

Exploration and Practice of Teaching Reform Based on OBE Concept in Internal Medicine

Simin Huang^{#,1}, Dan Wang^{#,2}, Chunting Lu^{#,2}, Jing Yang¹, Feifei Wang¹, Yuhong Wen², Andong Fan², Xianjun Meng^{3*}, Jun Guo^{1*} and Shengming Liu^{1*}

¹Department of Internal Medicine, The First Affiliated Hospital of Jinan University, Guangzhou, China

²Science and Education Office, The First Affiliated Hospital of Jinan University, Guangzhou, China

³Health Science Center (Scholl of Medicine) of Jinan University, Guangzhou, China

***Corresponding Author:** Shengming Liu, Department of Internal Medicine, The First Affiliated Hospital of Jinan University, Guangzhou, China.

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#: These authors contributed equally to the work.

Abstract

Objective: To explore the teaching reform in internal medicine based on outcome-based education (OBE) concept and evaluate its effects.

Methods: Forty-nine students in grade 2018 (five-year program) majoring in clinical medicine were enrolled in this study. According to standards and requirements for undergraduate education of clinical medicine in China (2016 edition), combining with the teaching syllabus of internal medicine, learning goals, implementation plan and evaluation index of internal medicine course were established. The course included two parts, part I and part II. Each part contained theoretical and practical teaching. In the process of teaching, many methods were applied, for example, arranged course secretary, established a WeChat group, introduced course and strengthen theoretical knowledge and basic clinical skills such as history taking, physical examination, electrocardiograph interpretation ability and clinical thinking through monthly exercises, case study, autonomous learning. All these measurements were also intended to help students pass the internship qualification examinations smoothly, which was held on May 2022. Scores of final examinations and clinical skills in two parts were used to evaluate the effects. These results were compared with fifty-one students in grade 2017. When every part was end, questionnaires were distributed to understand students' opinions about the teaching arrangement.

Results: Scores of theoretical test of internal medicine part I were 85.62 points in grade 2018 and 81.91 points in grade 2017, and the difference was statistically significant ($P = 0.003$). Scores of history taking in grade 2018 was 83.14 points, higher than that in grade 2017 with 77.45 points. Statistically significant was found between two grades ($P = 0.005$). Three items including physical examination, internal punctures and ECG were no statistically significant. Scores of theoretical test of internal medicine part II was 76.85 points in grade 2018 and 71.18 points in grade 2017. Difference was statistically significant ($P = 0.002$). 34 students in grade 2018 and 49 students in grade 2017 participated internship qualification examination. Results showed that scores of history taking in both stations in grade 2018 were lower than that in grade 2017, but there were no statistically significance. Scores from standardized patient evaluation in grade 2018 were higher than that in grade 2017, there was statistically significance in second station ($P = 0.012$). Scores of physical examination in grade 2018 were higher than in grade 2017, but differences were not found between them. 49 students in grade 2018 finished the questionnaires, 46 students thought they could analyze electrocardiograph proficiency and

improved compared with the time studying diagnostics. In addition, they were very satisfied with the course arrangements, and had a high evaluation on the teaching model of case learning in consolidating history taking, physical examination and cultivating clinical thinking.

Conclusion: The teaching reform in internal medicine based on OBE concept is a good exploration. It improved students' theoretical scores. Students were satisfied with the course arrangements. The proposal to improve basic clinical skills and evaluation indexes need to be explored in the future.

Keywords: *Outcome-Based Education; Clinical Medicine; Internal Medicine; Teaching Reform; Teaching Effectiveness*

Introduction

The concept of outcome-based education (OBE) was put forward by Spady, *et al.* in 1981. It meant that teaching outcomes were determined at the beginning of learning and should be achieved by education. The teaching goal is student's learning outcome, not the teaching process. The core of OBE concept is to shift from the traditional teacher-centered, goal-orientation to student-centered, results-orientation [1,2]. Under the guidance of OBE concept, the goal of education has shifted to focus on how to cultivate students to be qualified a career with knowledge, skills and qualities [3]. In other words, OBE is closely connecting the talent training, major setting and curriculum arrangement of universities with the demands of society and requirements of occupation.

OBE concept has arisen extensive attention in educational fields over the past 40 years. It can be said that OBE is the most prominent and popular idea in the process of reforming the traditional education system [4]. It has been introduced into higher education in many countries. Many educators and teachers reflected traditional training program, teaching strategies and began to apply this concept to specialties setting and curriculum reform [5-7]. Teaching strategies based on OBE included interactive learning, case study, E-learning, adaptive teaching and a site-visit [5].

In 2003, nine abilities were proposed for medical graduates, such as communication, lifelong learning and problem-solving ability [8]. Many studies based on OBE concept in medicine were explored and practiced to improve these abilities. For example, application of OBE concept in cerebrovascular disease teaching to ensure that students met the graduation requirements [9]. Another researcher reformed the curriculum "emergency medicine" to improve students, theoretical and operational levels [10]. Two studies from Korea also showed that OBE concept had great value and significance in medical education [11,12].

