

REVIEW ARTICLE



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Nurse prescribing in China: A systematic review

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Abstract

Introduction: This study aims to explore the development of nurse prescribing and identify nurse prescribing implementation and challenges in China.

Methods: Conducted as a systematic review adhering to the PRISMA, this study involved a comprehensive literature search across various databases. A timeline mapping and a region mapping were conducted.

Results: A total of 28 articles from databases were included in the study. The growth of nursing education and research, the emergence of specialty nurses, and the establishment of nurse-led clinics have contributed to the advancement of nurse prescribing in China. Presently, approximately half of the 34 regions in China are either actively researching or preparing for nurse prescribing involving medication.

Conclusion: Based on the findings, several tasks have been identified for the implementation of nurse prescribing in China. Firstly, it is imperative to elevate the overall level of nursing education and revise the existing curriculum to equip nursing students with the necessary knowledge and skills required for prescribing. Secondly, it is crucial to establish a systematic qualification system for prescribing nurses, defining the roles of specialty nurses and advanced practice nurses. Thirdly, the development of nurse prescribing includes scope of nursing practice and prescribing protocols are essential. Lastly, extension of the geographic reach of legislation and pilot projects is needed to realise the nationwide implementation of nurse prescribing.

Keywords: *Nursing, Health Professional, Prescribing*

Practice Highlights

- Nurse prescribing is fueled by the emergence of specialty nurses and nurse-led clinics.
- There are regional disparities in readiness for nurse prescribing.
- The key tasks are enhancing nursing education, qualification systems, and prescribing protocols.

I. INTRODUCTION

A. Background

Prescribing is a complex process requires deep understanding of pharmacology and disease, clinical judgement on risks and benefits of a treatment under an unpredictable context (Abuzour et al., 2018). The International Council of Nurses (ICN) stated that prescribing is an evolving process involving information gathering, clinical decision-making, communication, and evaluation which results in the initiation, continuation, or cessation of a medication (International Council of Nurses, 2021).

The extension of prescriptive authority to nurses has taken place for several reasons. First, nurse prescribing contributes to efficient and effective patient care and the quality and continuity of care (Gielen et al., 2014). Second, nurse prescribing accommodates nurses' professional skills, increases nurses' autonomy, and minimises unnecessary time waste for medical practitioners and patients (Kilańska et al., 2022). Third, the patient outcome of nurse prescribing is indicated as similar or better compared to the prescribing of other healthcare professionals (Ling et al., 2018; McMenamin et al., 2023).

The legislative expansion of prescriptive authority for nurses has taken place in the 1980s in the USA, 1990s in the UK, at the turn of the 21st Century in Canada, Europe, Australia, New Zealand, some countries of Africa, and Spain. As of 2021, 44 countries were reported to have formal laws or regulations that authorise nurse prescribing (International Council of Nurses, 2021; Maier, 2019).

Nurse prescribing is identified by scholars as sensitive to the country's context and the healthcare culture, defining and implementing of nurse prescribing follows a distinctive pattern in different countries (International Council of Nurses, 2021; Nissen et al., 2010). The common areas of prescription include medications, therapies and therapeutics, durable medical equipment, appliances and certain dressings, foods designated for specific therapeutic purposes, and electrolytes (International Council of Nurses, 2021). Due to its complexity, the following frameworks and models are formed by scholars and institutions to enhance the understanding of nurse prescribing.

The ICN published the 'Guidelines on Prescriptive Authority for Nurses' in 2021, suggesting a framework with five components including education, regulation, authorisation, scope of practice, and continuing professional development. This guideline adopted a four-category prescribing model (Nissen et al., 2010). This model consists of four categories: independent prescribing, supplementary prescribing (dependent), prescribing via a structured prescribing arrangement (protocol), and prescribing to administer. Each of these four categories in order requires increased skill level, decision-making ability, and accountability of prescriber.

The qualification system of prescribing nurses in different countries and regions is diverse (Maier, 2019). ICN differentiates the post-basic level nurse prescribing from the advanced practice level nurse prescribing. Prescribing nurses at the post-basic level are those who have completed their basic nursing education, and practice nursing as registered nurses (RNs). Prescribing nurses at the advanced practice level are those with a certain period of clinical experience, holding higher credentials such as APN (advanced practice nurse), NP (nurse practitioner) or specialty nurse (International Council of Nurses, 2021).

In China, nurse prescribing is defined as nurses diagnosing and making decisions on diet, psychological health, treatment, disease, and care level of the patients (Ma & Ding, 2018). In 2022, Shenzhen of China passed a medical regulation. This is seen as the first legislation

in China that grants prescriptive authority to nurses. The growth of nursing education and research, the emergence of specialty nurses, and the establishment of nurse-led clinics have contributed to the advancement of nurse prescribing in China.

