



Original Article

The effectiveness of clinical problem-based learning model of medico-jurisprudence education on general law knowledge for Obstetrics/Gynecological interns

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ABSTRACT

Objective: The effective education method of medico-jurisprudence for medical students is unclear. The study was designed to evaluate the effectiveness of problem-based learning (PBL) model teaching medico-jurisprudence in clinical setting on General Law Knowledge (GLK) for medical students.

Materials and methods: Senior medical students attending either campus-based law curriculum or Obstetrics/Gynecology (Ob/Gyn) clinical setting morning meeting from February to July in 2015 were enrolled. A validated questionnaire comprising 45 questions were completed before and after the law education.

Results: The interns attending clinical setting small group improvisation medico-jurisprudence problem-based learning education had significantly better GLK scores than the GLK of students attending campus-based medical law education course after the period studied.

Conclusion: PBL teaching model of medico-jurisprudence is an ideal alternative pedagogy model in medical law education curriculum.

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Objectives

The current state of legal education in medical curricula

Presently all medical universities offer legal and ethics curricula to fulfill medical and dental students' degree requirement. Most medical schools offer formalized coursework dealing with the legal or regulatory issues in medicine [1]. Several schools incorporate

“medical jurisprudence” into another course, typically the medical ethics [1]. Chung Shan Medical University provides “Medicine and Law” for medical and dental students as a core course. The major part of the course focuses on malpractice law and legal issues from which the discussion focusing on malpractice, as opposed to regulatory and enforcement issues, would ensue. The current medico-jurisprudence pedagogy is campus-based large class didactic course. However medical students are clamoring for more exposure to law and clinical medicine [1]. Why is the gap between outcome and supply? First, it is difficult to find qualified clinician to teach law in medical schools. Second, the campus-based courses are traditionally large and not well organized for panel discussion. It is understandable there is a reluctance within medical education to discuss practical legal and business realities of medicine particularly when teaching senior medical students, simply because

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business issue is not regarded the issue of medical professional consideration.

Consequences

Recently, medical litigation became a global issue. In an American medical survey, five percent of the responding physicians had encountered one malpractice claim between 2007 and 2008 [2]. A US nationwide client base review study began from 1991 to 2005 revealed that 7.4% of all physicians had experienced one malpractice dispute annually. However, only 1.6% of these cases led to payment. The same study also indicated that over 38% of these claims were in neurosurgery and thoracic-cardiovascular surgery [3].

Similarly in Taiwan, although the prevalence of malpractice disputes has been decreasing, the gravity of particular case related consequences has been increasing. Physician risk for encountering civil or criminal litigation remains high, as well as the scale of associated settlement [4]. Some researchers have shown civil and criminal medical malpractice litigation cases truly increased significantly in Taiwan [5], particularly in Internal Medicine, Surgery and Obstetrics/Gynecology (Ob/Gyn) [5]. Informal survey showed that most students subjectively fear of medical litigation dispute in their future career and subsequently stave off choosing Internal Medicine, Surgery, and Ob/Gyn as their practice specialty. In fact, the majority of medical centers in Taiwan are in short of residents in above-mentioned departments [6].

Almost all students wished medical school offered a class on “legal pitfalls in practice” and “physician liability” courses in clinical setting [1]. However, it would be impractical while the general law knowledge for medical or dental students is unexpectedly insufficient. How to improve the general medico-jurisprudence knowledge has been proposed at Chung Shan Medical University educational committee and hopefully would reduce medical practice disputes and eradicate the trend of staving off Internal Medicine, Surgery and Ob/Gyn in medical community.

Recent trends in medical education include a shift from the traditional, didactic, lecture-oriented approach to a more student-driven PBL learning [1]. In an era where evidence-based medicine is the basis for the standard of health care, physicians who practice defensive medicine out of a misunderstanding of the law do a disservice to their patients, which leads to the outstanding National Health Insurance (NHI) administration and the financial difficulty of NHI as a result.

