Construction of Evaluation Index System of General Practice Graduates' Competence

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Research article

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Abstract

Objective To construct the evaluation index system of general medical graduates' competence, provide the basis for improving the comprehensive quality of general medical graduates and promoting the further reform and optimization of the training program of general medical talents in colleges.

Methods Two rounds of expert consultation by Delphi method were used to determine the evaluation index system of general practice graduates' competence. AHP was used to calculate the weights of all levels of indicators.

Result The evaluation index system of general practice graduates' competence is constructed with 3 primary factors, 9 secondary factors and 32 tertiary factors. Delphi results showed that the positive coefficient of experts was 1 and the authority coefficient was 0.858. Index system weight results showed that the weights of knowledge, skill and quality were 0.1532, 0.4207 and 0.4261 respectively. Among the second-level factors, the top three weight coefficients were professional ethics (0.2614), community practice (0.1526) and communication skills (0.1308).

Conclusion This study constructed the evaluation index system of general practice graduates' competence, which can be used as the basis to evaluate the ability of general practice graduates and provide guidance for the cultivation and evaluation of general practice talents.

Introduction

With the development of Chinese economy and the improvement of people's living standard, it is an urgent need to develop general medical education^[1]. "Planning for deepening the Reform of Medical and Health system in the 13th five-year Plan" (guo fa [2016] no. 78), to promote the building of general practitioners (GPs) system, we should strengthen the GP as the key point of the construction of health personnel, improve on the basis of post responsibility requirements, moral character, ability, performance oriented, accord with the characteristics of medical personnel assessment mechanism of scientific and social^[2]. GPs have an essential role in promoting the health of the population. GPs need have a high level of competence^[3]. Colleges and universities are the primary gateway to train GPs. Over the past 20 years, there has been increasing focus on general practice and the role of general practitioners (GPs) in undergraduate medical education^[4]. It is of great significance for the cultivation of general medical students' ability and quality to promote the sustainable development of general medicine. At present, the establishment of competency model for GPs has become more and more perfect^[5-6]. However, there is a lack of research on the evaluation of the comprehensive quality of the graduates majoring in general medicine, and there is no evaluation method suitable for measuring the comprehensive quality of the graduates of general medicine, which can not further guide the reform of the cultivation and reform of the talents of the general medical students in colleges and universities. This study used the theory and method of educational objective classification theory and technology proposed by Bloom^[7] and other scholars to measure competency, and divided competency into three aspects: knowledge level, work skills and professional quality. Based on the survey results of the current situation and needs of GPs in anhui province, the evaluation index system of GPs' ability and quality was constructed.

1 Objects And Methods

1.1 Objects

Anhui provincial health administrative departments, higher medical colleges, medical and health institutions at all levels and other relevant experts were selected for consultation. A total of 20 experts were selected, including 8 general practice medical education researchers of anhui higher medical colleges, 3 municipal/county health administrative personnel, 5 principals of primary medical and health service institutions, and 4 primary GPs.

1.2 Methods

1.2.1 Initial establishment of evaluation index system

Status and demands according to GPs ability quality in anhui province based on the results of a survey. The comprehensive ability and quality of GPs were evaluated by domestic and foreign scholars and combined with China's national conditions and the local actual situation, the preliminary construction of general medical graduates ability quality evaluation index system, including 3 primary elements, 10 secondary elements and 38 level 3 elements.

1.2.2 Delphi method

Delphi method was applied to conduct two rounds of expert consultation. The first round of expert consultation: (1) collection of basic information of experts: gender, age, education background, professional title, working years, professional occupation and familiarity with evaluation elements; (2) experts' opinions on the initial evaluation index system: likert 5 subscale was applied to the importance degree of the index elements at all levels, which was divided into 5 grades: very important, relatively important, general important, not too important and not important, and 5, 4, 3, 2 and 1 points respectively. At the same time, there was a suggestion column to supplement or modify the various elements. The second round of expert consultation: revised and improved indicators at all levels, conducted the second expert consultation, and scored the importance of indicators again. According to the analysis of two rounds of expert consultation results, the index elements of the evaluation system were clarified.

1.2.3 Analytic hierarchy process(AHP)

AHP was proposed and founded by Saaty, a famous American operations research scientist. It combines human subjective judgment and is a multi-objective analysis and decision-making method combining quantitative analysis and qualitative analysis^[8]. Yaahp software is a visual modeling and calculation software based on the principle of AHP, which provides functions such as hierarchy model construction, judgment matrix and ranking weight, etc^[9].

