Integrative Pharmacotherapy Teaching with Objective Structured Pharmacotherapy Examination

Abraham Simatupang, Mulyadi Djojosaputro, Roma Tobing, Hertina Silaban, Lili Indrawati
Department of Pharmacology and Therapy, Faculty of Medicine, Universitas Kristen Indonesia, East Jakarta, Indonesia

Abstract

Writing an appropriate prescription is one of the main competencies of medical doctors. Studies reveal that medication error is still a significant issue in health service, and many efforts have been done to minimise this through trainings. Integrative pharmacotherapy is a module delivered for medical students in clinical clerkship, which is adopted and developed from the World Health Organization Guide to Good Prescribing. The aim of the study was to examine the effect of the module on pre-test and post-test scores which consists of 17 clinical cases. The study was done in the Faculty of Medicine, Universitas Kristen Indonesia, East Jakarta from July to November 2018. Eighty one subjects were randomly selected from the data of 100 students who were screened from 200 students based on the exclusion criteria. There was an increase of post-test score which was statistically significant compared to pre-test score, from 42.07±12.45 to 58.47±8.54 (p=0.000, CI -19.36;-13.45). There were 69 (>85%) students having grade D and E in pre-test, but the number decreased to 18 (22,2%) out of 81 subjects in post-test. Both grade C and B students increased from 13.5% to 70.4% and 1% to 7%, respectively. Most of the students were first entries into clinical clerkship, thus, their pre-test scores were very low since they had not had the clinical experience yet. However, at the end of the clerkship, there was a significant increase on their knowledge on pharmacotherapy and prescription for particular diseases. An outcome study to measure the retention and to examine their success on the final competency examination should be done.

Keywords: Medical education, OSCE, pharmacotherapy, prescribing

Pembelajaran Farmakoterapi Integratif dengan *Objective Structured Pharmacotherapy Examination*

Abstrak

Menulis resep yang benar merupakan salah satu kompetensi dokter. Penelitian menunjukkan kesalahan medikasi masih menjadi masalah besar di pelayanan kesehatan dan banyak upaya sudah dilakukan untuk mengurangi hal tersebut melalui pelatihan. Farmakoterapi integratif adalah sebuah modul yang diberikan kepada mahasiswa kedokteran saat kepaniteraan klinis. Modul ini merupakan hasil adopsi dan dikembangkan dari *World Health Organization Guide to Good Prescribing*. Tujuan studi ini adalah untuk melihat efek nilai pra-uji dan pasca-uji dengan 17 kasus klinis. Studi dilaksanakan di Fakultas Kedokteran Universitas Kristen Indonesia, Jakarta Timur pada Juli-November 2018. Delapan puluh satu subjek secara acak dipilih dari data 200 mahasiswa berdasarkan kriteria eksklusi. Terdapat peningkatan nilai pasca-uji yang signifikan dibandingkan nilai pra-uji dari 42,07±12,45 ke 58,47±8,54 (p=0,000; CI -19,36; -13,45). Terdapat 69 (>85%) mahasiswa yang memiliki nilai D dan E pada pra-uji, namun angka tersebut turun pada pasca-uji menjadi 18 orang (22,2%) dari jumlah total 81 mahasiswa. Mahasiswa dengan nilai C meningkat dari 13,5% menjadi 70,4%, dan mahasiswa dengan nilai B dari 1% menjadi 7%. Mayoritas mahasiswa pada penelitian ini baru pertama kali mengikuti kepaniteraan klinik sehingga nilai pra-uji yang diperoleh sangat rendah karena belum memiliki pengalaman klinis. Namun, di akhir kepaniteraan, terdapat peningkatan pengetahuan dan penulisan resep terhadap beberapa jenis penyakit yang signifikan. Perlu dilakukan studi jangka panjang untuk mengukur retensi dan keberhasilan mereka di ujian akhir kompetensi.

