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Research Status of Medical English based on CNKI Bibliometric Analysis and its Development Trend in China: Professional Cultivation and Teacher Development

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Abstract. Medical English provides a good platform for China to learn advanced Western medical knowledge and align with the world's advanced medical level, especially after the COVID-19 pandemic. This article first uses the CNKI (China National Knowledge Infrastructure) bibliometric visualization analysis tool and adopts content analysis to search and statistically analyse 248 academic articles on medical English published in China from 2011 to 2023. From the aspects of publication volume, literature sources, author and institution distribution, research topics, research methods, progress analysis is conducted on these articles to review the status quo of medical English research in China. The findings showed that the number of medical English papers fluctuates. There are few hot topics in research that directly involve medical issues. There are also few research achievements on medical English high water content. Furthermore, the research methods of medical English are mainly quantitative and experiential while the majority of medical English researchers are English teachers from higher medical institutions. This has enlightening implications for the future development direction of medical English. The training of medical English professionals and the professional development of medical English teachers will become new directions for future medical English research and development. Subsequently, this study further explores new ideas for training medical English professionals in the post-pandemic era. Finally, this study proposes professional development strategies for one type of medical English teacher with an English educational background in the

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transitional period. This study aims to provide some implications for medical English teaching reform.

Keywords: English for Specific Purposes (ESP); medical English; research status; professional cultivation; teacher development

1. Introduction

English for Specific Purposes (ESP) refers to English courses related to a specific profession or discipline, designed according to the specific purposes and needs of learners, such as tourism English, medical English, and the like (Ping, 2016). ESP has evolved significantly since its inception in the 1960s, particularly in foreign countries where it has become an independent branch of linguistics. In China, the academic research on ESP began in the 1980s and has since been a focal point for over forty years. With the evolving societal landscape and economic growth, higher education institutions in China are tasked with training versatile professionals adept in both professional knowledge and foreign languages, essential for international engagement. It can be seen that ESP has played a pivotal role in the reform of English teaching within higher education in China.

In May 2011, the English for Special Purposes Professional Committee of China Foreign Language Teaching and Research Association was officially established with the aim of conducting research on ESP teaching and theory in order to elevate the standards of ESP education and research nationwide. The establishment of this specialized academic organization marks a new era of systematic planning and comprehensive development in ESP research in China (Cai, 2015). In this context, medical English, as an important branch of ESP, has rapidly become a research hotspot and researchers in the ESP field have yielded notable research outcomes after years of development (Cai, 2021). However, at present, there remains a lack of systematic reviews and summaries of medical English research based on certain analysis tools within the academic sphere (Li et al., 2023). Therefore, this study positions itself at the juncture of the establishment of the English for Special Purposes Professional Committee from 2011, serving as a springboard for comprehensive analysis in this article based on the CNKI bibliometric analysis tool.

From a macro perspective, this study classifies and analyses the research status of medical English academic articles published in China over the past decade (2011-2023). Specifically, it focuses on scrutinizing the quantity, literature sources, authorship and institutional affiliations, research topics, and methodologies. By linking past endeavours to future prospects, the study seeks to furnish valuable insights for the trajectory of medical English research in China. Meanwhile, in the post-pandemic era, the demand for international and compounding medical English professionals is rapidly surging in China. "Compounding" here refers to the composite blending of and infiltration between disciplines (Wang et al., 2020). However, in order to cultivate such high-end international and versatile medical English professionals, it is necessary to have an exceptional medical English teacher group (Jiao & Liu, 2019). The professional development level of medical English teachers is paramount in shaping the quality of medical English education

and professional development (Cai, 2022). Therefore, based on an overall analysis of the research status of medical English, this study also delves into two crucial research dimensions: the training of medical English professionals and the professional development of medical English teachers. By delineating these perspectives, the aim of this study is to provide actionable strategies and recommendations for medical English researchers, while also offering insights to inform the direction and content of future medical English teaching reform.

2. Research Status of Medical English Based on CNKI Bibliometric Analysis

This study opted to utilize medical English articles authored by Chinese scholars and published in journals indexed by the CNKI database in China from 2011 to 2023 as its primary literature sources. The selection of the CNKI database is based on several justifications. Firstly, the CNKI is one of the most comprehensive and authoritative academic databases in China, encompassing a vast array of scholarly journals across various disciplines, including medical English. Secondly, the CNKI indexes a significant proportion of Chinese scholarly publications, ensuring a comprehensive coverage of relevant research within the Chinese academic landscape. Thirdly, the CNKI database provides advanced search functionalities and rigorous peer review processes, enhancing the reliability and quality of the selected articles.

This study utilized the CNKI visual bibliometric tool to conduct the advanced searches. The CNKI Visual Bibliometric Tool is specialized software developed by the CNKI that enables researchers to perform advanced searches and analyses within the CNKI database. This tool allows users to visualize bibliometric data through various graphical representations such as charts and diagrams. Researchers can utilize this tool to identify aspects such as influential authors, emerging trends, and research topics within their field of study. The CNKI Visual Bibliometric Tool enhances the efficiency and effectiveness of literature analysis by providing a user-friendly interface and powerful analytical capabilities tailored to the needs of academic and scientific research.