The main steps to construct the evaluation index system by using the analytic hierarchy process include:

- (1) Establishment of hierarchical model: the elements involved in the competency evaluation index system were divided into several levels, and a hierarchical model of multiple levels was established.
- (2) Construct a judgment matrix: compared and analyzed the pairwise importance of indicators by comparing factors at the same level. The 1-9 scale method of Saaty was adopted(table. 1).
- (3) Establishment of index weight: Yaahp software was used to calculate the ranking weight of the overall target/sub-target.
- (4) Consistency test: whether the weight allocation was reasonable, consistency test was needed. Yaahp software was used to carry out consistency test. When the consistency index CI of the judgment matrix was <0.1 and the random consistency ratio CR was <0.1 , it was believed that there was no logical error in judging the weight of indicators, which had satisfactory consistency and passed the test.

1.3 Statistical method

Excel2010 software was used to process relevant data, SPSS 18.0 software and Yaahp11.1 software were used for statistical analysis.

2 Result

2.1 Expert basic information

20 experts, including 14 males and 6 females; 7 graduate students, 10 undergraduate students and 3 junior college students; 13 senior titles, 5 intermediate titles and 2 junior titles. There were 2 employees with working years <5 years, 10 employees with 5-10 years and 8 employees with >10 years. 8 people mainly engaged in professional scientific research and teaching, 8 people in administrative management, 4 primary GPs. For the familiarity degree of evaluation elements, 11 people were very familiar with them, 9 people were relatively familiar with them (Table. 2).

2.2 The degree of positivity and authority of the expert

The positive coefficient of experts is the positive degree of experts' participation in research, which is reflected in the recovery rate of the questionnaire ^[10]. In the first round of this survey, 20 questionnaires were issued and 20 were collected, with a recovery rate of 100%. In the second round, 20 questionnaires were issued and 20 were collected, with a recovery rate of 100%. This indicates that the experts were highly motivated.

The coefficient of expert authority was mainly affected by the judgment basis of the indicator Ca and the familiarity Cs ^[11]. The judgment basis of experts was divided into practical experience (assignment 0.5, 0.4, 0.3), theoretical analysis (assignment 0.3, 0.2, 0.1), literature understanding (assignment 0.1, 0.1, 0.05), subjective feeling (assignment 0.1, 0.1, 0.05). The three levels of expert familiarity were assigned 1.0, 0.5 and 0.0 respectively. The authority coefficient of experts was the arithmetic mean value of the familiarity coefficient and judgment coefficient, which was between 0 and 1. The higher the authority coefficient is, the higher the authority degree of experts is. In the first round, the coefficient of expert authority was 0.803 (Ca=0.830, Cs=0.775). In the second round, the coefficient of expert authority was 0.858 (Ca=0.845, Cs=0.870).

2.3 The degree of concentration and coordination of expert opinions

The Kendall coordination coefficient (W) of the two rounds of expert consultation were 0.506 and 0.619, respectively, with statistically significant differences ($P < 0.01$) (Table. 3).

2.4 Results of the first round of expert consultation

According to the opinions of the consulting experts, the three first-level elements, 10 second-level elements and 38 third-level elements of the evaluation index system of general practice graduates' ability and quality were modified as follows: (1) delete indicators: delete secondary elements of a "system analysis", delete the three elements of the five "using health information to guide the community working ability", "analysis of the ability of health", "the skills of using evidence-based medicine", "the ability to apply the law to solve disputes", "ability", opinions from others suggested; (2) modified index: "basic pharmacological knowledge" changed to "Pharmacological knowledge and clinical rational drug use", "health management knowledge" changed to "grassroots health management knowledge", "good communication skills with the patient" changed to "Good communication skills with patients and family members", "health records management skills" changed to "establish health records, use and management", "carry out the work of teaching ability" and "carry out the work of scientific research capacity" into "scientific research".

2.5 Results of the second round of expert consultation

On the basis of the first round of expert consultation, the evaluation index system of general practice graduates' ability and quality was modified to form 3 first-level elements, 9 second-level elements and 32 level 3 elements. In the second round of expert consultation, the second-level element "continuous self-directed learning" was revised to "educational learning". According to the opinions of two rounds of expert consultation, and after discussion by the research group, the evaluation index system of general practice graduates' ability and quality was finally determined, including 3 first-level elements, 9 second-level elements and 32 level 3 elements.

