A Systematic Review of the Health Worker-Patient Relationship in China

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Abstract

Background

With a surge of medical disputes in recent years, the health worker-patient relationship (HWPR) in China is presently in a tense situation. Meanwhile, consequent social problems have begun to emerge, such as the practice of defensive medicine and distrust between health workers and patients. Although many empirical studies about the HWPR have been conducted in China, no related systematic reviews have been found. This study can convey the general findings from China to other areas of the world.

Methods

A systematic review and meta-analysis of the HWPR and related determinants were conducted. Six databases were comprehensively searched for articles to include in the review, with no restrictions on language. Articles published between January 1, 2000 and January 1, 2020 were included.

Results

Among the 3,290 records initially identified, 11 studies met the selection criteria. A total of 96,906 individuals were included in the review. The meta-analysis indicated that health workers who were male (male vs. female, OR: 1.48, 95% CI: 1.42- 1.55), older (≤ 50 vs. >50 , 0.86, 0.80-0.93), less educated (undergraduate or below vs. masters or above, 1.39, 1.21-1.60), working in a non-surgical department (surgery vs. other, 0.92, 0.88-0.96), and had a senior title (intermediate or below vs. senior, 0.77, 0.74-0.81) were more likely to be pessimistic about the HWPR or to encounter medical disputes. Patients who were rural residents (urban vs. rural, 0.92, 0.87-0.97), highly educated (below undergraduate vs. undergraduate or above, 0.75, 0.72-0.79), and had no medical insurance (medical insurance vs. no medical insurance, 0.77, 0.67-0.89) were more likely to be pessimistic about the HWPR or to encounter medical disputes. Furthermore, mutual trust could improve rapport between health workers and patients. The 25 other related factors were analysed and described using a narrative approach.

Conclusion

On average, 55.73% of health workers consider the HWPR to be tense, which is higher than the proportion of patients who hold this view (33.7%). The HWPR was significantly associated with individual factors and socioeconomic factors of both health workers and patients, as well as factors related to the health worker-patient interaction. More targeted strategies should be developed to improve the HWPR.

1. Background

As conflicts between health workers and patients have dramatically increased worldwide in recent years[1-5], the health worker-patient relationship (HWPR) has been in crisis and has attracted global attention. Previous studies have reported that medical professionals are more vulnerable to workplace violence than other professionals[6, 7]. In the United States, the number of medical disputes more than tripled from 1991 to 2005[8]. A survey of workplace violence among nurses in the United States showed that 76% of nurses had been attacked by patients or patient family members within the past year[9]. In 2017, 288 physical injuries and approximately 2600 psychological insults occurred in Germany, and nearly 40% of doctors experienced physical conflicts[10]. This rapid growth of medical disputes existed not only in Western countries but also in Asia. For example, in Japan, it was reported that the number of medical malpractice lawsuits had increased 10 times from 102 in 1960 to 1019 in 2003[11]. Furthermore, this pattern may trigger a vicious cycle [12] in that poor HWPR would undermine the mutual trust between health workers and patients, which would in turn result in medical disputes. Therefore, it is important to analyse the determinants of the HWPR and to establish effective strategies to improve such relationships.

Previous studies have explored the effects of various factors on the HWPR, such as health worker-related factors (i.e., age[13-19], gender[19-25], years of experience[26, 27], education level[28-30], ethnicity[30], marital status[29], professional title[31, 32], department[13, 33, 34], income[30, 35, 36], income satisfaction[30, 37, 38], etc.), patient-related factors (i.e., age[29, 30, 36], gender[29, 30, 36], residence[39-41], ethnicity[30], education level[42, 43], medical insurance[32, 44], medical expense[44], household income[30], waiting time[30], etc.), and other factors (i.e., doctor-patient trust[45, 46], doctor-patient communication[47, 48], etc.). Obviously,

previous studies have been conducted to investigate the individual factors and socioeconomic factors for both doctors and patients, as well as factors related to the health worker-patient interaction.

In the Chinese context, medical disputes are highly prevalent. A survey conducted by the Chinese Medical Doctor Association in 2017 reported that 66% of medical personnel had experienced verbal abuse or physical injury[49]. Although many empirical studies have been conducted in China, most were published in Chinese journals, and no related systematic reviews have been found.