B. Nursing in China

By 2021, the number of registered nurses in China doubled in the last decade and exceeded 5.02 million, nurses fill about 45% of the total number of health professionals and the number of registered nurses per 1,000 population reached 3.56 (National Health Commission of the People's Republic of China, 2022). The number of RN with a bachelor's degree or higher has steadily grown for decades, nearly 180,000 in 2010 and 1.36 million in 2020 (National Health Commission of the People's Republic of China, 2022), 30.4% of whom have received a baccalaureate or higher credential. An increased number of nurses with higher education level accelerates the development of nursing research (Wu, 2022).

Referring to advanced practice nursing in some developed countries, specialty nursing in China umbrellas registered nurses who have received specialised training and been certified by the training institutions, appeared first in the 1990s (Wu, 2022). Oncology, wound ostomy, PICC (Peripherally inserted central catheter), and blood purification are the most common and comparably developed specialties (Wang et al., 2018). Around 8000 nurses participated in specialty nurse (专业护士) training programs run by the Chinese Nursing Association in 2021 (Wu, 2022).

Advanced practice nursing, on the other hand, in 2007, the Guangdong Health Commission worked with the Hong Kong Hospital to prepare 614 APNs of 14 specialties over 4 years (Wong, 2018). To attain an APN credential, nurses are suggested to have a bachelor's degree, a minimum of 8 years of clinical experience, and 2 years of specialised clinical experience (Wong, 2018). Beijing University in 2017 admitted two candidates to an advanced practice nursing program (Zhang et al., 2022).

A nurse-led clinic is defined as a clinical practice facility where nurses have their own formalised and structured standards to address the healthcare needs of patients and their families (Hatchett, 2003). The common NLCs (护理门诊) of China are run as divisions of outpatients by hospitals. NLCs accommodate specialty nurses and are one of the main settings where pilot nurse prescribing takes place in China (Chen & Peng, 2023; Ling et al., 2018). China first initiated NLCs on maternal health in 1995, psychiatric NLCs in 1997. In 2016, over 900 NLCs

in 19 provinces were open, an average number of 2.8 NLCs were operated at each hospital, each NLC accommodated 36 clients a day, and 75.5% of these clinics were PICC NLCs (Gao et al., 2017). 69.3% of the NLC nurses reported that the lack of prescriptive authority is a major challenge they face in NLC nursing (Dong et al., 2022).

Given this global and domestic context, the objective of this study is to examine nurse prescribing in China, offering an overview of its development and implementation, identifying the challenges associated with it.

II. METHODS

The aim of this study is to review, identify, and synthesise the evidence presented in the included literature on nurse prescribing, so to

1. Track the development of nurse prescribing in China;
2. Describe nurse prescribing implementation in China; &
3. Identify challenges faced in nurse prescribing of China

A systematic review was conducted in accordance with the procedure of the PRISMA Statement 2020 (Page et al., 2021). The flow diagram was utilised for the literature search and the checklist was followed as an overall guide of this study.

A. Data Collection

The literature search was conducted on Medline (PubMed), CINAHL, CNKI (China National Knowledge

Infrastructure), and Wanfang Data. The records with titles or abstracts containing the terms ‘nurs* prescri*’ (护理*处方*) and ‘Chin*’ were expected in this process. The database and document search were conducted from 1 January to 17 June 2023. Articles are included when they present nurse prescribing in China and the full text is available in either Chinese or English. Articles are excluded when the focus is nurse prescribing out of China, or is a single group of a client population or a particular medicine.

B. Data Analysis

A quality assessment was conducted after the screening process, using the Mixed Methods Appraisal Tool 2018 (Hong et al., 2018).

For data analysis, timeline and region mapping were used in former studies to approach nurse prescribing of other countries. In this study, a timeline mapping was conducted to chart the progression of nurse prescribing practices over time. A region mapping was performed focusing on the geographical distribution and implementation of nurse prescribing practices. An overall nurse prescribing profile of China was provided and a discussion on the current practice and indicated challenges was applied.

III. RESULTS

A. Search Outcomes

As a result, a total of 441 studies were taken into the identification process (Figure 1). At the end of the screening, a total number of 28 articles from the databases were included for analysis.

