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Construction of evaluation index system of medical teaching effectiveness based on evidence based nursing teaching method

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Abstract. Evidence-based nursing is a new field emerging with the development of evidence-based medicine; for nursing education to keep up with the development of evidence-based nursing, school investment shall be reinforced; besides, professional teacher training shall be carried out to develop students' evidence-based thought and evidence-based practice ability so as to improve nursing quality. In order to improve teaching quality as well as teaching methods, various colleges have come out with a set of teaching evaluation methods; however when it comes to implementation, some imperfect aspects appeared. In the Thesis, teaching supervision experience of many years was summarized; opinions were collected from some teachers; hierarchical structure model of classroom evaluation and fuzzy analytical hierarchy process were used to determine weight coefficient; through case analysis, targeted improvement suggestions which are relatively satisfactory and better to reflect objective reality were obtained, which realizes the organic unification of teaching evaluation and teaching supervision.

Key words. Evidence-based nursing, Medical teaching, Evaluation index, Fuzzy analytical hierarchy process

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1. Introduction

Evidence-based nursing is a planned nursing activity process in which nursing personnel combine scientific research conclusions with their clinical experience and patients' wishes deliberately, definitely, and wisely to obtain evidences which are to be taken as basis of clinical nursing decision-making. Evidence-based nursing is originated from evidence-based medicine; in 1990s, the School of Nursing of British

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York University set up the first "evidence-based nursing center" in the world and firstly put forward the concept of "evidence-based nursing (EBN) practice". The Cochrane Collaboration established in 1993 plays an important role in global development and evidence-based health care promotion; and in close cooperation with evidence-based health care center in nursing field, it drives nursing personnel and professionals in related medical fields to carry out system evaluation and evidence propagation. The Chinese Cochrane Center formally set up by West China Hospital of Sichuan University in 1999 provides related training for nursing personnel on evidence-based practice and it applies evidence-based practice methods to clinical nursing practice; it is the first institution which introduces evidence-based practice in nursing in the mainland China[1∼3].

Compliance refers to the obedience of patients to examination, treatment, Usage of medication, nursing and other actions; patients' compliance will have direct influence on treatment and effect. Due to the particularity of many diseases, the whole process of disease treatment, control, and recurrence prevention requires uninterrupted treatment and long-term medicine taking. However, being influenced by factors like society, culture, family situation, and adverse drug reaction, patients have bad compliance, which greatly affects treatment effect; it is bad for patients' recovery and may even increase the possibility of repeated disease attack. Multiple researches have shown that using evidence-based nursing to carry out health education can significantly increase inpatients' compliance and satisfaction and it can enhance the effect of health education and improve the quality of nursing service; it is a diversified, personalized comprehensive means which combines clinical practice and uses evidences to obtain evidence-based effect so as to improve the effectiveness of patient health education. Authors in Literature [4] and others make systematical evaluation to get the best empirical research through reviewing literature; they come up with feasible, effective nursing plans and measures together with patients according to factors influencing patients' compliance, nursing experience and by combining individual demands of patients; for example, on the basis of evaluating patients' background information, charge nurse adopts multiple measures to explain propaganda and education contents to patients with bad compliance to strengthen their memory, to enhance their self-control ability, and to mobilize their initiatives so as to make patients cooperate with treatment proactively. Authors in Literature [5] provide scientific nursing intervention for 80 psychotic patients who refuse to take medicine during convalescence as well as correct explanation and guidance for patients who refuse to take medicine due to adverse reactions after taking medicine so as to take concerns away from patients. The result shows that evidence-based nursing has active promotion effect on improving psychotic patients' medication compliance during convalescence. Authors in Literature [6] provide evidence-based nursing for 49 psychotic patients who need protective constraint treatment, including preparation before constraint, care during constraint, and psychological guidance after constraint, so as to apply the nursing concept of "people oriented" to nursing practice; the result shows that evidence-based nursing can effectively improve the compliance and nursing satisfaction of psychotic patients in protective constraint treatment.