The study of jurisprudence-law, legal reasoning, and the legal system-has become progressively more important in medical school curricula. Familiarity with jurisprudence helps physicians practice medicine well and safe, collaborate productively with law specialty, and be more effective in public discourse about health care delivery. Moreover, the study of jurisprudence can help physicians polish the methods and clarify the purposes common to law and medicine. Empirical studies over the last 30 years demonstrate that patterns of change in the frequency and focus of jurisprudence teaching in medical school curricula can guide contemporary efforts to devise or refine curricula in medical jurisprudence. The general goal of such curricula should be to enhance physicians' clinical, institutional, and public effectiveness. These curricula should adhere to principles of sound pedagogy and be based on general basic knowledge about particular doctrines and laws. Curriculum planners should take into account the intellectual styles of the learners; integrate, not just coordinate, the courses with the clinical medicine. The delivery setting should be built on features that medicine and law share and where they collaborate. Even though limitations of time, faculty and differences in educational goals will influence what, when, and how medical jurisprudence is

taught, the effort should be made if physicians are to be better empowered to teach medicine related jurisprudence general knowledge.

PBL was established over 40 years ago in North America as an educational philosophy to encourage life-long and self-directed learning especially in the fields of health science such as medicine, dentistry, nursing, occupational health and physiotherapy. It involves a holistic approach to education using integration, collaboration and self-discipline. PBL was created as a solution to the increase in large classroom format courses resulting from the overloaded curricula with encyclopedic content. PBL has been demonstrated in medical learning to be an effective platform for increasing medical knowledge and application of the knowledge in students [7,8].

The innovative learning probably is an efficient model to promote the medico-jurisprudence education. In PBL model teaching, students use “triggers” from the problem, case or scenario to define their own learning objectives. Subsequently they do independent, self-directed study before returning to the group to discuss and refine their acquired knowledge. Thus, PBL is not about problem solving purpose, but rather it uses appropriate problems to increase knowledge and understanding. The process is clearly defined, and the several variations that exist all follow a similar series of steps. Group learning facilitates not only the acquisition of knowledge but also several other desirable attributes, such as communication skills, teamwork, problem solving, independent responsibility for learning, sharing information, and respect for others. PBL can therefore be thought of as a small group teaching method that combines the acquisition of knowledge with the development of generic skills and attitudes. Presentation of clinical material as the stimulus for learning enables students to understand the relevance of underlying scientific knowledge and principles in clinical practice.

However, when PBL is introduced into a curriculum, several other issues for curriculum design and implementation need to be tackled. PBL is generally introduced in the context of a defined core curriculum and integration of basic and clinical sciences. It has implications for staffing, learning resources and demands a different approach to timetabling, workload, and assessment. PBL is often used to deliver core material in non-clinical parts of the curriculum. Paper-based PBL scenarios form the basis of the core curriculum and ensure that all students are exposed to the same problems. Recently, modified PBL techniques have been introduced into clinical education, with “real” patients being used as the stimulus for learning. Despite the essential ad hoc nature of learning clinical medicine, a “key cases” approach can enable PBL to be used to deliver the core clinical curriculum [9].

Although PBL teaching is a common method of learning in medical schools, it is not generally used for medico-jurisprudence education purposes because all the problems are improvised. In order to improve the general law knowledge, the study propose using problem based learning model of medico-jurisprudent teaching in clinical setting with medical law resources at hand. A possible setting for using PBL model of medico-jurisprudence teaching is hospital everyday department morning meeting, during the morning meeting occasion, when there is an appropriate legal learning point, these cases can be presented using problem based method regarding legal issues.

Since PBL is characterized as small group learning class and case oriented study. Hospital everyday department morning meeting for 8–10 interns is an ideal occasion to practice PBL model of medico-jurisprudence education. Most universities teach law (and most other subjects) in a traditional format whereby there is a transmission of information-facts about the law and how it is applied—from teacher to student. In traditional law teaching

programs, the transmission takes the form of lectures or large group seminars and through the study of prescribed reading which describe general legal principles, largely through statutes and case law. Under this process, students are not presented with problems until they have sufficient knowledge—from these lessons, books and other resources—to solve them. The main role of the problems is to “test” students on how much knowledge they have acquired, and how well you can apply it. Typically, they will start with the general principles you’ve learned and work to apply the principles to prescribed (and often unrealistic) problems, which will be discussed and analyzed in tutorials and small group seminars.

PBL model takes a very different approach. It places the student at the start of the process and reverses the traditional didactic approach to teaching. In PBL, the discussion and analysis of a problem starts the process of learning, rather than acting as the end point. A PBL problem sets out a factual scenario that raises legal issues which students have not yet studied. The key role of the problem is to trigger their awareness of these issues.