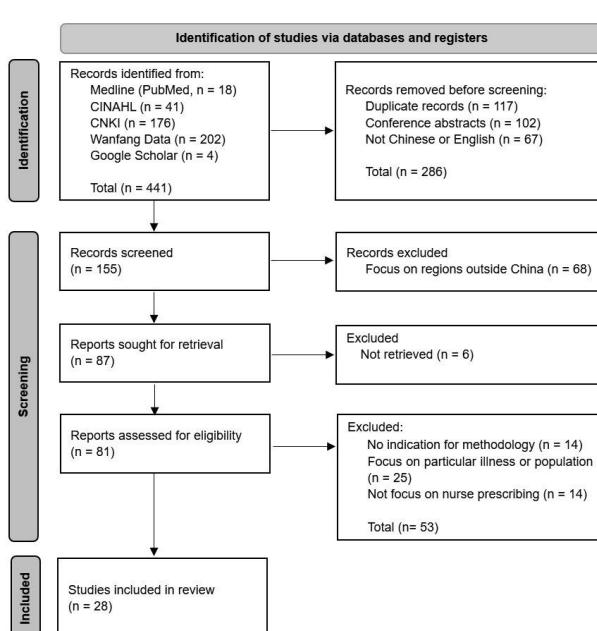


Figure 1. Screening Flow Diagram

CINAHL - Cumulative Index to Nursing and Allied Health Literature
CNKI - China National Knowledge Infrastructure

No	Authors	Origin	Purpose	Research design	Disciplinary home	Method/framework	Major finding
1	Chen L. & Peng G. (2023)	Guangdong	To describe nurse prescribing at NLCs in Guangdong	Quantitative	Nursing	No	Detailed nurse prescribing in Guangdong (content focused)
2	Wang, X. et al. (2022)	Shanxi	To construct general clinical practice training program for drug prescribing applicants of nurses in China	Qualitative	Nursing	Delphi method	Three-level indexed training program development and comparison with the US, UK and Ireland.
3	Zhang, Q. et al. (2022)	Shanxi	To interpret ICN guideline to promote common understanding of nurse prescribing in China	Qualitative	Nursing	ICN Guideline	Analyses nurse prescribing in China providing interpretation of the guide and comparison of other countries
4	Han, S. et al. (2022)	Shanxi	To review main research results and application on nurse decision making and prescribing	Qualitative	Nursing	No	Further research and practice in nursing education, APN, nurse prescribing is needed
5	Fan, Y. et al. (2022)	Henan	To review development of nurse prescribing globally and summarise theory and practice evidence	Qualitative	Nursing	No	Provides suggestion for the government, nursing institutions and scholars.
6	Xing, M. et al. (2022)	Zhejiang	To identify nurse prescribing challenges and advantages in China.	Qualitative	Nursing	SWOT analysis	Summarises internal and external challenges and advantages and provides future strategies. S-O, W-O, S-T, W-T strategies are proposed.
7	Han, S. et al. (2021)	Shanxi	To further explore nurse prescribing contents	Qualitative	Nursing	Delphi method	Conducted a list of nurse prescribing medications, suggested forms and training curriculums of nurse prescribing. 348 nurse prescribing medications, 6-unit training

8	Wang, L. et al. (2021)	Zhejiang, Liaoning	To identify regulatory challenges in nurse prescribing, suggest effort on liability system and institutional mechanism	Qualitative	Law	No	Redefines nurse prescribing in China, suggests regulatory support and clarification on liability
9	Wang, Y. et al. (2021)	Shanxi	To construct the general training syllabus for nurses' prescription right of applicants for prescription right in different clinical specialist nurses	Qualitative	Nursing	Delphi method	The constructed training syllabus for clinical specialist nurses was reliable, which could provide basis for prescription right training of clinical specialist nurses. A training guide of nurse prescriber is provided.
10	Wang, X. et al. (2021)	Shanxi	To conduct a global analysis of nurse prescribing training	Qualitative	Nursing	No	Identifies challenges, provides suggestions on practical training of nurse prescribing
11	Hou, X. (2021)	Sichuan	To investigate scope and related factors of nurse prescribing in third-level hospitals	Qualitative	Nursing	Phenomenological analysis, Colaizzi	Nurse prescribing in China is in its infancy.
12	Zhong, M. et al. (2020)	Guangdong	To understand nurses' belief in and attitudes towards nurse's prescription right so as to provide a reference for medical decision makers to formulate relevant policies and expand the scope of nursing service	Quantitative	Nursing	Scale of nurses' attitudes and belief towards nurse prescribing	Nurses have positive attitudes and beliefs in nurse's prescription. A minimum of 10 years' clinical work experience, a professional title of supervisor nurses and a bachelor's degree are suggested as entry qualifications for the right
13	Wang, Y. et al. (2020)	Shanxi	To discuss training in nurse prescribing under global context to provide evidence for domestic application	Qualitative	Nursing	/	Standardised trainings to nurses with different education backgrounds are needed

