficulties with time management and that often left them feeling tired.

Evaluation meetings with 5 hospital pharmacists and another group of 9 nurses were undertaken in the hospital. A pharmacist in the outpatient pharmacy unit shared their opinion that the student rotation added more work for them. Two hospital pharmacists in the wards appreciated the student rotation as their involvement made the pharmacists more alert and helped update their knowledge. Friendliness in the wards was encouraging to students. Nurses in the primary care units PCU really appreciated the students and the faculty member who came to practice and help to dispense medication prescriptions. Individual interviews of the community pharmacists showed that students helped the pharmacists in screening high-risk patients.

In-depth interviews of 9 faculty members showed that, in general, the active-learning activities were effective in teaching students. Although the workload was a concern, modifications were proposed for future rotations. The respect the students received from patients at the experience sites gave the students confidence in collaborating with physicians; reviewing patient medication; cooperating with nurses in performing routine tasks such as educating patients on how to use inhalers; measuring blood pressure with a sphygmomanometer; performing finger blood tests to screen for diabetes; and counseling patients. The structured case reports were scored by 12 faculty members who worked in clinical setting and returned to the students. The open scoring caused students' to question the varied pattern of scoring, although we used the same patient evaluation form which provided a protocol of scoring. Further description of the feedback obtained from students, hospital pharmacists, nurses, and faculty members is given in a faculty health promotion report.[10]

DISCUSSION

The integrated teaching modules were carried out from July 2007 to December 2007. Although the coordination between practitioners at the experience sites and the university staff was not strong, we received appreciation from some practitioners. At the clinics and PCUs the students were appreciated for their help in counseling and their dispensing services to patients. Students in this program were not paid as in one published report[14] , but the university paid for the practitioners providing rotation sites for their contribution to our students. In 2007, there was improved coordination. The university provided a bus for traveling to the experience sites. In order to encourage student leadership, debating was introduced and the journal club was organized both in the placement locations and at the university. Although they were satisfied with good experiences in all activities, the students complained that they often felt too tired to use their free time to complete the assignments. That is a challenge for the organization of the modules in 2008. The course syllabus time has been revised to add free time for students to work at home. The 15 weeks includes 10 weeks of lecturing, 2 weeks for midterm and final examinations, and 3 weeks to spend all day on rotations. The rotations in the morning and the lectures in the afternoon may have affected the students' learning process, so this revised schedule may prove to be more conducive to active learning. As a result of the concern over differences in faculty scoring of the debates, the plan for 2008 is to assign the same faculty members to grade all 3 debates, and a faculty meeting will be scheduled for faculty members to learn to use the scoring protocol more consistently.

Greater coordination among the university and practitioners at the experience sites is the most important issue requiring attention.[13] Hospital pharmacists used their routine work in dispensing and in some clinics and wards to emphasize the safe use of medications. The rotations enhanced the pharmacist service, as some pharmacist services were not offered to patients on a regular basis, such as in ICU, psychiatric clinic, renal screening clinic, and PCUs. It is planned that the university will hire some teacher practitioners in 2008 to reduce the university faculty workload and encourage placement pharmacists to teach students. Faculty members who work full time at the experience site as teacher practitioners are the first considered for faculty positions in 2008. As the integrated teaching modules support the practice experience, university staff have more opportunity to work with hospital pharmacists and other practitioners. To date, documentation has not been sufficiently well organized to evaluate students' interventions. Researching our students' abilities during placements to promote patients' health needs to be further evaluated as other studies have shown that the impact of PharmD students giving recommendations had high acceptance. [11-12, 20]

As a result of the feedback of students, placement practitioners, and university staff, the module directors decided to keep just 4 activities for the next year in order to reduce the student workload. Although the journal club was discontinued, the debates were kept as most module directors agreed that the debates helped the students stay up to date on new knowledge and the students seemed to enjoy the lively atmosphere of the debates more than the journal clubs. Research projects, case reports and presentations, and practice experiences will be continued as they strengthen the pharmacy services through the integrated teaching modules. The pharmacy services were expanded into more settings and covered both health promotion and rational drug use, and they also created free of charge services, eg, screening at the pharmacies. Further research is needed to quantify the actual impact of these integrated teaching modules on the patients.

