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# Developing a professional competency framework for general practitioners in tertiary hospitals in China: a modified Delphi study

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## ABSTRACT

**Objective** At present, the competency of general practitioners (GPs) in tertiary hospitals has not been reported, and there is no suitable competency evaluation tool. This study was conducted to develop a professional competency framework for GPs in tertiary hospitals.

**Design** A modified Delphi method was adopted in the study.

**Participants** Considering the expert authority, a wide range of sources, expert qualification and willingness, 20 eligible experts were invited and 19 experts agreed to participate in this study.

**Results** 19 experts (the median age of the experts was 51 (49, 57) years and 84.2% were women) participated in both two rounds of Delphi survey. From the literature review, 4 primary indicators, 14 secondary indicators and 48 tertiary indicators were identified. In the first round, all indicators achieved consensus except for the secondary indicator '3.3 Data processing', which did not achieve 70.0% agreement in both of importance (63.2% agreement) and feasibility (63.2% agreement). After the first round of the Delphi survey, the description of 7 secondary indicators and 11 tertiary indicators was modified. Two secondary indicators and two tertiary indicators were merged, respectively. One secondary indicator was deleted due to not achieving consensus level, and seven new tertiary indicators were suggested to be added by more than two experts. After the second round of the Delphi survey, all three levels of indicators achieved consensus in terms of importance and feasibility. Finally, the professional competency framework for GPs in tertiary hospitals in China was constructed including 4 primary indicators, 12 secondary indicators and 54 tertiary indicators.

**Conclusion** The professional competency framework for GPs in tertiary hospitals in China was successfully constructed in this study with good scientific soundness and rationality. It is expected to be used in medical education, general practice research, quality improvement and more broadly within the healthcare system to reflect the competency of GPs in tertiary hospital.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study addresses the lack of evaluation tools for general practitioners (GPs) in tertiary hospitals, which meet the competency feedback requirements for GPs in China.
⇒ This Delphi process in this study has engaged experts with a wide range of areas.
⇒ The survey response rate was good.
⇒ Although the selection of experts was appropriate for the purpose of this study, the results may have limited generalisability.
⇒ The effectiveness of the competency framework for GPs in tertiary hospitals is unknown, which may entail further evidence from implementation in real practice settings.

## INTRODUCTION

In recent years, the hospital-centric health delivery system was prevailing in China, in which patients tend to seek medical services in public tertiary hospitals rather than primary healthcare (PHC) institutions, leading to a perception of health services as 'too difficult to access and too expensive'.[1] To enhance accessibility to healthcare, the Chinese government promulgated guidelines for building a so-called tiered healthcare delivery system in 2015, where each level of healthcare facility (tertiary, secondary and primary) would provide services according to their designated roles.[2] Patients may receive treatment for common and minor illnesses at the primary or community health centre level by general practitioners (GPs), with referrals to hospitals (secondary or tertiary) for more complex and severe conditions. Care across these levels is intended to be integrated and coordinated through bidirectional referral mechanisms, facilitated by the establishment of medical alliances or integrated systems.[3]

However, in practice, patients in China can seek care from any tier of healthcare provider without the need for a referral. Previous studies have consistently shown that healthcare services are predominantly used in tertiary hospital with a potential reason that service quality in tertiary hospitals is higher

compared with primary care and secondary hospitals.[4 5] In addition, evidence indicates deficiencies related to hypertension and diabetes, which are the most common chronic conditions encountered in PHC settings.[6] China has substantially increased financial investment and implemented favourable policies aimed at enhancing its PHC system, which plays a pivotal role in the prevention and management of chronic diseases. However, widespread gaps in the quality of PHC still exist. System challenges include the suboptimal education and training of PHC practitioners, a fee-for-service payment system that incentivises testing and treatments over prevention, fragmentation of clinical care and insufficient continuity of care throughout the entire healthcare system.[6]