In this study, OBE concept was introduced into internal medicine to explore a teaching arrangement to cultivate students with solid theoretical knowledge and practical ability. Internal medicine is a very important curriculum of clinical medicine and its foundations are great significance for learning other clinical courses and practicing in the future.

Aim of the Study

This study aimed at students' learning outcomes based on the standards and requirements that undergraduates of clinical medicine major should meet, combining with the teaching goals of internal medicine, and adopting various methods to achieve the goals.

Materials and Methods

Subjects

For the 2021 - 2022 academic year, 49 students in grade 2018 (five-year program) were enrolled in this study. These students took internal medicine as an elective course for the first time and they came from different provinces and cities in mainland China.

Curriculum

From September 2021 to July 2022, when students studied internal medicine, the OBE concept was introduced into the course to reform the curriculum arrangement. The course was divided into part I and part II. Part I was finished from September 2021 to January 2022, and part II was from March 2022 to July 2022. Teaching contents in these two parts were introduced in the paper published by our team [13].

Plan

Determine learning goals, teaching methods and evaluated index

According to standards and requirements for undergraduate education of clinical medicine in China (2016 edition), combining with the teaching syllabus of internal medicine, learning goals including four fields of science and academic, clinical ability, health education and professional quality, and teaching methods, evaluated index of the course based on OBE concept were established (Table 1).

Fields	Learning goals	Teaching methods	Evaluated index
Science and academic	To master the etiology, pathogenesis, clinical manifestations, diagnosis, treatment and prognosis of important and common diseases in seven systems.	Theoretical and practical learning. Monthly exercises, subjective questions, case learning	Theoretical test and questionnaires
Clinical ability	<ol style="list-style-type: none"> 1. Good communication skills. Be able to communicate with patients, their family members, doctors and other health professionals effectively. 2. Be able to take history comprehensively, systematically and correctly. 3. Be able to perform physical examination in a systematic and standardized manner. 4. Write medical records in a corrected manner. 5. Be able to form a preliminary diagnosis based on the findings of history, physical examination and other clues. Put forward differential diagnosis and reasonable treatment principles. 6. Be able to choose appropriate laboratory and auxiliary examination items according to the patient’s condition. Safety and cost effectiveness can be considered. Be able to interpret the results. 7. Be able to finish thoracentesis, abdominocentesis, bone marrow aspiration and lumbar punctures smoothly. Be able to analyze pleural effusion, ascites and cerebrospinal fluid based on patient’s condition and clinical data. 8. Developing clinical thinking. 	<p>In the ward, case-based learning, group discussion, problem-based learning.</p> <p>In comprehensive clinical skills training center, standardized patient, models were applied to train students.</p> <p>In addition, encouraged students to train these skills by themselves.</p>	Scores of basic clinical skills including history taking, physical examination, internal punctures, ECG interpretation skills. Questionnaires.
Health education	Health education for chronic diseases such as hypertension, diabetes mellitus, coronary heart disease, etc.	Real patients and standardized patients.	History taking.
Professional quality	<ol style="list-style-type: none"> 1. Have empathy, respect for patients and protect their privacy. 2. Team-work spirit. 3. Respect for other health practitioners. Developing collaboration and learning abilities. 4. Establish ability of self-learning and lifelong learning. 	<p>In the ward to attend early shift, ward rounds, interview real patients.</p> <p>Group discussion and autonomous learning.</p>	History taking and physical examination.

Table 1: Learning goals, teaching methods and evaluated index based on OBE concept in four fields.

Process

Arranged a course secretary

A course secretary was arranged to distribute course information, tracking students' learning process, checking homework in Rain Classroom platform and feedback.

Established a WeChat group

A WeChat group included administrators, teachers and students was established at the beginning of the course to provide a platform for communicating between teachers and students at any time.

Course introduction

In the first week of first semester on September 2021, learning goals, contents and methods of the course, problems existing in former students, learning suggestions, course evaluation methods, and composition of final scores were introduced to students by secretary.

Theoretical part

Contents were taught in classroom, introducing important and common diseases included in seven systems. Theoretical study focused on etiology of disease, mechanism, clinical manifestations, diagnosis, differential diagnosis and treatment. Some teachers also introduced new progress of discipline, new diagnosis and treatment methods, guidelines. Professional literature was recommended to read after class. In addition, reinforced theoretical knowledge and clinical thinking through the following methods.

Monthly exercises

Monthly exercises were sent to students through the Rain Classroom platform on the 1st of each month. All exercises were multiple choice questions, including A1, A2 and B1 questions. The topics focused on the scientific and academic fields in seven systems to train students' knowledge application and transformation ability. All questions were accompanied with answers and explanations. Secretary regularly checked students' performance and answered their questions.

Subjective questions

It included noun explanation, fill in the blank and short answer questions which were pushed to students to strengthen students' theoretical knowledge.

