

Research Hotspots and Development Trend Analysis of Standardized Training of Chinese Medicine Resident Doctors

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Abstract: *Objective:* To explore the research hotspots and trends of the standardized training of TCM resident doctors in the past 11 years through the bibliometric analysis of the research on the standardized training of TCM resident doctors (abbreviated as resident training). Based on the China Knowledge Network (CNKI) database, the research used bibliometric research methods through CiteSpace to visually analyze the annual distribution, institutions, authors, and keywords of articles published from 2011 to 2021 and analyze the frequency and aggregation of keywords. The analytical results were discussed. *Results:* 1) A total of 470 articles on residential training in traditional Chinese medicine were included. The results showed that Beijing Traditional Chinese Medicine Hospital affiliated with Capital Medical University, was the institution with the most publications, and Wang Yan and Liu Yonghui were the authors with the most publications. 2) The research hotspots of TCM residency training mainly include primary teaching, case-based teaching and seminar teaching and other teaching mode research, TCM clinical thinking, clinical skills and doctor-patient communication ability and other post competency training research, teaching reform, dual-track integration and "5 + 3" integration and other talent training models research, TCM inheritance, residential training quality, residency employment and scientific research capabilities and other problems in TCM residential training, TCM innovative talent training and TCM international integration exploration and practice research. 3) From the exploration of standardized training mode—the exploration of teaching reforms and teaching methods — The research on the competency of resident doctors was the trend of the research on residential training of traditional Chinese medicine. Conclusion The critical research directions of TCM residency training should focus on the teaching and training mode of TCM residents, the problems existing in TCM residency training, the cultivation of innovative TCM talents and the internationalization of TCM.

Keywords: Traditional Chinese Medicine, Standardized Residency Training, Visualization Analysis

1. Introduction

Medical education is a cornerstone for the development of health care. Residential training in Traditional Chinese Medicine (TCM) is essential to medical education after graduation from TCM. It is the only way to train qualified TCM clinicians, an essential link in the training of TCM talents [1], and an essential means to train TCM talents in line with international practice [2]. Since the outbreak of the novel coronavirus, the world has a new understanding of

TCM. The world has a new understanding of TCM. [3] Currently, China is facing the new task of implementing the healthy China strategy. Still, there are some problems in Chinese medicine education, such as optimizing the talent training structure and improving the training quality. In this study, we used the Bibliometrics method to conduct a statistical and visual analysis of the relevant literature in the field of TCM residential training in the past 11 years in the CNKI database. The purpose of this study is to provide a reference for relevant researchers.

2. Data Acquisition

This bibliometric analysis is based on the CNKI database from January 2011 to December 2021. Data retrieval strategy: topic = "Resident" and topic = "standardized training" and topic = "traditional Chinese medicine", 667 related literatures were retrieved. Manually select and remove literature such as meeting minutes, advertisements, notices, newspapers and achievements, then through reading these documents, screen out the literature that is irrelevant to the research topic. Finally, 470 pieces of literature were selected as the analysis object. In order to avoid analysis bias caused by the CNKI database update, the data was retrieved on August 9, 2022.

2.1. Analysis Method

These 470 documents were exported from the CNKI database in Refworks format. Then, CiteSpace (version 5.8.R3) [4] was used to convert the original data into data in the

web of science format and remove duplicates. No duplicate literature was found. The parameters of CiteSpace were as follows: the Timespan was 2011-2021, the Slice Length was one year, and node types were, according to the research contents, different options, such as institute, author and keyword.

2.2. Result

2.2.1. The Analysis of Publication Quantity

From 2011 to 2021, 470 pieces of literature related to the residential training of TCM were published. Before 2019, the number of literary publications increased year by year, and then the number of literature published in 2020 decreased by 21 compared to 2019. In 2021, two more pieces of literature were published than in 2020. The number of publications related to the standardized training of Chinese medicine residents in the past 11 years showed an increasing trend and tended to be stable in the past two years. (Figure 1)