In the Thesis, teaching supervision experience of many years was summarized; opinions were collected from some teachers; hierarchical structure model of classroom evaluation and fuzzy analytical hierarchy process were used to determine weight coefficient; a method of establishing evaluation index system for medical teaching effect of evidence-based nursing teaching method was proposed. Through case analysis, targeted improvement suggestions which are relatively satisfactory and better to reflect objective reality were obtained, which realizes the organic unification of teaching evaluation and teaching supervision.

2. Materials and methods

1. Clinical materials. Eighty 2008 to 2010 student nurses of nursing major who have completed basic teaching were taken as research objects, in which 2 are males and 78 are females; their average age is 19.45 ± 2.21; all these student nurses have completed and passed basic teaching. They are divided into control group and observation group based on the principle of randomization; they are 40 nurses in each group. There is no big difference in sex ratio, average age, and results of basic teaching examination between the two groups, thus they are comparable.

2. Methods. Traditional teaching mode is adopted to teach student nurses in control group; namely, teachers' explanation and demonstration as well as student nurses' listening and probation are taken as the principal. On the contrary, evidence-based nursing teaching method is adopted to teach student nurses in observation group; specific methods and steps are as follows: (1) look for clinical questions requiring evidence-based research: teachers explain main contents of neurosurgery nursing first; arrange 16-hour course to make students basically grasp main contents of neurosurgery nursing; arrange 6-week clinical rotation training. Students are required to put forward problems needing evidence-based research during clinical rotation training according to clinical practice and by combining theoretical knowledge. Each student shall ask no less than three questions requiring evidence-based research. (2) Evidence-based support: students put forward questions for evidence-based research; nursing personnel for clinical teaching offer guidance and answer according to experience; students search literatures systematically based on questions so as to look for solid evidences from research fields. (3) Evidence-based selection: provide guidance for students in selection of obtained literatures; evaluate the effectiveness, practicability, and time suitability of these literatures (such as preciseness of research design, conclusion effectiveness, limitations of research conditions, and so on); select conclusions which are precise in design and with strong practicality from them as reference base. (4) Nursing plan formulation: help student nurses to combine answers to asked question given by and literatures selected by nursing personnel for clinical teaching with actual conditions of patients; design nursing plan for questions requiring evidence-based research. (5) Nursing plan implementation: implement patient nursing as per above prepared nursing plan; monitor the nursing effect.

3. Evaluation index. (1) Critical thinking ability test: after the neurosurgery nursing courses of the two groups of student nurses are completed, use Watson-

Glasser critical thinking test scale to test their critical thinking. This scale will be used to test five abilities of student nurses which are reasoning ability, assumed recognition, deductive ability, explanatory ability, and dissertation ability; there are 16 topics for each partial design and 80 questions; 1 point for each question. High score will mean high critical thinking ability. (2) Research cooperation ability: school teachers are taken as evaluators who will evaluate the ability of searching literatures, selecting literatures, extracting literatures, implementing nursing plan, and collecting data of student nurses respectively; for each ability, living examples will be used to evaluate; 20 points for each item; and total score is 100; evaluators are to give scores according to results.

4. Statistical treatment. SPSS 13.0 software is used to analyze obtained data in the Thesis; mutual check will be adopted for design data; it will be thought to have statistical significance in case $P < 0.05$

3. Hierarchical structure model for classroom teaching quality evaluation of medical teaching

3.1. Evaluation index system

At present, expert evaluation index system for classroom teaching quality supervision is as shown in Table 1.

Table 1. Supervision expert lecture evaluation form

No.	Evaluation index	Weight	Sub-item scoring criteria					
			10	9	8	7	6	5
1	Clearly tell teaching purpose, teaching requirements, and key learning points at the first class and every time when giving a lecture.	0.5			√			
2	Lesson preparation is sufficient; be familiar with teaching contents; not lower than teaching program requirements.	1.5		√				
3	Classroom information is abundant; theory and practice connection is highlighted; development condition of the discipline is reflected.	1.5			√			
4	Clear teaching mind; accurate concept; well arranged; give prominence to the key points; appropriate breadth and depth.	1.5			√			
5	Teaching methods are enlightening; the development of logical thinking, independent analysis ability, problem solving ability, and innovation ability is emphasized; no solely text reading.	1.5				√		