To enhance the general medical service, strengthen the training of GPs, facilitate an effective and efficient healthcare system and improve the quality of health management, the Chinese government stipulates all tertiary hospitals to establish general practice departments by 2019.[7] The basic functions of the general practice departments in tertiary hospitals across China included (1) providing comprehensive and coordinated medical services, encompassing diagnostic evaluation and therapeutic interventions, chronic disease management and health education; (2) carrying out standardised residency training for GPs, including formulating training plans, outpatient and inpatient instruction, assessment and related activities; (3) conducting scientific research in the fields of innovation of primary health service model, clinical studies related to general practice and quality improvement and (4) providing prevention-oriented health services, including screening, primary prevention, health education and self-management strategies.[8] At present, most GPs in tertiary hospitals were doctors from other departments after the on-job training (1-year training for doctors who want to register as a GP). New GPs recruited to the general practice departments in tertiary hospitals should have a PhD degree and have finished the standardised residency training (3-year rotational training after undergraduate medical education). The standardised residency training represents the primary pathway for GP training. On successful completion of the residency programme, trainees will be eligible to register as GPs and pursue careers in community health service institutions (CHSIs) or within the general practice departments of hospitals. The standardised residency training comprises two distinct phases: (1) 30 months dedicated to hospital-based clinical rotations and (2) 6 months focused on CHSI-based training.[9 10] According to statistics in 2021, there were 54115 GPs in tertiary hospitals (accounting for 12.4% of the total GPs in China).[11]

Professional competency in medicine was defined as 'the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practice for the benefit of the individual and community being served' by Epstein and Hundert in *JAMA*.[12] In some western countries, practical competency models for GPs, such as the Family Medicine Milestone Project in the USA,[13] Workplace-Based Assessment and Annual Review of Competence Progression guidance in the UK,[14] the CanMEDS-FM 2017 in Canada[15] and competency profile of the Australian GP at the point of fellowship in Australia,[16] have been widely used in competency assessment of GPs in primary care. In China, there were studies concentrated on the development of competency models for GPs in rural areas[17] and GPs after standardised residency training.[18]

Generally, general practice provides 'person-centred, continuing, comprehensive and coordinated whole person healthcare to individuals and families in their communities with common and frequently occurring diseases'.[19] A multimethod study exploring the work content of GPs in primary care in Beijing indicated that GP–patient consultation with common and frequently occurring diseases is the major part of GP work. In addition, GPs also undertake work like chronic disease management and follow-up, health file management, family doctor contract services, teaching students, etc.[20] In addition to outpatient medical services, GPs in tertiary hospitals also deliver inpatient diagnostic and therapeutic services, which is different from PHC providers that exclusively offer outpatient care. Typically, the epidemiology of multimorbidity among the outpatients and inpatients admitted to the general practice departments of tertiary hospitals is complex. As reported in the previous study, the prevalence of multimorbidity among inpatients in the general practice department of tertiary hospitals in China is extremely high, reaching 93.1%.[7] In tertiary hospitals, in addition to providing clinical diagnosis and treatment within both outpatient and inpatient departments, GPs are also required to engage in educational activities related to standardised resident training, conduct scientific research pertinent to career advancement and professional title promotion as well as participate in disease prevention and management initiatives. These responsibilities have established heightened expectations for the competencies of GPs working in tertiary hospitals. Given the varied backgrounds of GPs in tertiary hospitals and the current focus of competency evaluations primarily on GPs in primary care, there is a notable absence of the literature addressing competency evaluation for GPs in tertiary hospitals and the associated evaluation tools. Consequently, this study aims to establish a professional competency framework for GPs in tertiary hospitals, thereby providing a reference point for future assessments of GP competencies.

## METHODS

### Design

A modified Delphi method was adopted in the study, which was the most widely used method for selecting quality indicators in healthcare.[21 22] There is no restriction on the number of rounds that can be conducted,[23] but two or three rounds are most common in previous studies.[24–26] The process concludes on reaching a consensus regarding