Based on the above, this study aimed to systematically review the HWPR and related determinants in China and to further compare these findings with existing international evidence from other countries.

2. Methods

According to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[50], this study comprehensively searched published studies that investigated the determinants of the HWPR in electronic databases. This systematic review was conducted based on English and Chinese databases from January 1, 2000 to January 1, 2020. We searched the following English databases: PubMed, EMBASE and Web of Science; we also searched the following Chinese databases: China National Knowledge Internet Database (CNKI), Wanfang database, and China Biology Medicine disc (CBM/Sinomed).

2.1 Search strategy

For the three English databases, i.e., PubMed, EMBASE and Web of Science, we used a search strategy based on a combination of the following terms: [(China) OR (Chinese)] AND [(doctor-patient relationship) OR (patient-doctor relationship) OR (clinician-patient relationship) OR (patient-clinician relationship) OR (therapist-patient relationship) OR (patient-therapist relationship) OR (physician-patient relationship) OR (patient-physician relationship) OR (doctor-patient relation) OR (patient-doctor relation) OR (clinician-patient relation) OR (patient-clinician relation) OR (therapist-patient relation) OR (patient-therapist relation) OR (physician-patient relation) OR (patient-physician relation) OR (the relationship between doctor and patient) OR (the relationship between health worker and patient) OR (the relationship between physician and patient) OR (the relation between doctor and patient) OR (the relation between health worker and patient) OR (the relation between physician and patient) OR (the interactions between doctor and patient) OR (the interactions between health worker and patient) OR (the interactions between physician and patient) OR (medical dispute) OR (conflict between doctor and patient) OR (conflict between physician and patient) OR (conflict between health worker and patient) OR (medical trouble)] AND [(determinants) OR (factors) OR (influences)].

For the three Chinese databases, i.e., China National Knowledge Internet Database (CNKI), Wanfang database, and China Biology Medicine disc (CBM/Sinomed), we used the combination of the following terms: [zhong-guo OR zhong-guo-de] (China/Chinese) AND [yi-huan-guan-xi OR yi-huan-mao-dun OR yi-huan-jiu-fen OR yi-liao-jiu-fen OR yi-nao] (doctor-patient relationship/conflict between doctor and patient/medical dispute/medical trouble) AND [ying-xiang-yin-su OR cheng-yin] (determinants/factors).

The search strategy is shown in additional file 1.

2.2 Eligibility criteria

The eligibility criteria were as follows: (1) Studies (without language restrictions) that were published in a peer-reviewed journal from January 1, 2000 to January 1, 2020 and located in China were included. (2) Studies in which participants included medical personnel (excluding medical personnel in internship and medical students) and patients were included. (3) Studies that analysed related determinants of the HWPR were included. (4) Studies that analysed the determinants of the HWPR in special departments (i.e., psychiatry department, dental department, etc.) or diseases (i.e., urinary system diseases, cancer, etc.) were excluded. (5) Only cross-sectional studies were included.

2.3 Data extraction and quality assessment

Two independent reviewers participated in the data extraction by screening the acquired studies at the same time, according to the flow diagram (illustrated in Fig. 1). All discrepancies were resolved through discussions, leading to full group consensus. All articles were extracted into a standard extraction form focused on identifying the following for each study: the first author, year of publication, locations, participants, sample size, qualified rate, analytical perspective, determinants, negative cases, rate of negative cases and number of references (shown in Table 1).

According to the Grading of Recommendations: Assessment, Development, and Evaluation (GRADE) approach[51], a modified Newcastle-Ottawa scale (NOS) was utilized to assess the quality of the included studies. The quality assessment criteria consisted of seven components: (1) representativeness of the sample, (2) sample size, (3) non-respondent rate, (4) ascertainment of the exposure, (5) comparability of subjects in different outcome groups, (6) assessment of the outcome, and (7) use of an appropriate statistical test (shown in Table 2). The total quality assessment score of each study was 7, which was divided into three levels: good quality (score of 5–7), medium quality (score of 3–4), and poor quality (score of 1–2). Studies with medium and good quality were included in our analysis.