14	Wang, S. et al. (2020)	Shandong	Discuss the content of the prescription right of nurses and provide references for relevant decision-making	Qualitative	Nursing	Delphi method	Content table of medical and non-medical nurse prescribing: 27 nursing intervention prescriptions, 15 examination prescriptions, 21 medical device prescriptions and 35 drug prescriptions were identified.
15	Wan, Z. & He, Y. (2020)	Beijing	To summarise the classification, development data and qualification of nurse prescribing at home and abroad	Qualitative	Nursing	/	4 suggestions on nurse prescribing
16	Feng, S. et al. (2020)	Shandong	To summarise practical exploration and theoretical research of nurse prescribing in China	Qualitative	Nursing	/	Stresses both education curriculum and continuing training on prescribing for nurses
17	Li, M. (2019)	Guizhou	To compare nurse prescribing at home and abroad: the US, Australia, England	Qualitative	Medicine	/	Comparison on prescriber qualification, specialization, contents.
18	Han, S. & Hou, Y. (2019)	Shanxi	Advantages, disadvantages, opportunities and threats of granting prescription rights to clinical nurses in China	Qualitative	Nursing	SWOT analysis	Construction of nurses team the development of specialist nurses and the training of highly educated personnel in China all should be strengthened
19	Tian, Y. et al. (2019)	Henan	To investigate the status quo of clinical nurses' cognition of nurse prescribing	Quantitative	Nursing	/	262 nurses lack of knowledge on nurse prescribing while showing a strong will for it.
20	Wang, M. et al. (2018)	Anhui	To explore attitudes of doctors and nurses towards nurses' qualification of prescribing	Quantitative	Nursing	/	1056 medical staff from 14 hospitals in Anhui
21	Li, H. & Ding, P. (2018)	Anhui	Overview nurse prescribing under NLC context	Qualitative	Nursing	/	NLC nurse prescribing overview and future suggestions
22	Ma, D. & Ding, P. (2018)	Anhui	To identify the scope of authority on prescription right of nurses in Anhui	Qualitative	Nursing	/	Zoom in on Anhui trail

23	Cheng, Z. & Xia, H. (2017)	Shanghai	To review nurse prescribing in England, Canada, Australia and the US.	Qualitative	Nursing	/	Provides details of prescriber qualification, content, format, extension of nurse prescribing, suggests regulations and trials on nurse prescribing in China
24	Gong, S. et al. (2016)	Jilin	To review nurse prescribing in England, so to provide evidence for domestic application	Qualitative	Nursing	/	Provides details of prescriber qualification, content, format, extension of nurse prescribing in England. Identifies 3 challenges of China.
25	Wei, X. (2016)	Gansu	Explore certain prescriptions that meet nurse's capability in China	Qualitative	Nursing	/	Suggests certain prescriptions nurse should practice within extended prescribing. 11 prescriptions for extended prescribing
26	Zhang, G. et al. (2012)	Shanxi	To gain opinions on baccalaureate curriculum for nurse prescribing from experts	Qualitative	Nursing	Delphi method	Provides evidence for baccalaureate curriculum in preparation of nurse prescribing. 3 categories, 11 subjects
27	* Zhang, G. et al. (2012)	Shanxi	To study on qualification of nurse prescribing applicants	Qualitative	Nursing	Delphi method	Provides evidence on minimised qualification of nurse prescriber. Baseline of nurse prescribing applicants
28	Han, S. & Li, X. (2011)	Shanxi	To probe into the promotion factors of nurse prescribing implementation in China	Qualitative	Nursing	Delphi method	Categorises and lists factors of nurse prescribing in China. 43 promoting factors of nurse prescribing

Table 1. Summary of included studies

*NLC (Nurse-Led Clinics), Shanxi (山西省), ICN (International Council of Nurses), US (United States), UK (United Kingdom), SWOT (Strengths, Weaknesses, Opportunities, and Threats), AHP (Analytic Hierarchy Process)

The 28 (100%) articles were all in Chinese, published between 2010 and 2023, eleven papers (39.3%) were conducted in the Shanxi (山西) Province. Four (14.3%) studies are designed quantitative and 24 (85.7%) are qualitative. Two articles (7.1%) were conducted in the

medicine or law disciplines, the rest 26 (92.9%) were conducted in nursing. Seven studies (25.0%) applied Delphi method and 2 (7.1%) applied SWOT analysis. The studies on nurse prescribing fall mostly into the reviews of nurse prescribing abroad. This research work

provides evidence for the qualification of prescribing nurses, the prescription protocols and the challenges in nurse prescribing.

B. Development of Nurse Prescribing in China

Nurse prescribing as well as nurse-led clinic nursing are being practiced since 1996 in Hong Kong (Parker & Hill, 2017; Wong & Chung, 2006). As for the mainland, the realization of nurse prescribing started in 2005 (Han et al., 2022). Research teams formed in 2005 and started research on decision-making in the patient classification system among nurses (Han et al., 2022). In 2007, a research team proposed that nurses should be the decision maker of nursing care, and divided nursing interventions into 16 independent and 11 integrated categories for decision making (Han et al., 2022). In 2020, a list of nurse prescriptions was provided (Wang et al., 2022), it consists of 27 prescriptions for nursing interventions, 15 for tests and examinations, 21 for medical aids and instruments, and 35 for medicine.