As a goal of the teaching modules was to encourage a positive attitude towards the pharmacy profession, additional teaching themes of providing love with care and giving more help to others will be given greater emphasis.

CONCLUSION

Integrating health promotion in the teaching program was started through collaboration between 2 organizations, the university and the Provincial Hospital. The integration of the teaching between modules in the same semester is possible and greatly benefits student learning. Student feedback expressed a clear picture of how the integration of teaching helps them to learn by performing activities both in placements and in class. Nevertheless, coordinators and teacher practitioners need to be well organized in order to strengthen the activities and reduce confusion.

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REFERENCES

1. Doctor of Pharmacy Curriculum 2005, Faculty of Pharmacy, Mahasarakham University. http://www.pharmacy.msu.ac.th/new/course1.php. Accessed July 18, 2009. (Thai)
2. Doctor of Pharmacy Program in Pharmaceutical Care Curriculum 2004, Faculty of Pharmaceutical Sciences, Naresuan University. http://www.pha.nu.ac.th/education/ungrade.html. Accessed July 17, 2009.
3. Doctor of Pharmacy Program 2000, Faculty of Pharmaceutical Sciences, Chulalongkorn University. http://www.pharmacy.msu.ac.th/PharmD.pdf
4. Doctor of Pharmacy Program in Pharmaceutical Care, Faculty of Pharmacy, Chiang Mai University. Available at: http://www.pharmacy.cmu.ac.th/filessum/course/course6_47.pdf Accessed July 17, 2009. (Thai)
5. Doctor of Pharmacy Program, Faculty of Pharmaceutical Sciences, Prince of Songklanakarin University. http://www.pharmacy.psu.ac.th/images/stories/files/curriculum/thi/pharm/Pharm_major2.pdf. Accessed March 4, 2009.
6. Doctor of Pharmacy Program 2004, Faculty of Pharmaceutical Sciences, Srinakharinwirot University. http://pharm.swu.ac.th/academic_program/pharmD.htm. Accessed March 4, 2009.
7. The Standard Criteria of the Bachelor Degree Programs, Ministry of Education, Thailand. 2005. http://www.moe.go.th/webld/pdf/c_6.pdf. Accessed March 4, 2009. (Thai)
8. Visions of the program 2007-2010. The Pharmacy Network for Health Promotion (PNHP).http://www.pharmhp.org/index2.php. Accessed March 4, 2009.
9. Ottawa Charter for Health Promotion, World Health Organization. http://www.euro.who.int/AboutWHO/Policy/20010827_2. Accessed March 4, 2009.
10. The Faculty of Pharmacy. The faculty health promotion program year report. Faculty of Pharmacy Mahasarakham University, Thailand. 2007.
11. Pham DQ. Evaluating the impact of clinical interventions by PharmD students on internal medicine clerkships: the results of a 3 year study. *Ann Pharmacother.* 2006;40((9)):1541–1545.
12. Pound MW, Miller SM. Written versus oral recommendations made by pharmacy students during internal medicine rotations. *Ann Pharmacother.* 2007;41((5)):722–726.
13. Reutzel TJ. Development of a patient-based practice model in community pharmacy practice: academic-practice interface. *Am J Pharm Educ.* 1999;63(2):119–126.
14. Clark JS. Developing the future of pharmacy through health-system pharmacy internship programs. *Am J*

Health-Syst Pharm. 2007;64((9)):952–954.

15. Nichols-English GJ, White CA, Brooks PJ. Bridging community based pharmacy outreach with service learning principles. *Am J Pharm Educ.* 2002;66((2)):124–131.

16. Globe DR, Johnson K, Conant L, Frausto Sona. Implementing a community-based health promotion program into the pharmacy curriculum: The USC FUENTE initiative. *Am J Pharm Educ.* 2004;((2)):68.Article 32.

17. The Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) Investigators. High-Dose Atorvastatin after Stroke or Transient Ischemic Attack. *New Engl J Med.* 2006;355((6)):549–559.

