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Research on the Impact of Continuing Medical Education on the Sustainable Development of Zhejiang Provincial Public Hospitals

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Abstract: ***Objective:*** ***This paper explores the impact of continuing medical education (CME) in provincial hospitals on the sustainable development of public hospitals. Based on the KSA model (Knowledge, Skills, Attitudes), it analyzes the role of CME in optimizing the personnel structure of hospitals, improving the quality of talent cultivation, promoting discipline construction, and enhancing patient satisfaction.*** ***Methods:*** ***Taking the representative continuing medical education (CME) projects of provincial public hospitals in Zhejiang Province from 2013 to 2024 as the research objects, this paper analyzes the current situation of CME and then uses the KSA model to analyze the impact of CME on the sustainable development of public hospitals.*** ***Results:*** ***95.7% of continuing medical education programs take the latest medical knowledge and technology as the core content, and the forms of these programs show a trend of diversification. Through knowledge updating and skill training, CME has significantly improved the professional level of medical staff in public hospitals, optimized the personnel structure, promoted talent cultivation and discipline construction, and also enhanced the satisfaction of both patients and medical staff.*** ***Conclusion:*** ***Continuing medical education in provincial hospitals plays a significant role in promoting the sustainable development of public hospitals. However, there is still room for improvement in humanistic medical education and practical skills training. Optimizing the blended teaching model, developing demand-oriented continuing medical education assessment, and improving information management are important directions for enhancing continuing medical education.***

Keywords: Continuing Medical Education, Sustainable Development of Public Hospitals, KSA Model.

1. Introduction

The medical service industry is a field that closely combines labor and technology [1]. Continuing Medical Education (CME), as an important part of lifelong learning for medical personnel, continuously improves the professional skills and service capabilities of medical personnel through systematic training [2], and is an important guarantee for the sustainable development of public hospitals. In 2016, General Secretary Xi Jinping emphasized at the National Health and Wellness Conference that "we should improve the training and development system for medical personnel, so that every medical personnel has the opportunity to receive continuing education and professional retraining, and realize the renewal of knowledge" [3]. On October 23, 2024, the National Health Commission issued the "Management Measures for Continuing Medical Education Credits (Trial)" to encourage the development of diverse and rich educational activities [2]. However, existing research lacks systematic analysis of continuing medical education in provincial public hospitals, especially multi-dimensional research.

This study selected 69 continuing medical education projects of provincial public hospitals in Zhejiang Province from 2013 to 2024 and analyzed their role in optimizing personnel structure, improving the quality of talent training, promoting discipline construction and improving satisfaction based on the KSA model. Knowledge Skill & Attitude (hereinafter referred to as KSA) is a competency evaluation framework based on the three-in-one knowledge, skill and attitude. It is mainly used to reflect the impact of education and training on the comprehensive competence of practitioners [4]. KSA is widely used in the formulation of continuing education and development frameworks to ensure that trainees or practitioners meet the corresponding education and training standards [5]. For example, internationally, the KSA model is used in the field of medical education and quality management in pediatric treatment. In China, most of the KSA systems are used as competency assessment systems, not only in employee training and assessment [6], but also in comprehensively assessing the competence of clinicians and identifying competency gaps [7]. Since continuing medical education is not only directly reflected in clinical practice ability, but also in medical staff's attitude towards patients, professional ethics and values, the comprehensive ability constituted by these three factors is the key to the sustainable development of public hospitals [8].

In recent years, Zhejiang Province, as a pioneer in national medical reform, has provided important lessons for the national medical reform through its innovative practices and advanced experience in the medical field. Against this backdrop, this paper selects representative continuing medical education (CME) programs in Zhejiang provincial public hospitals for evaluation. The study found that CME significantly improved the professional level of medical staff, optimized personnel structure, promoted discipline development, and significantly increased patient and staff satisfaction. However, there is still room for improvement in humanistic medical education and practical skills training. This study provides scientific support for improving the continuing medical education system and enhancing the sustainable development capacity of public hospitals, and has significant theoretical and practical value.