Table 1. Continued

No.	Evaluation index	Weight	Sub-item scoring criteria					
			10	9	8	7	6	5
6	Passion in teaching; using mandarin; clear spoken language; speaking at a moderate speed; accurate expression.	0.5	√					
7	Clean and clear blackboard-writing; appropriate use of multimedia teaching measures; good effect.	1.0		√				
8	Be strict with students; high attendance rate; good classroom discipline. Good interaction in asking and answer; active learning atmosphere in classroom.	0.5			√			
9	Rigorous scholarship; serious attitude; attaching importance to teaching and educating; being a model for others.	1.0			√			
10	Following teaching disciplines; attending class finishing class on time.	0.5	√					
	Overall score	10			82			

There are other contents like “course name”, “course teacher”, “class and grade”, “classroom”, “comprehensive comments”, and “teaching condition” in the table which shall be filled in.

This table is determined through repeated deliberation and discussion of experts organized by Teaching Department of school; there is no doubt that this table can evaluate the classroom teaching quality of medical teaching to some extent. However, it can be seen from contents in the above table that there is only one-class index in this evaluation system; according to the weight value in Table 1, the importance of each index attached by experts can be divided into three groups with same importance, in which the first includes 2, 3, 4, 5; the second includes 7, 9; and the third includes 1, 6, 8, and 10. The first group is the most important one and the third is of the least importance. To consider as per this importance, the following fuzzy judgment matrix can be established according to Literature [1]:

$$\begin{pmatrix} 0.5 & 0.2 & 0.2 & 0.2 & 0.2 & 0.5 & 0.4 & 0.5 & 0.4 & 0.5 \\ 0.8 & 0.5 & 0.5 & 0.5 & 0.5 & 0.8 & 0.7 & 0.8 & 0.7 & 0.8 \\ 0.8 & 0.5 & 0.5 & 0.5 & 0.5 & 0.8 & 0.7 & 0.8 & 0.7 & 0.8 \\ 0.8 & 0.5 & 0.5 & 0.5 & 0.5 & 0.8 & 0.7 & 0.8 & 0.7 & 0.8 \\ 0.8 & 0.5 & 0.5 & 0.5 & 0.5 & 0.8 & 0.7 & 0.8 & 0.7 & 0.8 \\ 0.5 & 0.2 & 0.2 & 0.2 & 0.2 & 0.5 & 0.4 & 0.5 & 0.4 & 0.5 \\ 0.6 & 0.3 & 0.3 & 0.3 & 0.3 & 0.6 & 0.5 & 0.6 & 0.5 & 0.6 \\ 0.5 & 0.2 & 0.2 & 0.2 & 0.2 & 0.5 & 0.4 & 0.5 & 0.4 & 0.5 \\ 0.6 & 0.3 & 0.3 & 0.3 & 0.3 & 0.6 & 0.5 & 0.6 & 0.5 & 0.6 \\ 0.5 & 0.2 & 0.2 & 0.2 & 0.2 & 0.5 & 0.4 & 0.5 & 0.4 & 0.5 \end{pmatrix}$$

Weight values got as per it are as follows:

$$(0.0696 \quad 0.1348 \quad 0.1348 \quad 0.1348 \quad 0.1348 \quad 0.0696 \quad 0.0913 \quad 0.0696 \quad 0.0913 \quad 0.0696)^{\mathrm{T}}.$$

After multiplying by 100 and rounding off, there are different from current weight values; some indexes are with too much explication in actual lecture evaluation, which makes it difficult to grasp. As a result, not every item is given an evaluation; the case is that overall impression evaluation is given as per feelings firstly; and then the score of each sub-item is given as per the overall evaluation; it is obvious that there will be a lack of scientificity, justice, and equity in this way.