18. Faculty of Pharmacy, Mahasarakham University. Patient evaluation form. Mahasarakham University. http://cyberclass.msu.ac.th/cyberclass/library/library.php?courseid=NW47N2Bj&pid=46054&lang=th. Accessed July 19, 2009

19. Sookaneknun P, Saramunee K, Rattarom R, Kongsri S, Senanok R, Sawangsri W, and Pinitkit P. A final report of a model of the collaboration between community pharmacies and national health insurance in the city of Mahasarakham Province. Faculty of Pharmacy. 2007.

20. MacKinnon GE. Documentation: a value proposition for pharmacy education and the pharmacy profession. *Am J Pharm Educ.* 2007;((4)):71.Article 73.

Tables

Table 1

Five Teaching Modules Used in Year Five of the Doctor of Pharmacy Degree Program at a Thai University

	Teaching Modules				
	Introduction to Clinical Pharmacy	Pharmaco-kinetics and Pharmaco-dymanics	Pharmaco-epidemiology and Pharmaco-economics	Introduction to Research Methodology in Pharmaceutical Sciences	Postmarketing Surveillance
Total Credit[tblfn1] (Lecture:Laboratory)	5 (4:3)	5 (4:3)	5 (4:3)	4 (4:0)	2 (2:0)
Total Hours (Lecture: Laboratory)	105 (60:45)	105 (60:45)	105 (60:45)	60 (60:0)	30 (30:0)
Module Evaluation, %	100	100	100	100	100
Examination	20	80	70	45	75
Attention	2	5	5	5	5
Assignments (eg, seminar, home works)	10	10		10	5
Health promotion integrated activities					
A. Research project	10	-	5	20	-
B. Clinical rotation	8	2	-	-	-
C. Case report & presentation	30	-	-	-	-
D. Journal club	10	-	5	8	10
E. Academic debate	10	3	15	12	5
Hours contribution to the Health promotion integrated activities	75	15	45	26.5	6.5
A. Research Project	45	-	10	18.5	-

B. Clinical rotation		15			
C. Case report & presentation	12	-	-		6.5
D. Journal club	6	-	10		
E. Academic Debate	12	-	25		

a

[tblfn1]1 credit of lecture = 1 hour lecture in class per week for 15 weeks; 1 credit of laboratory = 3 hours of practice per week for 15 weeks

Table 2

Schedule for Students During the 4th -15th Week of the Semester

Days	8-12 am	1-3 pm	3-4 pm	4-5 pm
Monday	4 days in rotation 1 and 3 days in rotations 2 and 3[tblfn2] (module 1[tblfn3])	PostMarketing (module 5)[tblfn3]	Epidemiology & Economics (module 3)[tblfn3]	
Tuesday		Research (module 4)	Kinetics (module 2)[tblfn3]	
Wednesday		Journal club/debates/case presentations		
Thursday		Kinetics (module 2)[tblfn3]		
Friday		Research (module 4)		

a

[tblfn2]Rotation 1 was the inpatient wards; Rotation 2 was the outpatient clinics at Mahasarakham Hospital and pharmacies. Rotation 3 was the primary care settings consisting of three primary care units and 4 pharmacies

b

[tblfn3]Module1 = Introduction to Clinical Pharmacy, module 2 = Pharmacokinetics and Pharmacodymanics, module 3 = Pharmacoepidemiology and Pharmacoeconomics, module 4 = Introduction to Research Methodology in Pharmaceutical Sciences, module 5 = Post-Marketing Surveillance