2.4 Statistical analysis

We used RevMan 5.3 (The Cochrane Collaboration, Oxford, UK) and Stata 16.0 (Stata Corp, College Station, TX, USA) to statistically analyse the results from the included studies. This study mainly analysed the determinants of the HWPR from the perspectives of health workers, patients and health worker-patient interactions. All related variables extracted from the included articles were added to the standard extraction form, and the different variables were transformed into binary variables to permit dichotomous meta-analysis. However, only the same variables or variables that could be combined into the same types were included in the meta-analysis. The variable screening process is shown in Additional file 1.

The determinants included in the meta-analysis were those reported in at least three articles. For the meta-analysis, we conducted a dichotomous meta-analysis and computed the summary risk estimate by using a fixed-effect model. The significance of the pooled odds ratio (OR) was determined by the Z-test, with $P < 0.05$ considered statistically significant. The Q statistic was calculated to estimate the heterogeneity, and $P \leq 0.10$ was considered statistically significant[52]. We assessed the possibility of publication bias for the studies included in the meta-analyses with Egger's linear regression test, which was used to quantitatively evaluate the publication asymmetry, and a $P < 0.05$ was set as statistically significant.

If it was infeasible to make a quantitative synthesis and conduct a meta-analysis for a variable, studies that reported the same determinants were grouped, and a narrative approach and descriptive statistics were used to compare their associations with the HWPR.

3. Results

3.1 Search results

As shown in Figure 1, 3290 articles were initially identified after conducting the search strategy, and 2118 articles remained after directly removing duplicate literature. After reviewing the title or abstract, 1957 articles that did not meet the eligibility criteria were discarded. Among the remaining 161 studies, 150 articles were removed after full-text review for the following reasons: (1) 46 articles were not cross-sectional studies, (2) 71 articles had no original data, (3) 25 articles did not adopt the standard sampling method, (4) 6 articles had obvious quality problems, and (5) 2 articles were literature reviews. Ultimately, 11 studies were included.

3.2 Analysis of the included articles

The characteristics of the included articles are presented in Table 1. A total of 11 articles contained 65,006 health workers and 31,900 patients distributed throughout China. Of the 11 articles, 4 articles analysed the determinants only from the health worker perspective (HWP)[53, 55-57], 2 articles analysed the determinants from only the patient perspective (PP)[58, 63], 1 article analysed the determinants from both the HWP and the health worker-patient interaction perspective (HWPIP)[54], 2 articles analysed the determinants from both the PP and the HWPIP[59, 61], 1 article analysed the determinants from both the HWP and the PP[62], and 1 article analysed the determinants from the HWP, PP, and HWPIP[60].

Fifty determinants were extracted from the included studies and were categorized into three groups: (1) 24 health worker-related factors: gender, age, years of experience, education level, professional title, department, hospital type, region, income, income satisfaction, working time per day, marital status, employment form, administrative position, whether disputed with patient, workload, medical ethics, whether medical disputes interfere with work, career satisfaction, ability to handle dispute, whether worry about encountering dispute, daily average rate of outpatient visits, medical liability insurance, and time spent in direct contact with the patient; (2) 18 patient-related factors: gender, age, registered residence, education level, occupation, medical insurance, medical expenses, household income, whether have a familiar doctor, hospital type, region, department, whether first visit, registration, sources

of patients, whether have family doctors, referral, and operation; (3) 8 health worker-patient interaction-related factors: health worker-patient trust, service attitude, service quality and level, treatment effect, whether health worker receives kickbacks on medications or medical devices, whether adequate medical information is shared, health worker-patient communication, and whether patient bribes or entertains doctors.

3.3 Quality of the included articles

The quality score of 11 articles ranged from 5 to 7 (shown in Table 2), and the average score was 6 out of 7 according to the modified Newcastle-Ottawa scale. All studies were of good quality. Five articles did not meet the sample representative standard (sample size ≥ 1000). Five articles did not report the non-respondent rate. All studies met other assessment criteria.