2.6 Evaluate index weight results

Yaahp software was used to build the hierarchical structure model, with "general medical graduates' ability and quality evaluation index system" as the decision-making target, the first and second level as the middle layer, and 32 third level as the scheme layer. Yaahp software builds a judgment matrix of decision objectives and intermediate elements according to the model. Combining with the weight of experts, each judgment matrix was scored in group decision-making, and the weight results of each index element were obtained through calculation and analysis (table. 4).

3 Discussion

3.1 Scientificity of ability and quality evaluation indexes of general practice graduates

In this study, Delphi expert consultation method and analytic hierarchy process method were combined to construct the evaluation index system of general practice graduates' ability and quality. The two applied methods were based on the judgment made by consulting experts based on theoretical knowledge and practical experience, and yaahp software combines subjective evaluation and mathematical evaluation with analytic hierarchy process to conduct data statistical processing on the basis of expert subjective judgment, increasing logic and scientificity^[12]. The results of this study showed that the judgment matrix of index elements at all levels and CI and CR at all levels are all <0.1 , suggesting that the ranking of each level had a satisfactory consistency, and the evaluation index and hierarchy structure constructed was objective and scientific.

3.2 Determination of the content and weight of the competency evaluation index system for general medical graduates

After two rounds of expert consultation, 3 primary elements, 9 secondary elements and 32 tertiary elements were finally determined. The relative weight of each indicator was statistically analyzed. Among the first-level indicators, "professional quality" had the highest weight, with a weight coefficient of 0.4261. Three secondary factors were established under this index, and the weight coefficient ranking the first was "professional ethics", with a weight coefficient of 0.2614. The results suggested that professional quality was the most important ability of general medical students. General practice advocates human-centered, guided by the bio-psycho-social medical model, respects the needs of patients and families, focus on the physical and mental health of individuals and families, and pays attention to the care of the inner quality of life^[13]. In the context of tense doctor-patient relationship and increasing medical disputes, doctors' professional ethics, as a soft service, are increasingly valued, which directly affects the improvement of medical service quality^[14]. It is a critical period for general medical students to strengthen their professional quality during professional learning. Under the influence of the professional role environment of doctors, medical students gradually internalize and form stable and effective professional ethics, which is a prerequisite for doing a good job of GPs.

Secondly, "community practice" was the second factor in the second level, with a weighting coefficient of 0.1526. As the main force of primary medical care, GPs' community practice skills are the foundation of their foundation. With the reform of the medical system, a basic medical and health system covering both urban and rural residents has been established and improved, and the medical philosophy of "minor diseases are at the grassroots level, serious diseases are in hospitals, and rehabilitation is returned to the community" has been implemented^[15]. To this end, GPs need to be proficient in the use of general practice principles and be able to integrate them in practice. According to the results of this study, under "community practice", the weight coefficient of "High blood pressure, diabetes, mental illness and other health education skills" was the highest, with a weight coefficient of 0.0475. The prevention and management of chronic disease is a key priority for primary care services^[16]. One of the most important skills of GPs, which is different from other specialists, is health education and development of a high-quality preventive service, which aims to prevent diseases and improve residents' self-management ability and quality of life^[17]. Therefore, colleges and universities should pay attention to the cultivation of health education skills and deepen the health propaganda and education ability of GPs when cultivating the comprehensive ability and quality of general medical students.

Among the secondary factors, experts agreed that "communication " was one of the important indicators. Good and effective communication is the basis and guarantee of increasing patients' subjective initiative. When there are potential conflicts with patients or family members, doctors are also required to have a skilled communication and coordination ability to resolve conflicts. Therefore, good communication skills are an effective way to improve the service quality of GPs^[18].

In addition, among the secondary factors, the lowest weight value was "educational learning ", with a weight coefficient of 0.0346. Under the index of educational learning ability, four three-level elements were constructed. Among them, "scientific research" was the lowest requirement, with a weight coefficient of 0.0049. This may have a certain relationship with China's general practice scientific research system and the teaching and research level of GPs^[17]. The development of general practice scientific research helps to improve the image of general practice and the sense of achievement of GPs, and is more conducive to the development of general practice^[19]. To improve the scientific research ability of GPs through different ways and to establish the closeness of clinical practice and scientific research. Colleges and universities should strengthen the cultivation of general medical students' scientific research ability, improve their scientific research thinking ability, and enable them to combine their own characteristics and apply the scientific research results to practical work when facing specific working environment and clinical problems^[20].