Case learning

Presented cases with a step-by-step information presentation mode to intensive history taking, physical examination, selection of laboratory and auxiliary examination and interpretation results, clinical thinking. Consolidated basic knowledge as well as improved students' ability to apply knowledge to solve problems. All cases were divided into four modules [13], which were pushed in turn in Rain Classroom and should be completed in a limited time. Teacher corrected and explained after every module was finished.

Practical part

Both part I and part II were divided into small groups, with 10 - 13 students in each group to practice in the ward or in clinical skills training center.

Reviewed the knowledge related with diagnostics

At the beginning of the practical part, the preview contents of each system were distributed through e-learning platform Rain Classroom, which including the basic knowledge of diagnostics, such as the key points for history taking of symptoms and physical examination, laboratory and auxiliary examination, etc.

Practiced in the ward

Practical process going to the ward included attend early shift, ward rounds and bedside teaching, etc. Students communicated with real patients in the ward and completed history collection and physical examination, and then discussed within groups. Summarized the characteristics of cases and put forward diagnosis, differential diagnosis and treatment principles would be done guided by teacher. Medical record writing was required to finish after class. Sometimes, students had opportunities to see clinical operation scenarios, for example, thoracentesis, abdominocentesis, bone marrow aspiration and lumbar puncture. A variety of teaching methods were used in ward practice, such as case case-based learning, group discussion, and problem-based learning to guide students to master clinical manifestations, diagnosis and treatment process of common diseases, and to cultivate clinical thinking.

Strengthen basic clinical skills

In addition to bedside teaching, strengthen the following basic clinical skills in practical part. Especially in part II, from the first week to the eight week, students were required to train history taking and physical examination every Monday afternoon after class in clinical training center under teacher's supervision in order to help students pass internship qualification examination successfully.

History taking

Introducing standardized patients (SP) to train this skill. The training mode was one-to-one and the process focused on doctor-patient communication skills, humanistic care and history contents. Feedback was given after training and assessment.

Physical examination

Students trained physical examination with each other. They were required to master doctor-patient communication, humanistic care, physical examination methods and be able to finish this process smoothly and proficiency.

Internal punctures

Students completed thoracentesis, abdominocentesis and bone marrow aspiration and lumbar puncture on models according to clinical cases. Teacher observed their performance and gave some advises. At the same time, the characteristics and possible etiology of pleural effusion, ascites and cerebrospinal fluid were analyzed according to patient's condition and laboratory results.

Electrocardiograph (ECG) interpretation ability

Combining with the teaching objectives of cardiovascular diseases in part I, from week 1 to 8, two to three ECG pictures with brief history introduction were distributed every week in Rain Classroom in order to improve ECG interpretation skills. Students were required to write down the characteristics and conclusions of each picture. Teacher corrected and summarized existing problems, omission information, feedback was given one by one.

Autonomous learning in the comprehensive clinical skills training centre

Students made an appointment and trained the above-mentioned basic skills by themselves with 2 - 3 students in a group according to standard procedures issued by teachers.

The arrangements of internal medicine based on OBE concept is shown in figure 1.

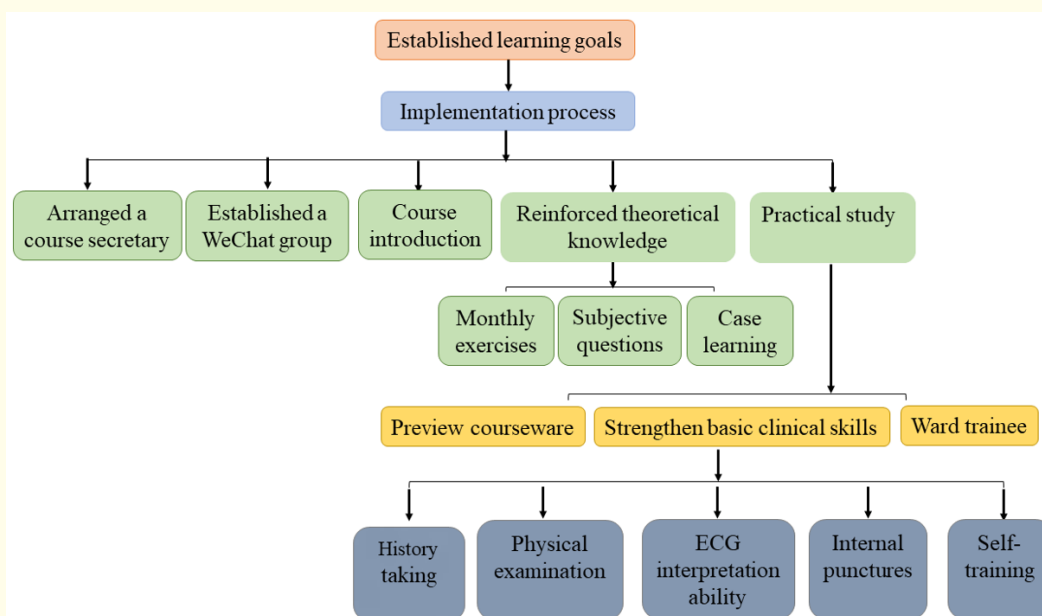


Figure 1: The arrangements of internal medicine based on OBE concept.