3.2. Analytic hierarchy process

Suppose there n pieces of objects which are $A_1, A_2, ..., A_n$; their weight values are $w_1, w_2, ..., w_n$ respectively. If the weight values of every two of them are compared, the $n \times n$ matrix A can be formed with their ratios.

$$A = \begin{pmatrix} \frac{w_1}{w_1} & \frac{w_1}{w_2} & \cdots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & \cdots & \frac{w_2}{w_n} \\ & \cdots & \cdots & \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \cdots & \frac{w_n}{w_n} \end{pmatrix}. \tag{1}$$

Multiply weight vector by

$$W = (w_1, w_2, ..., w_n)^T. \tag{2}$$

right matrix A to get:

$$AW = \begin{pmatrix} \frac{w_1}{w_1} & \frac{w_1}{w_2} & \cdots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & \cdots & \frac{w_2}{w_n} \\ & \cdots & \cdots & \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \cdots & \frac{w_n}{w_n} \end{pmatrix} \begin{pmatrix} w_1 \\ w_2 \\ \cdots \\ w_n \end{pmatrix} = n \begin{pmatrix} w_1 \\ w_2 \\ \cdots \\ w_n \end{pmatrix} = nW. \tag{3}$$

Namely

$$(A - nI)W = 0. \tag{4}$$

According to matrix theory, W is a feature vector; n is also a feature vector. If W is unknown, then the ratio can be judged subjectively according to the contrast relation of every two objects by decision makers; if W is known, then a judgment matrix written as $\overline{A}$ can be got. It is obvious that the matrix $A = (a_{ij})_{n \times n}$ has the

following features:

(1) $a_{ij} > 0, a_{ij} = \frac{1}{a_{ji}},\ i \neq j, i = 1, 2, \cdots, n, j = 1, 2, \cdots, n$

(2) $a_{ii} = 1\ ,\ i = 1, 2, \cdots, n$

The matrix $A = (a_{ij})_{n\times n}$ here is called positive reciprocal matrix.

If the positive reciprocal matrix $A = (a_{ij})_{n\times n}$ meets the following condition

$$a_{ij}.a_{jk} = a_{ik},\ i, j, k = 1, 2.\cdots, n$$

Then, A will become a uniform matrix which has the following features:

1) The transposition of $A = (a_{ij})_{n\times n}$ is also a uniform matrix;

2) Each line in $A = (a_{ij})_{n\times n}$ is the multiple of any appointed line; so rank (A)=1;

3) The maximum characteristic root of $A = (a_{ij})_{n\times n}$ is $\lambda_{\max} = n$; the value of other characteristic roots is zero;

4) If the feature vector of $\lambda_{\max} = n$ is $W = (w_1, w_2, \cdots, w_n)^T$, then $a_{ij} = \frac{w_i}{w_j}$.

In case the given judgment matrix $\overline{A}$ has the above features, then the matrix has complete conformity. However, when every two factors of complex matters are compared, it is hard to guarantee complete conformity of judgment; therefore, there will be estimation error, which will inevitably cause deviation of characteristic value and feature vector. At this moment, the question turns from $AW = nW$ to $\overline{A}W' = \lambda_{\max}W'$; here, $\lambda_{\max}$ is the maximum characteristic value of matrix $\overline{A}$, and W' is relative weight vector with deviation. In order to prevent the error from being too big, the conformity of matrix $\overline{A}$ shall be checked.

When matrix $\overline{A}$ is in complete conformity, since $a_{ij} = 1$, then $\sum\limits_{i=1}^{n} \lambda_i = \sum\limits_{i=1}^{n} a_{ij} = n$; therefore, there is a sole non-zero characteristic value which is $\lambda = \lambda_{\max} = n$.

When matrix $\overline{A}$ is not in conformity (in most cases, $\lambda_{\max} \geq n$), then

$$\lambda_{\max} + \sum_{i\neq\max} \lambda_i = \sum_{i=1}^{n} a_{ij} = n\,.$$

And then

$$\lambda_{\max} - n = -\sum_{i\neq\max} \lambda_i\,.$$

Its average value is taken as the index for checking and judging matrix conformity

$$CI = \frac{\lambda_{\max} - n}{n-1}\,. \tag{5}$$

When $\lambda_{\max} = n, CI = 0$, the matrix $\overline{A}$ is in complete conformity; the bigger the CI is, the worse the judgment of complete conformity of matrix will be.