Kata kunci: Farmakoterapi, OSCE, pendidikan kedokteran, penulisan resep

Correspondence: Dr.med., dr. Abraham Simatupang, M.Kes., Department of Pharmacology and Therapy, Faculty of Medicine, Universitas Kristen Indonesia. East Jakarta, Special Capital Region of Jakarta 13630, Indonesia, email: *abraham.simatupang@uki.ac.id*

Introduction

Pharmacotherapy is one of the many subjects which medical students should learn during their clinical clerkship. Pharmacotherapy is a subject that is close to clinical pharmacology where students start to integrate and "digest" the basic pharmacology (pharmacokinetics and pharmacodynamics) which they learnt in the pre-clinical semesters into a clinical setting. The usual measurement of output on learning of pharmacotherapy is writing a prescription, but a prescription is not merely a list of medicine with some regulations and precautions of how medicine should be taken by the patients but also how and why the prescribers choose those particular medicines towards the benefit of their patients. Thus, writing a prescription is actually a decision making process in which every prescriber should consider many aspects apart from the diagnosis. Therefore, it is revealed in many studies that inappropriate prescribing still becomes one of the problems existing in many health services.[1–3] There are also a lot of trainings given to medical doctors or nurses for reducing this problem.[4] Faced with this problem, many trainings of writing prescription, through many approaches, are done for medical students, especially during their clinical clerkship, but the results are various.[2,4,5]

Recently, Department of Pharmacology and Therapy, Faculty of Medicine, Universitas Kristen Indonesia (FM UKI) has developed a module of integrative pharmacotherapy. The students learn pharmacotherapy through simulated-cases and real cases taken from the hospital, and they learn how to choose the medicine and prescription properly in accordance to the cases. The students also have to appraise critically prescriptions that are given from the hospital. The core concept of the module is adopted and developed from the World Health Organization (WHO)

Guide to Good Prescribing. Vollebregt,[6] Sandilands et al.,[4] de Vries and Reade, et al.[7] have reviewed and constructed, at least in the Netherlands, the curriculum and method of teaching and learning of pharmacotherapy. Therefore, a rubric was developed which was adopted from Objective Structured Clinical Examination (OSCE) called Objective Structure Pharmacotherapy Examination (OSPE). The aim of the study is to compare the grade of the students who have taken pre- and post-test during their integrative pharmacotherapy clerkship.

Methods

Subjects of the study were medical students of FM UKI, East Jakarta, who took their clinical clerkship of Integrative Clinical Pharmacotherapy at 5th-6th year. This was a pre- and post examination study. At the beginning of clerkship, the students took a pre-test, and they continued the clerkship which lasted for 6 weeks afterwards. During the first and second week, they learnt the concept of prescription writing, at the third to sixth week students were rotated to the Department of Internal Medicine, Department. of Pediatrics, Department of Skin and Venereaology Diseases, Department of Opthalmology and Department of Ear, Nose and Throat (ENT). In these departments, students directly learn and critically appraise the prescribed medicines for in-patient and out-patient. During the clerkship students also wrote short-articles on certain drugs that are important and will be prescribed frequently in the practice, such as anti hypertensive drugs, drugs for tuberculosis, etc. At the end of the rotation, they have to take OSPE. Students took pre-test and post-test scores at the first and sixth week respectively. From first week to fifth week, students learn many aspects as written in the syllabus shown in Table 1.

Subjects who were included in this study

Table 1 Timetable and Contents of the Integrative Pharmacotherapy Module

1st Week	2nd Week	3rd Week	4th Week	5th Week	6th Week
1. Pre-test 2. Introduction to the module 3. Learning on prescription writing	1. Learning on prescription writing	1. Cases from clinics 2. Students appraise therapies of clinical cases	1. Cases from clinics 2. Students appraise therapies of clinical cases	1. Cases from clinics 2. Students appraise therapies of clinical cases	1. Post-test 2. OSPE

were randomly taken from the whole students data-set. They had taken both pre-test and post-test. Two hundred students who had had taken the module were registered in student's data-set, and they were primarily selected by excluding students who were repeater. From this procedure, 100 students were found to be eligible. Number of students taken as sample were calculated using Slovin formula, which came to 80.[8] Hence, a total of 81 students were randomly selected from 100 students as subjects in this study (Figure 1). The pre-test and post-test consisted of 17 clinical cases; the cases were presented in Google Forms. The students clicked on the answers provided or wrote a prescription as instructed.

Seventeen clinical cases studied by the students on tests were clinical cases that should be mastered by every Indonesian general practitioner according to Standar Kompetensi Dokter Indonesia (SKDI) 2012 (Indonesian Medical Doctor's Standard of Competence 2012),[9] such as uncomplicated hypertension, type-2 diabetes mellitus, certain infectious diseases, anaemia, etc. These materials are also tested on Uji Kompetensi Mahasiswa Program Profesi Dokter (UKMPPD) (Competency Test of Doctor Profession Program) in the form of Computer Based Testing and OSCE.

