

Effect of undergraduate teaching modules on residents EBM competency

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Abstract

Objectives: To investigate the effectiveness of the problem based teaching integration in medical schools compared with traditional teaching on residents EBM performance.

Materials and Methods: We conducted a questionnaire based, cross-sectional survey among all residents from various medical specialties for 6 years from 2008 to 2013.

Result and Conclusion: Two hundred and twenty nine first year residents participated in the study. 75.3% of the participants had evidence based medicine in their curricula, either in the academic or clinical years or both. The majority of participants feel that evidence based medicine helped them in their daily patient care practice.

Key words: Problem Based learning, Evidence based Medicine, Residents, Saudi Arabia

Introduction

EBM was introduced in 1992 as a tool to guide the health care provider with the best available evidence [1]. It is crucial that medical students have a strong educational foundation regarding Evidence-Based Medicine (EBM), otherwise it is expected there will be adverse sequelae on the health of the individual and the population, due to failure of finding the best available evidence which helps in addressing and managing patients' complaints based on a correct rational and scientifically sound approach.[1, 2]

However the best and most efficacious point of time allocated for teaching undergraduate students of EBM is still debatable[3] 4, most EBM teaching takes place during the clinical phase of medical schools.[4-6] EBM integration into the medical curriculum is not unified across the world. Some medical schools cram the EBM courses within a short period, which is not enough for the student to develop and gain the necessary level of EBM skills. On the contrary, some medical schools provide a spiral course of EBM teaching which provides the medical student with multiple successive sessions [7]. Lauren A. Maggio et al suggest that EBM teaching for the undergraduate students should be conducted in a spiral curriculum[6].

The method of EBM teaching is preferred to be active and via interactive online courses. Prober and Heath stated, "It's time to change the way we educate doctors", and they recommend taking advantage of the new technology in teaching EBM.[8]10 Recognizing the knowledge gap is so crucial and is regarded as "step zero" in EBM teaching.[9]. Lauren A. Maggio et al suggest that EBM teaching should focus on the fundamental skills of identifying the knowledge gap since it acts as the fuel that kindles the EBM teaching process.[6]

Teaching EBM to undergraduates cannot be over emphasized. The importance of teaching EBM practice to undergraduate students is similar to teaching them the skills of physical examination and history-taking.[10] However, the implementation of EBM teaching requires overcoming many obstacles including the presence of a module for teaching EBM, having role models among teaching staff, time of EBM teaching, integrating EBM into the medical curriculum, tutor interest in EBM practice, incorporation of technology, practicing critical appraisal of the evidence, linkage of EBM teaching session with its relevant clinical utilization, and belief in the importance of EBM practice. A study was conducted by (Alahdab et al, 2012) which stated that 94% of medical students in Damascus University declared that lack of a module for teaching EBM was one of the main impediments to successfully practicing EBM and 92% of the medical students stated that having role models among the teaching staff is crucial.[7]. Moreover, a study conducted by (Dragan Ilic et al 2010) concluded that medical students in Monash University who have been taught EBM skills in the undergraduate phase are more likely to continue using EBM principles during their professional life as students and clinicians. In addition, the medical students stated that the behaviour of senior clinicians affects their attitude toward EBM practice.

Moreover, the medical students declared that teaching critical appraisal is one of the most crucial steps in EBM teaching.[11] A study conducted by (Bradley P et al, 2005) suggested that medical students are more likely to apply the principles of EBM through their professional life if there is a connection between the EBM teaching session and real clinical utilization. [12]

Even though EBM practice is essential, still some clinicians do not use it or don't support it due to many reasons including lack of time, lack of skills in EBM technology such as searching PubMed, shortage of resources, or doubts about EBM practice's importance.[13, 14] However, regardless of behaviour and attitude whether against or for EBM practice, all health care providers must accept the fact that EBM practice should complement rather than displace their clinical expertise.[15] Haynes RB et al 2002, stated that the best health care should be provided by "integrating individual clinical expertise with the best available external clinical evidence and use of individual patients' values and preferences in making clinical decisions".[16] The availability and the convenience to access valid and up to date medical information has been shown to improve EBM teaching significantly and make the individual confident about their clinical decision.[17]