Table 3

Evaluation Matrix of Integrated Health Promotion Activities

Overall Evaluation				
• 3 items VAS[3] on knowledge gained, skill gained, and attitude towards profession • Open-ended questionnaire • Group meetings and in-depth interview in the student group, hospital pharmacists, nurses, faculty members • Writing a page of impression in the clinical rotation in the student group				
Research Project	Clinical Rotation	Case Report & Presentation	Journal Club	Academic Debate
Discussion with group faculty advisor (15%)	Consistency and paying attention in class (5%)	Case reports and presentation were evaluated by faculty members who took	Discussion with group faculty advisor (20%)	Discussion with group faculty advisor (30%)

		care in each setting (100%)			
Oral presentation of the research findings to the faculty members (50%)	Consistency and paying attention in rotations; keeping the daily log (10%)		Presentation evaluation by faculty members at the university and hospital pharmacists at the hospital (80%)	Presentation evaluation by faculty members at the university (70%)	
Oral presentation of the plan for the intervention based on the findings to the faculty members (25%)	Bedside examination by the faculty members at the rotations (70%)				
Peer evaluation (students), (10%)	Evaluation of the performance at the experience site by a pharmacist supervisor in each setting, the forms were sent to the coordinator every 2 weeks (15%)				

a

tblfn4 students response were anonymous and were not used for grading

b

tblfn5 scoring for grading the students' performance

c

tblfn6 VAS = visual analogue scale. The VAS questionnaire covers knowledge, attitudes and practice or skill, the results was published elsewhere[12]

Appendix 1.

Course Characteristics and Sample Activities

	Healh Promotion Integrated Activities				
Objectives	A. Research Project	B. Clinical Practice Experience	C. Case Report & Presentation	D. Journal Club	E. Academic Debate
Knowledge	Measurement of clinical, humanistic, and economic outcome Research methodology Data analysis	Apply the knowledge into practice for the rational use of medication and life style modification Clinical assessment	Clinical assessment	Update recent evidence in specific issue in clinical pharmacy practice	update knowledge in specific issue integration of knowledge from the 5 teaching modules
Skill	Conducting research from routine work (the clinical practice experience) Interviewing with	Creativity skill to set suitable activities for promoting patients' health in the rotation setting Communication skill Systematic approach skill to	Interviewing and communication skill with patients, patients' relatives, physicians, nurses	academic reading skill critical appraisal skill presentation skill structural	literature search skill critical appraisal skill academic

	questionnaire Clinical outcome measurement Analyzing and interpreting data Presentation skill Team work	care patients and deal with problems	assessment and make a care plan for patient including the alternative medicine and lifestyle intervention	comment skill	presentation skill persuasive skill structural comment skill explanation skill by evidence
Attitude	Positive attitude towards pharmacy profession and research in pharmacy practice				
Activities	**Group activity**: Students work in a group of 12-16, totally 4 groups **Collecting data**: Students work as research assistant for the existing Diabetic research project of the Faculty Research conducted in 4 settings. ***Group 1*** at the University Community Pharmacy ***Group 2 and Group 3*** at the Primary care units ***Group 4*** at the Provincial Hospital Analysis and presentation: Reliability test of a questionnaire, data collection (during the clinical rotation), data analysis, and presentation	**Group activity**: Students work in pair, totally 27 pairs Schedule: Students rotate in 3 settings; 0.5 day in the morning x 4 days/wk x 4week each Create suit methods to promoting health: Develop health promotion activity for each setting ***Setting 1***: In-patient ward at the Provincial hospital (Clinical assessment and care plan for each patient before leaving the hospital) ***Setting 2***: Out-patient clinic at the provincial hospital & Primary care unit (PCU) (Clinical assessment, conducting group education (e.g. TB, HIV and DM clinics), and individual counseling) ***Setting 3***: Community pharmacy & PCU (Screening high-risk people, individual counseling and education for life style modification, and home visit) **Supervisor** at each setting were a placement pharmacist and/or clinical pharmacy faculty members	**Pair activity**: Students work in pair Review drug use in selected case study Discuss the case study with a supervisor at each setting = 2 times/wk Presents a case study to friends and faculty members (1 case/student) Submit a complete case report every 2 weeks to the supervisor at the setting and the course director of the module	**Pair activity**: Students work in pair Select article with a topic related to pharmacy practice, AIDS, CVS, or new publication in year 2007 from interested international journal Comment a selected article by following the 11 -item guideline Present to friends and faculty members	**Group activity**: Students work in a group of 10-12, totally 5 groups Five debate topic assigned by the modules' course director Each debate takes 1.5 hours followed by a special lecture in related issue