The bigger the dimensionality n of matrix $\overline{A}$ is, the worse the conformity of judgment will be; in order to reduce conformity requirements for high-dimensional judgment matrixes, modification value (namely random conformity index RI in Table 2) is brought in; and more reasonable CR is taken as index for judging matrix

conformity.

$$CR = \frac{CI}{RI}. \tag{6}$$

Here, CR is called random conformity ratio.

Table 2. Value of random conformity index RI

n	1	2	3	4	5	6	7	8	9	10	11
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51

When CR<0.1, $\overline{A}$ will be thought to have satisfactory conformity; otherwise, the judgment matrix A shall be readjusted until it has satisfactory conformity.

In order to compare every two factors to get quantized judgment matrix, the scale of 1-9 is introduced in; according to psychologist researches, it is proposed: people's ultimate ability of differentiating information level is 7 ± 2; a special table is make; see Table 3.

Table 3. Scale definition table

Scale a_{ij}	Definition
1	It means that factor i is as important as factor j
3	It means that factor i is a little more important than factor j
5	It means that factor i is relatively more important than factor j
7	It means that factor i is much more important than factor j
9	It means that factor i is absolutely more important than factor j
2,4,6,8	It refers to the scale value of intermediate state of the above two factros
Reciprocal	If factor i is compared with factor j, then the judgment values can be got as $a_{ji} = 1/a_{ji}$ and $a_{ii} = 1$

In case number larger than 9 is needed, first cluster factors to compare firstly according to actual situations; and then compare factors of each classification, so as to avoid using numbers other than 1 to 9.

4. Empirical analysis

The consistency check is required for the judgment matrix of the analytic hierarchy process; in case the consistency cannot meet the requirements, then the adjustment should be implemented repeatedly, which is not only troublesome, but also the scientificity of adjustment cannot be guaranteed; therefore, the weighted value of index in various layers relative to the index of last layer should be decided with the method of fuzzy analytical hierarchy process[1]. Due to the space limitation, the preferential relation matrix $\boldsymbol{B}_i'$ of secondary index corresponding to the primary index $\boldsymbol{B}_i$ and the converted fuzzy judgment matrix $\boldsymbol{B}_i$ are presented directly with

the method introduced in Literature [1] hereunder, as shown below:

$$\boldsymbol{B}_1' = \begin{pmatrix} 0.5 & 1 & 1 & 1 \\ 0 & 0.5 & 1 & 1 \\ 0 & 0 & 0.5 & 1 \\ 0 & 0 & 0 & 0.5 \end{pmatrix} \quad \boldsymbol{r} = \begin{pmatrix} 3.5 \\ 2.5 \\ 1.5 \\ 0.5 \end{pmatrix} \quad \boldsymbol{B}_1 = \begin{pmatrix} 0.5 & 0.625 & 0.75 & 0.875 \\ 0.375 & 0.5 & 0.625 & 0.75 \\ 0.25 & 0.375 & 0.5 & 0.625 \\ 0.125 & 0.25 & 0.375 & 0.5 \end{pmatrix}$$

$$\boldsymbol{B}_2' = \begin{pmatrix} 0.5 & 1 & 1 & 1 & 1 \\ 0 & 0.5 & 1 & 1 & 1 \\ 0 & 0 & 0.5 & 1 & 1 \\ 0 & 0 & 0 & 0.5 & 1 \\ 0 & 0 & 0 & 0 & 0.5 \end{pmatrix} \quad \boldsymbol{r} = \begin{pmatrix} 4.5 \\ 3.5 \\ 2.5 \\ 1.5 \\ 0.5 \end{pmatrix} \quad \boldsymbol{B}_2 = \begin{pmatrix} 0.5 & 0.6 & 0.7 & 0.8 & 0.9 \\ 0.4 & 0.5 & 0.6 & 0.7 & 0.8 \\ 0.3 & 0.4 & 0.5 & 0.6 & 0.7 \\ 0.2 & 0.3 & 0.4 & 0.5 & 0.6 \\ 0.1 & 0.2 & 0.3 & 0.4 & 0.5 \end{pmatrix}$$