Throughout all the medical education degrees, teaching evidence based medicine has been integrated into the main curricula.[18] Most of the medical schools target the teaching of evidence based medicine mainly for the senior undergraduate medical students in the third and fourth years, probably due to the conventional wisdom that EBM teaching should be predominately in clinical years.[19] However, some medical educators encourage teaching EBM throughout the four years in medical school, by introducing the principle of EBM and search methodology during the preclinical phase, then reviewing this knowledge and applying it to clinical practice (e.g. evaluation of diagnosis and prognosis) during the clinical phase.[20] Indeed, early introduction of EBM in medical schools enhances critical thinking about the diagnostic and therapeutic decisions that the preclinical medical student may make upon entering the clinical phase.[21] Srinivasan M et al conducted the first study that demonstrated that early introduction of EBM principle to the preclinical medical student was successful and practical. This study suggested that the practice of EBM depends more on whether the medical student can apply the methodology rather than the student's clinical knowledge per se.[22]

Problem based learning (PBL) is characterized by building new ideas and knowledge based on pre-existing ones, therefore not only absorbing knowledge as in the traditional models [23]. A study conducted by Johnston M et al showed that the traditional teaching was more effective than the PBL teaching and the students showed better attitude toward EBM knowledge after traditional teaching more than PBL teaching.

The aim of the current study is to compare the effect of undergraduate problem based learning with traditional teaching modules on residents EBM performance and satisfaction.

Method

A cross-sectional study aimed to include all first grade residents in King Abdulaziz Medical City Riyadh from year 2008 - 2013. A questionnaire was distributed and answered by participants at the end of the R1 introductory course to evidence based medicine. The questionnaire consisted of 36 questions in four parts. The first part included questions of demographical data of participants. The second was about the inclusion of evidence based medicine in the curriculum. The third was their exposure to evidence based practice and research. The last part was about the participant's opinion regarding the importance of evidence based medicine in their daily practice. Data entry and analysis was done using SPSS version 20 (IBM, SPSS Inc.). The questionnaire data had multiple choices so it was presented in categorical variables with percentage. Chi square test or Fisher exact test, if small number were used to test the association between type of teaching and other variables. Significance was considered if P value was less than 0.05.

Results

A total of 229 first year residents, who represented 75% of those who attended the EBM awareness sessions were questioned. Table (1) shows the participants socio-demographic characteristics, where the mean age is 25.6 ± 1.78 , and the percentage of male participants is 60.7%. Pediatric residents represent the highest (17.5%), Internal Medicine as 16.7%, Surgery as 14.9%, Family Medicine as 11.4%, Obstetrics and Gynecology as 5.7%, and Emergency Medicine is the lowest with 4.4%. There were also other specialties like orthopedics and ophthalmology as 29.4%. The dominant undergraduate teaching model is the traditional (63.2%).

Table (2) demonstrates the types of EBM teaching in the medical schools, in which teaching EBM was not included in the curricula for 24.7%; and is included in the academic years in 16.3%; and in the clinical years in 27.8% and in both academic and clinical years in 31.3%. 34.8% attended EBM extra-curriculum teaching. 64.3% of residents were satisfied with EBM teaching at the undergraduate level.

Eighty five percent admitted that EBM curricula included theoretical teaching and more than two thirds of residents were taught appraisal and searching skills, and another two thirds had EBM assignments.

Table (2) also depicts the responses of EBM residents' activities during the last month. Around one third of residents formulated a clinical question (PICO), and around one quarter appraised an article, while more than two thirds had used hand held devices to search for evidence.

Around half of residents believe that EBM helps them to prepare for the exams, and around 90% said that it helps in answering clinical questions, keeps them updated with new information, and helps them make the right decision in managing their patients. It also helps them interpret EBM statistics (77.8%). Finally, 95.9% believe that EBM should be included in medical school curricula.

Other than the gender, three variables were statistically significant in relation to PBL teaching models (satisfaction, exam preparation and interpreting statistics) (Table 2). Other variables were similar in both PBL and traditional teaching.

Relationship between type of teaching models and other variables:

Three variables were statistically significant in relation to PBL teaching models (satisfaction, exam preparation and interpreting statistics) (Table 2). Other variables were similar in both PBL and traditional teaching.