4 Conclusion

This study used medical graduates ability quality as study unit, with qualitative and quantitative method to establish the system, objective and scientific index system and its content conforms to the basic medical demand for general medical students ability quality, to some extent, improved the shortages on the general ability of medical students quality appraisal, and to provide a scientific basis for college talent training in general medicine.

Declarations

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None

Ethics approval and consent to participate

The experimental protocol was established, according to the ethical guidelines of the Helsinki Declaration and was approved by the Ethics Committee of Bengbu Medical College. Written informed consent was obtained from individual or guardian participants.

Consent for publication

Written informed consent for publication was obtained from all participants.

Availability of data and material

All data generated or analysed during this study are included in this published article.

Competing interest

The authors declare that they have no competing interests

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Tables

Table 1
Saaty 1-9 scale method

scale	Comparison of two indicators
1	As important
3	Slightly more important
5	Obviously important
7	Highly important
9	Extremely important
2,4,6,8	The intermediate value of the adjacent judgment
The inverse of each of these	The two indicators were compared in reverse

Form judgment matrix according to pairwise comparison results.

Table 2
Basic information of experts(n=20)

Project	Number	Ratio%
Gender		
Male	14	70.00
Female	6	30.00
Age		
<40 age	4	20.00
45-50 age	13	65.00
>50 age	3	15.00
Formal schooling		
Graduate student	7	35.00
Undergraduate course	10	50.00
Specialized subject	3	15.00
Title		
Senior	13	65.00
Intermediate	5	25.00
Primary	2	10.00
Working fixed number of year		
<5 year	2	10.00
5-10 year	10	50.00
>10 year	8	40.00
Professional		
Professional scientific research and teaching	8	40.00
Administrative management	8	40.00
GPs	4	20.00
Familiarity with indicators		
Very	11	55.00
General	9	45.00
Not	0	0.00

Table 3
Two rounds of expert consultation Kendall
coordination coefficient

	The first round	The second round
W	0.506	0.619
χ^2	374.213	383.657
P	0.000	0.000

Table 4
Weight of evaluation index system of general practice graduates' ability and quality

Level 1	Weight	Level 2	Weight	Level 3	Weight
Knowledge	0.1532	Basic knowledge	0.0585	Biomedical	0.0206
				Pharmacological knowledge and clinical rational drug use	0.0156
				Grassroots health management	0.0103
		Professional knowledge	0.0947	Traditional Chinese medicine	0.0120
				General practice	0.0395
				Clinical medicine	0.0309
				Prevention, rehabilitation and health care	0.0243
Skills	0.4207	Clinical	0.1107	Medical history and physical examination	0.0250
				Treatment and Clinical decision-making	0.0331
				Judge the prognosis of disease and grasp the opportunity of consultation and referral	0.0201
				Pre-hospital first aid skills for acute, critical and critical patients	0.0164
				Psychological consultation and treatment	0.0161
				Establish, use and manage health records	0.0399
			0.1526	High blood pressure, diabetes, mental illness and other health education skills	0.0475
				Health care skills for special groups	0.0372
				Reporting of infectious diseases and public health emergencies	0.0280
		Communication	0.1308	Good communication skills with patients and family members	0.0721
				Establish mutual trust and cooperation with patients and their families	0.0587
		Teamwork	0.0266	Tacit cooperation with team members, information exchange	0.0089
				Work with teams to perform community primary health care tasks	0.0037
				Two-way referral and continuing education with medical institutions at all levels	0.0140
Quality	0.4261	Professional ethics	0.2614	Observe professional ethics and conduct ethics	0.0983
				Respect and solidarity with colleagues	0.0577
				Respect patients and treat others equally	0.0901
				To provide patients with safe and cost-effective	0.0153

			medical services	
	Humanistic practice	0.1301	Be able to consider the patient's family background and community environment	0.0414
			Focus on the overall health of the patient	0.0407
			Continuous primary health care services for patients	0.0437
	Educational learning	0.0346	Initiative and self-learning ability	0.0198
			Teaching and demonstration	0.0037
			Scientific research	0.0049
			Training and further study	0.0062