2. Materials and Methods

2.1 Data Sources

The data for this study primarily consist of continuing medical education programs conducted by provincial public hospitals in Zhejiang Province and sustainable development indicators

of these public hospitals. The continuing medical education programs were sourced from the official websites of 17 provincial hospitals in Zhejiang Province, which published training notices from 2013 to 2024. A total of 69 provincial public hospital continuing medical education programs with clear content were selected as the research subjects. According to the 2023 National Tertiary Public Hospital Performance Assessment Manual, the sustainable development indicators of public hospitals include personnel structure, talent cultivation, discipline construction, and credit construction. Since credit construction data are difficult to obtain, the National Tertiary Hospital Performance Assessment Operation Manual (2022 Edition) clearly states that satisfaction is a key monitoring indicator for the sustainable development of public hospitals. Moreover, satisfaction evaluation indicators are widely recognized internationally for measuring hospital credit construction [9]. Therefore, this study selected the satisfaction evaluation indicator to represent credit construction.

2.2 Research Methods

This paper primarily uses the KSA model to conduct a characteristic analysis of continuing medical education programs in provincial public hospitals, and then explores the impact of continuing medical education in provincial public hospitals on the sustainable development of public hospitals (see Figure 1). Descriptive statistical analysis was used to analyze the basic situation of continuing medical education programs in provincial public hospitals. $P < 0.05$ was considered statistically significant.

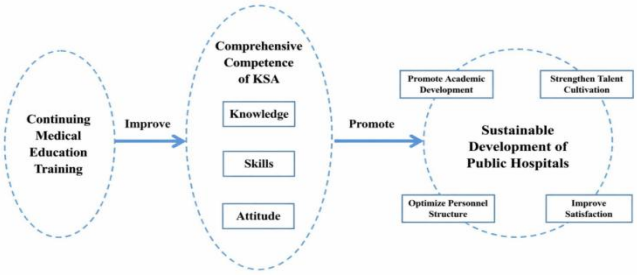

Figure 1: Analysis of the impact of continuing medical education and training on the sustainable development of public hospitals based on the KSA model.

3. Results

3.1 Current Status of Continuing Medical Education and Training in Provincial Hospitals

When evaluating the continuing medical training program of provincial hospitals, we combined the management measures of the National Health Commission and the literature of Michail Sideris et al., and combined the situation of provincial hospitals to select a series of characteristic indicators to evaluate the continuing medical training program, namely, region, pathway, demand, learning outcome, learning method, participation and assessment [10], as shown in Table 1.

Table 1: Evaluation of the current status of continuing medical education training programs (Unit: number of programs; number of individuals)

Year/Quantity	Training Program	Online projects	Offline projects	Online and offline combined projects	National level	provincial	Domestic projects	International Projects	Demand assessment methods	Results of previous activities	Survey of potential participants	Expected learning outcomes	Learning methods	Number of participants in the report
2013	1	0	1	0	1	0	1	0	2	0	0	0	1	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	4	0	4	0	4	0	3	1	9	1	1	4	10	260
2016	1	0	1	0	1	0	1	0	1	0	0	4	2	0
2017	2	0	2	0	1	1	2	0	3	0	2	3	3	180
2018	3	0	3	0	3	0	3	0	6	0	2	5	5	0
2019	4	0	3	1	3	1	3	1	4	1	2	10	9	400
2020	1	0	0	1	1	0	0	1	1	0	0	0	4	1645
2021	7	2	5	0	2	5	4	3	9	2	4	7	16	1390
2022	11	8	1	2	1	10	10	1	21	1	4	17	12	284
2023	11	4	7	0	6	5	10	1	15	3	8	twenty one	20	626
2024	twenty four	3	18	3	12	12	twenty three	1	36	4	13	52	42	17740
sum	69	17	45	7	35	34	60	9	107	12	36	123	124	22525