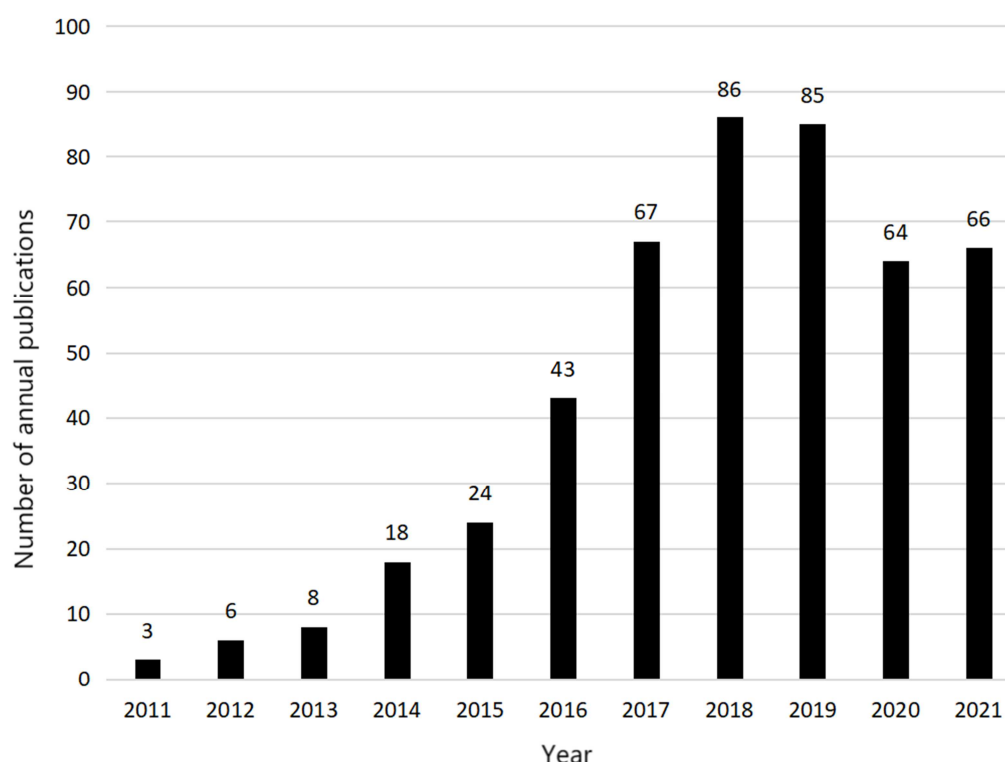


Figure 1. The number of publications indexed by CNKI from 2011 to 2021.

2.2.2. The Analysis of Institution

Generating an institution map using CiteSpace resulted in 315 nodes. Three hundred fifteen institutions have published relevant literature on residential training in traditional Chinese

medicine. Due to some medical institutions having multi-level departments, these institutions are merged after the manual screening. The top 10 prolific institutions in this field are counted and listed in the form of charts (Table 1).

Table 1. Top ten prolific institutions were researching residence training of TCM.

Ranking	Institutions	Frequency
1	Beijing Hospital of TCM Affiliated with Capital Medical University	41
2	The First Affiliated Hospital of Henan University of TCM	18
3	The First Affiliated Hospital of Guangxi University of TCM	16
4	The First Affiliated Hospital of Guangzhou University of TCM	13
5	Yunnan University of TCM	13

Ranking	Institutions	Frequency
6	Dongzhimen Hospital of Beijing University of TCM	11
7	Affiliated Hospital of Changchun University of TCM	9
8	The Second Affiliated Hospital of Henan University of TCM	9
9	Shanghai University of TCM	9
10	Guangzhou University of Chinese Medicine	8

2.2.3. The Analysis of the Author

A visual map describing the author has been generated: The number of nodes is 1468, the number of links is 3680, and the density is 0.0034 (Figure 2). A total of 1468 authors

participated in the research on the standardized training of Chinese medicine residents. The authors who produced the most literature in this field were Wang Yan and Liu Yonghui, and each published seven articles.



Figure 2. Top 10 prolific authors were researching residence training in Traditional Chinese Medicine.