Assessment methods

Scores of theoretical tests

The scores of internal medicine part I and part II are composed of 40% usual score and 60% final examination score. 40% usual score included attendance, class performance, homework such as medical records, ECG, monthly exercises, case learning and basic skills exam. The final exam consists of multiple-choice questions (types A1, A2 and B1), short answer questions and case analysis.

Scores of basic skills examinations

Practical process of part I was divided into two rounds. At the end of the second round, skills of history taking, physical examination, internal punctures and ECG interpretation skills were assessed in each group.

When coming to the end of part II, students took internship qualification examination, which was organized by National Medical Examination Center of China (NMEC). The exam consisted of theoretical test and clinical skills test with unified exam questions and scoring standards all over the country. Objective Structured Clinical Examination (OSCE) was applied in clinical skills test. The first to the fourth

stations assessed ability of history taking and physical examination. Students should complete each station within 10 minutes. Here, contents and methods of the first to the fourth station were described.

The first and the second station was history taking. The test mode for these two stations were interviewed SP. One week before the test, scripts were issued to medical universities and colleges from NMEC. SP were trained according to the requirements and scripts. During the examination, the basic information of the patients was provided to students, for example, Li XX, 60 years old, came to the hospital complaining of “shortness of breath and edema”. Patient’s vital signs were T36.5°C, P 95 bpm, R 22 bpm, BP 140/70 mmHg. Please finish present history and other important information within 10 minutes.

Students’ performance was graded by two examiners and a SP who had undergone rigorous training. Assessment criteria for examiners and SP are shown in the following table 2.

Evaluator	Assessment points	Total score	Score distribution	Degree
Examiner	Inquiry contents	60	Present history	No
			Other medical history	
	Comprehensive performance	30	Collecting history, communication ability and humanistic quality.	Five degrees, from 5 points to 1 point with one point for each degree.
SP	Communication ability and humanistic quality	20	Ask questions, communication skills, manners and humanistic care	Five degrees, from 5 points to 1 point with one point for each degree.

Table 2: Assessment criteria of history taking.

As the table was showed, the examiner’s score was composed of two parts: inquiry contents and comprehensive performance. The total score of the former was 60 points, about 80 to 90 percent of it was distributed in present history. The remaining score was for other medical history. Total score of comprehensive performance was 30 points with five degrees, which from 5 points to 1 point. Assessment indexes in this part included collecting history, communication ability and humanistic quality.

The scores evaluated by SP were included two parts, that were communication ability and humanistic quality with two items in every part. The total score in this part was 20 points with five degrees, which from 5 points to 1 point.

The third and the fourth station were physical examination, which completed by using a standard physical examination. Contents in the third station included lung and pleural examination, heart examination and abdominal examination. Contents in the fourth station consisted of five items, for example, blood pressure measurement (indirect measurement method), unilateral axillary lymph node examination, pupil examination, lower extremity edema examination and Babinski examination. Students were required to described the procedures as they finished and reported the results. The assessment criteria included contents, sequence and methods of the exam items. Medical humanistic spirit was also evaluated.

Questionnaires

In January 2022, when part I was end, two questions about ECG interpretation Skills were given to students. The first question was about “the ability of ECG interpretation”. The second question was “compare with diagnostics course, the ability of ECG interpretation was?”. Three choices were given in these two questions (See in figure 6).

When the course was end in June 2022, questionnaires were distributed to understand students opinions about the teaching reform. The contents of questionnaires were showed in table6. There are five choices in every question including strongly agree (5 points), agree (4 points), neutral (3 points), disagree (2 points) and strongly disagree (1 point).

Control group

The results of theoretical and skills test were compared with students in grade 2017 (five-year program) with the same major. They studied internal medicine in 2020 to 2021 academic year, that was from September 2020 to June 2021. Origin of students, textbook, hours and contents of the course in two grades were consistent. Composition of course scores were also the same. Course arrangement in grade 2017 is described in the following figure 2.

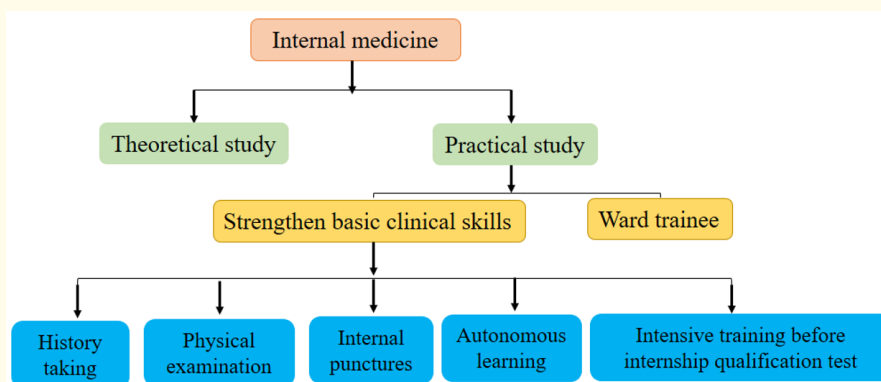


Figure 2: Course arrangement in grade 2017.