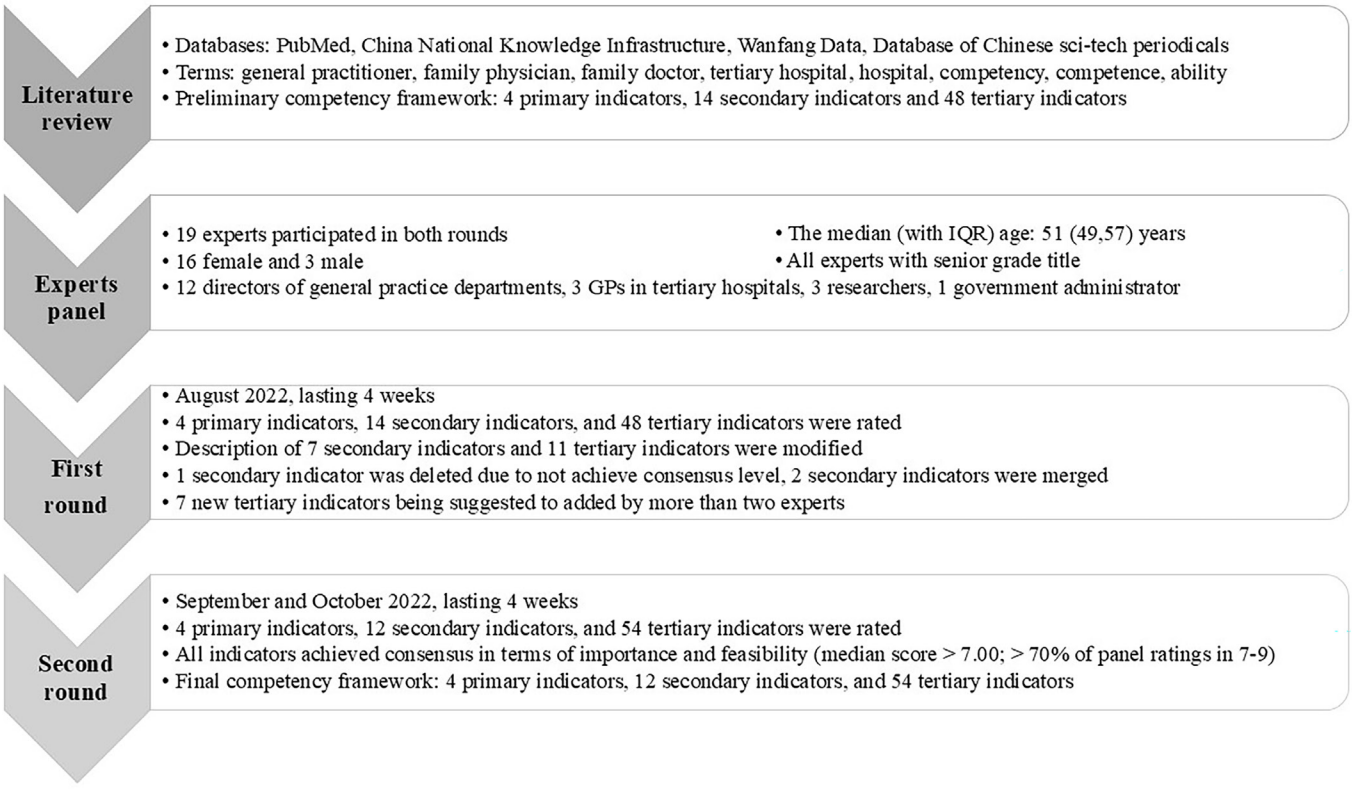


**Figure 1** Flow diagram of the process of developing a professional competency framework for GPs in tertiary hospitals in China. GPs, general practitioners.

the topics under discussion. The Delphi study lacked the definitive consensus criteria.[27] In this study, consensus was established based on two selection parameters: a median score exceeding seven on a 9-point scale and at least 70% of panel ratings falling within the top tertile (7–9) for both importance and feasibility.[28]

This study involved two rounds of questionnaires to an expert panel via email from August to October 2022. The Delphi process was carried out in accordance with established methodologies from prior studies[25 26] and research guidelines for the Delphi survey technique,[29] which included two stages: (1) generating an initial set of potential competencies to be considered for inclusion in the competency model for GPs in tertiary hospitals from a systematic review and (2) conducting a modified Delphi survey to prioritise and gain consensus on the most essential competencies for GPs in tertiary hospitals (figure 1).