There is, however, a critical distinction between problem-solving and problem-based learning. Problem-solving is an important legal skill and one which will be developed further in the skills sessions and later on in the program. PBL, however, is concerned with much more than simply teaching student to be aware of medicine related problem—its principal goal is developing knowledge and understanding. The point of a PBL medico-jurisprudence problem is not simply to teach students how to advise a patient on their chances health. This is not crucial to PBL. Whilst there will be opportunities to develop problem-solving skills, and whilst these skills are important, developing them is not the primary goal of the PBL process.

Material and methods

Study design: prospective cohort study

The study protocol (CSMUH No. CS 15044) including questionnaire (Version 1.0) was reviewed and approved by the Institutional Review Board of Chung Shan Medical University Hospital. Each participant willingly participated in this study and completed an informed-consent form. The participants were informed regarding the purpose and design of this study and are free to withdraw from this study at any time without consequence.

Questionnaire: there are 40 questionnaire items selected from national civil servant qualification examination question sample, picked by hospital law office staffs and the content validity has been tested by 3 physicians who is holding LL.M. (Master of Laws) degree.

The reliability of the questionnaire was previously tested by the database of 30 medical students.

Participants:

1. The sixth year medical students for campus-based classroom education group.
2. Rotated interns of Ob/Gyn department who provided the complete electronic version and text of essential justice code for clinical PBL education group.

Group I (traditional approaches group):

Traditional teaching of medico-jurisprudent education is campus-based classroom law education.

The main campus-based teaching group course contents included introduction to criminal law, introduction to medical law, physician’s law and physician’s legal liability, and medical dispute solution.

Group II and III were clinical PBL model teaching groups.

PBL model teaching examples:

Example 1. For instance, during postpartum rounds on a G1P1 15-year-old female, the student presentation focuses on the dilation and the effacement of the cervix on presentation and the uneventful perinatal course. However, pertinent legal issues can be raised such as the exact birthdate of the mother and the age of the father to determine if a crime of underage sexual activity has been committed as it is illegal to engage in sexual activity with a minor under the age of 14 [10].

Example 2. In a case of dystocia due to a small pelvis requiring vacuum assisted delivery, a code was called on a stillborn baby and the injection of epinephrine and resuscitation increased the Apgar score from 0 to 1 at 1 min, that means the baby was born alive at medical definition. However, the neonate expired after one minute of life. While the ability to increase the Apgar score can be viewed as an objective improvement, it in fact is not a meaningful improvement in terms of prognosis for the baby. Additionally, this improvement in the Apgar score raises multiple legal issues. Because the neonate sustained one minute of the life, human rights are thus granted to the neonate and this could potentially become a multiple case malpractice suit due to the one minute of life [11]. Indeed, within one week, two malpractice suits were raised by the parents, one being the stillbirth and/or in the death of the neonate in a couple of minutes. The other is the failure to recognize that this was a potentially difficult delivery due to the size of the pelvis and early preparation for a possible C-section. These law-related issues were thus discussed during the morning meeting in a PBL model. The Internet served as the medium for essential reference source.

Mann Whitney test and Wilcoxon rank sum test were used to test the differences because of the discrete nature of scores.

Results

There were 80 senior medical students in campus-based traditional teaching group and only 68 (70%) questionnaires were analyzed based on fully consent participants. There were 8 interns in group II (early spring group in Ob/Gyn department), and 6 interns in group III (late spring group in Ob/Gyn department). (Fig. 1).

The test and retest reliability of the General Law Knowledge questionnaire was 0.523 which was statistically significant.

The general baseline of law knowledge for all participants (including the participants in Reliability test) were unexpectedly insufficient. The medium of baseline GLK scores range from 45 to 54 (full mark is 100) (Table 1).

There were 33 students who had improvement in general law knowledge after a 15 weeks’ campus-based law education while 32 students got worse in general law knowledge. There were no before-after score differences ($P = 0.407$) (Table 2).

There were 22 students who had improvement in administrative law of GLK after 15 weeks’ campus-based law education while 37 students got lower scores. There were no significant differences between before-education and after-education scores ($P = 0.068$).

There were 37 students who had improvement in civil law of GLK after 15 weeks’ campus-based law education while 23 students got lower scores. There were no significant before-after score differences ($P = 0.096$).

There were 33 students who had improvement in criminal law of GLK score after 15 weeks’ campus-based law education while 21 students got lower scores. There were no before-after score differences ($P = 0.394$).

