Medical Students' Feedback about Teaching Fundamental Pharmacology in an Integrated Curriculum

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

Original Research Article

ABSTRACT

Objective: International Medical School at Management and Science University (MSU) adopted an integrated systemic curriculum in 2011. The current study aimed to evaluate 2nd-year medical students' feedback on teaching fundamental pharmacology in an integrated course.
Study Design: A cross-sectional survey was conducted between January and June 2013.
Methodology: Data were collected from 2nd–year medical students (n=164) studying at MSU in Malaysia using modified course evaluation questionnaire and descriptive and inferential analysis was conducted using Chi-squared and the post-hoc Tukey's Honestly Significant Difference (HSD) tests.
Results: The response rate was 76.2% (164/210); 39 male and 125 female participated in this study. The average percentage of respondents with agreed feedback was highly significant ($P<0.0001$) compared with the average percentage of respondents that disagreed. Analysis of each

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item of the course evaluation questionnaire showed that the percentage frequency of respondents with agreed response was significantly ($P<0.001$) greater than the percentage frequency of respondents with disagreed response.

Conclusion: The study showed that 2nd-year medical students have positive feedback on teaching fundamental pharmacology within an integrated curriculum. The integrated curriculum improved motivation of medical student for learning fundamental pharmacology. Therefore, integrated curriculum can be considered as one of the means for improvement of teaching and learning pharmacology.

Keywords: Teaching pharmacology; integrated systemic curriculum; para-medical student; International Medical School (IMS).

1. INTRODUCTION

Pharmacology is a crucial component for medical students who are going to be future medical practitioners. It is important that medical students appreciate pharmacological principles and are able to apply them in the practice of medicine [1]. Traditionally, pharmacology teaching in medical schools is a discipline based on lecture-based centred with a heavy emphasis on acquiring factual knowledge about drugs [2] and does not train the medical student adequately for therapeutics [3]. Despite this motivation, fundamental pharmacology knowledge has remained poor among medical practitioners [1]. Although the need for improved education in clinical pharmacology is clear, the fact that assessments of pharmacology knowledge of medical practitioners have shown little change during the past several decades suggests little is known about how to accomplish such improvement [1,2].

Recently, creating a systemic based curriculum has appropriately focused attention on critical appraisal of teaching pharmacology. The system based curriculum is more content-integrated, learner-centred, clinical performance-oriented, and community-oriented. Each course/module of integrated curriculum consists of pharmacology as one of several disciplines taught using a mixed approach to the content [4]. A result of this movement is that medical practitioners may show improvement in their grasp of epidemiological and drug action principles, which in turn, leads to better academic outcomes. Recent studies have demonstrated that teaching, practicing, and assessing knowledge and skills in the context in which they will be used leads to better recall and application [5,6]. Moreover, the learning of pharmacology in clinical context or framework leads to energized students and improved retention of knowledge, skills, and attitudes. An integrated curriculum creates learner-centred curriculum that develops the competencies required of a contemporary physician. Medical school applicants have expectations that an integrated, outcome-based medical education curricula comprised of well-defined learning objectives and active learning activities and appropriate assessments of students' clinical competencies.

The shift to an integrated, systems-based medical curriculum represents a national trend and is certainly not unique to the International Medical School at Management Science University. Scores of medical schools, Johns Hopkins University, Stanford University, University of Pittsburgh, UNC-Chapel Hill, University of Pennsylvania, Vanderbilt University, University of Vermont, and Yale University, have already or are currently creating system-based system curricula and/or incorporating active learning into each phase of medical education [7].

There are several core integrated courses included as a course content of pharmacology, pathology, microbiology and forensic medicine in third and fourth semesters [8]. One of the essential core courses is fundamental of pharmacology**.** This course is designed to advance the knowledge of the fundamental principles of pharmacology, such as the drug-receptor association theory, cellular mechanisms of drug action and molecular aspects of drug interactions. It also includes applied aspects of pharmacology, such as the basis of methods and measurements in pharmacology, absorption and distribution of drugs, drug elimination and pharmacokinetics [3].

Students' feedback about teaching integrated fundamental pharmacology may be helpful for improving curricula implementation and introducing appropriate changes into the curricula where and when necessary. This study

was conducted as a cross-sectional survey to evaluate medical students' feedback toward teaching fundamental pharmacology in integrated course.

2. MATERIALS AND METHODS

2.1 Setting and Participants

A descriptive cross-sectional study was conducted between the 25th January and 13th June 2013. Of the 210 2nd-year medical students at International Medical School (IMS), Management and Science University (MSU), Malaysia, 164 volunteers (39 male and 125 female) participated in this study.