Firstly, this study implemented a combined fuzzy search strategy utilizing "Medical English" and "ESP" as the thematic words or keywords while simultaneously excluding the irrelevant term "EGP". This initial search yielded a total of 299 articles. Among these articles, eight book reviews, such as Meng's (2019) review of the book, *Medical Imaging Technology Industry English*, were excluded; a total of 291 articles were actually obtained. Secondly, this study further analysed the titles, abstracts, and, where necessary, full texts of the 291 articles using the content analysis method. This meticulous approach facilitated the exclusion of articles with irrelevant content and unclear themes. Then, 43 articles with irrelevant content, such as that of Wang et al. (2017), which only explored the training model for the comprehensive English ability of medical staff, were excluded. Subsequently, the search results underwent a rigorous review process by peer experts, then were adjusted again based on their feedback to ensure their accuracy and relevance. Finally, 248 articles were selected as research samples.

By reviewing these papers, this study mainly analyses and explores the research status quo of medical English in China focusing on the following five aspects: (a) the number of research papers and overall research trend of medical English in China; (b) the distribution of disciplinary fields and specific literature sources in medical English research; (c) the authors of medical English papers and the distribution of their affiliated institutions; (d) the hot topics in medical English research; and (e) the research methods for medical English.

2.1 Quantity of research papers and overall research trend of medical English in China

The statistical results showed that the research trend of medical English from 2011 to 2023 roughly presents three stages. The first stage is a period of rapid growth. The overall number of published medical English research papers in China from 2011 to 2015 showed an increasing trend, and the growth momentum was significant. The quantity of research papers reached its peak in 2015 (31 papers). This is basically consistent with the research findings of Cao (2016), who pointed out that the number of related studies in the field of medical English showed an upward trend from 2011 to 2015. This phenomenon indicates that there is an urgent need for research on ESP and medical English in China (Chen, 2023). The second stage is a period of stable development. Although the quantity of research papers decreased from 2015 to 2019, it has maintained a stable development trend, which to some extent reflects that research in this field has gradually entered a period of stable development. The third stage is a bottleneck period. Owing to the impact of the global COVID-19, the total number of medical English papers published since 2020 is relatively small, and has remained relatively equal to that of 2011 in the past two years. This indicates that research on medical English has undergone a period of rapid expansion and stable development, and is now in a state of saturation and stagnation, with little recent progress in updated research.

The research on medical English urgently needs to explore new perspectives and content. The research on medical English in the new era should not be simply limited to what medical English is and how important it is, but should be aligned with the new policies and requirements proposed by China for medical English under the current circumstances. In the post-pandemic era, the demand for medical English professionals who are proficient in professional knowledge and have strong foreign language abilities continues to increase, and China attaches great importance to the development of medical English teaching staff, with apparent strengthening of relevant policy protection (Fan et al., 2023). Therefore, paying attention to the professional development of medical English teachers is the key to deepening and expanding medical English research scope in the future (Figure 1):

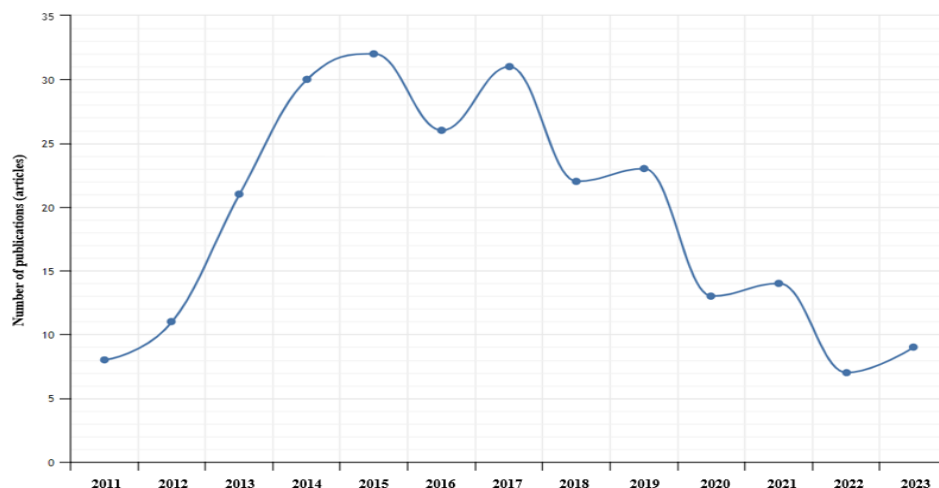


Figure 1: Number of papers on medical English published from 2011 to 2023

2.2 Distribution of disciplinary fields and specific literature sources of medical English research

The statistical results showed that research papers on medical English published from 2011 to 2023 were mainly concentrated on three major disciplines: Foreign Language and Literature, Medical Education, and Higher Education (Figure 2):