The clinical setting PBL model law teaching group II had a good improvement in general law knowledge. The mean rank difference of post-education and pre-education was 4.50 ($P = 0.012$).

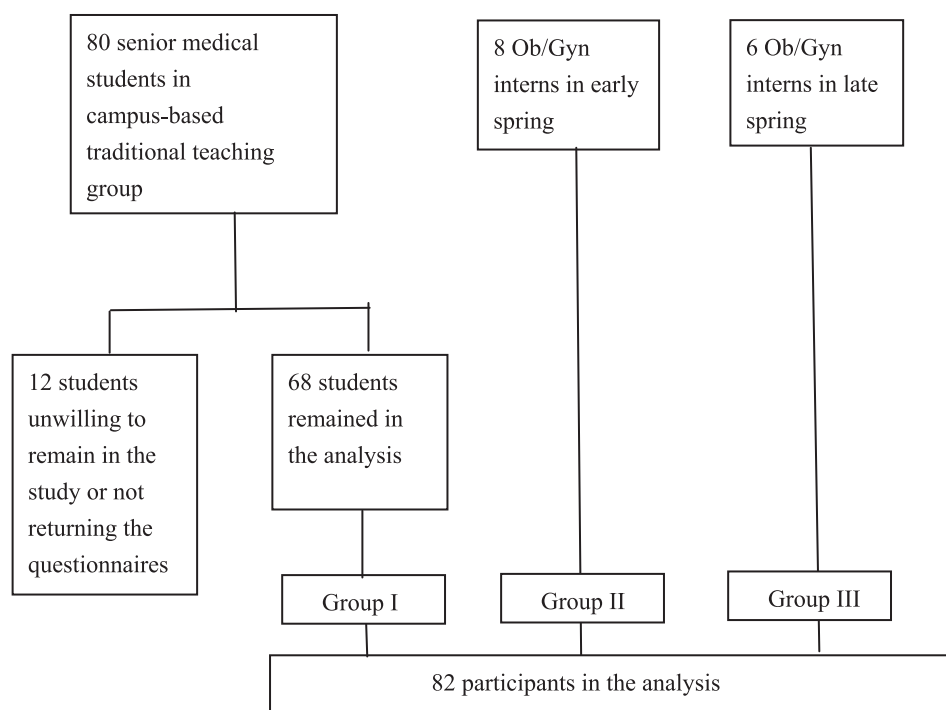


Fig. 1. Recruitment of study participants.

Table 1
Baseline scores of the GLK score.

	Reliability test	School law curriculum	Clinical setting law course group 1	Clinical setting law course group 2	
Number of Students	30	68	8	6	112
Mean rank of Score	54.98	59.18	45.31	48.67	*

*Kruskal–Wallis test: Sig. $P = 0.607$.

All of clinical setting PBL model law teaching group II had good improvement of general law knowledge in administrative, civil and criminal law. The mean rank differences of post-education and pre-education were 4.50 ($P = 0.011$), 4.50 ($P = 0.012$) and 4.50 ($P = 0.012$) respectively.

The clinical setting PBL model law teaching group III had a good improvement in general law knowledge, the mean rank difference of post-education and pre-education was 3.50 ($P = 0.012$).

Table 2
Pre- and Post-education Test Scores in the Campus-based Law Education Group.

Ranks		N	Mean rank	Sum of ranks
Post – Pre	Negative ranks	33 ^a	36.33	1199
	Positive ranks	32 ^b	29.56	946
	Ties	3 ^c		
	Total	68		
Z = -0.828 ^d				
Asymp. Sig. (2-tailed)				
0.407 ^e				

^a Post education Test Scores < Pre education Test Scores.

^b Post education Test Scores > Pre education Test Scores.

^c Post education Test Scores = Pre education Test Scores.

^d Based on positive ranks.

^e Wilcoxon signed ranks test.

All of clinical setting PBL model law teaching group III had good improvement of general law knowledge in administrative, civil and criminal law. The mean rank differences of post-education and pre-education were 3.50 ($P = 0.027$), 3.5 ($P = 0.027$), and 4.50 ($P = 0.024$) respectively.

There were no differences of pre education General Law Knowledge scores between groups II and III, the mean rank difference was 0.29 ($P = 0.897$) (Table 3).

There were no significant differences of pre-education general law knowledge scores between group II and group III in administrative, civil and criminal law domains. The mean rank differences were 3.64 ($P = 1$), 0.58 ($P = 0.793$) and 4.08 ($P = 0.064$) respectively.