For medicine nurse prescribing, starting in 2008, researchers have looked into the contents and forms of prescribing (Han et al., 2022). They identified the contents in 7 acute and 4 chronic illnesses, modified the qualification of prescribing nurses (Han et al., 2022). They also provided a list of nurse prescriptions with 348 medicines and proposed a four-level prescribing model:

independent prescribing, supplementary prescribing, extended prescribing, and adjusted prescribing (Han et al., 2022).

As for the qualification of prescribers, prescribing nurses should be those who work at third level hospitals, have bachelor's degrees in nursing, and have 5 years of clinical work experience after obtaining the intermediate profession rank (Zhang et al., 2012). Researchers also proposed to add courses in nursing education to prepare nurses to prescribe, such as laws and regulations, nursing intervention, dosage calculation and substance abuse (Han et al., 2022).

In July 2017, Anhui Province initiated a trial as the landing of nurse prescribing in China. By the end of 2017, Anhui arranged 78 specialty nurses into 22 community health centers, opened 7 nurse-led clinics, and authorised these nurses limited prescribing (Ma & Ding, 2018). Guangdong Province is known as the first region opened traditional Chinese medicine NLCs in 2006. In 2022, the Shenzhen City of Guangdong Province authorises specialty nurses with the examination, treatment, and external medicine prescribing (Shenzhen Municipal People's Congress, 2022). A survey conducted in Guangdong indicates 88.54% of the NLC nurses practice independent nurse prescribing (Chen & Peng, 2023).

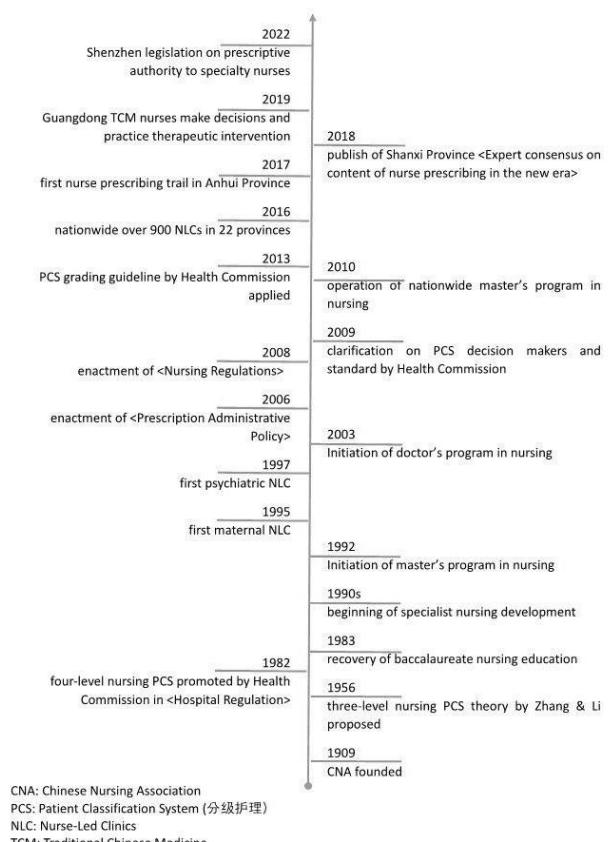


Figure 2. Nurse Prescribing Timeline in China

*The left presents events in policy and practice, right in education and research.

C. Present Nurse Prescribing in China

Nurses have shown their positive intention in nurse prescribing in several research. A sample of nurses responded with an intermediate to a positive level of faith and attitude toward nurse prescribing (Zhong et al., 2020). The same study also emphasises that higher professional ranking and longer clinical experience led to a stronger intention and faith in nurse prescribing.

In the Anhui trial, the nurse prescribing is limited to non-medicine prescription for hypertension, diabetes, stroke, wound stoma, mental illness, gestational diabetes, and childbirth (Ma & Ding, 2018). Prescribers are limited to a group of nurses who have over 15 years of clinical experience, had received specialty nurse training with certificates, and have advanced communication skills (Ma & Ding, 2018). Prescribers make decisions and provide interventions on dressing changes, general physical examination, health education and consultation, test result and report reading, history taking, and physical or mental examination in chronic diseases (Ma & Ding, 2018).

In Guangdong Province, the NLC nurse prescribing includes medicine, tests and treatments, medical aids and

devices, home medical devices, dressings, therapeutic diet prescriptions, and health education (Chen & Peng, 2023). Nurses prescribe several external medicines and limited injected medicines (normal saline solution, heparin injection, peritoneal fluid, etc.) (Chen & Peng, 2023).

In the Shenzhen legislation, specialty nurses are regulated to be the only qualified prescribing nurses, specifically those who have a baccalaureate degree or above in nursing, more than five years of clinical experience and more than two years in relevant specialised departments, meanwhile having intermediate profession ranks or above (Shenzhen Municipal People's Congress, 2022).