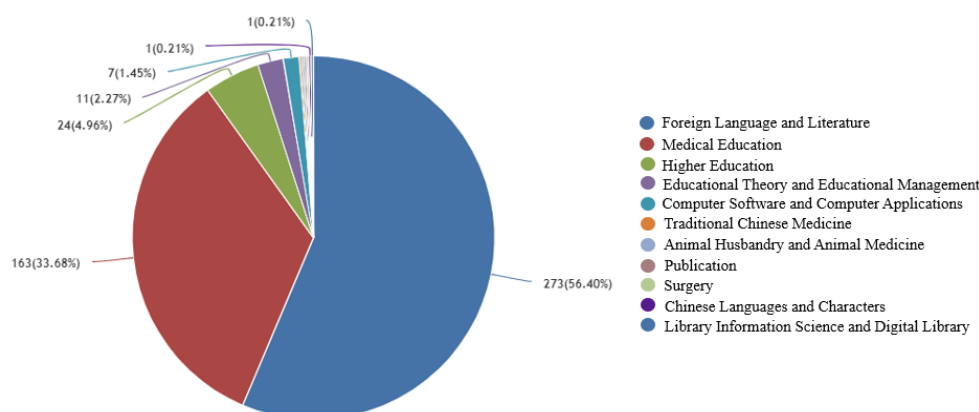


Figure 2: Distribution of disciplinary fields of research on medical English

From the distribution of literature sources, the top three in terms of quantity of papers are foreign language journals such as Campus English, China ESP Research, and Overseas English. Next are medical education journals such as Chinese Journal of Medical Education, China Continuing Medical Education, China Higher Medical Education, and China Medical Education Technology (Figure 3):

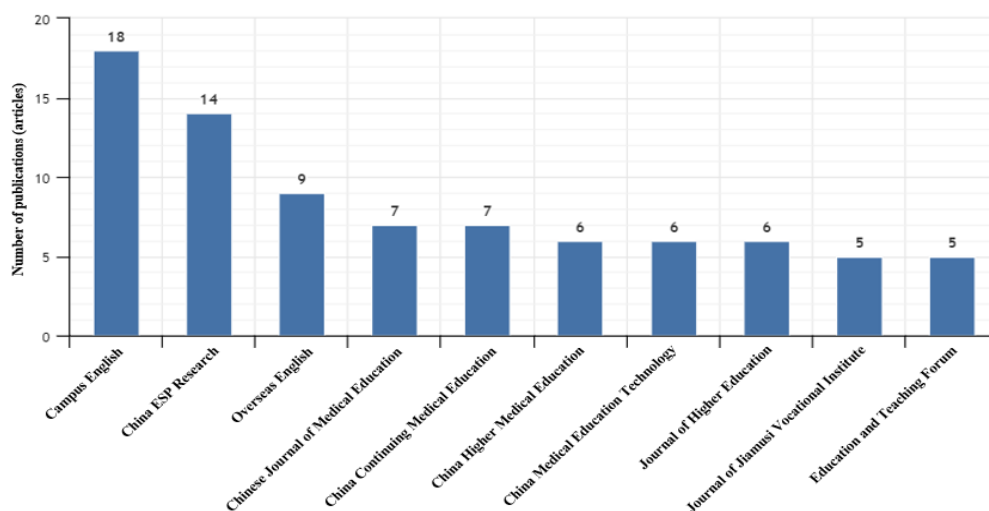


Figure 3: Distribution of the top ten literature sources

It can be seen from Figure 3 that most foreign language journals and medical education journals have been already exploring the topic of medical English, while other journals have paid relatively insufficient attention to medical English research. After further screening, it was found that relatively few articles have been published in core journals indexed in Core journals of Peking University (PKU), the Chinese Social Science Citation Index (CSSCI), and Core journals of Chinese humanities and social sciences (AMI), with only 37 articles (accounting for 14.9%) (Figure 4):

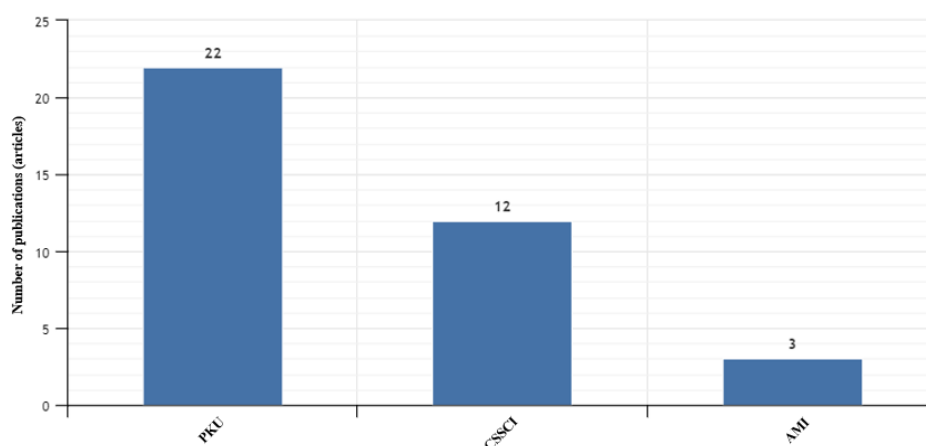


Figure 4: Number of papers published in core journals indexed in PKU, CSSCI, and AMI

Moreover, most of the core journals mentioned above are foreign language Core journals. This research status also reflects the problem of the low research level of medical English in China; the quality of research on related topics of medical English needs to be further improved.

