

Ten years of research and publications about hospice and palliative care in Mainland China: a bibliometric study

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Research article

Keywords: China, bibliometrics, hospice, palliative care, publications, research

Posted Date: September 25th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-41366/v3>

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Version of Record: A version of this preprint was published at Journal of Palliative Care on November 8th, 2021. See the published version at <https://doi.org/10.1177/08258597211039056>.

Abstract

Objectives: Research is a fundamental element in the sustainable development of hospice and palliative care. Mainland China is facing increasing demand for hospice and palliative care and has launched related policies over the past decade. However, the state of research and publications in this field in China remains largely unknown. This study aimed to provide an overall picture of hospice-and palliative care -related research and publications in Mainland China of the last decade.

Methods: We searched Web of Science, Scopus, PubMed, CINAHL, OVID, and China National Knowledge Infrastructure for hospice-and palliative care -related publications in English and Chinese for 2010–2019. We analyzed the production, citations and impacts, publishing journals, region and institution of origin, publication types and topics.

Results: A total of 3224 publications were identified, and 636 of them were published in high-quality journals. The production and impacts showed a clear increase—especially after 2016. However, there is no specialized journal of hospice and palliative care in Mainland China. The publications scattered among various journals. The regional disparity between East and Western China in production was conspicuous and closely linked to economic factors. The most prosperous cities in Mainland China, Beijing and Shanghai, were the most productive regions. The hospice providers in the first five pilot regions had no collaboration with leading universities in their publications. Hospice and palliative care for cancer patients was the most common publication topic; some essential topics were rarely explored.

Conclusions: Research and publications about hospice and palliative care in Mainland China is developing faster than before; however, it remains at an early stage and should be promoted in terms of interregional equity. Collaboration among different disciplines, institutes, and regions should be encouraged.

Introduction

Hospice and palliative care (HPC) is a fundamental human right and a crucial part of an integrated, person-centered health service. The world as a whole has made rapid progress in this sector, but HPC in Mainland China has long been in a state of infancy [1]. According to the 2010 Quality of Death Index by the Economist Intelligence Unit, China ranked 37th among the 40 countries and regions [2]. Five years later, in 2015, the second edition of Quality of Death Index ranked China the 71st among the 80 countries and regions, revealing limited progress [3].

Though HPC has developed slowly in Mainland China, the demand for it has undoubtedly increased. China has a rapidly aging population: in 2019, 17,599 million Chinese were aged over 65 years (12.6% of the total population) [4]; that proportion is estimated to reach 26.9% in 2050 [5]. Meanwhile, chronic non-communicable diseases (including stroke, ischemic heart disease, lung cancer, chronic obstructive pulmonary disease, and liver cancer) have become a major burden; they are the main causes of years of life lost [6]. According to the Serious Health-Related Suffering (SHS) Database in 2015, it was estimated that 10443 thousand people (7.55‰ of the population) in China were in need of palliative care[7]. Meanwhile, futile medication at the end of life is still prevalent in China [8]. According to a recent study, aggressive care and catastrophic health expenditure are common for cancer patients and families. More than 80% of the families of cancer patients were left below the poverty line after the patients' death [9]. Most patients are willing to learn more about HPC, but few have access to it [10].

In light of this situation, the Chinese government has promoted related policies over the last decade. In 2012, Shanghai began promoting a community-based hospice service[11]. In 2014, China, along with the other 194 countries in the 67th World Health Assembly, committed to enhancing HPC as a component of comprehensive care throughout the life course [12]. In 2017, the former National Health and Family Planning Commission of China issued a guideline for hospice care [13]; subsequently, five regions were chosen for a national pilot on hospice implementation. In 2019, the number of pilot regions expanded to 71[14].

Though China's policy making has become active in this regard, there has been no adequate promotion of research. The role of research has been identified as a fundamental element for sustaining the development of HPC [15]. The lessons learned from previous research have shaped and fueled the implementation of HPC within the standards of evidence-based medicine [16]. Thus, the state of research and publications should be regarded as a key measure when examining the development of HPC in a region. Previous reports have identified a growth in HPC-related publications, both globally and in the Asia-Pacific region [17-19]. However, documents in Chinese were not included owing to the language barrier. Recently, investigators from Hong Kong managed to avoid the "Tower of Babel" bias by searching in Chinese: they found a considerable knowledge gap related to HPC research in Mainland China [20]. However, the authors focused on original studies with a strict inclusion criterion and failed to provide a whole picture of the structural changes in the HPC-related literature that have occurred over recent years.

In the present bibliometric study, we sought to remedy that deficit by analyzing HPC-related publications from Mainland China during the important time window from 2010 to 2019, including both primary and secondary literature, in English and Chinese. We investigated the production, regional distribution, impacts, and topics related to this young discipline. We aimed to depict a panoramic, yet detailed, view of HPC-related research and publications in Mainland China: that is crucial to understanding the present situation and future direction for the sustainable development of HPC. We also hope that the study could provide beneficial information for promoting research in China and other low- and middle-income countries.