Statistical method

SPSS v22.0 was used for statistical analysis. Quantitative data are expressed as the mean ± standard deviation (M ± SD). Comparisons between the two grades were analyzed by independent sample t tests. P < 0.05 was considered to be statistically significant.

Results

Basic information

There are 49 students in grade 2018, including 21 boys and 28 girls. 51 students in grade 2017 with 29 boys and 22 girls were enrolled. There was no significant difference in gender between the two grades (P = 0.161).

Comparison of performance in the first and the second academic year

Grade points in the first and the second academic year between grades were no statistical difference (P were 0.563 and 0.151 respectively). Scores of diagnostics were also no statistical difference (P = 0.150). The results are shown in table 3.

Contents	Grade 2018 (n = 49)	Grade 2017 (n = 51)	P
Grade points in first year	3.52 ± 0.49	3.46 ± 0.44	0.563
Grade points in second year	3.55 ± 0.52	3.40 ± 0.47	0.151
Diagnostics	79.57 ± 7.15	81.73 ± 7.48	0.150

Table 3: Comparison of performance in two academic years between two grades.

Comparison of scores in internal medicine part I between two grades

Scores of theoretical tests of part I were 85.62 points in grade 2018 and 81.91 points in grade 2017. Difference was statistically significant (P = 0.003). Scores of history taking in grade 2018 was 83.14 points, higher than that of in grade 2017 with 77.45 points. Statistically significant was found between these grades (P = 0.005). Three items including physical examination, internal punctures and ECG were no statistically significant. Comparison of scores of part I between two grades were described in the following table 4 and figure 3.

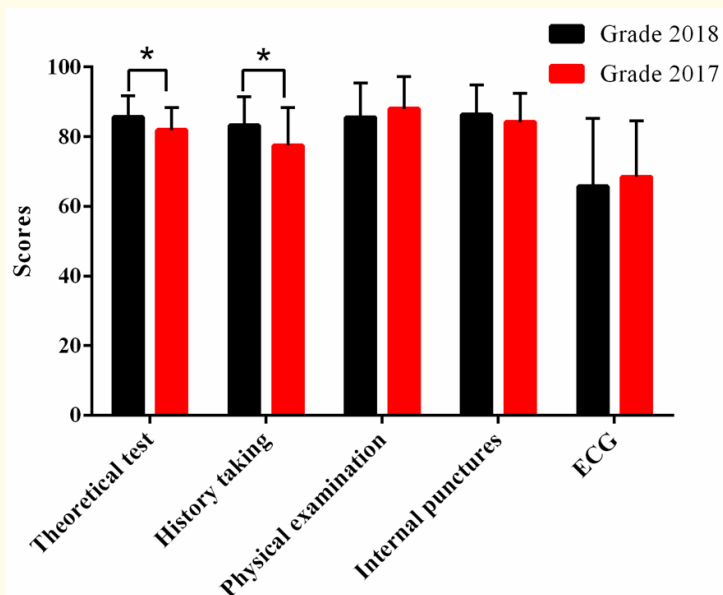


Figure 3: Comparison of scores in internal medicine part I between two grades.

*: P < 0.05.

Contents	Grade 2018 (n = 49)	Grade 2017 (n = 51)	P
Theoretical test	85.62 ± 6.12	81.91 ± 6.45	0.003*
History taking	83.14 ± 8.27	77.45 ± 10.93	0.005*
Physical examination	85.47 ± 9.91	88.00 ± 9.26	0.198
Internal punctures	86.29 ± 8.54	84.19 ± 8.28	0.223
ECG	65.75 ± 19.56	68.39 ± 16.12	0.471

Table 4: Comparison of scores in internal medicine part I between two grades.

*: P < 0.05.

Comparison of scores in internal medicine part II between two grades

As showed in figure 4, scores of theoretical tests of part II were 76.85 points in grade 2018, and 71.18 points in grade 2017 respectively. Difference was statistically significant (P = 0.002).

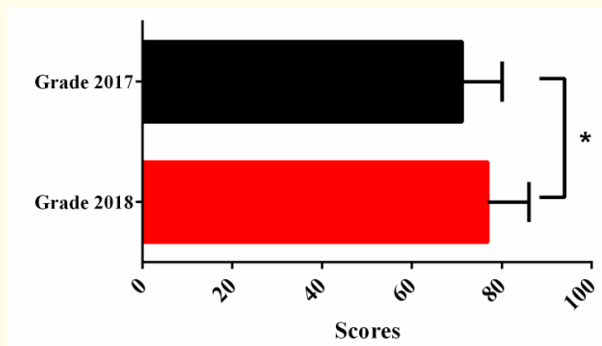


Figure 4: Comparison of scores in internal medicine part II between two grades.

*: P < 0.05.