From the above statistical results, it can be seen that (a) medical English has interdisciplinary characteristics. Not only language journals, but also education, medicine and health, social sciences, and information publishing journals focus

on medical English; (b) Although medical English has received attention from foreign language and medical education journals, high-level medical journals have paid little attention to medical English; and (c) High-quality articles about medical English mainly come from foreign language journals.

2.3 Authors of medical English literature and distribution of their affiliated institutions

Regarding the distribution of authors, the top ten authors in terms of the number of articles are Liu, Y. (Mudanjiang Medical College, 7 articles), Jiao, P. (Gannan Medical College, 5 articles), Xu, D. L. (Mudanjiang Medical College, 5 articles), Yan, W. J. (Hebei Medical University, 4 articles), Li, X. W. (Mudanjiang Medical College, 3 articles), Liu, C. J. (Gannan Medical College, 3 articles), Qin, S. Y. (Sun Yat-sen University, 3 articles), Liu, Y. Z. (Hebei North University, 3 articles), Li, L. (Binzhou Medical College, 3 articles), and Yang, Z. (Guangzhou University of Traditional Chinese Medicine, 3 articles) (Figure 5):

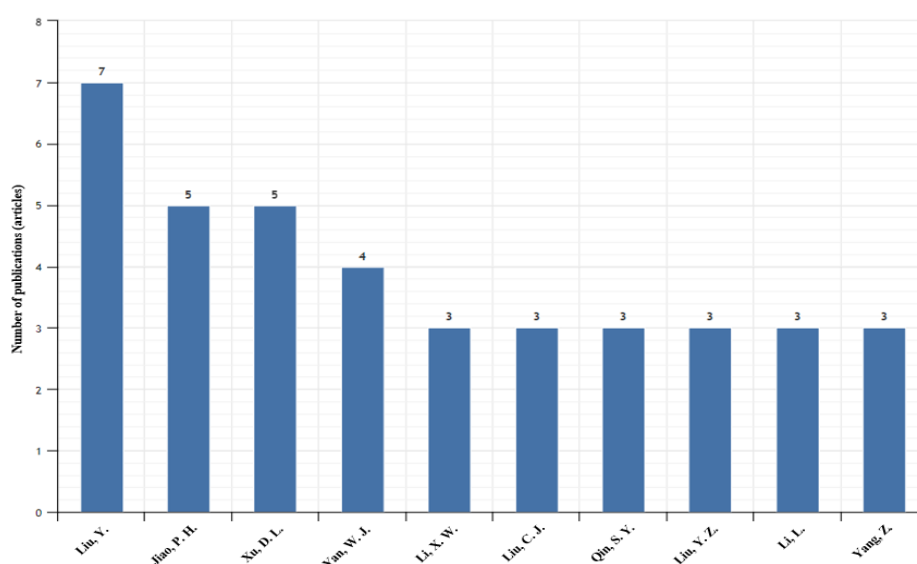


Figure 5: Top ten authors of medical English literature

From the distribution of authors' affiliated institutions, the top ten institutions in terms of quantity of articles are Hebei Medical University (10 articles), Mudanjiang Medical College (9 articles), Harbin Medical University (8 articles), Baotou Medical College (7 articles), Gannan Medical College (7 articles), Guangdong Medical University (5 articles), Beijing University of Traditional Chinese Medicine (5 articles), Guangzhou Medical University (5 articles), Hubei University of Traditional Chinese Medicine (4 articles), and China Medical University (4 articles) (Figure 6):