3.4 Analysis of health worker-related factors

Of the 11 included articles, a total of 7 analysed the health worker-related factors. Based on these 7 studies, the incidence of health workers with pessimistic attitudes towards the HWPR or who had experienced medical disputes ranged from 8.16% to 82.50%, as shown in Table 1. Overall, the mean proportion of negative attitudes was 55.73% (SE: 10.10%, 95% CI: 31.02%- 80.43%).

Among all extracted health worker-related factors, six factors were included in the meta-analysis, and all the extracted determinants were included in the descriptive analysis. Figure 2 shows the meta-analysis results of the health worker-related factors. Gender (male vs. female, OR: 1.48, 95% CI: 1.42- 1.55, $P=0.00001$), age (≤ 50 years old vs. >50 years old, OR: 0.86, 95% CI: 0.80-0.93, $P=0.0001$), education level (undergraduate or below vs. master or above, OR: 1.39, 95% CI: 1.21-1.60, $P=0.00001$), department (surgery vs. other, OR: 0.92, 95% CI: 0.88-0.96, $P=0.0001$), and professional title (intermediate or below vs. senior, OR: 0.77, 95% CI: 0.74-0.81, $P=0.00001$) were significantly associated with HWPR. However, years of experience ($P=0.21$) was not significantly associated with the HWPR. The results indicated that male health workers, those over 50 years old, those with a bachelor's degree or less, those in non-surgical departments and those with senior professional titles were more likely to be pessimistic about the HWPR or to encounter medical disputes.

Among other health worker-related factors reported in these 7 studies, the determinants that were significantly associated with the HWPR included working time per day, workload, income satisfaction, medical ethics, whether medical disputes interfere with work, whether worry about encountering disputes, daily average rate of outpatient visits, hospital type, administrative position, medical liability insurance, and time spent in direct contact with patients. The occurrence of pessimistic attitudes and medical disputes was more likely for health workers who had longer working times[53, 57], had greater working pressure[54, 57], were less satisfied with income [54], had worse medical ethics[54], had more daily outpatients [57], worked in comprehensive hospitals rather than specialty hospitals[56], had no administrative position[56], had no medical liability insurance[56], and spent longer time in contact with patients[53]. Meanwhile, the more likely the health workers are to be affected by medical disputes, the more pessimistic their perception of the HWPR is[54].

3.5 Analysis of patient-related factors

Of the 11 included articles, a total of 6 analysed patient-related factors. Based on the 6 studies, the incidence of patients with pessimistic attitudes towards the HWPR or who had experienced medical disputes ranged from 13.19% to 57.10%, as shown in Table 1. Overall, the mean proportion of negative attitudes was 33.45% (SE: 6.70%, 95% CI: 16.24%- 50.66%).

Among all extracted patient-related factors, five determinants were included in the meta-analysis, and all the extracted determinants were included in the descriptive analysis. Figure 3 shows the meta-analysis results of patient-related factors. Registered residence (urban vs. rural, OR: 0.92, 95% CI: 0.87-0.97, $P=0.001$), education level (below undergraduate vs. undergraduate or above, OR: 0.75, 95% CI: 0.72-0.79, $P=0.00001$), and lack of medical insurance (medical insurance vs. no medical insurance, OR: 0.77, 95% CI: 0.67-0.89, $P=0.0004$) were significantly associated with HWPR. However, gender ($P=0.11$) and age ($P=0.96$) were not significantly associated with the HWPR. The results indicated that rural patients, patients with a bachelor's degree or above, and uninsured patients were more likely to be pessimistic about the HWPR or to encounter medical disputes.

Among other patient-related factors reported in these 6 studies, the determinants that were significantly associated with the HWPR included occupation, medical expenses, household income, whether they had a familiar doctor, type of visiting hospital, region, department, and whether they were at their first visit, and whether they had family doctors. The occurrence of pessimistic attitudes or medical disputes was more likely to occur in patients who had no regular occupation[60], had higher medical expenses[59, 60], had no

familiar doctors or family doctors[58, 59], were not at their first visit[58], visited a specialty hospital[58], visited the department of gynaecology or paediatrics[58], and resided in the western region of China[58].