Methods

Data source and document retrieval

In this study, we searched the Web of Science (WoS), Scopus, PubMed, CINAHL, and OVID for publications in English. The China National Knowledge Infrastructure (CNKI) was searched for ones in Chinese. CNKI is the largest digital publishing platform in China, and it covers a whole category of academic

resources, including China's largest academic database, the Chinese Journal Full-Text Database (CJFD). We retrieved relevant articles published from January 2010 to December 2019 from the international databases if they contained "Chinese" or "China" in the affiliation address and contained any of the following terms in the title, abstract or keywords: "palliative care," "hospice," "end-of-life care," or "terminal care." The searching strategy is exemplified in S1 Table. When searching for Chinese articles in CNKI, we applied various Chinese versions of "HPC" as follows: "huan-he-yi-liao," "shu-huan-yi-liao," "shu-huan-liao-hu," "gu-xi-yi-xue," "gu-xi-zhi-liao," "gu-xi-guan-huai," "an-ning-liao-hu," and "lin-zhong-guan-huai." All the above terms have appeared in Chinese literature at different times and in different regions. We restricted the literature types to consensus, guidelines, editorials, original research, and case studies. To eliminate the possibility of duplication with original research, we excluded conference proceedings, master's theses, and doctoral dissertations. After completing the retrieval, we reviewed the titles, abstracts, and author affiliations of the documents according to the following exclusion criteria: (1) The topic is curative medicine. (2) The article was in English and focused on Taiwan, Hongkong, Macao, and other places outside Mainland China. (3) The article was a translation of work that had already appeared in an international journal. We did not exclude articles if they were in Chinese and described the situation of HPC in places other than Mainland China: such articles play an essential role in distributing knowledge and reflect people's interest. Two reviewers (S.J. and S.L.) independently screened the documents for exclusion. Conflicts were resolved by discussion and mutual agreement. The procedure is shown in Fig 1. The articles were assigned to a specific province or municipal city according to the affiliation address of the first author.

To conduct an impact assessment and content analysis with a focused data source, we created a subgroup of publications in high-quality journals. The quality of a specific journal is hard to determine. So, here we applied a rather loose standard. If a journal is a core journal according to the Peking University Library [21] or included in internationally recognized databases like WoS, Scopus, etc., it is considered as a high-quality journal. The list of core journals of Peking University Library has been widely accepted in China for years. Searching for articles within core journals is a built-in function of CNKI. The core journal list is renewed periodically; thus, some journals may become newly included as their quality improve. We did not consider articles published in those journals before the inclusion year in the high-quality-journal subgroup.

Bibliometric indicators

Several bibliometric indicators were used here to evaluate scientific activity in the field of HPC. Production indicates the ability to create knowledge in a given period. It was assessed using the number of publications as well as that number per million inhabitants. We obtained socioeconomic parameters, such as the number of inhabitants and regional gross domestic product (GDP), from the National Bureau of Statistics of China on April 26, 2020 [4]. To evaluate the pattern of growth, we conducted a linear adjustment and exponential adjustment. According to the finding of Derek John de Solla Price, scientific knowledge grows exponentially [22].

The impacts indicate the quality of the articles published by a specific region. They were measured using the regional impact factor (RIF): that is similar to the impact factor of a journal and could be established each year based on the previous 2-year period. We determined the RIF of a given year as follows: the denominator signified the total number of articles published during the 2 years before the index year; the numerator signified the number of citations in the index year of the articles included in the denominator. Some regions produce few publications; thus, we introduced the 5-year RIF of 2019 as a more stable indicator for interregional comparison. The 5-year RIF was the same as the RIF, except it used a 5-year time window. To avoid excessive articles with no citations, the calculation of impact factors employed only the citation data of publications in high-quality journals.

Content analysis

The articles in the high-quality journals were categorized according to literature types and topics. We regarded original research and case reports as primary literature and reviews, guidelines, and consensus studies as secondary literature. No editorial among our data followed an introduction-method-result-discussion format pattern, so we classified them as secondary literature. According to the subject and research topic described in the abstract, the two reviewers classified each article into the following categories with mutual agreement:

1. Aging and geriatric HPC
2. Pediatric HPC
3. HPC in cancer patients
4. HPC in non-cancer patients
5. Pain and symptom management
6. Rehabilitation and nutrition
7. Spiritual and psychological care
8. Complementary therapy
9. Humanity and art
10. Communication and advanced care planning
11. Family caregivers and volunteers
12. Bereavement
13. Self-care of the HPC team
14. Education and training
15. Nursing in HPC
16. HPC in primary care
17. HPC in other specialties

18. Ethics
19. Policy and program advocacy
20. Assessment of needs and implementation of HPC
21. HPC timing and screening

Those categories were adopted from the Asia Pacific Hospice Palliative Care Network with some modifications [23]. Overlap was permitted, and so each article could fall into more than one category. There is an example of literature categorization in the S3 Table.

