

Attitude and Behaviour of Standardized Training Students to Evidence-Based Practice: A Cross-Sectional Questionnaire Survey

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Abstract: Although evidence-based practice provides the best diagnosis and treatment decisions for patients, there is no relevant theoretical basis for designing an evidence-based practice curriculum for medical students. Also, no study has been conducted to investigate the attitude and behaviour of evidence-based practice among resident doctors in China. Therefore, this study aims to identify the beliefs and implementation of evidence-based practice among registered resident doctors in Lianyungang First People's Hospital. A descriptive cross-sectional design was used to recruit 257 participants conveniently. Beliefs about the evidence-based practice was evaluated using the Evidence-Based Practice Beliefs scale. In addition, the implementation of Evidence-Based Practice was evaluated using the Evidence-Based Practice Implementation scale. Participants' rate of evidence-based practice was 71.60%. Cronbach's alpha was more than 0.90 for each scale. Participants who had learned about evidence-based medicine gave significantly higher scores on the Evidence-Based Practice Beliefs scale and Evidence-Based Practice Implementation scale than those who did not. This study demonstrates that resident doctors develop a positive attitude towards evidence-based practice but exercise it to a lesser extent. Integrating the theory course of evidence-based medicine at the undergraduate level with the practice course at the standardized training stage is crucial to improving their practice, aiming to enhance that patients receive the best available care based on high-quality evidence.

Keywords: Evidence-Based Practice Belief Scale, Evidence-Based Practice Implementation Scale, Medical Education, Standardized Training of Students

1. Introduction

The Evidence-based Practice (EBP Evidence-based Practice) concept, rooted in the field of Evidence-based medicine (EBM), refers to clinical doctors in the entire collect medical history, physical examination, and essential laboratory examination and imaging, based on the integration of professional theoretical knowledge and clinical skills, surrounding the principal clinical problems. It also involves taking the initiative to retrieve the latest comment on the current best research evidence collection, combined with the desire and value orientation of patients and the medical environment to arrive at the best diagnosis and treatment decisions [1]. Evidence-based practices potentially improve

patient outcomes. For instance, they reduce patients' 10-year coronary atherosclerotic heart disease-related mortality [2]. Therefore, it is essential to strengthening evidence-based knowledge education, training, and reeducation. According to a study, the rate of evidence-based practice in participants was significantly correlated with their knowledge and attitudes towards evidence-based practice [3]. Similarly, a few scholars demonstrated that clinical medicine students who experienced EBM reeducation exhibit better practical ability to solve clinical problems with EBM thought than the control group; notably, the difference between the two student groups was statistically significant [4].

Among the two main currently available research tools for evaluating the evidence-based practice of resident doctors

include the EBP-I scale and the EBP-B scale. The former contains 18 items for assessing how often resident doctors perform essential components and steps of EBP, whereas the latter includes 16 items intended to measure the beliefs of resident doctors about the value of EBP and their beliefs and confidence in its implementation in practice [5, 6].

Clinical resident standardization training was discovered in 1993 by the Chinese ministry of health issued the implementation of clinical trial measures of resident standardization training notice. It aimed to improve the ability of medical students to put theory into practice. However, there is no report on evidence-based practice's behavior and attitude among resident doctors. This prompted us to explore, through a questionnaire, how often resident doctors perform EBP, their beliefs about the value of EBP, and their confidence in its implementation. This would provide a theoretical basis for teaching in evidence-based practice.

2. Methods

2.1. Participants

Clinical students were enrolled in the First People's Hospital of Lianyungang City, Jiangsu Province, China, between 2018 and 2020, and participated in standardized training, i.e., Grade 2018, Grade 2019, and Grade 2020 were assessed.