Student t-test for paired data was used to calculate whether there was a difference between pre-test and post-test values between female and male students and the whole students. Statistical analysis was performed using the SPSS Version 22 and results were considered significantly different at 5% ($p < 0.05$). This study was conducted from July to November 2018 and had been approved by
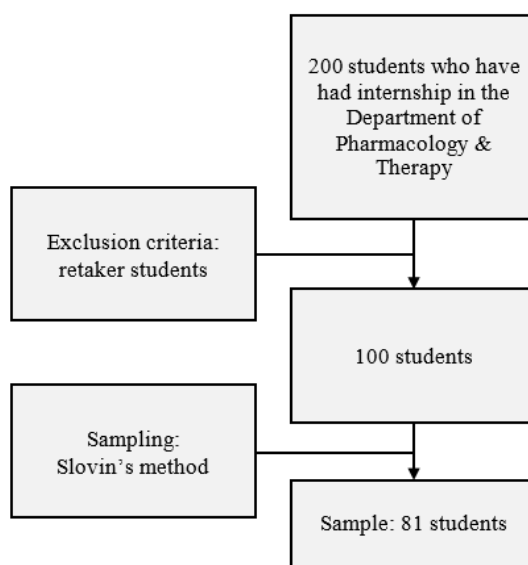

Figure 1 Subjects Recruitment

Table 2 Rubric of Objective Structured Pharmacotherapy Examination (OSPE)

Examination / Item(s)	Score				Weight	Total Score
	0	**1**	**2**	**3**		
Aim/goal of therapy	Does not set therapeutic goals	Provides an incomplete explanation of the goals of therapy	Provides a quite complete explanation of the therapeutic goals	Provides a comprehensive explanation of therapeutic goals	2	6
Prescription	Does not submit a prescription	Submit a prescription. However, there is no information other than just mentioning the name of the drug, the amount and how to use it	Submit a prescription. But list only 3 of the following information: 1. Name and address of doctor's practice 2. Name and address of the patient 3. Drug name, amount and dosage 4. How to use	Submit a prescription and list all four elements below: 1. Name and address of doctor's practice 2. Name and address of the patient 3. Drug name, amount and dosage 4. How to use	3	9
Indication(s) and contraindication(s)	Does not know at all the indications and contraindications of the given drug	Knows only 1 indication and contraindication of the given drug(s)	Knows only 2 the indication(s) and contraindication(s) of the given drug(s)	Knows all indications and contraindications of the given drugs	2	6
Adverse drug reaction(s)	Does not know any of adverse effects of the given drug(s)	Knows only one adverse effect of the given drug(s)	Knows two adverse effect(s) of the given drug(s)	Knows more than two adverse effects of the given drug(s)	2	6
Drug interaction(s)	Does not know the possibility of drug interaction of the given drugs	Knows only one drug interaction of the given drugs	Knows two drug interactions of the given drugs	Knows more than two drug interactions of the given drugs	2	6

the Ethics Review Committee of FM UKI no. 11/Etik Penelitian/FKUKI/2018.

Results

Table 3 shows the mean of the students as divided by gender as well as the total students. The scores between pre- and post-test are significant, whereas scores between gender is not significant. Figure 2 and 3 shows the box-plot of both pre- and post test between women and men. Number of students was calculated based on their grade classification as depicted in Table 4. It appears that there is increasing number of students who originally got grade D and E which turned into C and B.

Discussion

As mentioned in many studies, inappropriate

Table 3 Students' Pre- and Post-test Scores

Gender (N)	Pre-test Score (Mean±SD)	Post-test Score (Mean±SD)	p
Female (60)	42.06±11.84	58.18±7.91	Not significant
Male (21)	42.1±14.36	59.31±10.31	
Total (81)	42.07±12.45	58.47±8.54	0.000 (CI -19.36;-13.45)

prescription is still one of the main issues found in health services either in developing countries or developed countries.[8,10] Most of the findings from these studies show an overuse of antibiotics and polypharmacy.[8,9] Unnecessary prescription includes giving medicaments that are actually not needed, such as lipid-lowering agents or acetylcholine esterase inhibitor for advanced dementia patients, is also profound.[1] In overcoming this problem, numerous trainings for prescribers and medical students have been done.[11,12] Many studies on prescription writing training for medical students, for instance studies by de Vries et al., are also available.[5,13–15] Their core concept of method is WHO Guide to Good Prescribing, which is used and developed in medical faculty in both developing countries and developed countries.[16–19]

In this study, it is shown that a significant increase of knowledge in pharmacotherapy was found as depicted through their grade scores. Before the intervention, more than 85%

subjects got D or E (less satisfactory and fail). Despite the fact that as many as 22.2% subjects still got D or E after intervention, there are is an increasing number of students who get C (satisfactory) and B (good) from 13.5% to 70.4% and 1% to 7%, respectively. However, no students with grade A (excellent) found after the intervention.