$$\boldsymbol{B}_3' = \begin{pmatrix} 0.5 & 0 & 1 & 0 \\ 1 & 0.5 & 1 & 1 \\ 0 & 0 & 0.5 & 0 \\ 1 & 0 & 1 & 0.5 \end{pmatrix} \quad \mathbf{r} = \begin{pmatrix} 1.5 \\ 3.5 \\ 0.5 \\ 2.5 \end{pmatrix} \quad \boldsymbol{B}_3 = \begin{pmatrix} 0.5 & 0.25 & 0.625 & 0.375 \\ 0.75 & 0.5 & 0.875 & 0.625 \\ 0.375 & 0.125 & 0.5 & 0.25 \\ 0.625 & 0.375 & 0.75 & 0.5 \end{pmatrix}$$

As for $\boldsymbol{B}_4$, as any judgment matrixes set up by the analytical hierarchy process are consistent, and the fuzzy judgment matrixes are constants without regard to the importance weight of two indexes, the judgment matrix of analytical hierarchy process is more reasonable based on comparison; therefore, the judgment matrix set up by the 9-scale analytical hierarchy process is as follows:

$$\boldsymbol{B}_4 = \begin{pmatrix} 1 & 4 \\ 0.25 & 1 \end{pmatrix}.$$

The weight matrix can be obtained based on the judgment matrix, and the results are shown separated hereunder:

$\boldsymbol{w}_1 = \begin{pmatrix} 0.3525 & 0.2842 & 0.2158 & 0.1475 \end{pmatrix}^{\mathrm{T}}$;

$\boldsymbol{w}_2 = \begin{pmatrix} 0.2877 & 0.2438 & 0.2000 & 0.1562 & 0.1123 \end{pmatrix}^{\mathrm{T}}$;

$\boldsymbol{w}_3 = \begin{pmatrix} 0.2158 & 0.3525 & 0.1475 & 0.2842 \end{pmatrix}^{\mathrm{T}}$; $\boldsymbol{w}_4 = (0.80.2)^{\mathrm{T}}$

Similarly, in case the precedence matrix and fuzzy judgment matrix of primary index are

$$\boldsymbol{A}_1' = \begin{pmatrix} 0.5 & 0.5 & 1 & 1 \\ 0.5 & 0.5 & 1 & 1 \\ 0 & 0 & 0.5 & 1 \\ 0 & 0 & 0 & 0.5 \end{pmatrix} \quad \boldsymbol{r} = \begin{pmatrix} 3.0 \\ 3.0 \\ 1.5 \\ 0.5 \end{pmatrix} \quad \boldsymbol{A}_1 = \begin{pmatrix} 0.5 & 0.5 & 0.6875 & 0.8125 \\ 0.5 & 0.5 & 0.6875 & 0.8125 \\ 0.3125 & 0.3125 & 0.5 & 0.625 \\ 0.1875 & 0.1875 & 0.375 & 0.5 \end{pmatrix}$$

Then the weight matrix should be

$\boldsymbol{w}_1 = \begin{pmatrix} 0.3525 & 0.2842 & 0.2158 & 0.1475 \end{pmatrix}^{\mathrm{T}}$.

As for the index system evaluated by students of Medical College, the primary indexes are the same, and $\boldsymbol{B}2$ of the secondary index are the same to $\boldsymbol{B}1$ mentioned

above; the $\boldsymbol{B}3$ is totally the same to above, other matrixes are shown as follows:

$$\boldsymbol{B}_1' = \begin{pmatrix} 0.5 & 1 & 1 & 1 \\ 0 & 0.5 & 1 & 1 \\ 0 & 0 & 0.5 & 0 \\ 0 & 0 & 1 & 0.5 \end{pmatrix} \quad \boldsymbol{r} = \begin{pmatrix} 3.5 \\ 2.5 \\ 0.5 \\ 1.5 \end{pmatrix} \quad \boldsymbol{B}_1 = \begin{pmatrix} 0.5 & 0.625 & 0.75 & 0.875 \\ 0.375 & 0.5 & 0.625 & 0.75 \\ 0.25 & 0.375 & 0.5 & 0.375 \\ 0.125 & 0.25 & 0.625 & 0.5 \end{pmatrix}$$

$\boldsymbol{B}_4 = \begin{pmatrix} 1 & 3 \\ 1/3 & 1 \end{pmatrix}$; $\boldsymbol{w}_4 = (0.750.25)^{\mathrm{T}}$

Therefore, the corresponding weight-value matrix of $\boldsymbol{B}_1$ is $\boldsymbol{w}_1 = \begin{pmatrix} 0.3508 & 0.2832 & 0.1921 & 0.1740 \end{pmatrix}^{\mathrm{T}}$.