3.6 Analysis of health worker-patient interaction-related factors

Of the 11 included articles, a total of 4 analysed the health worker-patient interaction-related factors. Among all extracted health worker-patient interaction-related factors, one determinant was included in the meta-analysis, whereas all the extracted determinants were included in the descriptive analysis. Figure 4 shows the meta-analysis results of health worker-patient interaction-related factors. Health worker-patient trust (trust vs. distrust, OR: 0.24, 95% CI: 0.18-0.32, $P=0.00001$) was significantly associated with HWPR. The results indicated that cultivating trust between health workers and patients can reduce conflicts between them.

Among other health worker-patient interaction-related factors reported in 4 studies, the determinants that were significantly associated with the HWPR included service attitude, service quality and level, treatment effect, whether health worker receives kickbacks on medications or medical devices, whether adequate medical information is shared, health worker-patient communication, and whether patient bribes or entertains doctors. These 3 of 4 studies reported that if there are good service attitudes[59, 60], high service quality and level[59], good treatment effects[59], sufficient medical information sharing [59], and effective communication[61] in the doctor-patient interaction, the HWPR will tend to be harmonious. However, if the health workers receive kickbacks on medications or medical devices, or the patients bribe or entertain the doctor during the treatment[59], the HWPR will become tense.

Discussion

In this study, we conducted a systematic review of the present situation and related determinants of the HWPR in China. Seven articles reported the present situation of the HWPR from the perspective of health workers, whereas six articles reported the present situation of the HWPR from the perspective of patients.

The synthesis of the data of 11 articles confirmed that there were significant differences in the evaluation of the HWPR situation between health workers and patients[20]. The proportion of health workers with pessimistic attitudes towards the HWPR or who had experienced medical disputes ranged from 8.16% to 82.50% (mean: 55.73%, SE: 10.10%, 95% CI: 31.02%-80.43%). However, the proportion of patients with pessimistic attitudes towards the HWPR or who had experienced medical disputes ranged from 13.19% to 57.10% (mean: 33.45%, SE: 6.70%, 95% CI: 16.24%- 50.66%). These results demonstrated that the proportion of health workers who held that the HWPR with a relatively tense situation was higher than that of patients. This finding was considered to be the result of the high sensitivity to disputes and the poor practice environment of health workers[64, 65], which was thought to be related to the fact that most patients are inclined to rely on and trust health workers when seeking medical help[20].

This study also analysed the related determinants of the HWPR. A total of 50 determinants were identified, of which 36 were determined to have significant associations with the HWPR, including 16 health worker-related factors, 12 patient-related factors, and 8 health worker-patient interaction-related factors.

In terms of health worker-related factors, first, male health workers were more likely to hold a pessimistic attitude towards the HWPR or to encounter medical disputes than female health workers were. However, many previous studies in China reported that there was no gender difference[15, 53, 55, 60]. Conversely, studies in other countries reported the same conclusion as our study[19, 21, 23-25]. Previous studies argued that female doctors had advantages over men in many aspects of medical treatment. For example, female doctors are more patient-oriented[22] and more sensitive to relationship values[66]. Patients generally preferred female doctors because they deemed that the characteristics of female doctors were more in line with the characteristics of "good doctors". An investigation found that 63% of female doctors felt their relationship with their patients was friendly rather than business-like, compared with only 42% of male doctors[23]. Second, we concluded that health workers over 50 years old were more likely to hold pessimistic attitudes towards HWPR or to encounter medical disputes. In contrast, this finding is inconsistent with existing evidence from previous studies, which showed that doctors had high risks of holding pessimistic attitudes towards HWPR were those who were younger (lower age)[13-18]. Moreover, Yun X, et al. and Tianjiao M, et al. reported that health workers over 50 years old had a better appraisal of the HWPR. In Nigeria, doctors aged 30 years and above had significantly higher mean scores on doctor-patient relationships than their colleagues[24]. Third, health workers with a master's degree or above had a better perception of the HWPR, partly because health workers with an advanced degree received more empathy and medical humanities education. A study in the United States also considered that a better education background reflected, to a certain extent, excellent medical skills and flexible