One possible reason about high percentage (more than 85%) of incoming students' poor results of pre-test grade is that the students are generally the very first students to enter clinical clerkship, and hence they have not yet entered the clinical department such as internal medicine, pediatrics, ophthalmology, etc. Other influencing factors are, only 4-week period is scheduled for basic pharmacology lecture (e.g. introduction to pharmacology, pharmacokinetics, pharmacodynamic, etc.), and specific subjects of pharmacology are given separately in the blocks or modules. However, it is shown that some knowledge on pharmacotherapy for particular diseases
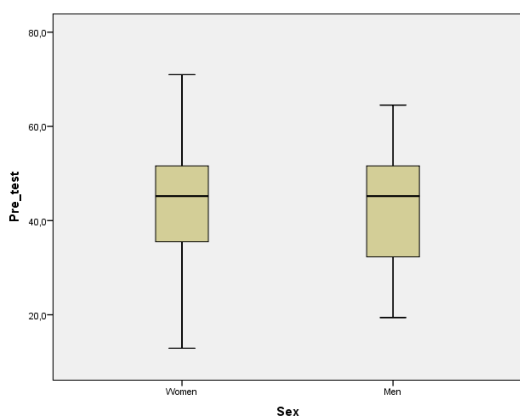

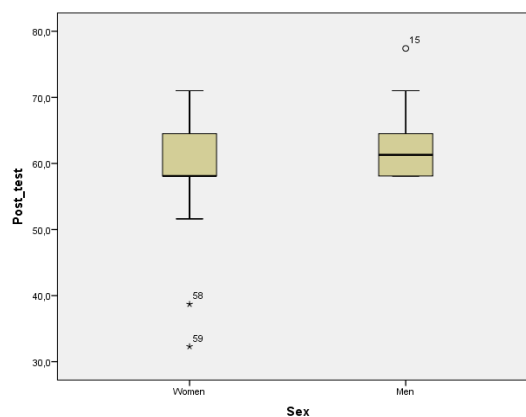**Figure 2 Box-plot of Mean Scores of Pre-test by Gender**

Figure 3 Box-plot of Mean Scores of Post-test by Gender

Table 4 Number and Percentage of Students Based on Grades

Letter Grade	Predicate	Range of Numerical Grade	Number of Subjects (%)		Percentage of Increase or Decrease of Students' Achievement
			Pre-test	Post-test	
A	Excellent	80.00–100.00	0 (0)	0 (0)	0%
B	Good	68.00–79.99	1 (1)	6 (7)	500%
C	Satisfactory	56.00–67.99	11 (13.5)	57 (70.4)	418%
D	Less satisfactory	45.00–55.99	27 (33.3)	14 (17.2)	↓48%
E	Fail	0.00–44.99	42 (51.8)	4 (5)	↓950%
	Total		**81 (100)**	**81 (100)**	

significantly increased during their clerkship in our department. As stated also in the goal of the module, students were firstly introduced to the decision making process according to the WHO Guide to Good Prescribing, namely 6-steps of rational therapy: step 1: define the patient's problem; step 2: specify the therapeutic objective; step 3: verify whether your p-treatment is suitable for this patient; step 4: start the treatment; step 5: give information, instructions and warnings; and last, step 6: monitor (stop) the treatment. This module emphasizes students to have better understanding in the process of selecting medicines according to the context of patients they are facing.

Limitation of this study is that it does not employ a control group. Nevertheless, we had tried setting students set as control, i.e. students who had not taken this module yet. However, it is difficult to get their post-test accurately since they were already in another department's clerkship.

Conclusion

This integrative pharmacotherapy approach, far as we know, is one of its kind, to put the pharmacology in clinical context in clerkship, especially focusing on the decision making process in pharmacotherapy of which medical students should learn as earlier as possible. With regards to the outcome, we have not

conducted a correlation study between the pharmacotherapy learning of this model and student's Objective Structure Pharmacotherapy Examination (OSPE) graduation rate. It is also necessary to examine the success of students in joining Uji Kompetensi Mahasiswa Program Profesi Dokter (UKMPPD)/Competency Test of Medical Doctor Profession Program with Objective Structured Clinical Examination (OSCE) model, particularly by looking at examination's result of prescription writing.

Funding

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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