2.2. Instruments

This was a descriptive survey. The questionnaire mainly comprised three parts: (1) Demographic data related to gender, age, the education of evidence-based medicine, etc. (2) the EBP-I scale, including 18 items, items were evaluated on a two-point Likert scale with 1 point for each affirmative answer and 0 point for each negative answer. Total scores ranged from 0 and 18, with higher scores denoting a higher rate of evidence-based practice. (3) The EBP-B was a 16-item questionnaire adopting a 4-point Likert scale to evaluate individuals' beliefs about the value of EBP and their ability to implement it. Higher scores reflected more positive beliefs about EBP.

2.3. Data Collection

We collected data in the form of an online questionnaire. An investigator elaborated the purpose of the study to the subjects. The link to the questionnaire was published in the standardized training clinical resident group of the First People's Hospital of Lianyungang City, Jiangsu Province, China. To ensure data quality, all the items in the questionnaire were set as required questions such that none was missed out or not filled in. The research subjects used mobile phones, computers, and other devices to fill in the online questionnaire through access links.

2.4. Data Analysis

The IBM SPSS software Version 22.0 was employed for data analysis. Internal consistency of the scales was assessed using Cronbach's α ; the enumeration data were expressed as frequency and percentage, whereas measurement data were expressed as mean and standard deviation. Through Univariate analysis, we compared physicians' EBP-I and EBP-B scores with different characteristics. Results were considered statistically significant at $p < 0.05$.

3. Results

3.1. Basic Characteristics

From a total of 257 students investigated, only 184 students were available (71.60%), including 106 (57.61%) women and 78 (42.39%) men, with 84 (45.65%) 20-25 years old, 85 (46.20%) 26-30 years old, and 15 (8.15%) more aged than 30 years old. Among the subjects, there were 13 (7.07%) with 3 years of specialty degree, 97 (52.72%) with 5 years of an undergraduate degree, 73 (39.67%) with a master's degree, 1 (1.58%) with doctor degree. Further, 152 (82.61%) graduated major in clinical medicine, 18 (9.78%) specialized in general medicine, 14 (7.61%) specialized in other majors; also, there were 131 (71.20%) proposed to major in clinical medicine, 36 (19.57%) proposed to major in general medicine, 17 (9.24%) proposed major in other majors. The majority of participants (72.28%) had learned about EBM (Table 1).

Table 1. Demographic characteristics of the respondents.

Demographic characteristics	2020 grade	2019 grade	2018 grade
Total No. of Residents, N (%)	91 (35.41)	84 (32.68)	82 (31.91)
Number of participants, N (%)	66 (25.68)	63 (24.51)	55 (21.40)
Gender			
Female, N (%)	36 (54.55)	35 (55.56)	35 (63.64)
Male, N (%)	30 (45.45)	28 (44.44)	20 (36.36)
Age			
20-25, N (%)	45 (68.18)	30 (47.62)	9 (16.36)
26-30, N (%)	15 (22.73)	26 (41.27)	44 (80.00)
>30, N (%)	6 (9.09)	7 (11.11)	2 (3.64)
Education			
Junior college degree, N (%)	1 (1.52)	9 (14.29)	3 (5.45)
Bachelor degree, N (%)	37 (56.06)	22 (34.92)	38 (69.10)
Master degree, N (%)	28 (42.42)	31 (49.21)	14 (25.45)
Doctor degree, N (%)	0	1 (1.58)	0

Demographic characteristics	2020 grade	2019 grade	2018 grade
Graduated Major			
Clinical medicine, N (%)	53 (80.30)	57 (90.48)	42 (76.36)
General medicine, N (%)	12 (18.18)	0	6 (10.91)
Other majors, N (%)	1 (1.52)	6 (9.52)	7 (12.73)
Intended Major			
Clinical medicine, N (%)	52 (78.79)	49 (77.78)	30 (54.54)
General medicine, N (%)	12 (18.18)	6 (9.52)	18 (32.73)
Other majors, N (%)	2 (3.03)	8 (12.70)	7 (12.73)
EBP intervention mode			
Take courses in EBM, N (%)	51 (77.27)	44 (69.84)	38 (69.09)
Not taking courses, N (%)	15 (22.73)	19 (30.16)	17 (30.91)

3.2. Scores of the Two Scales

The average total score on the EBP-I Scale was 13.66 (SD = 4.54, range = 0-18). Scores on the EBP-B scale ranged between 0 and 16, with an overall mean score of 13.64 (SD =

2.75), reflecting the positive belief of participants in EBP. The positive response frequency of the EBP questionnaire is outlined in Table 2. The mean distribution of the EBP belief scale is presented in Table 3.