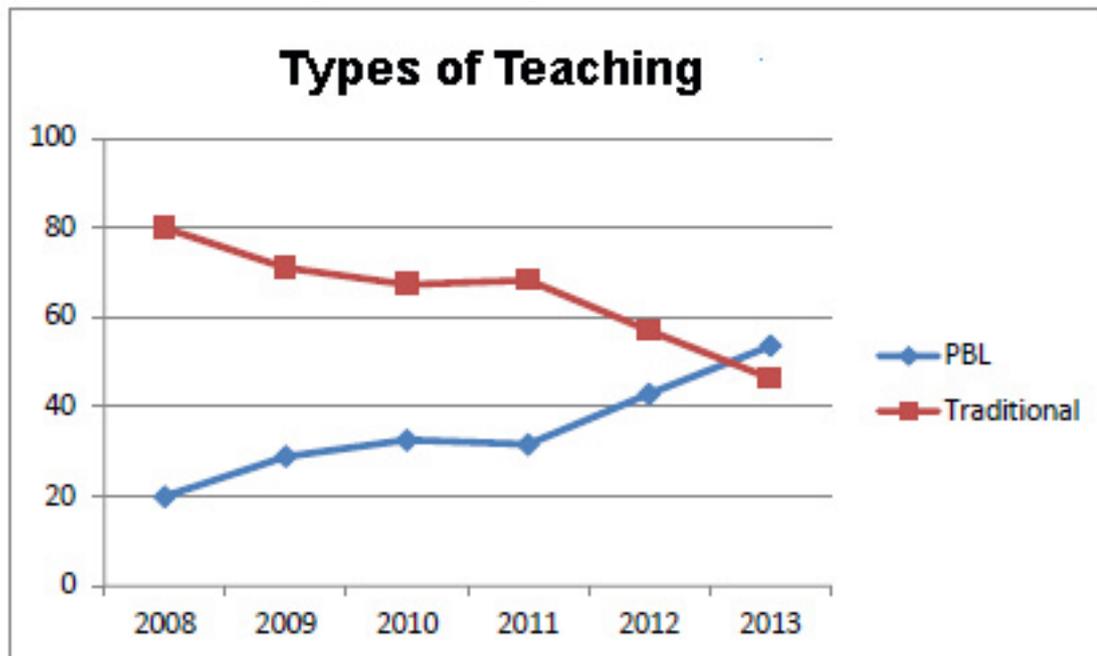
Table 1: Demographic Data

		Mean	SD
Age		25.58	1.78
		N	%
Gender	Male	139	60.7
	Female	90	39.3
Specialty	IM	38	16.7
	FM	26	11.4
	Pediatric	40	17.5
	OBGYNE	13	5.7
	Surgery	34	14.9
	ER	10	4.4
	Other	67	29.4
Graduation	2008	25	10.9
	2009	34	18.5
	2010	30	16.3
	2011	25	13.6
	2012	22	12.0
	2013	49	26.6
Teaching	PBL	84	36.8
	Traditional	144	63.2

Table 2: the Residents point of view towards EBM

		Type of teaching				P value
		PBL		Traditional		
		N	%	N	%	
Gender	Male	59	70.2	80	55.6	.028*
	Female	25	29.8	64	44.4	
Specialty	IM	14	16.7	24	16.8	.113
	FM	13	15.5	13	9.1	
	Pediatric	19	22.6	20	14.0	
	OBGYNE	4	4.8	9	6.3	
	Surgery	15	17.9	19	13.3	
	ER	3	3.6	7	4.9	
	Other	16	19.0	51	35.7	
satisfaction	yes	55	75.3	62	57.4	.013*
	No	18	24.7	46	42.6	
Formulate Questions	YES	23	29.1	54	38.8	.148
	NO	56	70.9	85	61.2	
Appraise Evidence	YES	21	26.9	39	28.5	.808
	NO	57	73.1	98	71.5	
Use Hand Held	YES	59	75.6	98	69.0	.298
	NO	19	24.4	44	31.0	
Search for evidence	YES	55	68.8	99	69.7	.298
	NO	25	31.2	43	30.3	
EBM help me prepare	YES	51	64.6	71	49.7	.033*
	NO	28	35.4	72	50.3	
EBM keep me updated	YES	75	93.8	130	91.5	.554
	NO	5	6.2	12	8.5	
EBM help me in decision making	YES	76	95.0	128	90.1	.203
	NO	4	5.0	14	9.9	
EBM help me answer questions	YES	74	93.7	122	87.8	.064
	NO	5	6.3	17	12.2	
EBM help me in statistic interpretation	YES	69	88.5	103	72.5	.006*
	NO	9	11.5	39	27.5	
EBM assist me	YES	73	92.4	126	88.7	.382
	NO	6	7.6	16	11.3	
WOULDLIKEEBM	YES	77	97.5	134	95.0	.495
	NO	2	2.5	7	5.0	