More than half of the 34 provinces run nurse-led clinics and about 70% of nurses at these clinics report independent nursing practice (Gao et al., 2017). Currently, about half of the total 34 regions are recognised in the research or preparation phase for the implementation of nurse prescribing on medicine (Figure 3). Trials and legislative move are seen to take place in regions with intermediate research activity.



Figure 3. Nurse Prescribing Region Mapping of China in 2023

D. Indicated Challenges

Despite the positive intentions, nurses and nursing students lack knowledge of nurse prescribing and lack confidence in it (Hou, 2021; Tian et al., 2019). A percentage 60.7 of registered nurses reported it necessary for nurses to have prescriptive authorization and 58% are willing to have it, but about half, 49.2% of the nurses have not heard about nurse prescribing by the time they were surveyed (Tian et al., 2019). A qualitative study indicates all participated specialty nurses advocated for nurse prescribing (Hou, 2021). Less than 35% of medical and nursing students had heard of nurse prescribing, and less than 5% had heard of the Anhui trial (Tian et al., 2019).

The current nursing education level is a major concern in nurse prescribing (Feng et al., 2020; Y. P. Wang et al., 2020; Zhang et al., 2012). In China, as of 2020 and 2021, respectively, 71.2% and 69.5% of the nurses had credentials below baccalaureate, 28.7% and 30.1% had a baccalaureate degree, 0.2% and 0.3% had a master's or a higher credential (National Health Commission of the People's Republic of China, 2022).

For the education curriculum, researchers suggest multi-level prescribing training due to the diversity of current nursing education levels. Researches focus on curriculum design for baccalaureate nursing education (Zhang et al., 2012) or the design for specialty nurse training (Wang et al., 2022), most suggest including pharmacology and related legislation (Zhang et al., 2012).

For the nurse prescribing training, an education program is recommended to reach a performance set standard for the nurse seeking prescriptive authority (International Council of Nurses, 2021). A prescribing-specific training is suggested in some studies (Wang et al., 2021; Wang et al., 2022), most of these studies take the training system of the United Kingdom (UK) as their reference.

The current qualification system for prescribing nurses has been identified as problematic in several studies (Gong et al., 2016; Xing et al., 2022; Zhong et al., 2020). Some studies suggest a combination of a master's degree and the highest professional rank (Cheng & Xia, 2017). Some suggest specialty nurses (Cheng & Xia, 2017) practice prescribing in their specialties. Some others suggest a baccalaureate degree and 5 years of clinical experience with intermediate profession rank (Wang et al., 2018; Zhang et al., 2012).

The present nurse prescribing implementation is limited within the extended category (Wang et al., 2021) due to

the lack of organizational preparation (Han et al., 2022; Hou, 2021). These organizational conditions include the current nursing education level, the lack of systematic qualification of prescribers (Zhang et al., 2012), the clear scope of nursing practice (Fan et al., 2022; Wei, 2016), guidelines and protocols (Han et al., 2021), and solutions on extension and geographic expansion (Wang et al., 2021).

Under the limited pilot practice and the absence of national legislation, current nurse prescribing in China requires both expansion and extension. This session summarised the implementation of nurse prescribing and analysed the indicated challenges. The improvement of nurses' knowledge of prescribing, the current nursing education level, and the training and qualification of prescribing nurses are indicated as the priorities.

IV. DISCUSSION

Previous studies on nurse prescribing have primarily focused on developed countries, however, it is worth noting that developing countries have shown a slightly higher rate of nurse prescribing authorization, with 38% compared to 31% in developed countries (International Council of Nurses, 2021). This study reviewed the development and implementation of nurse prescribing and identified the challenges China is facing to further practice nursing prescribing.

Unlike other countries that initiated nurse prescribing decades ago, in China, the exploration of nurse prescribing appeared late. Nurse prescribing related regulations can be traced to the 2006 Prescription Administrative Policy, the Article 2 indicates that physicians are the only prescribers of medicine in China. The Nursing Regulation indicates nurses are obliged to implement necessary first aid in emergencies and remain critical on instructions of doctors according to Article 17.

On June 23, 2022, the Municipal People's Congress of Shenzhen passed the Medical Regulation of Shenzhen Special Economic Zone that came into force on January 1, 2023. This is the first legislation in China that grants prescriptive authority for nurses according to Article 65. It also provides a general qualification guide of specialty nurses, clarified in Article 64.

For the implementation, nurses and nursing students show limited knowledge and confidence in nurse prescribing. This is seen caused by the current nursing education level and the content of the education curriculum. For nursing education level, referring to the nursing education level in the United States, 2016 is

reported as the year when all the states in the US practice nurse prescribing. In 2015, an estimated 65% of nurses had obtained a baccalaureate or higher degree (National Council of State Boards of Nursing, 2016). In 2017, the number of RNs with a master's degree in nursing has increased to 17.1% and 1.1% had a Doctorate in Nursing Practice, 10.0% held an APRN credential (National Council of State Boards of Nursing, 2018).