We analyzed the trend in research interests using CiteSpace[®] (version 5.6.R3), a JAVA-based software that can detect the word bursts over a period of time [24]. A word burst is a surge in the frequency of the appearance of a word. Its strength is a valuable indicator of active research topics [25]. Owing to language differences, we applied the burst detection to articles in English and Chinese separately.

Statistics

The statistical analysis was performed using IBM SPSS Statistics 26. We conducted a linear adjustment of the total publications according to the equation $y=41.794x-83871$ and an exponential adjustment according to the equation $y=4.562E-103e^{0.12x}$. We undertook a similar analysis with the high-quality-journal subgroup according to the following equations: $y=11.188x-22474$ versus $y=1.183E-151e^{0.175x}$. Difference were considered significant at a P -value below .05.

Results

Growth of HPC-related publications

We identified 3224 documents as HPC-related publications for 2010–2019; among them, 636 were published in high-quality journals and 255 were in English journals. Irrespective of journal quality, the annual number of publications grew notably during the 10-year period (Fig 2). According to the regression analysis of total publications, the R^2 was 0.873 when adjusted to an exponential curve; it was 0.784 with a linear adjustment. This finding indicates that exponential growth better explained the pattern of increase, thereby fulfilling Price's law[22]. A similar pattern was evident in publications in high-quality journals. We also observed a sharp increase in total publications after 2016, followed by a similar, though milder, increase in publications in high-quality journals after 2017. The impacts of scientific production also rose during the study period.

Journals publishing HPC-related articles

Table 1 shows the top 10 productive journals among total and high-quality journals in terms of HPC-related articles. The articles were distributed among various journals with a scattering pattern: the 10 leading journals published only 18.7% of all publications. Among them, only three journals are considered of high quality according to the standard in the present study. The top 10 journals in the high-quality subgroup published 8% of the total publications. There were three international journals on the list: *Journal of Pain and Symptom Control*, *American Journal of Hospice and Palliative Medicine*, and *Supportive Care in Cancer*. The other journals are all China-based. Notably, there is no specialized HPC journal in Mainland China. The field of the listed Chinese journals are interconnected with HPC, such as general practice and nursing.

Table 1: Top 10 journals publishing HPC-related articles.

All Journals			High-quality Journals		
Journal	Number of Publications	%	Journal	Number of Publications	%
World Latest Medicine Information	93	2.9	Chinese general practice ^a	46	1.4
Chinese Medical Ethics	83	2.6	Medicine and philosophy ^a	33	1.0
Electronic Journal of Practical Clinical Nursing Science	66	2.0	Journal of Pain and Symptom Management ^b	31	1.0
Chinese Nursing Research ^a	60	1.9	Chinese Journal of Gerontology ^a	29	0.9
Guide of China Medicine	57	1.8	Chinese Nursing Research ^a	27	0.8
Electronic Journal of Clinical Medical Literature	56	1.7	Chinese Journal of Nursing ^a	27	0.8
Chinese General Practice Nursing	51	1.6	Chinese Nursing Management ^a	20	0.6
Shanghai Medical and Pharmaceutical Journal	51	1.6	Journal of Nursing Science ^a	18	0.6
Chinese General Practice ^a	46	1.4	American Journal of Hospice & Palliative Medicine ^b	14	0.4
Journal of Nursing Science ^a	39	1.2	Supportive Care in Cancer ^b	12	0.4
In Total	602	18.7	In Total	257	8.0

^a The Chinese Core Journals.

^b International Journals in English.

Regional distribution of the publications

Although the overall growth of HPC-related publications during the 10-year period appears promising, the regional disparity was substantial (Fig 3A). In decreasing order, the five most productive regions were Beijing (11.8% of total publications in Mainland China), Shanghai (11.1%), Jiangsu (8.2%), Guangdong (7.3%), and Sichuan (5.3%). By contrast, China's northern and western provinces lacked publications. When adjusted by the number of inhabitants, the prominence of Beijing and Shanghai became greater: during the 10-year period, they contributed 17.6 and 14.8 articles per million inhabitants, respectively. They were followed at a considerable distance by Tianjin (5.5), another municipal city with the first-ever hospice center in Mainland China (Table 2). There was a strong correlation between annual production and regional economy (Fig 3B). However, on that basis, Beijing and Shanghai were outliers and performed much better than could be expected. The regional difference in publication impacts is indicated by the 5-year RIF (Table 2); there was no correlation between productivity and impacts ($R^2=0.02$, $P=0.42$).