## Participants

The basic criteria for the selection of experts in our study include (1) expert authority, which means the academic background related to general practice in tertiary hospitals, including roles in leading or participating in research, seminars and academic conferences related to the establishment, positioning and development of general practice departments; (2) a wide range of sources, including management personnel in general practice departments in tertiary hospitals, GPs in tertiary hospitals, government administrators or scientific researchers in the field of general practice, who possessed a comprehensive understanding of the responsibilities of GPs in tertiary hospitals; (3) expert qualification, which refers to a senior professional title or an associate senior grade title and (4) willingness to participate in this research. Individuals who lack an understanding of the functional orientation of the general practice department and the responsibilities of GPs in tertiary hospitals will be excluded. Finally, 20 eligible experts were invited by QC via email, and 19 experts agreed to participate in this study.

## Questionnaire preparation

Four primary competency indicators (medical services, teaching, research and prevention) were determined based on the basic functions of the general practice departments in tertiary hospitals.[8] A preliminary list of secondary and tertiary competency indicators was constructed by the literature review. The literature was searched in PubMed and three Chinese databases (China National Knowledge Infrastructure, Wanfang Data and Database of Chinese sci-tech periodicals) with terms commonly used to describe GP (eg, GP, family physician and family doctor), tertiary hospital (eg, tertiary hospital, general hospital and hospital) and competency (eg, competency, competence and ability). Furthermore, policy documents related to GP in tertiary hospitals across China were also reviewed to extract competency indicators. Finally, a total of 31 published research papers describing domestic and foreign GPs' competencies were identified from the literature review, which included 5 published competency models from international general practice organisations.

In addition, three published policy documents about the GP system in China were also reviewed (references of these papers and policies are shown in online supplemental material 1).

Potential competency indicators were extracted and screened by two reviewers (YW and YA) according to the following criteria: (1) the indicators were applicable to measure the competency of GPs in tertiary hospitals, (2) the indicators were relevant to requirements of GPs' work in tertiary hospitals in China and (3) the indicators were relevant to the development of GPs in tertiary hospitals. When there were doubts about whether an indicator should be retained, the research team would discuss together to make a decision. There were 74 competency indicators identified by the screening process. After deleting duplicate competency indicators, integrating the indicators with similar dimensions and classifying them into three hierarchical levels based on their connotations, a preliminary professional competency framework for GPs in tertiary hospitals in China was conducted including 4 primary indicators, 14 secondary indicators and 48 tertiary indicators (online supplemental material 2).

All indicators in the preliminary professional competency framework for GPs in tertiary hospitals in China were formatted into a Delphi questionnaire. Importance pertains to the significance of the indicator in reflecting the competencies of GPs, and feasibility pertains to the accessibility of information concerning evaluation outcomes during the actual evaluation process, which were both rated on a 1–9 Likert scale (1=not important/feasible at all; 9=very important/feasible).[27 28] Spaces were left for experts to make comments on these existing competency indicators or recommend new competency indicators, which they considered should be included in.

## Delphi survey

### First round

The first round of the Delphi survey was performed in 4 weeks in August 2022. The first-round questionnaire was sent to experts by email, along with materials about the research background, the aim of the study, the demographic information collection form, instructions of scoring criteria and descriptions of the indicators. In the first-round questionnaire, experts were asked to rate the importance and feasibility of each competency indicator using the 1–9 Likert scale, give their comments on the existing indicators and recommend new competency indicators which they considered should be included.

After the first round of the Delphi survey, data were collected and analysed. The median and the distribution of scores (frequency count of answer choices) as well as comments were reported. The rating result of each level of competency indicators and comments was discussed after the round 1 feedback. Competency indicators achieving the consensus level or being modified based on experts' comments were retained for the second round of the Delphi survey. New indicators were added into the second-round questionnaire based on the suggestions by more than two experts. Indicators were removed, which did not achieve the consensus level or were recommended to be removed by more than two experts.[25 30]

### Second round

The second round of the Delphi survey was conducted from September to October 2022, spanning a duration of 4 weeks. The competency indicators confirmed in the first round of the Delphi survey were formulated into the second-round questionnaire, which was sent to the same experts with the first-round survey by email, accompanied by a graph-based report detailing the results from the first round. The importance and feasibility of each level of competency indicators were rated using the same 1–9 Likert scale as in the first round. In this round of the survey, participants were also given a chance to suggest additional competency indicators, argue for or against proposed competency indicators and comment on competency indicators wording and comprehension.