communication skills in health workers[28]. Meanwhile, education played a buffering role in avoiding medical disputes as communication skills, doctor-patient relationships and other issues are covered in higher education[28]. Some previous studies reported the same results[55, 57]. Fourth, the relationship with patients is more harmonious for surgical health workers than for other departments' health workers. A previous study found that the proportion of surgeons who believed that the HWPR was increasingly harmonious was significantly higher than that of practitioners of internal medicine, obstetrics, gynaecology, etc.[13]. Meanwhile, some studies concluded that health workers in emergency departments were more likely to experience medical disputes than health workers in other departments[33, 34, 53, 55]. On the one hand, the patients in the emergency department and their family members are more anxious and have higher expectations for the health workers[67]; on the other hand, the health workers in the emergency department have a heavy workload[67]. Thus, it is particularly crucial to cultivate empathy between doctors and patients in the emergency department. Fifth, senior professional titles had a significant association with a high risk of medical disputes. A previous study reported that compared with intermediate and junior doctors, senior doctors had a stronger sense of tension towards the HWPR[31]. Although these senior doctors had rich experience in communication with patients, their workload and work pressure affected the doctor-patient relationship. In addition to the above factors, substantial previous studies have suggested that doctors with high income satisfaction could maintain a harmonious relationship with patients[30, 37, 38, 54]. In Germany, America, and Italy, a better health workers-patient relationship was correlated with higher job satisfaction[68-70], which was confirmed by many previous studies[14, 71-75]. In studies from the United States and Hong Kong, a heavy workload was shown to worsen the quality of communication and medical service, which in turn easily triggered medical disputes[76, 77]. In Iran and the United States, a better doctor-patient relationship was inseparable from the enhancement of medical ethics[39, 40].

In terms of patient-related factors, first, rural patients were more likely to hold a pessimistic attitude towards the HWPR or to encounter medical disputes than urban patients, which was consistent with the conclusions of previous studies in China[26, 58, 62]. As the majority of urban patients had more income than rural patients, their medical burden was relatively lighter, which partly eased the tensions. Nevertheless, a study from Germany suggested that urban patients showed poorer doctor-patient relationships than rural patients[41]. Second, patients with a better educational background tended to hold a worse perception of HWPR. This conclusion was similar to that of studies in China[15, 26, 58] and other countries[42, 43]. Patients with low educational levels are highly dependent on and have high trust in doctors[15, 42]. In contrast, patients with better educational backgrounds had higher expectations and requirements of doctors in all aspects, which partly raised the bar for patient satisfaction. Finally, medical insurance, medical expense, and household income had significant associations with HWPR. High medical expenses would place a substantial economic burden on patients with low household incomes, which could increase their dissatisfaction with health workers when defensive medical behaviour occurs. Adequate evidence has shown that patients with medical insurance tend to have a better relationship with health workers than do patients who pay out of pocket[26, 58, 62, 63]. Moreover, the reimbursement rate and range of medical insurance coverage may also affect the HWPR[78]. Therefore, the establishment of a sound medical insurance system, to a certain extent, would ease patient burdens and improve the HWPR[32, 44].

In terms of health worker-patient interaction-related factors, first, a higher prevalence of medical disputes was found amongst health worker-patient relationships with a low degree of trust. Mutual trust between health workers and patients could construct a favourable atmosphere for the HWPR. Substantial previous studies from Norway[45], Singapore[79], America[46], the Netherlands[80], Australia[81] and China[32, 78] argued that trust played a crucial role in fostering a win-win HWPR. Second, effective communication could promote rapport between health workers and patients. This viewpoint is consistent with abundant previous studies[47, 48, 82-84]. The important components of effective communication should include patient-centred communication[45, 85] and adequate medical information sharing[44, 86]. Therefore, this study supports the idea that health workers occupy the dominant position in health worker-patient communication, which suggests that training in communication skills for health workers should be strengthened[87, 88]. Third, service attitude[65, 89] and medical quality[89, 90] had significant associations with HWPR. Evidence from a previous study showed that patients not only paid attention to the quality of their medical results (medical effects) but also took the quality of the service process seriously[91]. Meanwhile, service attitude is also an important factor in the assessment of service process quality. Therefore, more attention to doctors' behaviour and attitudes is needed in the process of standardizing medical services. Finally, the existence of medical rebates and rent-seeking behaviour negatively impact HWPR[31, 37, 59, 92-94].