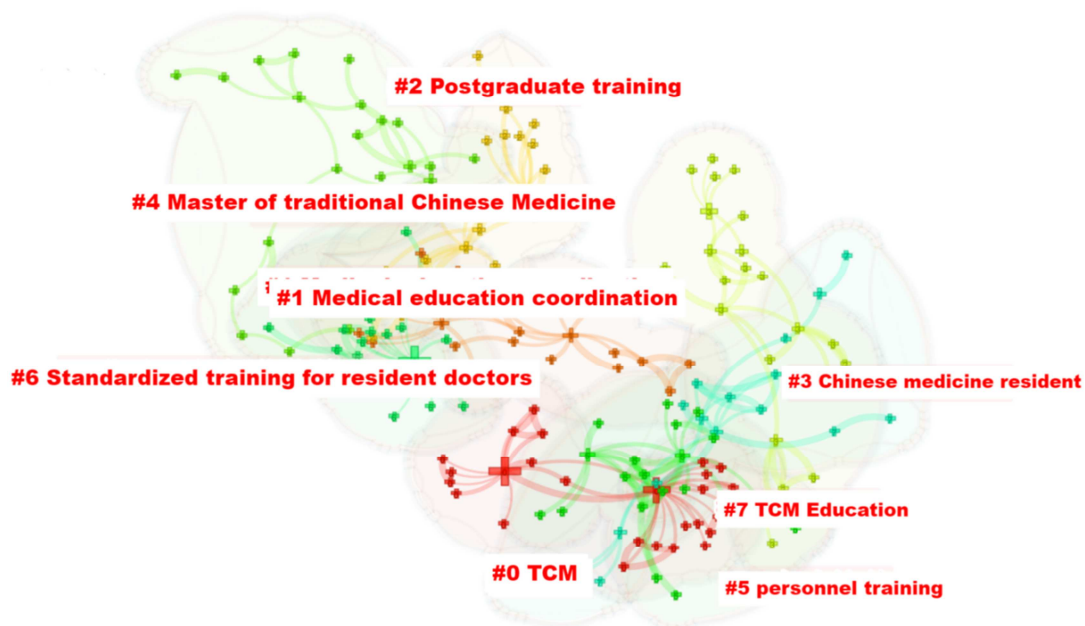


Figure 3. Keyword network diagram.

2.2.4. The Analysis of Keywords

The node type was set as the keyword, and the CiteSpace

was run to generate a keyword network map (Table 3, Figure 4). Table 3 lists the top 15 frequently occurring keywords, and

Figure 4 lists the top 15 with solid centrality. Then, by clustering analysis of keywords, CiteSpace generated a map with $Q = 0.8348$ and $S = 0.9394$ (Figure 3). According to the cluster analysis results, TCM residency studies were divided into eight major categories: TCM, medical-educational collaboration, postgraduate training, TCM residency, TCM master's degree, personnel training, standardized residency training and TCM education. Refining these eight categories of research directions according to the frequency of keywords and combining the information in Tables 2 and 3, the analysis revealed the following research hotspots in TCM residency: (1) Research on the exploration of teaching modes such as CBL teaching, PBL teaching, seminar teaching, SP teaching, video clinical teaching, Internet teaching, triple teaching, outpatient teaching and flipped classroom; (2) Research on talent training modes such as medical-teaching collaboration, teaching reform, dual-track integration, "5+3" integration and talent training program; (3) Research on the training of TCM residents' job competencies such as TCM clinical thinking, TCM clinical competence training, clinical practice competence, TCM classical learning, comprehensive quality training and doctor-patient communication competence. (3) research on TCM clinical thinking, TCM clinical competence training, clinical practice ability, TCM classical learning, comprehensive quality training and doctor-patient communication ability, etc. (4) research on TCM resident assessment mechanisms such as training assessment system, assessment scheme, two-way assessment and improved mini-clinical exercise assessment; (5) research on residency

training management mode, teaching, scientific management, teaching management, training management, etc. scientific management, teaching management, training bases and teaching teams, etc.; (6) research on the inheritance of TCM, quality of TCM residency training, employment of TCM residents and scientific research ability of TCM residents and other problems in TCM residency training; (7) research on the exploration and practice of training innovative talents in TCM and internationalization of TCM.

Table 2. High-frequency keywords.

Ranking	Keywords	Frequency
1	Standardized training	146
2	Residency Standardized Training	144
3	TCM	102
4	Residency	99
5	Chinese Medicine Residency	36
6	Standardized Training for TCM Residents	32
7	Medical Education Synergy	25
8	Talent Development	22
9	Training Model	18
10	Chinese Medicine	18
11	Graduate Students	14
12	Teaching Reform	14
13	Postgraduate Training	14
14	Professional Degree	13
15	Teaching	12

Timespan: 2011-2021 (Slice Length=1)
 Selection Criteria: g-index (k=25), LRF=3.0, L/N=10, LBY=5, e=1.0
 Network: N=295, E=402 (Density=0.0093)
 Largest CC: 268 (90%)
 Nodes Labeled: 1.0%
 Pruning: Pathfinder
 Modularity Q=0.8348
 Weighted Mean Silhouette S=0.9394
 Harmonic Mean(Q, S)=0.884