## Statistical analysis

The database was established and inputted by two researchers simultaneously using Epidata V.3.0. If there was any difference or error, the third researcher would check and correct it. Descriptive analysis was used to describe the characteristics of participants and results. Median and IQR were used to report continuous variables, while frequencies (%) were used to report categorical variables. The median and the distribution of scores (frequency count of answer choices) were used to report the rating result of each indicator. The data management and analysis were performed using the Statistical Package for Social Science (SPSS), V.22.0. All qualitative feedback from experts will be systematically extracted and categorised into distinct groups, encompassing revisions to the descriptions of indicators, proposed deletions of certain indicators and suggestions for new indicators to be added. The occurrence frequency of identical suggestions will be recorded.

## Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

# RESULTS

## Panel characteristics in the Delphi survey

All of the 19 experts participated in both two rounds of Delphi survey, with 16 female participants (84.2%) and 3 male participants (15.8%). The median age of the experts was 51 (49, 57) years. Among them, 15 experts were from Beijing, 2 experts were from Zhejiang Province, 1 from Guangdong Province and 1 from Hainan Province. Directors of general practice departments in tertiary hospitals accounted for 63.2%, GPs in tertiary hospitals accounted for 15.8%, researchers in the field

of general practice accounted for 15.8% and there was one government administrator (5.3%). 94.7% of experts had a master's or PhD degree, and 100% of experts were with a senior grade title. The median duration of experience in general practice was 7 (5, 14) years, with 26.3% of experts working for less than 5 years, 42.1% of experts working for 5–10 years and 31.6% of experts working for over 10 years in this field. 73.7% of experts had participated in the on-job training, 10.5% of experts had participated in the standardised residency training and 84.2% had participated in other training (faculty training of general practice) (table 1).

Table 1 Panel characteristics of the Delphi process (n=19)

| Characteristics | Frequency | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 3 | 15.8 |
| Female | 16 | 84.2 |
| Age, years | | |
| 30–39 | 1 | 5.3 |
| 40–49 | 6 | 31.6 |
| ≥50 | 12 | 63.2 |
| Professional field | | |
| Directors of general practice departments | 12 | 63.2 |
| GPs in tertiary hospital | 3 | 15.8 |
| Researchers | 3 | 15.8 |
| Government administrator | 1 | 5.3 |
| Working years | | |
| <5 | 5 | 26.3 |
| 5–10 | 8 | 42.1 |
| >10 | 6 | 31.6 |
| Highest degree | | |
| Bachelor | 1 | 5.3 |
| Master | 10 | 52.6 |
| PhD | 8 | 42.1 |
| Professional title* | | |
| Intermediate grade title | 0 | 0.0 |
| Deputy senior grade title | 3 | 15.8 |
| Senior grade title | 16 | 84.2 |
| Training experience (multiple choice) | | |
| On-job training | 14 | 73.7 |
| Standardised residency training | 2 | 10.5 |
| Other training† | 16 | 84.2 |
| No training experience | 0 | 0.0 |

*In China, the professional titles for physicians are categorised into four distinct levels: junior grade (resident physician), intermediate grade (attending physician), deputy senior grade (deputy chief physician) and senior grade (chief physician). These classifications are determined by the healthcare professionals' work experience and research accomplishments.
†There are also faculty training, continuing education and training for 100 outstanding GPs in the field of general practice.
GP, general practitioner.;

## First round

In the first round, the median scores of importance and feasibility for all primary and secondary competency indicators were ranged from 7.00 to 9.00. As shown in table 2, all primary indicators reached consensus with the exception of indicator '3. Research', which failed to attain a 70.0% agreement in terms of feasibility (63.2% of experts rating in the top tertile with 7–9). Considering that the importance and feasibility rating of the secondary and tertiary indicators within the scope of indicator '3. Research' achieved consensus, it was retained for the second round of expert consultation. All secondary indicators achieved consensus except for indicator '3.3 Data processing', which failed to attain 70.0% agreement in both of importance (63.2% agreement) and feasibility (63.2% agreement). No tertiary competency indicators failed to attain consensus in the first round. The median scores of importance and feasibility ranged from 7.00 to 9.00 and 7.00 to 9.00, respectively. The percentage of panel ratings in the top tertile (7–9) for importance and feasibility ranged from 73.7% to 100% (online supplemental material 3).