According to the above result, in case the non-direct relevance between the secondary indexes and the primary indexes is not considered, then the weight value of each secondary index against the evaluation should be:

Evaluation on leadership and supervision should be

$(0.112\ 0.090\ 0.069\ 0.047\ 0.091\ 0.077\ 0.064\ 0.050\ 0.036\ 0.047\ 0.076\ 0.032\ 0.062\ 0.119\ 0.030)^{\mathrm{T}}$

Evaluation on students should be

$\boldsymbol{w}\mathrm{S} = (0.124\ \ 0.100\ \ 0.076\ \ 0.052\ \ 0.082\ \ 0.069\ \ 0.057\ \ 0.044\ \ 0.032\ \ 0.042\ \ 0.068\ \ 0.028\ \ 0.055\ \ 0.139\ \ 0.035)^{\mathrm{T}}$

The evaluation results (see Table 4) about teacher A, B and C in the original Table 1 made by the supervision group are taken as the example; according to which, the teaching effect of three teachers are basically equal; and to be specific, the medical teaching effect of B is better than A and C; and the effect of A and C are the same.

Table 4. Results of three young teachers obtained by evaluating based on table 1

	0.5	1.5	1.5	1.5	1.5	0.5	1.0	0.5	1.0	0.5	General comment
A	8	9	8	8	7	10	9	8	8	10	82
B	10	9	9	8	8	9	8	7	8	10	85
C	9	8	9	7	8	10	8	8	9	9	82

Rating as good, medium and bad based on scores of items in Table 2 described as the same or of the similar meaning, with 10 and 9 as the good, 8 as the medium and 7 as the poor. According to Table 5, the teaching level of three young medical teachers are good. However, in case the accurate comparison should be made, then according to the conclusion different from Table 2, A is slightly poor than B and C, B and C are equal. According to Table 6, it can be observed intuitively that the ranking based on teaching attitude should be C, A and B; and the ranking based on teaching content comparison should be B, C and A; the ranking based on methods and means should be C, A and B; and ranking based on teaching effect should be A, C and B. Teacher B is much better than A and C in the teaching content, which is worth learning by another two teachers. These conclusions cannot be obtained intuitively from Table 2. It is obvious that the evaluation made by setting up hierarchical structural model and analyzing at fuzzy analytical hierarchy

process can reflect the objective fact better than the original evaluation, which is also beneficial to improve the teaching quality.

5. Conclusion

The evaluation of medical teaching class is the fuzzy judgment of multiple levels and objectives; how to decide the index and evaluation method is the problem worried by us; the improving scheme is proposed in the Thesis based on the existing research information; in case of simulation test analysis, it is much scientific and reasonable than the original method to some degree; as the secondary index system is set up, the improving direction has been defined for the evaluation result, which is absolutely better than the original method. How to set up the multiple-level hierarchical structural model structure, how to describe indexes for easier operation scientifically and reasonably and the importance of items relative to their superior indexes etc. are required to solved by collecting suggestions widely, which is under proceeding. In order to make the evaluation judge the teaching level and define the improving objectives more objectively so as to improve teachers' teaching level and teaching quality continuously, we are looking forward to the support of all teachers.