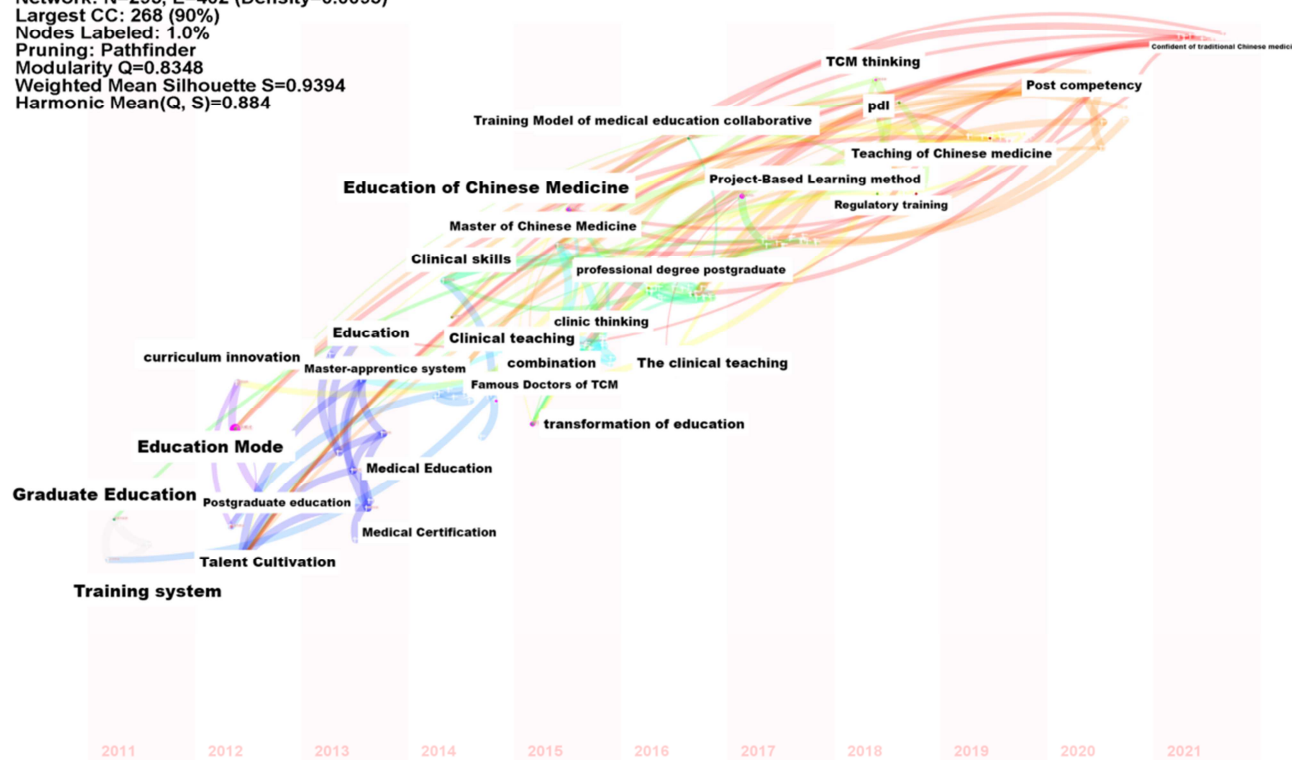


Figure 4. Keyword time zone map.

Table 3. Keywords of strong centrality.

Ranking	Keywords	Centrality values
1	Standardized Residency Training	0.76
2	Training Model	0.72
3	Traditional Chinese Medicine	0.47
4	Chinese Medicine	0.41
5	Professional Degree	0.31
6	Talent Cultivation	0.26
7	TCM Pediatrics	0.25
8	TCM Education	0.24
9	pbl teaching method	0.22
10	Teaching Reform	0.21
11	TCM Class	0.19
12	Residency	0.18
13	Communication skills	0.16
14	Teaching	0.15
15	Clinical Practice Ability	0.15

2.2.5. Research Trend Analysis

The main keywords from 2011-2013 were standardized residency training, training mode, personnel training, teacher training, curriculum reform, etc. From 2014 to 2017, the main keywords were clinical skills, clinical thinking, clinical teaching, clinical teaching, teaching reform, PBL teaching method, medical-teaching collaboration, etc. From 2018 to 2020, the main keywords were TCM clinical thinking, teaching mode, Internet, triple teaching, job competency, etc. Analysis of the keyword time zone map revealed that the exploration of standardized training model, teaching reform and teaching method, and resident job competency are the trends of TCM residency research, and teaching model and job competency are the key research directions of TCM residency training.