3.1.1 Forms and Contents of Continuing Medical Education Programs

With the rapid development of information technology, continuing medical education (CME) both domestically and internationally has adopted various organizational methods, including online and offline approaches. In terms of training formats, national-level training programs primarily utilize offline methods (77.1 %), while provincial-level programs show a more balanced distribution between online and offline methods (proportion). Significant differences exist between national and provincial-level training programs in Zhejiang Province ($p < 0.05$). According to the "Regulations on Continuing Medical Education (Trial Implementation)," CME programs are organized and implemented using various methods, including training courses, refresher courses, workshops, academic lectures, academic conferences, professional visits, and planned, organized, and assessed self-study. Analysis shows that in Zhejiang Province, "lectures" are the most common learning method (48/69, 69.6%), followed by "workshops" (12/69, 17.39%). Of the 69 national and provincial projects, 66 (95.7%) focused on the latest medical knowledge and technologies, while only 3 (4.3%) focused on medical ethics and doctor-patient relationships. These included one national project and two provincial projects. All of these projects aimed to cultivate the humanistic qualities and humanistic care abilities of medical staff.

3.1.2 Needs Assessment and Expected Learning Outcomes of Continuing Medical Education Programs

Needs assessment is key to the success of continuing medical education programs [11]. Of the 69 programs included in the analysis, 61 (88.4%) conducted needs assessments, but 79% of the programs considered industry needs, 55.1% focused on improving professional skills, and only 27.5% considered policy requirements. This shows that industry needs and professional skills improvement are valued, but policy guidance is not given enough attention. Historical data and surveys of potential participants are important parts of the assessment and help to understand the development process and actual needs of the program [10]. In addition, of the 69 continuing medical education programs, 59 (85.5%) explicitly

registered the expected learning outcomes. Among them, 22 programs (31.8%) reported a single expected learning outcome, while the remaining programs reported 2-6 expected learning outcomes. The most common learning outcomes included "improving professional knowledge and skills" (21/69, 30.4%), "obtaining various training certificates and credits" (18/69, 26.1%), and "standardizing and improving services in specific fields" (14/69, 20.3%).

3.1.3 Registration and assessment of continuing medical education training programs

According to the "Administrative Measures for Continuing Medical Education Credits (Trial Implementation)," my country implements a registration system for continuing medical education, covering information such as project number, name, date, location, format, and credit hours. Some projects recorded the number of participants and duration. Of the 69 projects, 33 did not mention the number of participants, while the average number of participants for the remaining 36 projects was 581.8. The study showed a weak negative correlation between the number of participants and the duration ($p < 0.05$). my country's continuing medical education adopts a credit system, requiring healthcare professionals to obtain at least 25 credits annually. This requirement ensures broad participation in training. Training locations are mostly concentrated in provincial capitals, with Hangzhou having the most (52.1%), followed by Wenzhou (11.9%). Organizers are required to assess the participation of healthcare professionals, but only 23.2% of projects described the assessment method, with online assessment being the most common.

3.2 KSA Characteristics of Continuing Medical Education Training in Provincial Public Hospitals

Continuing medical education (CME) emphasizes doctors' continuous learning, and the KSA model can adapt to different learning stages. The American Medical Association (AMA) uses the KSA framework to set CME points to ensure that doctors make progress in knowledge, skills and attitudes. This framework is applicable to both individual self-assessment and hospital training planning, and helps hospitals develop CME plans [12]. Based on the KSA model, we analyzed the characteristics of provincial hospital CME projects, covering three dimensions: knowledge, skills and attitudes.

3.2.1 Knowledge Characteristics of Continuing Medical Education

Knowledge is the foundation of evidence-based practice. Timely updated knowledge can help medical staff better understand and apply new medical technologies and methods, thereby improving the quality and efficiency of medical services [12]. Zhejiang provincial continuing medical education training programs show distinct characteristics in knowledge transmission. The vast majority of programs (95.7%) take the latest medical knowledge and technology as their core content, reflecting the urgent need of the medical industry for knowledge updates and ensuring that medical staff can keep up with the forefront of discipline development. In addition, 85.5% of the programs clearly define the expected learning outcomes, among which "improving professional knowledge and skills" is the most common goal (30.4%), which meets the core demand of medical staff for professional knowledge acquisition. However, the program content still has certain limitations. For example, the focus on the field of humanistic medicine is obviously insufficient. Only 4.3% of the programs take humanistic themes such as medical ethics and doctor-patient communication as their main content, reflecting the shortcomings in cultivating the humanistic qualities and care abilities of medical staff. Moreover, the coordination between the program content and policy orientation is weak. Only 27.5% of the programs include policy requirements in the needs assessment, which leads to insufficient alignment between the training content and macro medical policies, affecting the overall training effect.