As for the training of prescribing nurses, the UK applies prescribing-specific training. The training follows a structured framework governed by regulatory bodies such as the Nursing and Midwifery Council (NMC) and involves a combination of theoretical and practical components (Courtenay et al., 2007). The training program typically consists of two parts: the academic component and the clinical component (Nursing and Midwifery Council, 2018).

For qualification of prescribing nurses, thirty-one of the 44 countries authorise nurse prescribing at post-basic levels, to nurses who have completed their basic nursing education; 13 countries at advanced practice levels; 11 countries allow nurses to prescribe at both the post-basic and advanced practice levels (International Council of Nurses, 2021). In the United States by 2016, all 50 states and the District of Columbia authorise certain levels of independent prescribing to APNs (American Nurses Association, 2018). Canada has a broad advanced practice level prescriptive authority for NPs federally and in recent years at a post-basic level for RNs provincially in Alberta and Ontario (Canadian Nurses Association, 2015). In Europe, prescribing by nurses has been recognised legally in 15 countries at a post-basic level (Gielen et al., 2014).

In the UK, the NMC outlines the requirements and standards that nurses must meet to become qualified prescribers. Upon successful completion of an NMC-approved prescribing course delivered by a recognised educational institution, nurses are eligible to apply for the relevant prescribing qualification from the NMC (Nursing and Midwifery Council, 2018). These qualifications determine the scope of prescribing authority for nurses, specifying the range of medications they can prescribe and any limitations or restrictions.

In China, specialty nurses are recognised as prescribing nurses in the Shenzhen legislation. Although prerequisite 2 years of clinical experience, 2 to 3 months training period is seen in most specialty nurse training programs, current evidence shows there is no modified training,

qualification, or scope of practice for specialty nurses at a national level (Han & Hou, 2019; Han & Li, 2011).

The confusion in specialty nursing and advanced practice nursing is seen in former studies. The specialty nurse system should be well differentiated from the advanced practice nurse system in China. In a long-term stance either form a linked structure to umbrella both specialty nurses and APNs as equal prescribing nurses or assign respective categories of prescriptive authorities to each group. As a result, the qualifications of prescribing nurses can be modified at a national level.

Evidence on the outcome and evaluation of the current trial practice and the region-specific analysis were rare. The possibility and plan for the expansion of nurse prescribing over the country were not observed in former research. Despite expansion, the extension to other levels of nurse prescribing is needed. In the US, some states allow advanced practice registered nurses (APRNs) to practice independently (independent), some others require APRNs to work within a collaborative agreement with a physician (supplementary), 16 states allow RNs to dispense some medications (protocol) including contraceptives and drugs for sexually transmitted infection care in outpatient settings, such as a health department or a family planning clinic (Guttmacher Institute, 2023).

A. Limitation & Implication

Despite the scarcity of research on nurse prescribing in China and the lack of recent studies addressing the latest updates, this study overviewed nurse prescribing in China through a review of the development, the implementation, and the challenges, provides insights with global relevance. As healthcare systems worldwide face increasing demands and evolving roles for healthcare professionals, understanding diverse implementations of nurse prescribing offers crucial comparative perspectives. This article not only provides evidence on how nurse prescribing is integrated within China's unique healthcare landscape but also serves as a benchmark for evaluating similar practices across different countries. For researchers and policymakers, these findings contribute to a broader understanding of effective healthcare strategies, policy development, and the global advancement of nursing roles.

As for the limitation, bias might exist in the screening and analysis process as they were conducted by two reviewers. In China, the community healthcare setting is regulated as one of the nurse prescribing settings in the Shenzhen legislation. More investigation on nurse prescribing in community settings seems necessary.

V. CONCLUSION

This systematic review followed the PRISMA 2020 Statement, analysed 28 articles. The 28 articles were assessed by the MMAT 2018 for synthesis. Both a time and a region mapping of nurse prescribing in China were conducted. This study provides an overview of the implementation and challenges of nurse prescribing in China.

Along with the development of specialty nursing, more than half of the province-level regions run hospital-based nurse-led clinics and about 70% of the nurses at these clinics practice independently. As for nurse prescribing, post a long research and preparation period, Anhui Province started a trial in July 2017 and practices non-medicine prescriptions for certain diseases and conditions. In June 2022, the Congress of Shenzhen City passed a medical regulation authorises specialty nurses with examination, treatment, and external medicine such as ointment and dressing prescribing, as the first legislative move in China. About half of the total 34 regions are in research or preparation phase for the implementation of medicine nurse prescribing.