The names and locations of the top 10 productive institutes appear in Figure 3A: they are all universities and colleges with affiliated hospitals. It is noteworthy that four of the 10 institutes were located in Beijing and Shanghai; only one (Sichuan University) was in Western China. We also examined the production of the 41 institutes that provided HPC in the first five pilot regions for hospice implementation. Those institutes published 51 articles and had no collaborations with the leading institutes listed in Fig 3.

Table 2 Regional indicators of production and impacts.

Province /Municipal city	Total number of publications	%	Number of publications per million inhabitants	Number of publications in high-quality journals	%	5-year RIF of 2019
Beijing	380	11.8	17.6	108	17.0	3.9
Shanghai	358	11.1	14.8	103	16.2	2.8
Jiangsu	263	8.2	3.3	39	6.1	2.4
Guangdong	234	7.3	2.1	41	6.4	3.1
Sichuan	172	5.3	2.1	39	6.1	4.0
Hubei	169	5.2	2.9	45	7.1	1.7
Shandong	165	5.1	1.6	32	5.0	8.5
Zhejiang	157	4.9	2.7	24	3.8	4.6
Henan	155	4.8	1.6	24	3.8	2.4
Jilin	117	3.6	4.3	11	1.7	5.3
Liaoning	107	3.3	2.5	12	1.9	11.0
Hebei	98	3.0	1.3	12	1.9	3.6
Tianjin	86	2.7	5.5	31	4.9	5.1
Shanxi	85	2.6	2.3	9	1.4	2
Anhui	81	2.5	1.3	6	0.9	1.5
Chongqing	69	2.1	2.2	21	3.3	1.8
Hunan	63	2.0	0.9	17	2.7	5.9
Shaanxi	58	1.8	1.5	7	1.1	1.8
Fujian	54	1.7	1.4	9	1.4	4.4
Heilongjiang	51	1.6	1.4	8	1.3	2.8
Yunnan	46	1.4	1.0	5	0.8	1
Xinjiang	44	1.4	1.8	2	0.3	1
Guizhou	43	1.3	1.2	8	1.3	4.8
Guangxi	42	1.3	0.9	7	1.1	1
Inner Mongolia	34	1.1	1.3	1	0.2	0
Jiangxi	24	0.7	0.5	2	0.3	4
Gansu	23	0.7	0.9	5	0.8	0.7
Qinghai	21	0.7	3.5	2	0.3	3
Ningxia	16	0.5	2.3	4	0.6	1.7
Hainan	9	0.3	1.0	1	0.2	0
Tibet	0	0.0	0.0	0	0.0	N/A

Types and topics of the publications in high-quality journals

We further analyzed the publications in high-quality journals concerning their literature type and topic. In this subgroup, 411 of 636 articles were original research and 10 were case reports; thus, primary literature accounted for 66% of the total. Secondary literature comprised of 212 reviews or editorials and three consensuses. The articles were further categorized according to their topics. As shown in Table 3, HPC in cancer patients was the leading topic; that was followed by pain and symptom management, assessment of needs and implementation of HPC, and policy and program advocacy. The topics that received minor attention were bereavement, HPC screening and timing, rehabilitation and nutrition, self-care of the HPC team, and pediatric HPC.

Table 3: Topics of the publications in high-quality journals.

Topic	Number of publications	%
HPC in Cancer patients	250	39.3
Pain and symptom management	136	21.4
Assessment of needs and implementation of HPC	95	14.9
Policy and program advocacy	68	10.7
Spiritual and psychological care	56	8.8
Nursing in HPC	54	8.5
Humanity and art	44	6.9
Education and training	43	6.8
HPC in non-cancer patients	38	6.0
HPC in primary care	37	5.8
Ageing and geriatric HPC	37	5.8
Communication and advanced care planning	36	5.7
Complementary therapy	34	5.3
Ethics	28	4.4
Family care givers and volunteers	27	4.2
HPC in other specialties	13	2.0
Pediatric HPC	12	1.9
Self-care of the HPC team	8	1.3
Rehabilitation and nutrition	7	1.1
HPC screening and timing	6	0.9
Bereavement	4	0.6

We examined trends in research interest in HPC with the word burst detection function of CiteSpace[®]. Fig 4 shows the key words that began to burst from 2015. For example, one Chinese version of HPC (*shu-huan-liao-hu*) burst between 2015 to 2017, appearing in 100 articles. The terms “negative emotions” and “pain management” constituted the frontier of interest in 2019 and may continue to receive future attention.

Discussion

In this study, we attempted to provide an overall assessment of research and publications related to HPC in Mainland China over a 10-year period. During that time, both the production and impacts of the publications increased; however, regional disparities were conspicuous. There was also a lack of a discussion of some important areas of HPC.