Adjustment of all three hierarchical levels of competency indicators after the first round of the Delphi survey is shown in table 3. Description of 7 secondary indicators and 11 tertiary indicators was modified. Secondary indicator '2.3 Joint teaching with primary care' was merged into the secondary indicator '2.2 Practical teaching'. Tertiary indicator '3.3.1 Data collation' and tertiary indicator '3.3.2 Data analysis' are merged as '3.3.1 Statistical analysis of data'. One secondary indicator '3.3 Data processing' was deleted because of not achieving the consensus level. There were seven new tertiary indicators being suggested to be added by more than two experts and hence included in the second round.

## Second round

At this step, 4 primary indicators, 12 secondary indicators and 54 tertiary indicators were evaluated, including retained, modified and new competency indicators. In the second round, the median values of importance and feasibility scores for three hierarchical levels of indicators were 7.00–9.00 and 7.00–9.00, respectively. The percentages of panel ratings in the top tertile (7–9) about importance and feasibility were 89.5%–100% and 84.2%–100% for 4 primary indicators, 84.2%–100% and 84.2%–100% for 12 secondary indicators (table 2) and 89.5%–100% and 84.2%–100% for 54 tertiary indicators (online supplemental material 3). As a result, all competency indicators achieved consensus in terms of importance and feasibility in this round.

Table 2 Results about the agreement level in the top tertile (7–9) for primary and secondary competency indicators

| | Round 1 | | Round 2 | |
|---|---|---|---|---|
| Competency indicators | Importance | Feasibility | Importance | Feasibility |
| 1. Medical services | 100% | 100% | 100% | 100% |
| 1.1 Clinical knowledge and skills | 100% | 100% | 100% | 100% |
| 1.2 Diagnosis and treatment | 100% | 100% | 100% | 100% |
| 1.3 Chronic disease management | 94.7% | 94.7% | 100% | 100% |
| 1.4 Communication | 100% | 100% | 100% | 100% |
| 2. Teaching | 94.7% | 100% | 100% | 100% |
| 2.1 Theoretical lectures | 100% | 100% | 100% | 100% |
| 2.2 Practical teaching | 100% | 100% | 100% | 100% |
| 2.3 Joint teaching with primary care* | 100% | 100% | | |
| 2.4 Self-directed learning | 94.7% | 84.2% | 94.7% | 84.2% |
| 3. Research | 78.9% | 63.2% | 89.5% | 84.2% |
| 3.1 Project design and declaration | 73.7% | 73.7% | 89.5% | 89.5% |
| 3.2 Scientific research | 73.7% | 78.9% | 89.5% | 89.5% |
| 3.3 Data processing† | 63.2% | 63.2% | – | – |
| 3.4 Write paper and submission | 73.7% | 78.9% | 84.2% | 84.2% |
| 4. Prevention | 100% | 94.7% | 100% | 94.7% |
| 4.1 Disease prevention | 100% | 100% | 100% | 94.7% |
| 4.2 Screening | 100% | 100% | 100% | 84.2% |

Note that indicators in the table are modified versions before two rounds of consultation; experts rated the importance and feasibility of each indicator on a 1–9 Likert scale (1=not important/feasible and 9=very important/feasible).
*Secondary indicator '2.3 Joint teaching with primary care' was merged into the secondary indicator '2.2 Practical teaching' after round 1.
†Secondary indicator '3.3 Data processing' was deleted due to not achieving consensus level after round 1.

After two rounds of the Delphi survey, the professional competency framework for GPs in tertiary hospitals in China was constructed, which included 4 primary indicators, 12 secondary indicators and 54 tertiary indicators (online supplemental material 4).

## DISCUSSION

### Main finding

This study presents the results of the development of a professional competency framework for GPs in tertiary hospitals in China, in which 4 primary indicators, 12 secondary indicators and 54 tertiary indicators reached consensus after two rounds of the Delphi survey.