To our knowledge, this is the first systematic review to analyse the determinants related to the HWPR in China. Our findings present an overview of the current evidence from Mainland China. One strength of this review was that the analysis of the HWPR in China was based on a large sample size of 11 articles and 96,906 individuals (65,006 health workers and 31,900 patients). Another strength was the comprehensive analyses of the determinants, particularly the meta-analysis and narrative analysis. Fifty determinants were

extracted from the 11 included studies. Sixteen health worker-related factors, twelve patient-related factors, and eight health worker-patient interaction-related factors were significantly associated with the HWPR. However, two limitations existed in this systematic review. First, significant heterogeneity among the individual studies was found when performing the meta-analyses, which limited the ability to synthesize evidence clearly. Furthermore, articles using the Patient-Doctor Relationship Questionnaire (PDRQ) and the Difficult Doctor-Patient Relationship Questionnaire (DDPRQ) measurement tools were not included in this study, resulting that the current situation of the HWPR in China could not be measured systematically. To address these limitations, more studies should be included by changing the search strategy.

Conclusion

This systematic review and meta-analysis highlights the determinants related to the HWPR in China. The findings contribute to taking effective measures to promote the harmony and stability of the HWPR. From the perspective of health administration, first, the government should ameliorate the regulations of medical service standards and norms, especially in the attitudes and behaviours of doctors in the medical process, to improve patient satisfaction. Moreover, constant improvement of the medical coverage system in China is necessary to reduce the economic burden of disease on patients. At the same time, it is crucial that the medical coverage policy should be focused on patients with financial challenges. Finally, in view of the current situation of overcrowding in tertiary hospitals in China[95], the government should pay close attention to the implementation of a hierarchical medical system, which can lighten the workload of health workers in tertiary hospitals by diverting patients to different levels of hospitals. From the perspective of health workers, hospitals at all levels should not only strengthen the training of communication skills and empathy but also build a communication system and platform for health workers and patients to unblock communication channels. From the perspective of patients, community doctors should be used to strengthen the public perception of the HWPR and enhance patients' understanding of and respect for health workers. Furthermore, additional studies that explore the influences of health policy-related determinants on the HWPR in the Chinese context are necessary.

Abbreviations

HWPR: Health Worker-Patient Relationship; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; CNKI: China National Knowledge Internet Database; CBM: China Biology Medicine disc; GRADE: The Grading of Recommendations: Assessment, Development, and Evaluation; HWP: Health Worker Perspective; PP: Patient Perspective; HWPIP: Health Worker-Patient Interaction Perspective; OR: Odds Ratio; PDRQ: Patient-Doctor Relationship Questionnaire; DDPRQ: Difficult Doctor-Patient Relationship Questionnaire; CMB: China Medical Board.

Declarations

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Authors' contributions

WN, YM conceptualized and designed the study. NZ, JYZ screened the included articles. WN put forward outline of the article with TX. JNL made data analyses with YBL, and WN drafted the manuscript with RXH. All authors read and approved the final manuscript.

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Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study. All databases used in this study are open to the public.

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1 Characteristics of 11 included studies