3. Conclusion

The residency training system was officially launched in China in 2014 [5]. Residency training is an integral part of post-graduation medical education, aiming to train residents to work independently [6, 7], and the primary model is "5+3", i.e., five years of undergraduate medical education followed by three years of residency training [8]. Residency training in TCM is the critical link of medical education to deepen the reform of TCM personnel training and is an effective way to strengthen the construction of TCM clinical personnel [9]. Therefore, TCM residency training is a critical component of TCM talent construction. However, TCM residency training is still in the initial stage in China. Due to the differences in economic development, education, and medical level in different regions, many difficulties and defects have been exposed in TCM residency training [10].

3.1. Continuously Explore Cultivation Mode and Teaching Methods

Cultivation mode and teaching reform are two major clusters in this study, as well as high-frequency and high-school centrality keywords. In October 2017, Xi Jinping put forward the health China strategy at the 19th National Congress of the Communist Party of China, which provides a

broader prospect for TCM health services. However, China's TCM education has a single cultivation mode, and the curriculum and teaching content are detached from clinical reality. Therefore, exploring new training modes and teaching methods to cultivate residents' TCM clinical thinking and clinical skills has become an unavoidable problem for TCM residency training [11]. The CBL teaching method is case-oriented and problem-based, and research shows that CBL teaching can enhance the effectiveness of residency training [12]. PBL teaching is based on actual problems of clinical cases, with students as the core, group discussion as the primary mode, under the instructor's guidance, and the learning process of analysis and practice around the diagnosis and treatment of specific cases and other issues [13]. Exploring the application of different teaching modes such as CBL teaching, PBL teaching, seminar teaching and flipped classroom to find the suitable training mode and teaching method for TCM residents will be the crucial research direction and content of TCM residency training.

3.2. Promote the Development of Chinese Medicine Heritage and Innovation

The clustering of this study shows that the inheritance of TCM and the cultivation of innovative talents in TCM are the hot spots of concern for TCM residency training, and the inheritance and innovation development of TCM is vital for adhering to the equal importance of Chinese and Western medicine, creating a health and health development model with Chinese characteristics in which TCM and Western medicine complement each other and develop in a coordinated manner, giving full play to the original advantages of TCM and promoting innovative breakthroughs in China's life sciences, carrying forward the excellent Chinese traditional culture, enhancing national confidence and cultural In October 2019, the Central Committee of the Communist Party of China (CPC) and the State Council's Opinions on Promoting the Inheritance and Innovative Development of Chinese Medicine pointed out that the development foundation and talent building of Chinese medicine are still relatively weak, and the inheritance of Chinese medicine is insufficient, innovation is not enough, and its role is not entirely played [14]. Therefore, promoting the inheritance of TCM, improving the quality of TCM talent training, and promoting TCM science and technology innovation have become imperative and are also hot spots of concern for TCM residency training. Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the reference list. Use letters for table footnotes.

Unless there are six authors or more give all authors' names; do not use "et al.". Papers that have not been published, even if they have been submitted for publication, should be cited as "unpublished" [4-8]. Papers that have been accepted for publication should be cited as "in press" [9-12]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the

English citation first, followed by the original foreign-language citation [13-15].

3.3. Continuously Explore Cultivation Mode and Teaching Methods

The time zone chart of this study shows that "job competence" is a keyword that will appear in 2020. The contradiction between people's infinite demand for health and limited medical competence will always exist. It is worthwhile to pay attention to how much the social groups tolerate residents with insufficient clinical experience, which requires residents to improve their clinical competence. TCM residency training is a clinical training that enables medical students to improve their clinical thinking, clinical practice skills and doctor-patient communication to have strong job competency. Culturing medical students' clinical competence through TCM residency training will be the critical direction of TCM talent training research.

3.4. Cultivating Cultural Confidence in Chinese Medicine

The culture of TCM is a valuable asset to human health, as it unites thousands of years of Chinese medical philosophy and practical experience. However, with the development of Western medical thinking and the influence of the modern scientific atmosphere, students in TCM colleges and universities have lost their recognition of the superiority of TCM culture itself. They are unable to fully recognize and dare to learn from TCM theories. [15] It is an opportunity and a challenge for TCM colleges and universities to train future successors of the TCM career in the context of the new era. How to fit the traditional teacher-apprentice model of TCM with the Western medicine residency model, better inherit TCM thinking, let students fully experience the essence and connotation of TCM culture in clinical practice, establish TCM cultural confidence, and provide enduring vitality for the development of TCM inheritance is the way forward for the development of TCM residency training in the new era.

In summary, TCM residency training is the starting point for training qualified clinical TCM physicians, and the development of TCM urgently needs innovative TCM talents; it is an important research direction for TCM talent training to continuously explore teaching and training modes and improve the job competence of TCM residents.

Competing Interests

The authors declare that they have no competing interests.

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