### Comparison to previous competency frameworks

The indicators of the professional competency framework for GPs in tertiary hospitals across China were developed focusing on the current functions of the general practice departments of tertiary hospitals and were applicable to the whole country.[8] In 2018, Chinese government began requiring all tertiary hospitals to establish general practice departments and designating them as engines for increasing general medical service capacity and quality. The patients admitted to the general practice departments of tertiary hospitals in China were mostly suffering from chronic diseases and multimorbidity.[7] Patients with multimorbidity face reduced quality of life, prolonged hospital stay, increased number of readmissions, increased emergency visit rate, high incidence of multiple medications, adverse drug events, etc.[31–34] Therefore, the medical service ability was important and primary for GPs in tertiary hospitals, including clinical knowledge and skills, diagnosis and treatment, chronic disease management and communication. As described in the previous competency model in America, general practice demands a broad and deep fund of knowledge to proficiently care for a diverse patient population with undifferentiated healthcare needs.[13] Disease diagnosis and treatment and chronic disease management are the basic tasks of GPs as in the World Organization of Family Doctors tree.[35] Besides, effective communication was crucial to the doctor–patient relationship.[36] For general practice, communication and empathy are essential in patient-centred care,[37] which was proved by CanMEDS-FM 2017 in Canada,[15] the Family Medicine Milestone Project in America[13] and the competency profile of the Australian GP at the point of fellowship in Australia.[16]

In comparison to the foreign competency models for GPs in America,[13] Australia[16] and Europe,[35] the professional competency framework for GPs in tertiary hospitals in China imposes more stringent requirements regarding teaching. As clinical residential training bases, general

Table 3 Adjustment of competency indicators after the first round of the Delphi survey

| Indicators | | Adjustment |
|---|---|---|
| **Modification** | | |
| Primary indicator | – | – |
| Secondary indicator | 1.1 Clinical skills | 1.1 Clinical knowledge and skills |
| | 1.4 Doctor–patient communication | 1.4 Communication and cooperation |
| | 2.1 Teaching theory and method | 2.1 Theoretical lectures |
| | 2.2 Practical teaching<br>2.3 Joint teaching with primary care | Indicator 2.3 merged to '2.2 Practical teaching' |
| | 2.4 Continuing learning | 2.3 Self-directed learning |
| | 3.1 Project design | 3.1 Project design and declaration |
| | 3.4 Writing paper and submission | 3.3 Report of scientific research results |
| | 4.1 Guide disease prevention | 4.1 Disease prevention |
| Tertiary indicator | 1.2.1 Management of disease at early stages and undifferentiated disease | 1.2.1 Manage diseases at early stage presenting in an undifferentiated way |
| | 2.1.1 Preparation of lectures | 2.1.1 Preparation and design for lectures |
| | 2.2.3 Guiding management of patients | 2.2.3 Provide instruction to trainees in disease diagnosis and treatment |
| | 2.2.4 Leading case discussions | 2.2.4 Provide instruction to trainees in case discussion |
| | 2.3.1 Joint teaching with community | 2.2.5 Conduct joint theoretical lectures with primary care |
| | 2.3.2 Joint case discussions with community | 2.4.2 Conduct joint case discussion with primary care |
| | 2.3.3 Joint rounds with community | 2.3.3 Conduct joint teaching patient rounds with primary care |
| | 2.4.3 Taking part in the competition actively | 2.4.3 Participate in academic activities actively |
| | 3.2.1 Know about the general principles of research | 3.1.3 Know about the principles of research |
| | 3.2.2 Know about the general methods of research | 3.2.2 Know about scientific research methods |
| | 3.3.1 Data collation<br>3.3.2 Data analysis | Merged as '3.3.1 Statistical analysis of data' |
| | 3.4.1 Write scientific research papers | 3.4.1 Write paper |
| **Deletion** | | |
| Primary indicator | – | – |
| Secondary indicator | 3.3 Data processing | Did not achieve consensus level |
| Tertiary indicator | – | – |
| **Addition** | | |
| Primary indicator | – | – |
| Secondary indicator | – | – |
| Tertiary indicator | 1.1.1 Be with in-depth knowledge of clinical medicine | Suggested to be added by more than two experts |
| | 1.1.2 Be with in-depth knowledge of general practice | |
| | 1.3.6 Direct community-based chronic disease management | |
| | 1.4.6 Communicate effectively with colleagues | |
| | 1.4.7 Communicate effectively with staff in primary care institutions | |
| | 2.1.2 Know about teaching techniques | |
| | 3.2.1 Know about investigation techniques | |