2.2 Instrument

Course evaluation questionnaire was designed based on the literature review in this field [9,10]. The modified course evaluation questionnaire which included 16 questions divided into 4 parts. The first part consisted of 3 demographic questions, about age, gender, and race. The second part contained 4 questions about pharmacology lecture of integrated fundamental module which consists of pharmacology, pathology, microbiology and forensic medicine in third semesters. The third part of the questionnaire contains 4 questions which evaluate personal investment and development. The fourth part of the questionnaire consists of 5 questions to evaluate perceptions of module learning outcomes. The questions were framed into a 5-point Likert-scale format (5 =strongly agree, 4=agree, 3=neutral, 2= disagree, and 1 = strongly disagree).

2.3 Procedures

The questionnaire was distributed to second–year medical students during a regular session of 2013 and students were requested to complete anonymously the questionnaire and return it to the investigators. Students were duly informed that the questionnaire was designed to measure the satisfaction of students regarding teaching pharmacology as a part of integrated curriculum and the findings of study would be used for research purposes. The study was approved by the Institutional Review Board of the IMS, MSU, Selangor, Malaysia.

2.4 Statistical Analyses

Descriptive statistical analyses such as frequencies and its percentages were used to represent the respondents' demographic information. Inferential statistics were used to assess differences between students' feedback using the Chi-square test. Differences between averages of overall students' feedback were evaluated using Analysis of Variance (ANOVA) and the post-hoc Tukey's Honestly Significant Difference (HSD) test was used to provide further information on which means are significantly different from each other. A statistical significant level of 0.05 was used in all analysis. Statistical Package for Social Sciences (SPSS) version 16 was used.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Socio-demographic of participants

A total of 164 students out of 210 responded in this study giving a response rate of 76.2%. Female students were more than male. The range of the respondents' age was from 19 to 28 years. Majority of the respondents were Malay, followed by Indian, other races and Chinese (Table 1).

3.1.2 Students' feedback

Overall the average of percentage of agreed feedback responses for statements of the three parts of the questionnaire include Pharmacology lecture of integrated fundamental module, personal investment and development, and regarding module learning outcomes as (63.7 ± 9.77; 53.7 ± 2.18; 63.7 ± 8.33 respectively) was highly significant ($P< 0.0001$) when compared to the average of the negative feedback percentage (5.5 ± 3.27; 7.5 ± 0.57; 7.5 ± 2.64 respectively) (Fig. 1).

3.1.2.1 Pharmacology lecture of integrated fundamental module part

The frequencies of agreed students showed higher than the frequencies of disagreed and neutral students for all statements of this part of the questionnaire (Table 2).

3.1.2.2 Personal investment and development part

The frequencies of agreed students showed, similar to the previous part, higher percentage than the frequencies of disagreed and neutral students for all statements of this part of the questionnaire (Table 3).

3.1.2.3 Module learning outcomes part

The frequencies of agreed students showed, similar to the both two previous parts, higher percentage than the frequencies of disagreed and neutral students for all statements of this part of the questionnaire (Table 4).

Table 1. Social demographic of participants (n=164)

Variables	Categories	Frequency (%)
Gender	Male	39 (23.8%)
	Female	125 (76.2%)
Age	19 -21	89 (54.3%)
	22 - 24	64 (39.0%)
	25 - 28	11 (6.7%)
Race	Malay	93 (56.7%)
	Chinese	11 (6.7%)
	Indian	44 (26.8%)
	Others	16 (9.8%)

3.2 Discussion

The aim of the study was to evaluate medical students' feedback toward teaching fundamental pharmacology in integrated course. The majority of participated medical students in this research expressed a positive feedback on teaching fundamental pharmacology in integrated course. The overall feedback of participated medical students was positive. The comparatively high positive response rate observed in the current study indicates interest of medical student on teaching fundamental pharmacology through an integrated curriculum. Our findings are in agreement with the findings of previous studies that showed more positive feedback of medical students on teaching pharmacology in integrated curriculum than negative feedback [11]. Moreover, our finding was supported by previous study on students' perception about learning pharmacology which had mentioned that

Table 2. Students' feedback regarding teaching pharmacology of integrated fundamental module (n=164)

	Statements	Strongly agree/ Agree	Neutral	Strongly disagree/ Disagree
1	Lecturers are good at explaining things	111 (67.7%)*	47 (28.7%)	6 (3.6%)
2	Lecturers make the fundamental module interesting	86 (52.4%)*	63 (38.4%)	14 (8.5%)
3	Lecturers are enthusiastic about what they are teaching	123 (75%)*	37 (22.6%)	3 (1.8%)
4	The fundamental module is intellectually stimulating	98 (59.8%)*	53 (32.3%)	13 (7.9%)

*The values are represented frequencies of responses (percentage). Chi Squired test was used. A p value <0.05 was considered to be statistically significant. *P<0.001*

Table 3. Students' feedback regarding personal investment and development (n=164)