The traditional teaching method is applied in the medical teaching; although certain foundation can be set up among students, the traditional teaching pattern is no longer applicable with the development of nursing; teachers focus on the explaining in the traditional teaching pattern, but not pay attention to whether intern students really understand the knowledge; and also ignore the personnel participation of the intern students. In addition, practicing level of intern students is subject to less attention in the traditional teaching pattern, but the evaluation result after their practicing period is subject to excessive concern; such teaching pattern is obviously subject to many problems. However, the teaching methods of evidence-based nursing and case teaching are applied based on the traditional teaching pattern, which is helpful in improving the operation skills and ability of critical thinking of intern students etc. The teaching methods of evidence-based nursing and case teaching are of great significance to the later work of intern students. What's more, the clinical thinking ability of intern students can be also improved; the evidence-based nursing and case teaching are of positive significance, which can inspire intern students; the thinking ability of intern students can be greatly improved under such teaching environment.

References

[1] W. S. Pan, S. Z. Chen, Z. Y. Feng: *Investigating the Collaborative Intention and Semantic Structure among Co-occurring Tags using Graph Theory.* International Enterprise Distributed Object Computing Conference, IEEE, Beijing, (2012), 190–195.

[2] J. W. Chan, Y. Y. Zhang, and K. E. Uhrich: *Amphiphilic Macromolecule Self-Assembled Monolayers Suppress Smooth Muscle Cell Proliferation*, Bioconjugate Chemistry, *26* (2015), No. 7, 1359–1369.

[3] Y. Y. Zhang, E. Mintzer, and K. E. Uhrich: *Synthesis and Characterization of*

PEGylated Bolaamphiphiles with Enhanced Retention in Liposomes, Journal of Colloid and Interface Science, *482*, (2016), 19–26.

[4] J. J. Faig, A. Moretti, L. B. Joseph, Y. Y. Zhang, M. J. Nova, K. Smith, and K. E. Uhrich: *Biodegradable Kojic Acid-Based Polymers: Controlled Delivery of Bioactives for Melanogenesis Inhibition*, Biomacromolecules, *18* (2017), No. 2, 363–373.

[5] Z. Lv, A. Halawani, S. Feng, H. Li, & S. U. Réhman: *Multimodal hand and foot gesture interaction for handheld devices.* ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM), *11* (2014), No. 1s, 10.

[6] Y. Z. Chen, F. J. Tang, Y. Bao, Y. Tang, G. D. Chen.: *A Fe-C coated long period fiber grating sensor for corrosion induced mass loss measurement.* Optics letters, *41* (2016), 2306–2309.

[7] Y. Du, Y. Z. Chen, Y. Y. Zhuang, C. Zhu, F. J. Tang, J. Huang.: *Probing Nanostrain via a Mechanically Designed Optical Fiber Interferometer.* IEEE Photonics Technology Letters, *29* (2017), 1348–1351.

[8] W. S. Pan, S. Z. Chen, Z. Y. Feng.: Automatic Clustering of Social Tag using Community Detection. Applied Mathematics & Information Sciences, *7* (2013), No. 2, 675–681.

[9] Y. Y. Zhang, Q. Li, W. J. Welsh, P. V. Moghe, and K. E. Uhrich: *Micellar and Structural Stability of Nanoscale Amphiphilic Polymers: Implications for Anti-atherosclerotic Bioactivity*, Biomaterials, 84 (2016), 230–240.

[10] J. W. Chan, Y. Y. Zhang, and K. E. Uhrich: *Amphiphilic Macromolecule Self-Assembled Monolayers Suppress Smooth Muscle Cell Proliferation*, Bioconjugate Chemistry, *26* 2015, No. 7, 1359–1369.

[11] D. S. Abdelhamid, Y. Y. Zhang, D. R. Lewis, P. V. Moghe, W. J. Welsh, and K. E. Uhrich: *Tartaric Acid-based Amphiphilic Macromolecules with Ether Linkages Exhibit Enhanced Repression of Oxidized Low Density Lipoprotein Uptake*, Biomaterials, (53) 2015, 32–39.

[12] Y. Y. Zhang, A. Algburi, N. Wang, V. Kholodovych, D. O. Oh, M. Chikindas, and K. E. Uhrich: *Self-assembled Cationic Amphiphiles as Antimicrobial Peptides Mimics: Role of Hydrophobicity, Linkage Type, and Assembly State*, Nanomedicine: Nanotechnology, Biology and Medicine, *13* (2017), No. 2, 343–352.

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