Scores of internship qualification examination in the first to the fourth station

34 students in grade 2018 and 49 students in grade 2017 participated the examination. As showed in table 5 and figure 4, scores of history taking in both stations in grade 2018 were slightly lower than that of in grade 2017, but there were no statistically significance (P were 0.324 and 0.140 respectively). Scores evaluated by SP in grade 2018 were higher than that of in the grade 2017, there was statistical significance in the second station (P = 0.012). Scores of physical examination in both stations in grade 2018 were higher than in grade 2017, but differences were not found between them (P were 0.607 and 0.393 respectively). The results is showed in table 5 and figure 5.

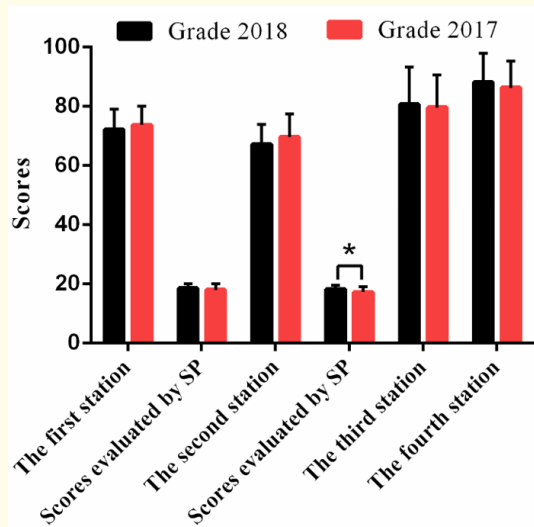


Figure 5: Comparison of scores in internship qualification examination between two grades.

*: P < 0.05.

Contents	Grade 2018 (n = 34)	Grade 2017 (n = 49)	P
The first station	72.07 ± 6.87	73.63 ± 6.44	0.324
Scores evaluated by SP	18.41 ± 1.52	17.87 ± 2.07	0.213
The second station	67.09 ± 6.76	69.55 ± 7.80	0.140
Scores evaluated by SP	18.12 ± 1.32	17.14 ± 1.92	0.012*
The third station	80.85 ± 12.64	79.51 ± 10.95	0.607
The fourth station	88.03 ± 9.75	86.24 ± 8.99	0.393

Table 5: Comparison of scores in internship qualification examination between two grades.

Results of questionnaires

Figure 6 showed the results of questionnaires about ECG interpretation skills. 3 students said they were able to analyze ECG proficiency. 43 students thought they could analyze. However, 3 students said they were still unable to analyze ECG proficiency. When compared with diagnostics course phase, 10 students thought it was obvious improvement after reinforce in internal medicine part I. 36 students said they improved ECG interpretation skills. 3 students considered they had no improvement.

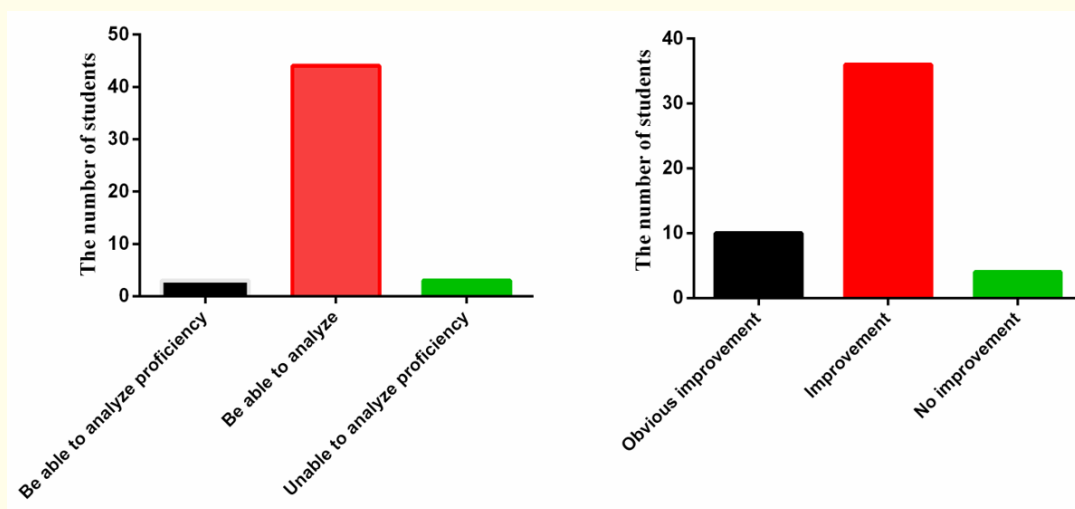


Figure 6: The results of questionnaires about ECG interpretation skills.

Table 6 showed that students were satisfied with the course arrangement, they gave high appraisalment about the teaching reform. Students thought case learning was helpful to consolidate history taking, physical examination and clinical thinking, especially to understand procedures of diseases diagnosis.