Stumbling out of infancy

The first hospice in Mainland China was founded in the municipal city of Tianjin in 1988[26]. But the adoption of HPC in Mainland China has been slow. There is still insufficient knowledge of the subject even among health professionals [27]. However, the present study found that the number of HPC-related publications in 2019 was almost three times that in 2010. The exponential rise of the production and impacts of HPC-related publications is a sign of academic attention and discussion, which are vital for professional education as well as research innovation. In our opinion, this trend will lead HPC in Mainland China out of its infancy.

There are several reasons for the growth. According to the 2010 and 2015 Quality of Death Index by the Economist Intelligence Unit, China is among the countries with the lowest rank [2, 3]. All three countries with a lower ranking than China in 2010 surpassed it in 2015. This was widely covered by Chinese media and elicited broad discussion, stimulating health-care workers and policy makers to reexamine the medical system and service. At the same time, a series of new policies prompted the promotion of knowledge about HPC. For example, community care, which burst as a key word in 2015, has been promoted by the government since 2012. The burst detection also showed a promising shift of key words from concepts to practical issues, such as pain management and negative emotions, which may lead to more clinically relevant research.

Despite its growth, our study indicates that the research into HPC in Mainland China remains at an early stage. First, the number of publications per million inhabitants is meager compared with other parts of Asia [19]. Second, a large number of those publications are secondary literature, which introduces ideas and knowledge but does not explore the unknown. Third, HPC for non-cancer patients is far less discussed than for cancer patients, and end-of-life care or hospice receives greater attention than integrated palliative care in an early stage. Thus, many professionals may be unaware of the latest concept of palliative care [28]. Fourth, only a small number of the publications were in high-quality journals. It means either the majority of the articles were not satisfactory in quality, or the journals were not interested. A lack of interest may be due to the absence of a specialized HPC journal in Mainland China. It hinders

the development of the academic community of HPC professionals. Accordingly, policies should be designed to support original research, education, and publications in HPC.

Conspicuous regional disparity

Imbalanced development in China has long been recognized—especially between East and Western China [29]. This inequality is evident in many areas, including the economy, human capital, public facilities, and science and innovation. Studies have observed that economic factors are closely linked to a country's production of HPC-related publications [30]. We found that relationship also applies on a provincial scale. The regions with higher GDP tended to have more HPC-related publications. The best examples in the study are Beijing and Shanghai, two most prosperous and resourced megacities in Mainland China. This brings us the concern that when residents in less prosperous regions have limited access to curative medicine [31], they have insufficient HPC service too. The regional disparity in research and publications would enhance the imbalanced development of HPC, produce the Matthew effect, and cause inequity in health care.

China's great cultural richness warrants more research in different regions and populations. Chinese attitudes toward death are heterogeneous. One study among Christians in a northern rural region of China determined that 95% could freely talk about death at home; 85% felt joyful when thinking about death [32]. That finding is against the stereotype of Chinese people. Another study from urban areas showed that older people were more willing to die in hospital than younger ones [33]; that is also against the stereotype of the Chinese elderly. Owing to different cultural and social factors, patients' attitudes to HPC varied from hostility to embracing the approach [34, 35]. Some regions with fewest publications (such as Tibet, Hainan, Xinjiang, and Inner Mongolia) are home to various ethnic groups. Thus, in a rapidly changing, culture-rich society, we believe that more research is needed to understand local needs and promote culture-sensitive care.

Call for collaboration

The study identified a lack of collaboration at different levels. From the names of journals publishing HPC-related articles, nurses, general practitioners, and geriatricians are especially active in this field. However, researchers from other specialties, such as emergency medicine and intensive care, were scarce. Nurses have done excellent work in HPC research. However, in Mainland China, nurses are not allowed to prescribe medications, which compromises their ability to conduct intervention studies. More doctors from different specialties, nutritionists, physical therapists, psychologists, social workers, and other related professionals should be involved in multidisciplinary HPC research.

At the institutional level, the hospice providers in the first five pilot regions had no collaboration with leading universities in their publications. HPC is highly practical, so we strongly recommend collaboration between HPC providers and professional researchers. Future policies and funding should support this collaboration.

International collaboration is also important for HPC practitioners and researchers in Mainland China: they should seize opportunities to communicate with researchers from the rest of the world, especially other Asian regions. Overall, collaboration is the way to make more people heard.

Strengths and limitations

To our knowledge, this is the first study that provides a whole picture of HPC-related research and publications in Mainland China. A bibliometric study has an advantage in assessing the development of a specific scientific field. There are also several limitations. First, the terminology for HPC in Mandarin Chinese is not unified, and so we included various versions. We may have missed articles that did not mention those terms. Second, it was difficult to determine the actual quality of a journal. We applied a loose standard using the judgement of the Peking University Library and international databases. Third, some excellent HPC centers dedicated themselves to delivering care rather than research. Their efforts were largely invisible in our study. Future investigations should aim to determine the factors that hinder or promote research in HPC.