3.2.2 Occupational Skills Characteristics of Continuing Medical Education

Skills refer to the ability of medical staff to apply knowledge in practical work, including operational skills, communication skills, and decision-making abilities. In terms of goal setting, 20.3% of the projects emphasize "standardizing and improving service capabilities in specific areas," indicating that the project design focuses on improving practical service capabilities, meeting the needs of medical staff's professional development. Continuing medical education training programs in Zhejiang provincial hospitals show a diversified trend, with a relatively balanced distribution of online and offline methods (41.2% online, 52.9% offline), which can meet the learning preferences of different trainees. However, there are still significant shortcomings in skills training. For example, the assessment mechanism is imperfect; only 23.2% of the projects clearly describe the assessment methods, and online assessment is the main method (56.3%). This weak assessment mechanism may make it difficult to effectively evaluate the training effect, affecting the actual effectiveness of skills improvement. At the same time, practical training methods are insufficient. Although "workshops" account for 17.39%, traditional lectures still dominate overall (69.6%). The lack of practical and interactive training may limit trainees' true mastery and application of skills.

3.2.3 Characteristics of Professional Attitudes in Continuing Medical Education

Attitudes are an important component of the KSA model. Positive attitudes and good humanistic qualities are crucial for the professional development of medical staff and patient satisfaction [13]. Continuing medical education programs have made some progress in attitude cultivation, but there is still much room for improvement. Some programs (4.3%) focus on humanistic themes such as medical ethics and doctor-patient relationships, indicating that they pay attention to the cultivation of medical staff's humanistic care ability and professional attitude. In addition, through mandatory credit requirements (no less than 25 credits per year), the programs ensure the participation of all health professionals, which helps to cultivate a professional attitude of lifelong learning. However, the overall importance attached to attitude cultivation is still insufficient. First, the proportion of programs on humanistic care is extremely low (only 3 programs), reflecting that the cultivation of medical staff's

values and professional qualities has not yet become a priority, which may have a negative impact on doctor-patient relationships and the quality of medical services. Second, in the needs assessment, the programs mainly focus on industry needs (79%) and professional competence improvement (55.1%), while the assessment of attitudes, values and humanistic care ability is relatively small, resulting in a disconnect between the training content and the actual needs of the medical industry for humanistic qualities.

Overall, the KSA indicator reflects that continuing medical education in Zhejiang provincial public hospitals focuses on knowledge updating and professional competence improvement, but there are still shortcomings in the practicality of skills training, assessment mechanisms, humanistic care, and value cultivation.

Table 2: Characteristics of Continuing Medical Education Training in Zhejiang Provincial Public Hospitals Based on KSA Analysis

KSA Dimensions	Current situation description	Results Analysis
Knowledge	95.7% of the projects focus on the latest medical knowledge and technologies.	The urgent need for knowledge updates in the medical industry
	"Improving professional knowledge" was the most common goal (30.4%).	The core needs of medical staff for acquiring professional knowledge
	4.3% of the projects focused on humanistic themes such as medical ethics and doctor-patient communication.	There are shortcomings in cultivating the humanistic qualities and compassionate abilities of medical staff.
Skill	20.3% of the projects emphasized "standardizing and improving service capabilities in specific areas".	The project design emphasizes the improvement of actual service capabilities.
	23.2% of the projects explicitly described the assessment methods, with online assessment being the primary method (56.3%).	A weak assessment mechanism may affect the actual effectiveness of skills enhancement.
	The format remains primarily traditional lectures (69.6%).	Lack of practical and interactive training
Attitude	The minimum number of mandatory credits per year is 25.	This ensured the participation of medical staff and fostered a lifelong learning attitude.
	The proportion of projects with a focus on humanistic care is extremely low (3 projects).	The cultivation of values and professional ethics among medical staff has not yet become a priority.
	The demand assessment focused on industry needs (79%) and professional skills enhancement (55.1%).	The training content is out of sync with the actual needs of the medical industry for humanistic qualities.