Table 1. The positive response frequency of the EBP questionnaire.

No.	item	Strongly agree, N (%)	agree, N (%)	Disagree, N (%)	Strongly disagree, N (%)
01	I believe that EBP results in the best clinical care for patients.	115 (62.50)	66 (35.87)	3 (1.63)	0
02	I am clear about the steps of EBP.	15 (8.15)	63 (34.24)	77 (41.85)	29 (15.76)
03	I am sure that I can implement EBP.	28 (15.22)	76 (41.30)	77 (41.85)	3 (1.63)
04	I believe that critically appraising evidence is an important step in the EBP process.	72 (39.13)	108 (58.70)	4 (2.17)	0
05	I am sure that evidence-based guidelines can improve clinical care.	71 (38.59)	106 (57.61)	7 (3.80)	0
06	I believe that I can search for the best evidence to answer clinical questions in a time-efficient way.	66 (35.87)	103 (55.98)	15 (8.15)	0
07	I believe that I can overcome barriers to implementing EBP.	56 (30.43)	112 (60.87)	15 (8.15)	1 (0.55)
08	I am sure that I can implement EBP in a time-efficient way.	58 (31.52)	114 (61.96)	11 (5.97)	1 (0.55)
09	I am sure that implementing EBP will improve the care that I deliver to my patients.	61 (33.15)	115 (62.50)	8 (4.35)	0
10	I am sure about how to measure the outcomes of clinical care.	55 (29.89)	112 (60.87)	17 (9.24)	0
11	I believe that EBP takes too much time.	53 (28.80)	108 (58.70)	23 (12.5)	0
12	I am sure that I can access the best resources in order to implement EBP.	48 (26.08)	108 (58.70)	28 (15.22)	0
13	I believe EBP is difficult.	43 (23.37)	112 (60.87)	29 (15.76)	0
14	I know how to implement EBP sufficiently enough to make practice changes.	45 (24.46)	96 (52.17)	43 (23.37)	0
15	I am confident about my ability to implement EBP where I work.	46 (25.00)	110 (59.78)	27 (14.67)	1 (0.55)
16	I believe the care that I deliver is evidence-based.	55 (29.89)	117 (63.59)	12 (6.52)	0
sum		887 (30.13)	1626 (55.23)	396 (13.45)	35 (1.19)

Table 2. EBP-B Questionnaire Response Frequency Statistical.

No.		40-59%	60-79%	>80%
01	Used evidence to change my clinical practice.			167
02	Critically appraised evidence from a research study.			169
03	Generated a PICO question about my clinical practice.		138	
04	Informally discussed evidence from a research study with a colleague.		141	
05	Collected data on a patient's problem.		142	
06	Shared evidence from a study/ies in the form of a report or presentation to > 2 colleagues.		128	
07	Evaluated the outcomes of a practice change.			152
08	Shared an EBP guideline with a colleague.		144	
09	Shared evidence from a research study with a patient/family member		111	
10	Shared evidence from a research study with a multidisciplinary team member.		147	
11	Read and critically appraised a clinical research study.		144	
12	Accessed the Cochrane database of systematic reviews.	77		
13	Accessed the National Guidelines Clearinghouse.		122	
14	Used an EBP guideline or systematic review to change clinical practice where I work.			162
15	Evaluated a care initiative by collecting patient outcome data.		129	
16	Shared the outcome data collected with colleagues.			160
17	Changed practice based on patient outcome data.			149
18	Promoted the use of EBP to my colleagues.		132	