	Statements	Strongly agree/ Agree	Neutral	Strongly disagree/ Disagree
5	Compared with other modules I have taken at this level, the intellectual demand seemed heavy	88 (53.7%)*	65 (39.6%)	11 (6.7%)
6	Compared with other modules I have taken, the workload seemed heavy	83 (50.6%)*	69 (42.1%)	12 (7.3%)
7	My commitment to learning during this fundamental module was high	91 (55.5%)*	60 (36.6%)	13 (7.9%)
8	This fundamental module enabled me to develop my abilities as an independent learner	90 (54.9%)*	61 (37.2%)	13 (7.9%)

*The values are represented frequencies of responses (percentage). Chi Squired test was used. A p value <0.05 was considered to be statistically significant. *P<0.001*

Table 4. Students' feedback regarding fundamental module learning outcomes (n=164)

	Statements	Strongly agree/ Agree	Neutral	Strongly disagree /Disagree
9	This module enabled me to understand pharmacokinetics (absorption, distribution, metabolism and excretion) in details	121 (73.8%)*	37 (22.6%)	6 (3.6%)
10	This module enabled me to understand pharmacodynamics in details	115 (70.1%)*	39 (23.8%)	10 (6.1%)
11	This module enabled me to distinguish the drug effects on Autonomic Nervous System (Sympathetic and Parasympathetic)	103 (62.8%)*	47 (28.7%)	14 (8.5%)
12	This module enabled me to understand autacoids in details	88 (53.7%)*	60 (36.6%)	16 (9.7%)
13	This module enabled me to classify different groups of chemotherapy	95 (57.9%)*	53 (32.3%)	16 (9.7%)

*The values are represented frequencies of responses (percentage). Chi Squired test was used. A p value <0.05 was considered to be statistically significant. *P<0.001*
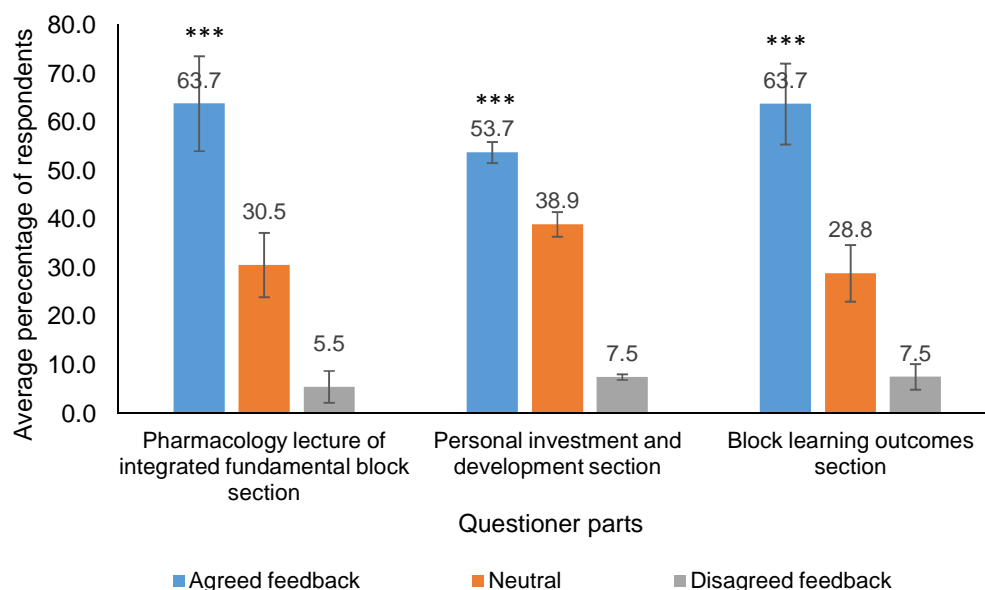

Fig. 1. The average percentages of respondents regarding feedback on different parts of the questioner

*The values are represented (mean ± SD) of percentage of frequencies. Tukey's Honestly Significant Difference (HSD) test was used as the post-hoc test. A p value <0.05 was considered to be statistically significant. ***P<0.0001*

students had higher interest on pharmacology to be integrated [12]. Integrated curriculum showed as a way to reduce pharmacology stigma which attached to teaching and learning process [13] and improve the students' performance in exams [14]. Stigma attached with teaching pharmacology knowledge in non-integrated curriculum has a heavy emphasis on acquiring factual knowledge about drugs more than applied therapies knowledge [2]. Stigma attached with learning pharmacology is that pharmacology knowledge perceived as dry and volatile and its terms are difficult to recollect and recall, similarly the concepts and drug names [14,15]. Recent study indicated that students following an integrated curriculum showed higher

performance in licensing exam than students following a traditional/discipline-curriculum [16].

Limitations of the current study include research was conducted at a single institution and a single measure was performed. Additional research on the same module would be helpful in confirming our findings.

4. CONCLUSION

Teaching fundamental pharmacology in an integrated curriculum showed an improvement in interest of medical student to learn pharmacology as well as a reduction in stigma attached to learning fundamental pharmacology. The outcomes of our study will be important for other medical schools which have recently implemented or have a plan to adopt an integrated curriculum in the near future.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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