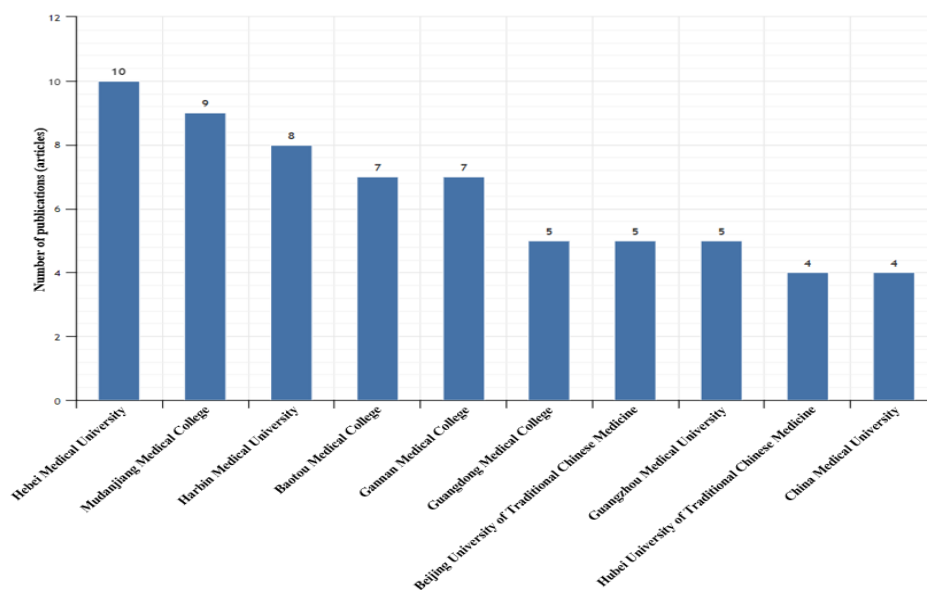


Figure 6: Distribution of top ten authors' affiliated institutions

According to the above statistical results, the research population of medical English mainly comes from universities and colleges in China, and specifically most of them come from the foreign language teaching departments of medical universities and colleges. It can also be seen that the research group of medical English in China is relatively concentrated, with English language teachers from medical universities and colleges as the core force of research on medical English.

2.4 Trending topics in medical English research

From the distribution of main topics in medical English research, it was found that the trending topics in medical English research over the past decade have mainly focused on those such as ESP, medical English, medical colleges and universities, medical English teaching, teaching models, needs analysis, teaching reform, and college English teaching. This indicates that medical English research places great emphasis on teaching but rarely directly involves medical issues. It is worth mentioning that among all topics in medical English research, ESP ranks first and has an absolute proportional advantage. This indicates that the demand for ESP in China has become increasingly urgent over the past decade and remains a significant focal point in the research field. The development trend of ESP affects and determines the direction of medical English research (Jiang et al., 2022) (Figure 7):

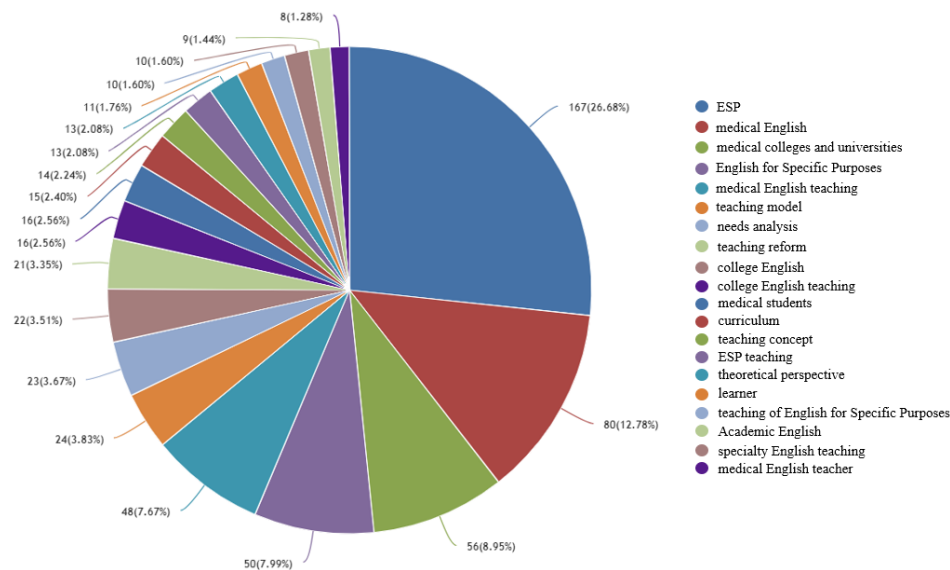


Figure 7: Trending topics in medical English research

2.5 Methodology in medical English research

According to the research method classification, medical English research is divided into empirical research and non-empirical research (Chen, 2013). This study categorizes and statistically analyses medical English research papers published from 2011 to 2023. The results showed that there is slightly more empirical research than non-empirical research; however, the difference is not significant. Among these research methods, quantitative and experiential approaches play a dominate role. However, there are very few high-level articles that fully qualitatively deal with medical English. Furthermore, most empirical research articles come from foreign language journals, while non-empirical research articles are chiefly found in education and social science comprehensive journals. This indicates that foreign language journal articles mostly focus on data and adopt a combination of quantitative and qualitative research methods. Many research papers on medical English primarily summarize experiences and reflect on theories, often appearing in journals outside the medical field, such as education journals (Figure 8):

	Empirical Research			Non-empirical Research			
	Quantitative	Qualitative	Mixed	Experience	Reflection	Operation	Other
2011	4		2	3	1	1	
2012	6			2	1	1	2
2013	7		3	5	5	1	2
2014	8	2	3	7	3	3	2
2015	10		4	7	4	2	2
2016	9		3	5	3	2	3
2017	12	2	6	4	3	1	1
2018	8		4	5	2	1	2
2019	9	2	3	4		2	2
2020	8		2	2		3	
2021	7		1	3	1	1	1
2022	6	2		3	1	1	1
2023	6			2	1		
Total		133				115	
Percentage		53.6%				46.4%	

Figure 8: Research methods for medical English

Based on the above five aspects of reviewing and analysing, the development status quo of medical English research in China over the past decade can be summarized as follows: (a) The number of medical English research papers is increasing albeit inconsistently, and there are few high-level articles; (b) The hot topics of research mainly include ESP, medical English, medical colleges and universities, medical English teaching, teaching model, needs analysis, and teaching reform, with less direct involvement in medical issues; (c) Linguistics, healthcare, and education all focus on medical English, but the extent and scope of attention are not the same; (d) The research methods of medical English are mainly quantitative and experiential, and high-level articles on quantitative research mostly come from foreign language core journals; and (e) The group of medical English researchers comprises mostly English teachers from higher medical institutions.