3.3 Analysis of the Impact of Continuing Medical Education in Provincial Public Hospitals on the Sustainable Development of Hospitals

Studies have shown that by integrating knowledge, skills and attitudes, we can more effectively cultivate the comprehensive professional abilities of medical staff, thereby improving the quality of medical services and the level of hospital management [13]. Therefore, based on the KSA (Knowledge, Skills, Attitudes) model, we conducted a systematic study to explain the important role of CME in improving the comprehensive KSA abilities of medical staff and thus promoting the high-quality development of provincial public hospitals from four dimensions: optimization of health personnel structure, talent training, discipline construction and satisfaction improvement.

3.3.1 The impact of CME on the structure of public hospital healthcare personnel

According to the National Tertiary Hospital Performance Appraisal Manual (2022 Edition), personnel structure indicators include the professional title structure of healthcare professionals and the doctor-nurse ratio. The professional title structure refers to the proportional relationship between the number of personnel with different professional titles, directly reflecting the knowledge level and work ability of healthcare professionals. Data shows that the proportion of personnel with associate senior or higher professional titles in provincial public hospitals increased from 10.45% in 2017 to 13.34% in 2021, while the proportion of personnel with intermediate professional titles remained above 24%. From the KSA model, continuing medical education (CME) training programs in provincial public hospitals reflect the urgent need of medical personnel to update their professional knowledge, with professional knowledge acquisition being the core objective of CME. From 2021 to 2024, the number of provincial CME programs increased from 1080 to 1387, raising the proportion of senior professional titles from 10.45% in 2017 to 13.34% in 2021. Regarding the doctor-to-nurse ratio, the number of licensed (assistant) physicians in Zhejiang Province increased from 190,800 in 2018 to 266,000 in 2023, while the number of registered nurses increased from 201,500 to 292,000, improving the doctor-to-nurse ratio from 1:1.06 to 1:1.08. Meanwhile, the positive correlation ($P < 0.05$) between the number of provincial-level projects and learning methods and the doctor-to-nurse ratio indicates that continuing medical education (CME) also improved the doctor-to-nurse ratio in public hospitals. However, the impact of CME on the structure of healthcare personnel is mainly reflected in knowledge and skills, with a relatively small impact on age and educational background. Future efforts should focus on optimizing the content of CME to ensure it not only improves the knowledge and skills of medical personnel but also has a more comprehensive impact on optimizing the personnel structure.

3.3.2 The impact of CME on talent training in public hospitals

According to the National Tertiary Hospital Performance Appraisal Manual (2022 Edition), the effectiveness of hospitals in undertaking medical talent training is mainly measured by financial input, including teaching expenses, postgraduate medical education expenses, and continuing medical education training expenses. In the context of high-quality development of public hospitals, talent training is key to enhancing their core competitiveness. Data shows that provincial hospitals in Zhejiang Province have seen a significant increase in investment in talent training: from 2017 to 2021, training expenditures increased from 3,192.56 yuan to 4,034.21 yuan; meanwhile, from 2019 to 2023, scientific research and education expenses increased significantly from

13.7421 million yuan to 40.2355 million yuan. From the KSA model, continuing medical education training programs in provincial public hospitals excel in knowledge updating; 95.7% of the programs focus on the latest medical knowledge and technologies, and 30.4% of the programs aim to "improve professional knowledge," fully meeting the urgent needs of medical staff for professional knowledge. However, only 4.3% of the projects involved humanistic themes such as medical ethics and doctor-patient communication, indicating a significant shortcoming in cultivating the humanistic qualities and compassionate abilities of medical personnel. Regarding skills training, 20.3% of the projects emphasized "standardizing and improving service capabilities in specific areas," and 23.2% designed clear assessment methods (56.3% of which were online assessments). However, 69.6% of the projects still relied primarily on traditional lectures, lacking practicality and interactivity, and the assessment mechanisms were relatively weak, potentially affecting the actual effectiveness of skills enhancement. In terms of attitude development, the mandatory 25 credits per year ensured the participation of medical personnel and cultivated a lifelong learning attitude. However, the proportion of projects focusing on humanistic care was extremely low (only 3). Needs assessments mainly concentrated on industry needs (79%) and professional capacity building (55.1%), indicating that cultivating the values and professional qualities of medical personnel has not yet become a priority, and the training content is disconnected from the industry's actual needs for humanistic qualities.