The lack of knowledge and confidence related to nurse prescribing among nurses and nursing students, the current nursing education level and curriculum, and the training and qualification of prescribing nurses are recognised as the major concerns of nurse prescribing in China. Limited research, pilot practice, and legislative move of nurse prescribing are observed.

To meet the growing need for nurse prescribing in China, the following tasks are identified. First, improvement in nursing education level and curriculum is necessary. Second, a systematic qualification system for prescribing nurses should be established based on the clarification of specialty nurses and advanced practice nurses. Third, the scope of nursing practice consists of prescribing and the protocols for prescribing are in need. Fourth, the geographic expansion of legislation and pilot project are expected to reach nurse prescribing implementation at a national level. Last, future research should focus on nurse prescribing in community healthcare settings.

Notes on Contributors

CL performed the literature search and analysis, wrote the original manuscript, prepared the figures and tables, and worked on the review and editing. GJL supervised the conceptualisation and the methodology, provided suggestions on the validation and visualization.

Ethical Approval

As this study is a systematic review, ethical approval and IRB application was not applicable.

Data Availability

Data set that support the findings of this study are openly available in Figshare repository

<https://doi.org/10.6084/m9.figshare.25310869>

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Declaration of Interest

No conflicts of interest are associated with this paper.

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Appendix 1. Quality assessment of included studies using the MMAT

Y= yes, N= no, CT= can't tell

Author	Methods	Screening Questions		Qualitative questions				
		S1. Clear research question	S2. Data addresses question	1. Qual approach appropriate	2. Qual data collection adequate	3. Findings derived from data	4. interpretation substantiated	5. Coherence between aspects of study
Wang, X. et al. (2022)	Delphi	Y	Y	Y	Y	Y	Y	Y
Zhang, Q. et al. (2022)	Review	Y	Y	Y	Y	Y	Y	Y
Han, S. et al. (2022)	Review	Y	Y	Y	Y	Y	Y	Y
Fan, Y. et al. (2022)	Review	Y	Y	Y	Y	Y	Y	Y
Xing, M. et al. (2022)	SWOT	Y	Y	Y	CT	Y	Y	Y
Han, S. et al. (2021)	Delphi	Y	Y	Y	Y	Y	Y	Y
Wang, L. et al. (2021)	Review	Y	Y	Y	Y	Y	Y	CT
Wang, Y. et al. (2021)	Delphi	Y	Y	Y	Y	Y	Y	Y
Wang, X. et al. (2021)	Review	Y	Y	Y	Y	Y	Y	Y
Hou, X. (2021)	Interview	Y	Y	Y	Y	Y	Y	CT
Wang, Y. et al. (2020)	Review	Y	Y	Y	Y	Y	Y	Y
Wang, S. et al. (2020)	Delphi	Y	Y	Y	Y	Y	Y	Y
Wan, Z. & He, Y. (2020)	Review	Y	Y	Y	Y	Y	Y	CT

Feng, S. et al. (2020)	Review	Y	Y	Y	Y	Y	Y	Y	CT
Li, M. (2019)	Review	Y	Y	Y	Y	Y	Y	Y	Y
Han, S. et al. (2019)	Review	Y	Y	Y	Y	Y	Y	Y	Y
Han, S. & Hou, Y. (2019)	SWOT	Y	Y	Y	Y	Y	Y	Y	Y
Li, H. & Ding, P. (2018)	Review	Y	Y	Y	Y	Y	Y	Y	CT
Ma, D. & Ding, P. (2018)	Review	Y	Y	Y	Y	Y	Y	Y	Y
Cheng, Z. & Xia, H. (2017)	Review	Y	Y	Y	CT	Y	Y	Y	CT
Gong, S. et al. (2016)	Review	Y	Y	Y	Y	Y	Y	Y	CT
Wei, X. (2016)	Review	Y	Y	Y	Y	Y	CT	CT	
Zhang, G. et al. (2012)	Delphi	Y	Y	Y	Y	Y	Y	Y	Y
* Zhang, G. et al. (2012)	Delphi	Y	Y	Y	Y	Y	Y	Y	Y
Han, S. & Li, X. (2011)	Delphi	Y	Y	Y	Y	Y	Y	Y	Y

Quantitative Descriptive		Screening Questions		Quantitative questions					
Author	Methods	S1. Clear research question	S2. Data addresses question	1. Sampling strategy relevant	2. Sample representative	Measurements appropriate	4. Non-response bias	5. Statistical analysis appropriate	
Chen L. & Peng G. (2023)	Survey	Y	Y	Y	CT	CT	Y	Y	

Zhong, M. et al. (2020)	Survey	Y	Y	Y	N	Y	CT	Y
Tian, Y. et al. (2019)	Survey	Y	Y	Y	Y	N	CT	Y
Wang, M. et al. (2018)	Survey	Y	Y	Y	Y	CT	Y	Y

* SWOT (Strengths, Weaknesses, Opportunities, and Threats)