No.	Questions	Results
1	I am satisfied with the course arrangement.	4.69 ± 0.51
2	Case learning is very helpful to consolidate history taking skills.	4.49 ± 0.62
3	Case learning is very helpful to consolidate physical examination skills.	4.31 ± 0.77
4	Case learning is very helpful to understand laboratory and auxiliary examination items for diseases.	4.53 ± 0.58
5	Case learning is very helpful to understand procedures of diseases diagnosis.	4.71 ± 0.50
6	Case learning is very helpful to cultivate clinical thinking.	4.61 ± 0.49
7	Case learning increase my interest to studying internal medicine.	4.35 ± 0.69
8	The mode of case presentation can increase my motivation to study.	4.39 ± 0.67
9	It is very helpful with the intensive training of basic skills to participate the internship qualification examination.	4.22 ± 0.72

Table 6: Results of questionnaires.

Discussion

This study explored and practiced teaching reform based on OBE concept in internal medicine curriculum. According to the standards and requirements for undergraduate education of clinical medicine in China, combining with the teaching syllabus, the purpose of this research is to explore a teaching mode to cultivate students with solid theories and clinical skills and improve students' professional quality for the future career. The study strengthened theoretical learning of important and common diseases in seven systems and reinforced the basic clinical skills with diverse methods. The results showed that scores of theories in grade 2018 were significantly improved compared with students in grade 2017. Although not all scores of clinical skills were higher in grade 2018 than those of in grade 2017, for example, physical examination and ECG in part I, history taking in internship qualification examination, students are still generally satisfied with the new teaching model.

With the development of society, the requirements for knowledge, skills and professional qualities have also changed in each occupation. These changes promote universities and colleges to renew educational concept and curriculum setting, innovate teaching methods in order to improve teaching quality suitable for social development and career demands. OBE concept conforms to educational requirements of social development. It focuses on learning outcomes and adjusting educational strategies, teaching methods, assessment procedures and methods accordingly.

In 2018, clinical medicine major of our university passed Medical Education Accreditation Standards. The accreditation carried out on the basis of the standards and requirements for undergraduate education of clinical medicine in China (2016 edition), which referred to the following criterions, they are Basic Medical Education: WFME Global Standards for Quality Improvement (The 2012 Revision); Standards for Assessment and Accreditation of Primary Medical Programs by the Australian Medical Council 2012; The General Medical Council (GMC) 2009 edition of Tomorrow's Doctors and The Liaison Committee on Medical Education 2013 edition of Functions and Structure of A Medical School. The standards had made detailed indexes on the abilities in various domains demanded by doctor in China. All medical schools in China should participate in the accreditation.

Passing accreditation puts forward higher requirements and brings more challenges for clinical medical education in our school. On the basis of these standards and requirements, the training system and curriculum setting should be improved to cultivate students adapt to the new era. Curricular reform and faculty development are strategies to achieve teaching goals [14]. Some scholars believe that innovations is necessary for curricular growth [15]. Based on outcomes-based accreditation strategy can improve clinical competence [16]. So, curriculum reform in internal medicine based on OBE concept has great significances for improving students' professional competence

at this time. According to the research plan, the curriculum was reformed from four fields to improve students' professional competence. The effect of the reform is evaluated from three aspects: final exam, clinical skills test and questionnaire.

The results showed that theoretical scores of both part I and part II in grade 2018 were higher than that of in grade 2017 and the differences were statistically significant. It indicated that the arrangement for reinforcement theory learning is effective though diverse methods, such as monthly exercises, subjective questions and case learning. Through a certain number of exercises to consolidate students' theoretical knowledge and improve their ability of applying knowledge to solve clinical problems.

When compared scores of clinical skills in two grades, score of history taking of part I in grade 2018 was higher than that of in grade 2017 and difference was found. The reason may be that students in grade 2017 had not contacted with real patients when studying diagnostics course from March to July in 2020 due to COVID-19, which resulted in fewer opportunities for practice. Score of internal punctures in grade 2018 was also higher than that of in grade 2017. It may be because they studied this skill offline, which brought more practical opportunities, though there was no statistically significant between grades. Students' performance in physical examination and ECG interpretation in grade 2018 was a little worse than grade 2017.

By the time to internship qualification examination, score of history taking in two stations in grade 2018 was slightly lower than those of in grade 2017, but differences were not significant. It indicated that the ability of history taking was improved in grade 2017 after one more semester of practice and accumulation. Scores evaluated by SP were higher in grade 2018, it may relate with introducing SP for training and test in part I and offline teaching in diagnostics course from March to July in 2021. Doctor-patient communication skills in grade 2018 was better than in grade 2017 because they had more opportunities to talk with real patients repeatedly. Score of physical examination in two stations in grade 2018 was slightly higher than those of in grade 2017, indicated that 1 - 8-week intensive training was effective.