3.3.3 The impact of CME on the development of disciplines in public hospitals

Discipline development primarily refers to the scientific research and innovation of public hospitals, including research project funding per 100 healthcare professionals and the amount of research results commercialized per 100 healthcare professionals. Data shows that since 2018, Zhejiang Province's research project funding per 100 healthcare professionals has steadily increased, reaching 1.2 million yuan in 2020, ranking fourth nationwide in both total amount and per capita funding. By 2023, the per capita research funding for provincial and municipal hospitals had increased to over 2.5 million yuan and 600,000 yuan respectively, further highlighting Zhejiang Province's strong support for scientific research and innovation. From the KSA model, continuing medical education (CME) training programs in provincial public hospitals have played a positive role in promoting discipline development in terms of knowledge updating and skills training. From 2018 to 2023, the number of National Natural Science Foundation of China (NSFC) projects funded by the 17 provincial hospitals in Zhejiang Province increased significantly, consistent with the increasing trend of CME projects, indicating that CME provides important support for scientific research and innovation. From a knowledge perspective, CME has significantly improved the research literacy of medical personnel through systematic training in research methods and the dissemination of cutting-edge technologies, which is directly reflected in the continuous growth of research funding per 100 healthcare professionals. At the skills level, CME's practical training has facilitated the translation of research findings into clinical applications, with the value of such translations reaching 1.7 million yuan in 2023, effectively enhancing the hospital's innovation efficiency. However, CME's impact on discipline development is mainly reflected in the number of research projects and the translation of research results; its influence on discipline development, such as the cultivation of discipline leaders and the building of discipline teams, needs further strengthening.

3.3.4 The impact of CME on patient satisfaction in public hospitals

Based on the attitude dimension analysis of the KSA model, CME in Zhejiang Province significantly improved patient satisfaction and medical staff's professional identity through humanistic literacy training. Taking the Second Affiliated Hospital of Zhejiang University School of Medicine as an example, the ophthalmology new technology training from 2019 to 2021 increased patient satisfaction from 85% to 92%, the effective rate of fundus disease treatment from 80% to 85%, and outpatient volume increased by 12.5% over three years. CME improved medical staff's empathy, professional responsibility, and job satisfaction through medical ethics courses, standardized service procedures, and career development support. However, despite the achievements of CME in improving satisfaction, there are still shortcomings in humanistic care education and communication skills training. Some medical staff lack the necessary communication skills and humanistic care awareness when facing complex clinical situations, leading to frequent doctor-patient conflicts. At the same time, the high work pressure of medical staff and the increase in professional burnout have affected the further improvement of their job satisfaction.

4. Discussion and Suggestions

4.1 Construct a KSA Three-dimensional Collaborative Capability Development System to Solidify the Foundation for Sustainable Development Talent

This study, based on the KSA model, reveals that Continuing Medical Education (CME) in provincial hospitals forms a core driving chain for improving the capabilities of medical staff through knowledge updating, skills enhancement, and attitude shaping. However, current training exhibits significant dimensional imbalances: humanistic medical projects account for only 4.3%, practical assessment coverage is less than 25%, and policy-oriented needs assessment is only 27.5%. This suggests optimization in three aspects: In the knowledge dimension, while strengthening the transmission of new medical knowledge, macro-level requirements such as healthcare reform policies and hierarchical medical treatment should be integrated into the training content. Meanwhile, the blended teaching model of online and offline learning was optimized [14], taking into account the flexibility of online resources and the depth of offline interaction, so as to ensure that students can better update their knowledge and improve their skills. In terms of skills, the step-by-step training model of "theoretical learning - virtual simulation - clinical practice" was promoted, and the proportion of practical forms such as workshops and case studies was increased. The process assessment replaced the single online assessment, and the efficiency of skill transformation was effectively improved [15]. In terms of attitude, existing research on medical