From the analysis of the quantity of papers and the previous overall trend of medical English research, it can be seen that there have been relatively few papers published in the past two years. This indicates that research on medical English has entered a saturation and stagnation stage after experiencing a period of rapid expansion and stable development. Therefore, the research on medical English urgently needs to explore new perspectives and content. Medical English teaching should adapt to the new policies and requirements proposed by China under the current new situation. In the post-pandemic era, China not only attaches great importance to the training of medical English professionals who are proficient in professional business and have strong foreign language abilities, but also needs to focus on the development of medical English teaching staff. The country has significantly focused on relevant policies related to the development of medical English teaching staff (Li, 2022). Therefore, focusing on the cultivation of medical English professionals and the professional development of teachers of medical English is a key objective for deepening and expanding medical English research in the future (Li et al., 2023).

In view of this, the following section discusses the two aspects of the trend in medical English research from multiple dimensions, that is, the cultivation of international compounding medical English professionals and the professional development of medical English teachers.

3. Development Trend of Medical English: Cultivation of Medical English Professionals & Professional Development of Medical English Teachers

3.1 Cultivation of compounding medical English professionals in the post-pandemic era

Compounding medical English professionals refer to specialized professionals who have both medical professional knowledge and proficiency in medical English (Chen, 2013). The establishment of medical English courses is of great significance in promoting the cultivation of versatile compounding medical English professionals.

The medical field is one of the most significant areas of international exchange. The importance of medical English in clinical practice is self-evident (Zhang & Wang, 2013). The global COVID-19 triggered a discussion on emergency language service capabilities, and explained the multiple scenarios and forms of medical English practical application. The COVID-19 pandemic has inspired people to respond to major epidemics by having both hardware and software that can keep up with modern trends. The hardware here refers to equipment, technology, and other service facilities, while the software refers to professionals, especially those related to medicine (Xiang et al., 2023). The global pandemic has highlighted the urgent need for practical professionals with multiple abilities and expertise (Li & Long, 2020). These practical professionals do not only need to have a solid foundation in English language, but also need to have practical clinical skills that enable them to remain calm in the face of danger and challenges. Faced with complex global public emergencies, medical English is increasingly being applied in various scenarios and forms. For example, medical staff in China are required to go abroad to participate in anti-epidemic rescue operations. There they have to deal with medical staff and patients who cannot speak the same language as they do. Secondly, there is a significant difference in the Chinese ways of thinking, treatment philosophies, and surgical processes. In addition, the equipment and material used are all in English. More importantly, they also need to share their valuable experience and therapies with international peers. At this point, a strong foundation in medical English will come in handy. Therefore, in the post-pandemic era, medical English education needs to achieve the following:

3.1.1 Concept update

Today, with the opening up of China and its continuous deepening of reform and, the demand for compounding professionals in various industries is increasing (Wang, 2014). At the top-level design level, old concepts need to be updated, the global perspective kept in mind, strengths leveraged and weaknesses avoided in order to keep up with the times and the pace of change by designing more scientific, reasonable, and practical courses. Therefore, medical English teachers should also update their concepts and reflect on their practice in every aspect of lesson preparation and teaching. Students are not only required to master solid language knowledge, but also to cultivate their proficiency in skills such as listening, speaking, reading, writing, and translation. This will enable them to become versatile professionals who are proficient in both their professional knowledge and skills, as well as being competent in English for communicating internationally and participating in rescue operations in international healthcare and other related fields (Zhang et al., 2018).

The cultivation of high-end compounding professionals demands top-level curriculum designers with a forward-looking global perspective and fresh international concepts. Additionally, frontline teachers at the grassroots level need to be keen and innovative, keeping pace with the evolving needs of the times and mastering new trends in their disciplines. They should continually update their ideas and teaching concepts, imparting the latest knowledge and concepts to students. Only in this way can the students be trained to be practically versatile and compounding both at home and internationally.

3.1.2 Goal clarity

From the Ministry of Education to various higher medical institutions, it is important to have a clear understanding of what is expected of the training of professionals (Zhang & Liu, 2011). Only with clear goals can they have a targeted approach. At present, medical colleges and universities place more emphasis on the cultivation of medical knowledge and skills; however, they do not pay enough attention to practical English language, thus neglecting the practical English language proficiency of students (Zhang, 2019). Under these circumstances, the trained students understand international medical literature, nor can they comprehend the cutting-edge research achievements of foreign counterparts at international conferences, let alone communicate orally in English, publish academic papers, or translate medical research findings between English and Chinese. Given the aforementioned shortcomings, it is necessary to reconstruct the teaching content, such as adding appropriate courses on listening, speaking, reading, writing, and translation in medical English, and increasing study hours. This will allow students to learn as much medical English knowledge and as many practical language skills as possible.