3.3. Stratified Analysis of the Scores of the Two Scales

Based on the different characteristics of participants, there was no statistical difference in EBP-I and EBP-B scores regarding the age of respondents and the time from the graduation of the first medical education ($P > 0.05$). Similar results were previously reported by Varnell [7]. However, we found significant differences in EBP-I and EBP-B scores across different genders ($P = 0.002$). The EBP-I scores were different with varying medical education degrees ($P = 0.01$);

however, we found no difference in EBP-B scores ($P = 0.123$). The EBP-I score varied for different majors ($P = 0.02$), but without a significant difference in the EBP-B score ($P = 0.03$). The scores of EBP-I and EBP-B of subjects who took EBM courses were significantly higher than those who did not take EBM courses ($P = 0.002$). No significant difference was reported in the EBP-I score regarding the length of training time ($P = 0.555$). However, there was a significant difference in the EBP-B score ($P = 0.02$), (Table 4).

Table 4. EBP stratified analysis.

items		EBP-I			EBP-B		
		mean	F value	P value	mean	F value	P value
Age	male	14.85	9.631	0.002	14.37	10.022	0.002
	female	12.79			13.10		
	20-25	13.83	2.370	0.096	13.67	0.009	0.991
	26-30	13.12			13.61		
	>30	15.80			13.67		
Education	Junior college degree	15.46	3.875	0.010	13.15	1.950	0.123
	Bachelor degree	12.65			13.26		
	Master degree	14.63			14.22		
	Doctor degree	18.00			15.00		
Graduated Major	clinical medicine	13.83	0.584	0.558	13.61	0.078	0.925
	general medicine	13.00			14.00		
	other majors	12.84			13.64		
Intended Major	clinical medicine	14.21	3.993	0.020	13.80	1.213	0.300
	general medicine	11.65			12.88		
	other majors	12.93			13.59		
EBP intervention mode	Take courses in EBM	14.29	9.445	0.002	14.05	10.903	0.002
	Not taking courses	12.04			12.59		
Grade	2020	13.95	0.591	0.555	14.38	3.992	0.020
	2019	13.84			13.37		
	2018	13.11			13.07		
Years of graduate from first medical education	1-3	13.74	2.116	0.124	13.66	0.083	0.921
	4-5	11.63			13.38		
	>5	14.57			13.70		

3.4. Reliability

The Cronbach's alphas were computed and summed to assess whether the data from the 16 items in the EBP-B generated a reliable scale. The overall alpha was 0.937, denoting that the scale had good internal consistency. The EBP-I scale also demonstrated good internal consistency, with a Cronbach alpha = 0.901.

4. Discussion

In the present study, we demonstrate that more than half of the resident doctors (90.76%) explored the use of evidence to change their clinical practice; notably, only 41.85% of them accessed the Cochrane database of systematic reviews. Similar results were reported in a self-made survey on the clinical practice of evidence-based medicine for resident doctors in the training base in China. Based on their findings, clinical guidelines were preferred for reading the literature regardless of whether or not they were educated in evidence-based medicine [8]. Compared to the original research evidence and systematic review, the guidelines enable medical personnel to timely

acquire and read clinical research results through rigorous and accurate text descriptions. They then readily apply them to medical practice-related activities since the guidelines are closer to clinical practice needs.

Herein, most of the participants (62.50%) agreed or strongly agreed that EBP resulted in the best clinical care. Consistent with previous findings, participants affirmed the clinical value of evidence-based practices [9-12], which was further confirmed by clinical practice [2]. We also revealed that participants were positive towards EBP, though they only practiced EBP slightly. This implies that a positive attitude towards evidence-based practice is not equal to an excellent ability to implement evidence-based practice [9-12].