There were no differences of post education general law knowledge scores between groups II and III. The mean rank difference was 5.11 ($P = 0.021$).

There were no significant differences of post-education general law knowledge scores between group II and group III in administrative and civil law domains. The mean rank differences were 1.75 ($P = 0.406$) and 2.92 ($P = 0.150$) respectively. However, a significant mean rank difference of 5.11 ($P = 0.016$) was noted in criminal law scores between group II and III.

There were no differences in pre-education general law knowledge scores of campus-based law teaching group and clinical setting PBL model law teaching group (group II + group III). The mean rank difference was 8.87 ($P = 0.203$) (Table 4).

There were no differences in pre-education general law knowledge of campus-based law teaching group and clinical setting PBL model law teaching group (group II + group III) in administrative and criminal law domains. The mean rank differences were 3.11 ($P = 0.663$) and 9.86 ($P = 0.147$) respectively.

There was significant difference in pre-education general law knowledge of campus-based law teaching group and clinical setting PBL model law teaching group (group II + group III) in civil law. The mean rank difference was 13.65 ($P = 0.049$).

Table 3

Pre-education Test Scores in the Clinical Setting Law PBL model teaching Groups: Group II vs. Group III.

		Ranks		
	Group	N	Mean rank	Sum of ranks
Score	Group II	8	7.38	59.00
	Group III	6	7.67	46.00
	Total	14		
Z = -0.130				
Asymp. Sig. (2-tailed)				
0.897 ^a				

^a Mann–Whitney test.**Table 4**

Pre-education Test Scores in the Campus-based Law teaching Group vs. Clinical Setting PBL model Law teaching Group (Group II + III).

		Ranks		
	Group	N	Mean rank	Sum of ranks
Score	Campus-based	68	43.01	2925.00
	Clinical	14	34.14	478.00
	Total	82		
Z = -1.274				
Asymp. Sig. (2-tailed)				
0.203 ^a				

^a Mann–Whitney test.

The general law knowledge scores of clinical setting PBL model law teaching group (Group II + III) had a remarkable improvement than campus-based law teaching group after the planned education period (Table 5). The mean rank difference was 40.14 ($P < 0.001$) (Table 6).

The difference of scores in administrative, civil and criminal law between clinical setting PBL model law teaching group (group II + group III) and the campus-based law teaching group were significant after the planned education period. The mean rank differences were 39.32 ($P < 0.001$), 36.91 ($P < 0.001$) and 40.34 ($P < 0.001$) respectively.

Discussion

Medical-legal education in the fields & health science generally lacks uniform regulation and many curricula have a sparse amount of medical-legal education. Medical students' understanding of medicine related law has also been demonstrated to be generally poor and inconsistent. In this study, we carried out legal–medical education in a PBL model during the morning meeting presided over by a medical professor who has completed L.L.M. courses at the graduate level. Morning meeting is an hour-long meeting with required attendance of all attending physicians and residents in the

Table 5

Pre- and Post-education Test Scores in the Campus-based Law teaching Group vs. Clinical Setting PBL model Law teaching Group.

	Pre-education Test Scores Mean \pm SD	Post-education Test Scores Mean \pm SD
Campus-based Law Education Group (Group I) N = 68	18.68 \pm 5.41	18.34 \pm 5.05
Clinical Setting Law PBL model teaching Group (Group II + III) N = 14	16.21 \pm 4.10	36.57 \pm 3.46

Table 6

Post-education Test Scores in the Campus-based Law teaching Group vs. Clinical Setting PBL model Law teaching Group (Group II + III).

		Ranks		
	Group	N	Mean rank	Sum of ranks
Score	Campus-based	68	34.65	2356.00
	Clinical	14	74.79	1047.00
	Total	82		
Z = -5.755				
Asymp. Sig. (2-tailed)				
0.000 ^a				

^a Mann–Whitney test.

department where current patient cases are discussed. We used these cases to raise law-related learning points and discuss the legal issue with the goal of increasing the students' medical legal knowledge.

The lack of legal exposure in medical education carries consequences. Firstly, the law suit cases are relatively high in United States and Taiwan. The serendipity choice of department of Ob/Gyn as study site is physicians of Ob/Gyn are frequently abashed by medical disputes; and Secondly, broad strokes of the legal landscape are prone to make risk management decisions based on lore rather than fact leading to the much-maligned practice of “defensive medicine” [12]. And defensive medicine carries its own costs, financial and otherwise. It leads to unnecessary testing, hospitalizations, and potentially harmful false-positives [13].