3.1.3 Method and textbook innovation

The traditional teaching content of medical English is to teach only from textbooks (Zhuang, 2022). A single textbook has been used for many years. The content of such textbooks is very outdated and cannot keep up with the latest research achievements of the time. Moreover, in order to cope with examinations, teaching methods are relatively outdated, and traditional translation methods are the most commonly used. It is suggested that diverse methods should be appropriately applied, such as the task-based teaching method and the product-oriented teaching method as the main approach to medical English teaching, to develop students' participation ability and problem-solving ability to better fulfil their role. (Qin, 2016). At the same time, in terms of teaching materials, there should be more appropriate medical English audio-visual and oral materials. In addition, authoritative newspapers and original medical journals and other extensive reading materials should be included so that students can be exposed to more practical and innovative medical English as soon as possible. In this way, medical English teachers can fully utilize online and offline resources and develop new textbooks.

In short, there is an urgent need for a team of versatile medical professionals who are proficient in both medical professional knowledge and English language skills. However, the current lack of qualified medical English teachers restricts the training of medical English professionals (Wang et al., 2023). According to the previous investigations, it has been found that the current medical English teaching staff comprises mainly teachers with an educational background in English.

The following section discusses the professional development of this type of medical English teacher.

3.2. Professional development of medical English teachers

3.2.1 Problems in professional development of medical English teachers

Under the premise that ESP has become a trend in college English teaching, teachers with a background in English in medical colleges must actively seek to transform and develop into medical English teachers (Qin & Huang, 2015). Overall, research on the current status of professional development of medical English teachers can be summarized as follows:

3.2.1.1 Slow transformation of medical English teachers

It is believed by some scholars (e.g., Wen, 2014; Wu et al., 2011; Yan & Lin, 2022; Zhou & Yan, 2017; Zhu & Li, 2013) that higher medical institutions generally lack teachers who are proficient in both English language teaching and medical professional knowledge. This leads to a lack of depth and breadth among English teachers when explaining medical English texts and vocabulary, resulting in teaching medical English being somewhat superficial. Kong et al. (2014) believed that English teachers in medical colleges and universities face significant challenges in their development, such as a lack of awareness of career development planning, outdated knowledge structures, and widespread occupational burnout. Gong (2016) pointed out that the transformation of medical English teachers is lagging behind. Although medical English teaching is the future direction of English teaching in medical colleges and universities, traditional Chinese medicine English teachers have encountered hurdles in the actual teaching process because they need to understand medicine and have a good level of English proficiency. Mature teachers who are accustomed to traditional public English teaching are unwilling to accept innovations, while some younger teachers and those with some teaching experience who are willing to try new methods are worried about the lack of medical knowledge and unwilling to take the initiative (Li, 2022). Therefore, these types of medical English teachers have undergone a slow transformation and are often disconnected from contemporary developments.

3.2.1.2 Incomplete training system for medical English teachers

Li (2014) pointed out that although many colleges and universities have offered medical English courses, the training of medical English teachers is currently in the exploratory stage in China, and a complete training system has not yet been finalised. There are pressing problems in the training of medical English teachers, such as outdated training theories, single training models, low qualifications of trainers, shortage of training funds, and inadequate training evaluation systems (Wang, 2022). Some scholars (e.g., Liu et al., 2023; Lou & Hou, 2019) have pointed out that many universities have not given sufficient attention to the standardized training of medical English teachers. In addition, experimentation from the micro perspective is still not deep enough and lacks the necessary detailed research.

3.2.1.3 Professional knowledge requirements for medical English teachers with a focus on basic knowledge

Medical English teaching integrates language instruction and medical knowledge (Liu & Xiao, 2016). However, many teachers with an educational background in English but who do not have a certain level of medical knowledge will not be

competent in teaching tasks (Liu, 2016). Hutchinson and Waters (1987) contended that the teaching content of ESP does not need to be highly specialized. Li and Fan (2015) advocated that medical English teachers only need to master the basic theories, common knowledge, basic vocabulary and terminology of medical English, and understand the literature with a focus on popular science. Because English teachers are not professional teachers, they do not need to be proficient; however, they are comparatively lacking in professional knowledge (Li & Fan, 2015). All the above views indicate that medical English teachers with an educational background in English still need to prioritize basic medical knowledge in their professional requirements.

3.2.2 Strategies for professional development of medical English teachers

In response to the challenges concerning the professional development of medical English teachers, this study believes that medical English teachers who only have expertise in English are still in a transitional phase and require a solid foundation in medical English knowledge. This foundation can be achieved through targeted strategies at both the individual and institutional levels.