The survey results of EBP-B showed that more than half of the subjects were not clear about the implementation steps of EBM and had no confidence in the implementation of EBP in the future. This possibly justifies the inconsistency between the evidence-based practice belief score and practice score. Meanwhile, the two main reasons for the negative answer to EBP-I were not linked to understanding the specific content of EBM and lack of motivation to implement EBP. The above survey results demonstrate that the subjects do not fully

understand EBM content, which poses challenges in practicing EBM knowledge [13]. Elsewhere, a study on the application of evidence-based medicine teaching mode in the standardized training of orthopedic students in China found that the evidence-based medicine teaching mode significantly improved the learning interest and self-learning ability of students, as well as their literature retrieval and reading and clinical thinking ability [14]. In the present study, the two examples show that the application of evidence-based medicine in the endocrine field improves the students' ability to understand the endocrine disease diagnosis and treatment norms and application level. At the same time, it improves the teaching potential for the teacher and higher hospital doctors' ability in clinical practice [15]. Besides, a study has shown that learning evidence-based practice can improve the attitude to evidence-based practice, thus improving the ability of evidence-based practice [16]. However, domestic research has shown that for subjects who studied the evidence-based medicine theory course residency in the literature retrieval tool usage, certain aspects of specific literature reading have fared better than those who did not study the course of a physician [8]. However, the difference was not statistically significant, suggesting that the evidence-based medicine theory course still cannot meet the practical demand of students [8]. Thus, students still need to learn evidence-based medicine in clinical practice so that they can apply the theoretical knowledge to practice. Furthermore, a controlled study suggests that clinical practice teaching based on the principles of evidence-based medicine (PICO) can significantly improve students' ability to raise and solve problems in clinical thinking and mobilize their learning initiative [17]. Simultaneously, the independent, cooperative, and inquiry learning mode based on the evidence-based practice ability of clinical medicine majors was implemented. Of note, 87.2% of the students believed that it stimulated their learning enthusiasm and interest, whereas 86.6% believed it improved their self-directed learning ability and efficiency. This potentially stimulated their learning potential [18]. At the same time, assisted use of information technology is a crucial method for learning evidence-based practice, such as PubMed's PICO tool [19, 20]. Studies have proved that combining the document-oriented self-learning learning method and the application of the evidence-based pharmacy teaching method can significantly improve students' clinical practice ability and employment rate [21]. The study by Lam CK *et al.* found that learning evidence-based practice in clinical practice can significantly improve subjects' ability to practice evidence-based practice [22]. To sum up, in teaching evidence-based practice, one should attach importance to the value of evidence-based medicine theory courses and pay attention to the significance of evidence-based medicine clinical practice courses.

Moreover, the EBP-I and EBP-B scores of subjects with higher medical education levels and physicians with standardized training in Evidence-based Medicine were significantly higher and were statistically significant. These results demonstrate the importance of accepting the course

education of evidence-based medicine. Further, the theoretical course of evidence-based medicine should be offered at the undergraduate stage for medical students, whereas the practical course of applying the theory of evidence-based medicine to clinical diagnosis and treatment should be provided during the internship and standardized training stages. Also, much focus should be attached to the cooperation between theoretical teachers and clinical teachers in course connection, which improves the understanding and application of evidence-based medicine by medical students and resident doctors and enhances doctors' internal motivation to implement evidence-based practice [12].

This study has the following strengths: Firstly, it is the first study in China to explore the implementation of evidence-based practice and confidence in overcoming the implementation of evidence-based practice in standardized training students. This is crucial in guiding teaching guiding. Secondly, this study provides a theoretical basis for setting up the course of evidence-based medicine. Nonetheless, there are a few limitations to this study. For instance, the participants in the questionnaire survey are only physicians participating in standardized training in a Grade III Class A general hospital. The sample size of the questionnaire survey is relatively small. The subjects are relatively limited; thus, data bias may arise.

5. Conclusion

The present work demonstrates that Evidence-based Medicine course education can significantly improve the EBP practice ability of students in standardized training, enhance their awareness of the value of EBP, and confidence in overcoming the drawbacks in EBP implementation. Therefore, it is essential to set up the theory course of evidence-based medicine in the undergraduate stage and promote the practice course of evidence-based medicine in the internship and standardized training stage.

Competing Interests

The authors declare that they have no competing interests.

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