In this study, scores in theoretical test in both parts were higher in grade 2018, but this phenomenon could not find in some skills. It maybe that the improvement of theory is more easy than practical skills, which is difficult and there are many influencing factors, for example, practice opportunity, students, attitude, time of assessment. Generally speaking, student's ability of these clinical skills will improve as time goes, but a reasonable arrangement can ensure students to get adequate practice opportunities and have a right attitude. Actually, there are many researches about how to improve basic clinical skills. A study conducted in University of Sao Paulo, medical students were taught in small groups in contents of taking history, physical examination and make diagnoses under teachers supervision, the teaching reform acquired students highly satisfied and they profit better from it [17]. In Mansoorian's opinion, participation and supervision from teachers in teaching basic clinical skills in bedside is not enough, self-learning is also recommended [18]. Another opinion is that disclosure of basic clinical skill rubrics could enhance students' scores in history taking and physical examinations [19]. Furthermore, adding these teaching contents such as communication training, skills-laboratory training beside bedside teaching can increase students' performance in history taking and physical examination skills [20]. In this study, many methods were used to improve students' ability of basic skills, but more efforts still should be made in the future. Reflection and self-directed learning, and a refresher course are proved effective educational interventions for training clinical skills [21,22]. In the future, we will formulate training programs to improve clinical skills based on literatures and actual situations.

In the past two years, students' learning opportunities in real patients decreased due to COVID-19 pandemic, but the standards for training a qualified doctor have not changed. Research conducted in Indiana found that the most prevalent of competency-related deficiencies in medical students were professionalism, basic clinical skills, and self-awareness, the author thought competency-related deficiencies could be identified and remediated in most cases [23]. Therefore, introducing OBE concept and applying many diverse methods to achieve the outcomes is very necessary. Our study indicated that the exploration and practice of OBE concept in internal medicine is

success and students benefit from this change. A study from Pakistan concluded that students' learning outcome in the contents and skills increased based on OBE implementation in English [24]. Another study conducted by Wang, *et al.* also proved that teaching reforms based on OBE could improve students' abilities demanded by enterprises, survey showed that students got desired occupation with a satisfying salary [25]. The feature of OBE concept is that learning goals is settled at the beginning, but the time to complete them is variable [8]. Students can flexibly arrange the time to finish tasks according to their situations. Therefore, in our research, we not only focus on the guiding role of teachers, but also pay attention to cultivate students' autonomous learning ability, such as monthly exercises and made appointment to practice basic clinical skills.

It is not enough to focus on scores alone to evaluate the effect of a teaching reform. Students' evaluation and satisfaction with the teaching model should also be considered. Teaching strategies are one of the factors evaluating students' satisfaction [26]. Curriculum evaluation mode under OBE concept can be improved [3]. So, in this study, we increase the proportion of ordinary grades in overall evaluation, evaluate students' learning outcomes from multiple perspectives. From the results of questionnaire, 93.9% (46/49) students thought they could interpretate ECG and improved compared with studying diagnostics. Students were satisfied with the curriculum arrangement, especially case learning with information presentation step-by-step, which is helpful to consolidate history taking, physical examination, laboratory examination and to cultivate clinical thinking. The schedule is also helpful them attend internship qualification examination.

In a word, the teaching strategies of internal medicine based on OBE had specific goals what students should achieve and ensured that they could achieve these expectations through appropriate teaching methods. In addition, criteria were set to evaluate whether these goals had finished. The study provides ideas for improving teaching quality, and the experiences can be recommended to other courses.

Limitations of the Study

Move to outcome-based education was a complex process, it needed staffs and students understand and accept the strategy and teaching process, and cleared the relationship among learning outcomes, learning opportunities, curriculum content, and assess students [8]. Several shortcomings exist in this study. First of all, internal medicine was taught by faculty from seven different specialties and the teaching process covered both theory and practice. OBE concept in teachers had different understanding and perspective, which may affect implementation. Making more teachers understand OBE concept and explore the teaching strategies and model based on it is very important [5,27]. Some scholars thought the construction of course teaching system based on OBE concept is helpful to improve teachers' teaching ability [28]. And teachers' level and teaching enthusiasm are directly affected the quality of talent training [29]. So, the renewal of teachers' teaching concept is helpful to improve the teaching quality. For us, there is still a long way to go before the concept of OBE is deeply rooted in every teacher's heart and fully integrated into the whole teaching process. In the future, efforts should be made to unify the teaching modes of the course. The second limitation is related with the evaluation index. In this study, evaluated index in academic and clinical ability, profession quality included final exam, basic skills tests, such as history taking, physical examination, doctor-patient communication and humanistic care. There are no corresponding evaluation indicators in some fields, such as health and social field. The evaluation indicators should be further improved in the future to ensure evaluation index cover each field. Although it is not easy to establish a comprehensive and reasonable evaluation system during OBE implement [30]. The third aspect is about the questionnaires. The content of it mainly emphasized the benefits of case learning, the assessment of other strengthening strategies was not included. Questionnaire should be further improved and updated in the future.

Conclusion

The teaching reform of internal medicine based on OBE concept is a good exploration. It can improve students' theoretical scores. Students are satisfied with the arrangement of the course. The proposal to improve teachers' awareness of OBE concept, basic clinical skills and evaluation indexes need to be explored in the future.

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Conflict of Interest

Declare if any financial interest or any conflict of interest exists.

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