Authors	Location	Participants	Sample size (Qualified rate %)	Analytical perspective	Determinants	negative cases rate, N (%)	Ref. No.
Shi, 2017	16 provinces (municipalities or autonomous regions)	Nurses	15970 (74.77)	HWP	Gender, Age, Education level, Marital status, Professional title, Employment form, Income, Department, Years of experience, Working time per day, Time spent in direct contact with patients.	10502 (65.76)	[53]
Zhao, 2017	Chongqing	Medical personnel	520 (not stated)	HWP& HWPIP	HWP: Education level, Professional title, Income satisfaction, Medical ethics, Workload, Whether disputed with patient, Whether medical disputes interfere with work. HWPIP: Health worker-patient trust.	421 (80.96)	[54]
Yuan, 2017	Shanxi	Medical personnel	3663 (81.40)	HWP	Gender, Age, Years of experience, Education level, Professional title, Marital status, Employment form, Department, Income.	2334 (63.72)	[55]
Liu, 2018	Nationwide	Medical personnel	44086 (not stated)	HWP	Gender, Age, Hospital type, Region, Professional title, Administrative position, Department, Income, Medical liability insurance.	24540 (55.66)	[56]
Gao, 2015	Chongqing	Doctors	160 (100)	HWP	Education level, Professional title, Workload, Daily average rate of outpatient visits, Working time per day, Whether disputed with patient, Whether worry about encountering dispute.	132 (82.50)	[57]
Zhao, 2018	Nationwide	Outpatients	29105 (99.82)	PP	Hospital type, Region, Age, Gender, Department, Whether first visit, Education level, Medical insurance, Household income, Registration, Registered residence, Sources of patients, Whether have a familiar doctor, Whether have family doctors, Referral.	8752 (30.07)	[58]
Zhang, 2011	Weifang	Patients	498 (not stated)	PP& HWPIP	PP: Medical expenses, Whether have family doctors. HWPIP: Service attitude, Service quality and level, Treatment effect, Whether health worker receives kickbacks on medications or medical devices, Doctor-patient trust, Whether adequate medical information is shared, Whether patient bribes or entertains doctors.	234 (46.99)	[59]
Wang, 2015	Wuhan	Patients& Medical personnel	Medical personnel: 618 (not stated) Patients: 618 (not stated)	HWP& PP& HWPIP	HWP: Gender, Age, Years of experience, Education level, Professional title, Career satisfaction, ability to handle dispute. PP: Gender, Registered residence, Age, Education level, Occupation, Medical insurance, operation, Medical expenses. HWPIP: Service attitude.	Medical personnel: 206 (33.33) Patients: 206 (33.33)	[60]
Yang, 2014	Hubei	Patients	1539 (95.60)	PP& HWPIP	PP: Age, Education level, Medical insurance.	203 (13.19)	[61]

					HWPIP: Health worker-patient communication, Health worker-patient trust.		
Deng, 2010	Changsha	Patients& Medical personnel	Medical personnel: 49 Patients: 140 (Total qualified rate: 99.47)	HWP& PP	HWP: Age, Gender, Professional title, Department, Education level. PP: Age, Gender, Education level, Registered residence, Medical insurance, Household income.	Medical personnel: 4 (8.16) Patients: 80 (57.10)	[62]
Liu, 2010	Urumqi	Patients	1514 (not stated)	PP	Medical insurance, Education level	303 (20.01)	[63]

*16 provinces (municipalities or autonomous regions) mean Beijing, Tianjin, Hebei, Shandong, Guangdong, Liaoning, Shanxi, Henan, Anhui, Hunan, Heilongjiang, Ningxia, Shannxi, Gansu, Sichuan, and Chongqing.

Table 2 Assessment of Risk of Bias

Study type: Cross-sectional; Score: 1=achieved, 0=not achieved								
Authors	Representativeness of the sample	Sample size	Non-respondent rate	Ascertainment of the exposure	Comparability of subjects in different outcome groups (control for confounding)	Assessment of the outcome	Statistical test is appropriate	Total score
Shi, 2017	1	1	1	1	1	1	1	7
Zhao, 2017	0	1	0	1	1	1	1	5
Yuan, 2017	1	1	1	1	1	1	1	7
Liu, 2018	1	1	0	1	1	1	1	6
Gao, 2015	0	1	1	1	1	1	1	6
Zhao, 2018	1	1	1	1	1	1	1	7
Zhang, 2011	0	1	0	1	1	1	1	5
Wang, 2015	0	1	0	1	1	1	1	5
Yang, 2014	1	1	1	1	1	1	1	7
Deng, 2010	0	1	1	1	1	1	1	6
Liu, 2010	1	1	0	1	1	1	0	5

Figures

Figure 1

Flow diagram of study selection

Figure 2

Forest plots of health worker-related determinants

Figure 3

Forest plots of patient-related determinants

Figure 4

The forest plot of health worker-patient trust

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