The Ministry of Education and the Ministry of Health and Social Welfare require that medical schools and dental schools provide relevant legal education. However, despite providing legal courses, medical students tend to have a weak understanding of medical law with performance on post educational exams not much different than that of the general public.

In the three groups, the pre-education evaluation results were similarly poor. It implies that the general medical student's best legal knowledge is insufficient.

The Campus-based class education did not improve this knowledge. However the small group education in the clinical setting achieved much better results with great improvement. The hospital based small group education was carried out in a modified PBL model. Since the internship is going to be evolved to Post Graduate Year (PGY) system. The interns and current sixth year medical students are technically comparable.

However using PBL to deliver law related learning has some disadvantages which may hinder its implementation in the curriculum that we have suggested.

The disadvantages include

1. Some of the law-related problems may surpass the instructor's capability.
2. The identification of a law-related learning point during morning meetings are impromptu and the planning of navigation through the case and the lesson require some improvisation from the professor/instructor. This is in contrast to the traditional PBL class in medical school where cases and learning points are prepared in advance by the instructor, and students are also required to prepare and study pertinent topics related to the PBL case and be prepared.

Nonetheless strengths of our study include a prospective study design with a relatively reliable result. We performed a comprehensive evaluation of the medical students' general legal knowledge by using previously validated and reliable measurement tool. On the other hand, the study has its limitations including our

inability to perform randomization of the subjects and to regulate the participation of all subjects in the clinical PBL model setting.

There was only 80 percent return of surveys from the campus-based class group. The compliance rate of 80 percent may reflect the student attitude towards legal education in the large class setting.

In conclusion, our study demonstrates that senior medical students who received traditional campus-based medical law education have no improvement in their medical law knowledge. The reason for this is unclear. Some have suggested that it may be due to the large group didactic model teaching of these classes, which allows poor attendance unnoticed, and the overly emphasis on textbook material.

Problem based learning is a common method of learning medicine in medical and dental schools, however it is not adopted for legal education purposes yet. A possible setting for using problem based learning is during the morning or grand rounds setting during case presentations. When there is an appropriate legal learning point, these cases can be presented using the problem based method regarding the legal issues. Of course, it requires that the professor or instructor be versed in both the medical and legal aspects of cases at issue, and be able to identify and define the learning point that can be weaned from the case.

In a small group setting, great learning results can be achieved. Particular this study showed consistent reliability. Using problem based learning in clinical setting for legal education in daily morning meetings can achieve a remarkable effect. Problems remain.

Few clinical staffs have expertise in law and it is recommended that clinical medical attending physicians to attend classes in legal education at law school. It would mitigate the problem of shortage in the attending physicians who are capable of performing the teaching. For instance, the medical school hospital in this study has over 200 attending physicians, of which only three have ever received formal legal education. In addition, there are 22 departments in the hospital. Only very few departments have access to staffs having dual backgrounds.

It is important not only presenting cases currently on the wards at morning meetings, but also presenting medical cases in the news and determining the legal issues involved. Opening these issues up for debate at morning meetings is a valuable law teaching model.

Conclusion

The level of general law knowledge for senior medical students or even the physicians was not as adequate as what has been expected.

In Taiwan, the shortage of manpower in certain clinical specialty department is considerably associated with the fear of legal disputes of those specialties. The unreasonable fear deters medical students from choosing those specialties as their future careers.

The underlying causes of the fear undoubtedly are attributable to the insufficient medico-jurisprudence knowledge. The current system of medico-jurisprudence education fails to provide medical students with sufficient legal conscience and knowledge in campus-based didactic class. The setback is lacking any systematic approach for thinking about the legal issues they will encounter. Many curricula provide students with no clear guidance on legal matters they will certainly deal with in the future. Medicine should be taught in concert with law and ethics.

Students should leave medical school with an appreciation for how the legal system works and how to navigate it. Such awareness may lead to fewer decisions made on the basis of myth, reducing defensive practice and having greater comfort in making clinical decisions.

Small group case oriented law courses led by medical staffs with legal expertise could significantly improve medical students general law knowledge. The development of law course curriculum in medical education could adopt the approach of Problem Base Learning (PBL) model teaching as the clinical medical course teaching modality which has been practiced for years.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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