Figure 1: Trend of undergraduate teaching models



Discussion

The number of medical schools that adopt PBL was on the rise during the period of the study, however it accelerated in 2011. On the other hand, traditional teaching model is the PBL mirror. The number of medical schools in Saudi Arabia has increased dramatically in the last two decades, from 5 to more than 30; this expansion is a result of investment of both the government and the private sectors. Moreover the curricula is switching from traditional disciplined-based to more innovative, problem-based, and community-oriented programs, which is not restricted to Saudi Arabia but worldwide[24-26]. On reviewing the list of medical schools which adopt PBL curriculum as shown in A. Telmesani's article (2011), one can notice that they were established beyond the year 2000, and many of those medical schools also teach EBM curriculum. The first three schools that adopted PBL in Saudi Arabia were Al Qassim, Jazan and King Abdaziz bin Suad University for Health Sciences (KASU-HS).[24]

EBM teaching is best delivered on a real or even hypothetical clinical scenario, where the learner goes through the five steps of practicing EBM: asking clinical questions, searching for and retrieving the best evidence, appraising the evidence, applying it to the patient and finally, assessing the whole process including self-reflection. This is actually what the cases in PBL settings do, and they both share similar features, like, adult learning, learner centered, self and active learning, lifelong learning, teamwork and collaborative learning, engaging students in finding solutions to real life situations and pertinent contextualized problems, and finally, self-motivation.[27-29]

This study was designed to assess the effect of EBM teaching models during the undergraduate medical schools on the junior resident's perceptions, attitudes and competencies

in Evidence Based Medicine Practice. Our study revealed that the most common type of teaching medicine in Saudi Arabia was traditional teaching (57.9%) which is not the best method to teach EBM to undergraduate students as a study conducted by (Liabsuetrakul T, et al 2013) which suggested that a PBL module is an effective method to improve the undergraduate students' skills, attitude and perceptions of EBM practice[30]. There is little evidence that the problem based learning (PBL) curriculum is better than the traditional curriculum [31-34], even though some experts provide contradictory evidence regarding the effectiveness of PBL in teaching the undergraduate medical students the EBM [35-37]. However, there is little evidence about how effective the PBL models are in teaching EBM in undergraduate medical students, and the variation in the outcome of PBL utility may vary depending on the culture[38]. Therefore, educational research is really crucial, relevant and practical not only for teaching purposes but also to make the teaching process in the same level of the learner cultural and social context [12]. Therefore, the best teaching models of EBM to undergraduate medical student is still debatable [39-41]. Our study showed that problem based learning (PBL) accounts for only (36.6%).

Since the introduction of EBM principles in 1992, there has been a variation of the response from medical schools worldwide. Some medical schools integrate EBM principles within the core medical curriculum as a spiral course which is suggested by some experts [42]; other medical schools teach EBM principle as separate topics not related to the medical curriculum, and other medical schools do not accept the EBM teaching due to many reasons. However, the literature emphasizes on the importance of EBM teaching and the integration of EBM principles within the medical curriculum is the first step to establish EBM practice. It has been shown that integration of EBM principles within the medical curriculum is helpful and increases the professional competency level among

the undergraduate students[43]. A study conducted by Meats E1 et al 2009 stated that “ The development of a national undergraduate EBM curriculum may help in promoting progress in EBM teaching and assessment in UK medical schools”[44]. Our study revealed that Teaching Evidence Based medicine was not included in the curricula for 24.7%.