humanities care evaluation tools is mostly concentrated in the nursing field. China is still in the initial stage in this regard, and the existing research does not pay enough attention to the needs of patients [16]. Therefore, a "medical humanities compulsory module" was added, and courses such as doctor-patient communication and ethical decision-making were included in the credit assessment system. Scientific education and humanities education were given equal importance [17], and the empathy of medical staff was improved through scenario-based teaching.

4.2 Strengthen the Demand-oriented Resource Allocation Mechanism to Break Through the Bottleneck of Improving Training Effectiveness

Research shows that although 88.4% of CME projects conducted needs assessments, only 53.6% surveyed the needs of potential participants, and the regional distribution of resources was unbalanced (52.1% of projects were located in provincial capitals), resulting in insufficient training targeting and weak grassroots coverage. By establishing a "three-dimensional demand collection model", namely industry development demand, hospital strategic demand, and individual professional demand, and by conducting annual pre-training questionnaire surveys and in-depth interviews with key departments, the matching degree between training content and the actual needs of medical staff can be improved ; the high-quality development of public hospitals requires reasonable allocation of resources, but there is an imbalance in the regional distribution of continuing medical education resources [18]. Therefore, it is necessary to construct a regional equalization strategy, and through remote live broadcasts, mobile workshops, and other forms, deliver high-quality courses from Hangzhou, Wenzhou and other regions to grassroots hospitals in Quzhou, Lishui and other regions, increase investment in training projects in non-provincial capital areas, solve the problems of imperfect system, lack of effective supervision mechanism, and insufficient funding in the continuing medical education of grassroots medical staff [19], and narrow the gap in medical level between regions ; promote management informatization, build a CME full-process management platform, integrate project application, student management, effect evaluation and other functions, intelligently recommend personalized courses based on students' learning time and assessment results, link process assessment data with professional title evaluation, solve the formalism problem of " taking courses for credits ", and improve the depth of training participation [20].

4.3 Establish a Long-term CME Empowerment Mechanism to Drive the Sustainable Development of Public Hospitals

Studies show that CME has a positive impact on medical staff's professional titles, scientific research translation and patient satisfaction, but there is still room for improvement in discipline team building and occupational burnout intervention. In order to promote the sustainable development of public hospitals, it is necessary to establish a long-term mechanism, including a discipline construction linkage mechanism and a "training-scientific research-clinical translation" docking platform to promote the transformation of training content into scientific research results. At the same time, a satisfaction improvement plan should be carried out, and "stress management" and "career development planning" courses in CME should be added [21], and a follow-up mechanism after training should be established in cooperation with the human resources department, such as customized training for doctors and matching of scientific research mentors, to improve professional identity. In addition, the training effect should be fed back through patient satisfaction data to form a closed loop, and a quality assessment iteration system should be established. The "KSA three-dimensional effect assessment model" should be adopted to conduct quantitative assessment from the three dimensions of knowledge, skills and attitudes. A training effect tracking study should be conducted every two years to ensure that CME is consistent with the hospital's strategic goals.

This study used the KSA model to analyze the impact of CME on the sustainable development of public hospitals, pointing out that the key lies in promoting a positive cycle between individual capacity improvement, organizational effectiveness enhancement and sustainable development by improving individual capabilities, optimizing resources and innovating mechanisms. However, the quantitative interaction of KSA dimensions and the design of cross-regional standardized training framework still need further exploration. Future research can combine structural equation modeling to study the impact of humanistic attitudes on knowledge transformation and conduct comparative studies in multiple provinces to provide a broader reference for the reform of the national CME system. By deeply integrating the KSA model into the continuing medical education system, public hospitals can comprehensively improve the quality of medical staff, realize the transformation from knowledge updating to capacity building, promote the strategic transformation from scale expansion to connotation development, and provide continuous talent and intellectual support for "Healthy China" [22].

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