3.2.2.1 Individual level

Individual behaviour refers to an individual's self-development (Liu et al., 2013). Autonomous learning is not only an ideal and requirement that teachers put forward to students, but also an important way for teachers to improve their knowledge structure and enhance their personal abilities and qualities. According to constructivist theory, knowledge is constructed by individuals themselves, rather than transmitted by others. Based on this understanding, teachers should actively develop themselves and build a reasonable knowledge base. Therefore, teachers can achieve self-development of medical English knowledge through the following channels:

(1) Audit learning

English teachers who aspire to teach medical English can actively attend basic and clinical courses, such as pathology, physiology, microbiology, internal medicine, surgery, paediatrics, obstetrics and gynaecology. They can develop an audit plan and choose to attend one to two medical major courses every semester, striving to complete the learning tasks of medical main courses within two to three years.

(2) Online self-learning

In the era of networking, it is possible to search for the necessary medical knowledge through the Internet, including the causes, symptoms, treatment, prevention, and prognosis of common diseases. Even for teachers who do not understand medical knowledge, they can search for basic knowledge related to the content of chapters from the Internet or books before preparing for a lesson. The complicated medical content will then become clearer and easier to understand. If the content of each chapter is learned through this method, the teachers will be able to understand and master basic medical knowledge to a large extent.

3.2.2.2 Institutional levels

If self-development is an individual behaviour, then school behaviour refers to school-based training, practical training, and off-campus experiential learning.

(1) School-based training

School-based in-service training, often known as school-based training, was proposed by the European Teacher Education Association in the early 1990s (Lv et al., 2023). It refers to the school training activities initiated and organized by schools to meet the work needs of individual teachers, stemming from the requirements of school curriculum and overall planning. School-based education can help teachers build and enrich their knowledge system, and expand and improve their professional knowledge and skills network. School-based training requires higher medical institutions to provide corresponding platforms, break down barriers between professions and language, and enable English teachers and medical teachers to learn from each other, complement each other, and develop together on the same platform. The training of medical knowledge for English teachers should be conducted at a fixed time every week, with a final examination at the end of the semester to obtain theoretical qualifications for teaching medical English. For medical problems encountered by English teachers during lesson preparation, they can submit them to the training class for assistance from medical teachers. It is understood that the Henan University of Traditional Chinese Medicine, the Changchun University of Traditional Chinese Medicine, the Guangzhou University of Traditional Chinese Medicine, and others have held traditional Chinese medicine knowledge training courses for English teachers, which have made beneficial attempts to enhance school-based training initiatives.

(2) Practical training

Medical courses are highly practical subjects, and theoretical training is the foundation of practice (Jiang et al., 2022). After the theoretical training has been completed, the schools coordinate with affiliated hospitals and organize qualified English teachers for theoretical courses to observe and learn through short- to medium-term secondment to affiliated hospitals. As in the case of the training of general practitioners in hospitals, they need to rotate among the various departments of the hospital, follow clinical doctors to learn, and consolidate basic medical knowledge through studying specific cases of illness. English teachers are required to rotate among the various departments of hospital at least once. At the end of each department's rotation, the supervising doctors will provide corresponding evaluation levels for the observation and learning of English teachers. Finally, the evaluations of all supervising doctors in each department collated and submitted to the school's relevant departments. Based on the academic performance of theoretical courses, English teachers will ultimately obtain a qualification to teach medical English. The duration of practical training should not be too short. In order to deepen the impression, especially the understanding of the medical terminology of English teachers, the training time should last at least six months to one year.

(3) Off-campus experiential learning

The higher medical institution should provide certain supporting funds and periodically send teachers for off-campus experiential learning, including continuing education at peer institutions with better medical English programmes. At the same time, English teachers should be able to participate more in medical English exchange seminars held among medical institutions. Both national and provincial-level medical English seminars provide an ideal platform for peer communication, which is conducive to exchanging information, learning from each other's strengths, and promoting cooperation.

4. Conclusion

In conclusion, the CNKI visual bibliometric tool enhances the efficiency and effectiveness of literature analysis. By analysing the research status of medical English relying on the CNKI visual bibliometric analysis tool, this study has highlighted the need for ongoing expansion and diversification of medical English research in China. While suggesting avenues for future exploration, the study recognizes several limitations inherent in the current research landscape. One primary limitation lies in the predominance of descriptive articles over high-level empirical research, indicating a gap in substantive contributions to the field. Additionally, the reliance on the CNKI database may have introduced biases in the selection and interpretation of articles. Given these limitations, the study proposes that future research should prioritize in-depth empirical investigation on current hot topics, emphasizing interdisciplinary approaches to medical English development.

Collaboration between medical English and related disciplines is crucial, particularly in professional cultivation and teacher development. Medical colleges and universities should harness the advantages of medical English to cultivate professionals with both medical knowledge and language proficiency. Furthermore, there is a call to align medical English research with trends in ESP, exploring new fields such as cross-cultural communication and the development of medical English teachers. To address the dominance of English language teachers and foreign language journals, collaboration with researchers and including journals in medicine and health are recommended to integrate practical medical theory and practice issues into medical English research. Regarding medical English teacher development, while temporary measures such as training English teachers are acknowledged, long-term solutions are needed. Training pre-service medical English teachers through dedicated programmes in regular colleges and universities is proposed. These programmes should impart both medical knowledge and English language skills to enable graduates to excel in medical English teaching, thereby achieving true professional development for teachers of medical English.

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