Conclusion

China is a good example of a low- and middle-income country with limited, yet highly demanded, implementation of HPC. The 10-year study period witnessed a considerable increase in HPC-related publications in Mainland China. However, regional disparity in production was conspicuous, and HPC research is at an early stage. Research is essential for the sustainable development of HPC and should be promoted with interregional equity. Policies should be made to encourage collaboration among different disciplines, institutes, and regions. Future research is needed to identify the factors that hinder or promote research in HPC.

Abbreviations

HPC: Hospice and palliative care

WoS: Web of Science

CNKI: China National Knowledge Infrastructure

RIF: Regional impact factor

GDP: Gross domestic product

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The data analyzed during the current study are available from the corresponding authors on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

The work was supported by Irma and Paul Milstein Program for Senior Health of the Milstein Medical Asian American Partnership Foundation (No grant number was available). With this support we were able to pay for the editing fee.

Authors' contributions

S.J., X.L., and X.N. developed the concept and design of the study. S.J. and S.L. collected the data and reviewed the publications. J.L. did the statistical analysis. J.S. wrote the manuscript. All authors read and approved the final manuscript.

Acknowledgements

We thank Liwen Bianji, Edanz Group China (www.liwenbianji.cn/ac), for helping us edit a draft of this manuscript.

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Figures

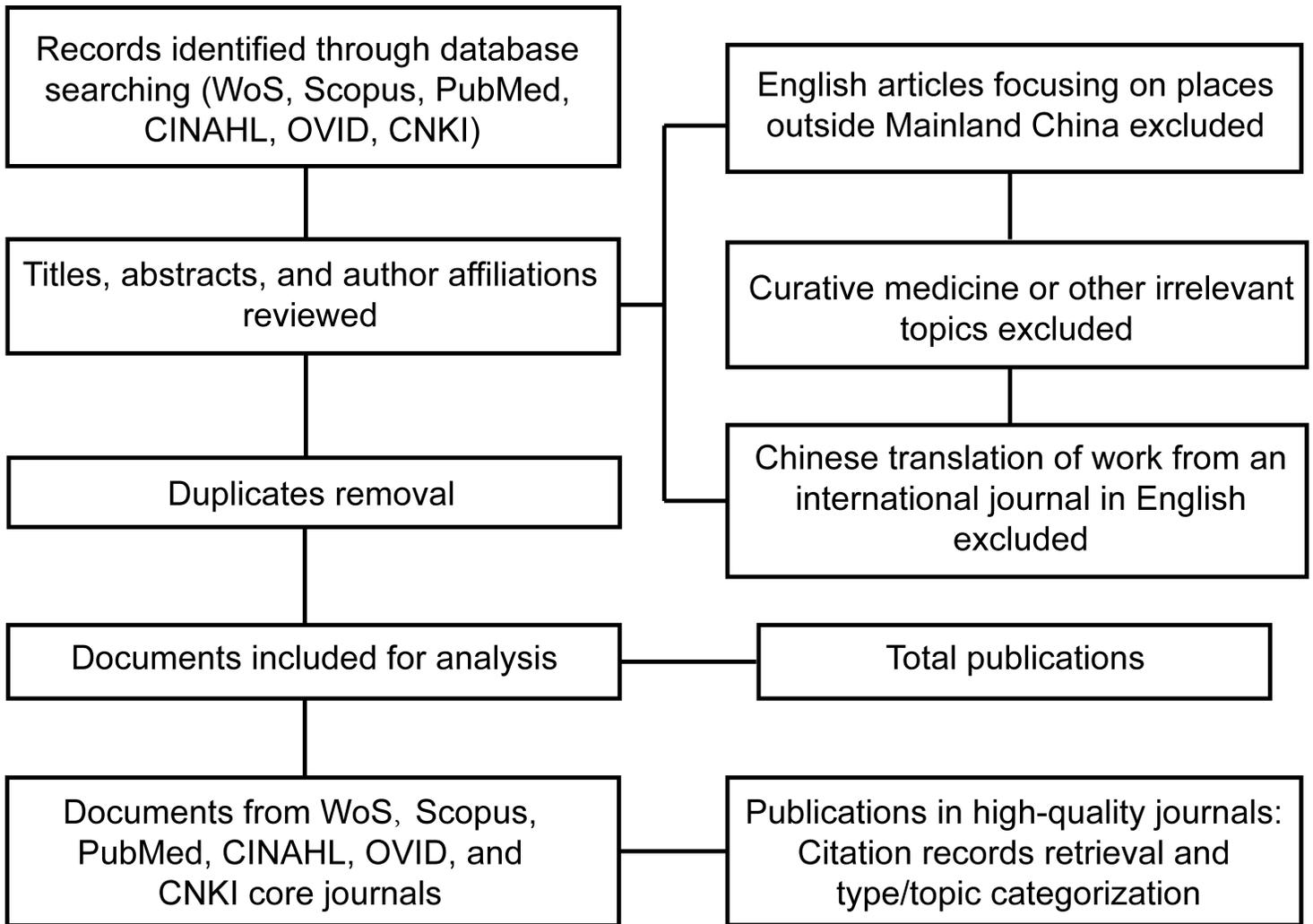


Figure 1

Flow chart of the bibliometric study

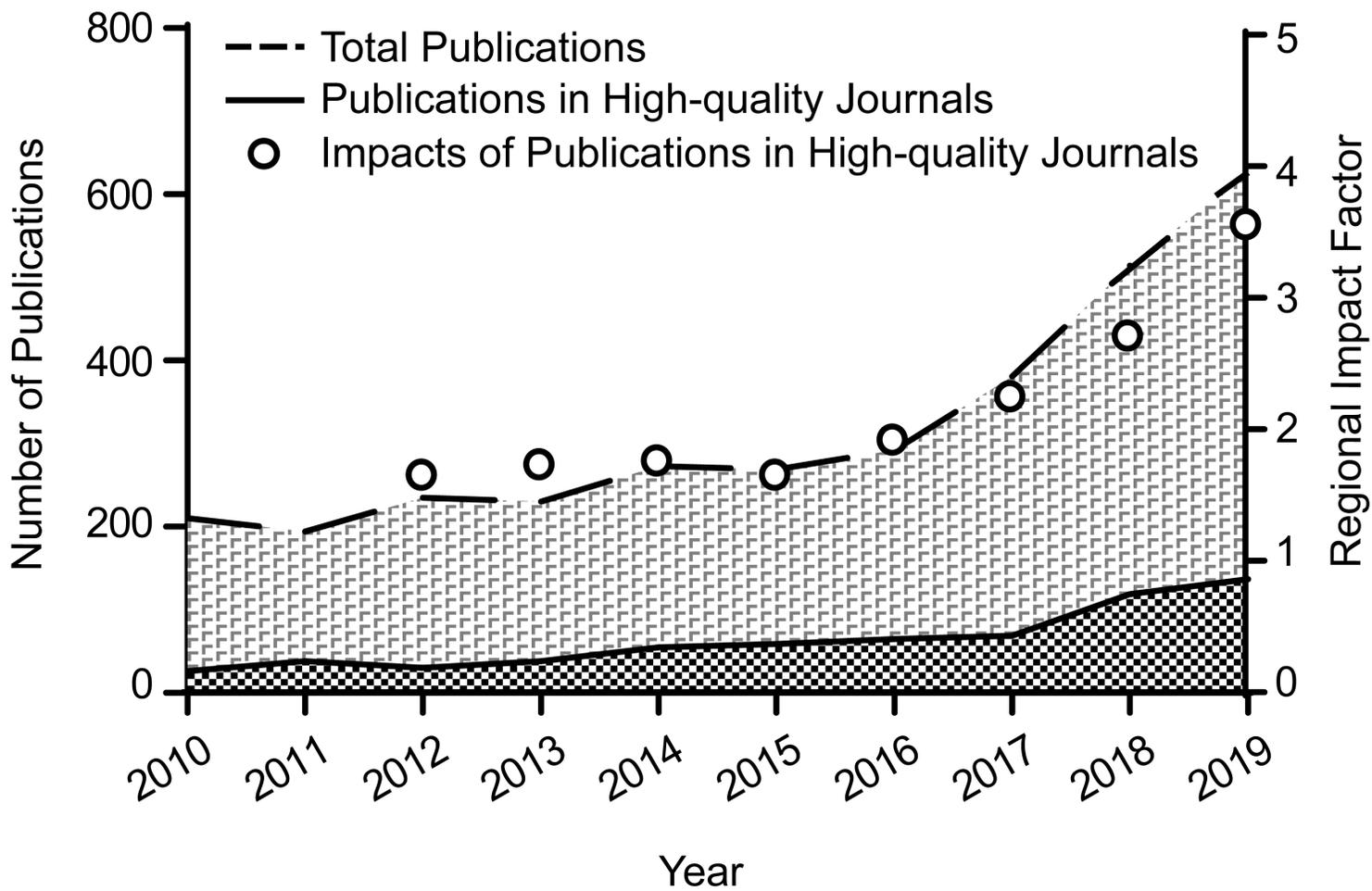


Figure 2

Annual development of production and impacts of publications

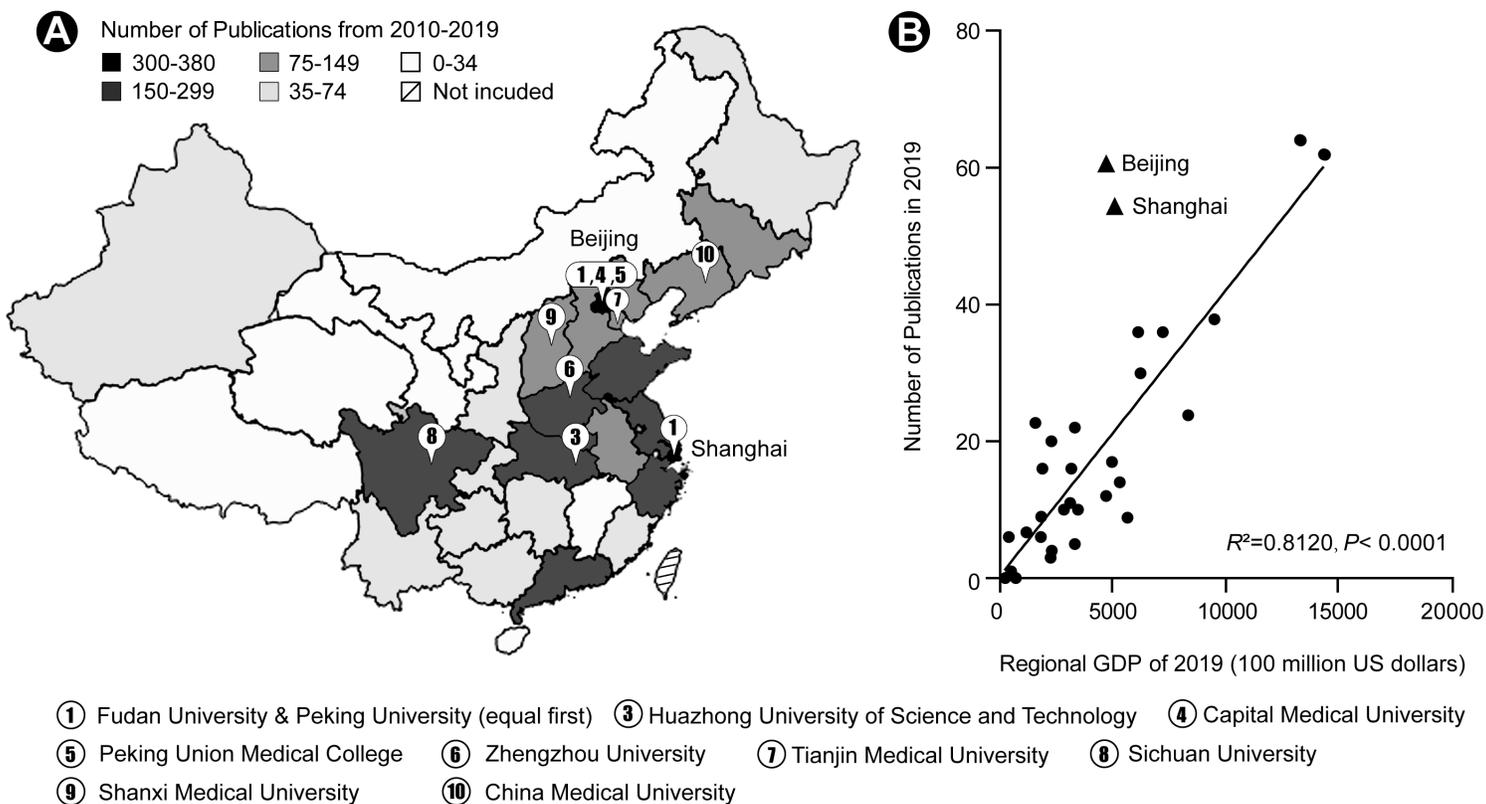


Figure 3

Regional distribution of publications. A, A heatmap of regional production, and locations and ranks of the top-10 productive institutes; B, an example of the correlation between annual regional GDP and number of publications in 2019. The GDP was based on a currency exchange rate of 689.85 Chinese Yuan to 100 United States dollar in 2019. Beijing and Shanghai were excluded from the regression model as outliers. The heatmap was generated by Microsoft Excel. The map was adapted from Bing@GeoNames, HERE, MSFT, Microsoft, NavInfo, Wikipedia with permission from Microsoft Corporation.

Key Words	Strength	Begin	End	2010-2019
HPC ¹	13.0542	2015	2017	
Community health care	11.3629	2015	2017	
Severity of illness index ²	2.6865	2015	2017	
Validity ²	3.968	2015	2016	
Advanced gastric cancer	3.7806	2015	2016	
Gastric cancer	3.2397	2015	2016	
Perspective ²	2.9142	2015	2016	
Family member	2.5715	2015	2016	
Chinese patient ²	2.6981	2015	2017	
Quality nursing care	4.5162	2016	2017	
Risk factor ²	2.7974	2016	2017	
Medical staff	4.1786	2016	2017	
Negetive emotions	3.1845	2016	2019	
Pain management	5.328	2017	2019	

Figure 4

Key words and burst periods from 2015 Note: 1 One Chinese version of HPC (shu-huan-liao-hu); 2 original terms in English-language articles not translated

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