We support the view that EBM teaching should be active and interactive sessions and not necessarily conducted in the traditional class especially with the advantage of new technology[9]. Really, online interactive EBM teaching sessions have been shown to be effective. A study conducted by Aronoff SC et al 2010 stated that “Medical students successfully acquired and independently applied EBM skills following extended, online, faculty mentored instruction “ and they recommend this method of teaching because it is effective and time-efficient.[45]

There is variation among the medical schools in the time of integration of EBM teaching whether during the academic phase, clinical phase or both. Our study revealed that inclusion of EBM teaching during the clinical phase was higher than the academic phase 27.8% and 16.3% respectively. Actually, there was an old perception about the EBM teaching in that it should be undertaken during the clinical phase because it easier to apply the EBM principle on the clinical cases [5, 6, 42]. However, the recent recommendation by some experts in EBM teaching suggest that EBM teaching should be introduced in the academic phase because undergraduate students are more likely to continue using EBM during their professional life as students and clinicians if they have early exposure to EBM practice[46]. Our study concluded that the most common category was the inclusion of EBM during both the academic and clinical phases (31.3%), which goes with the recent recommendation regarding EBM teaching.[7]

Even though assessing the satisfaction toward EBM teaching is subjective and can be affected by many factors, the literature search concluded that most undergraduate students are satisfied with EBM principle and practice[47]. Satisfaction about EBM practice was even higher among the clinicians.[48] Our study revealed that 64.3% of the study population are satisfied with evidence based medicine teaching in their colleges. Interestingly, we found that the satisfaction was significantly higher among PBL teaching modules with P value (0.003) compared with other teaching modules. A study conducted by (Liabsuetrakul T, et al 2013) ,which supports our finding, suggested that PBL module is an effective method to improve the undergraduate students’ skills , attitude and perception of EBM practice.[30]

Moreover, we found that the participants who have been taught EBM in both phases of the academic and clinical education were the most satisfied with a P value of 0.026 compared to the other groups.

Implementation of EBM practice requires many resources, one of which is the availability and easy access to valid and EBM databases. There are many EBM data bases that the health care provider can utilize in decision making, depending on which data base is available or easily accessible, the health care provider might prefer one database over the others. The most commonly used database our study identified was PubMed (71.9%) and least used database was Trip Database (4.9%). A study conducted by Alomari M et al 2009 revealed that despite the positive attitude toward EBM practice, there was under use of EBM data bases due to lack of skills and knowledge. Only 5% of the study population use Cochrane database to help them reach clinical decisions.[48]

It has been shown that integration of EBM principle within the medical curriculum is helpful and increases the professional competency level among the undergraduate students.[43] Our study revealed that 54.7% of the sample agrees that evidence based medicine helps them to prepare for the exam while 91.9% said that it keeps them updated with new information. 91.5% also agree that it helps them make the right decision with their patients. In the question ‘EBM helps me in answering clinical questions raised during day-to-day practice’ 89.5% said yes it really did. It also helps them in interpreting statistics by 77.8%. In addition they agree that it assists them in managing their patients by 89.6%. Finally, 95.9% of the sample is interested to learn and know more about Evidence Based Medicine.

Finally, our study revealed that more of the females said that ‘EBM assists me in managing my patients’ than male participants with a P value of 0.040, but we could not find out the exact reason for this finding.

To our knowledge, this is the first national study that evaluates the EBM teaching modules in medical schools and the influence on the junior residents. Our findings are consistent with other international and regional studies, which have already evaluated the EBM teaching in medical schools.

Limitation

The study did not include equal participants across the study period from 2008 to 2013 starting with 25 participants and ending with 56 participants respectively, which could bias the result. In addition, there are subjective findings which could not be assessed accurately, for example the stratification toward EBM teaching and the usefulness of EBM teaching in preparing for medical school examinations. Finally, this study included the residents who participate in EBM courses organized by National and Gulf Center for Evidence Based Health Practice (NGCEBHP) in Riyadh, therefore, the result could not be generalized and further study that evaluates the EBM teaching in all the junior residents across the Saudi Arabia is highly recommended.

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