practice department in tertiary hospitals need to undertake tasks about teaching and training, including taking the lead in formulating and implementing training plans, carrying out outpatient and ward teaching and cooperating with primary care institutions in teaching.[8] Although teaching ability is also emphasised in the CanMEDS role of Scholar,[15] teaching activities and competence requirements of GPs in tertiary hospitals in China are mainly focused on clinical practice, thus facilitating the transition of residency trainees from theoretical knowledge to practical application. Furthermore, aside from a few trainees engaged in the general practice department in tertiary hospitals, the majority of trainees pursue their careers within primary care institutions after residency training. Consequently, the ability to joint teaching with primary care is crucial not only for aiding students in mastering clinical skills in hospitals but also for considering the case characteristics and diagnostic approaches relevant to PHC.

GPs in tertiary hospitals appreciate the importance of research, actively engaging in and applying it within their practice to ensure that they remain competent to deliver high-quality, evidence-based care that supports positive patient and population health outcomes. The scientific research capabilities of GPs are also closely linked to continuing medical education and continuing professional development in China.[38] Similar to the CanMEDS role of Scholar,[15] competencies related to research design, implementation and the translation of research findings have been underscored in the competency framework for GPs in tertiary hospitals, which are not adequately represented in competency models from America,[13] Australia[16] and Europe.[35]

Another important indicator of the professional competency framework for GPs in tertiary hospitals in China was prevention. The provision of effective preventive care aims to reduce preventable morbidity and mortality, enhance quality of life and decrease an individual's need generally for medical services.[39] Since the mid-1990s, professional bodies have argued that prevention should be a constituent element of normal professional practice of GPs and nurses and that prevention and health promotion should be an integral part of general practice.[40] GPs can positively influence their patient's lifestyle choices and encourage and equip them to take a greater interest in, and greater responsibility for, their own health.[41] Same as the Family Medicine Milestone Project in America,[13] the role of health advocate as outlined in CanMEDS from Canada[15] and the competency profile of Australian GP at the point of fellowship,[16] disease prevention, encompassing screening and health risks management, constitutes a critical component of competency evaluation of GPs in tertiary hospitals across China.

Compared with previous competency models of GPs in China, there are some similarities and differences. GPs' abilities regarding medical service and doctor–patient communication were emphasised in either of the professional competency framework for GPs in tertiary hospitals or previous competency models for GPs.[17 18] Although teaching and research were also indicated in the competency model for GPs after standardised residency training,[18] the evaluation standards will be higher and more stringent for GPs in tertiary hospitals. In addition, GPs' teaching ability for the residency trainees and joint teaching with primary care was emphasised in the professional competency framework for GPs in tertiary hospitals. Besides, it is notable that there are two aspects special in PHC in China: basic public health service and 'family doctor contract' services. An independent domain of 'basic public health service' and 'teamwork' was identified in previous competency models for GPs.[17 18] Another difference was the indicator 'prevention', which was first included in the competency model for GPs in China in this study as an independent and primary indicator.

## Strengths and limitations

In most health service systems, GPs are classified as PHC providers. However, in the unique healthcare landscape of China, GPs in tertiary hospitals play a multiple role of medical service provider, GP trainer, researcher and preventive service provider.[8] This is the first study to explore the competency content of GPs in tertiary hospitals, which is helpful to reflect the competence of GPs and improve the quality of general practice service in China. Additionally, a modified Delphi method was adopted, through which diverging expert assessments and opinions become transparent and ultimately resolved and consented on.[42] The involvement and positive coefficient about experts in this study are commendable.

A potential limitation of this study is the narrow geographical diversity of respondents. Experts in this study were mostly from Beijing, and the proportion of experts in other provinces was low. They may not adequately represent the full spectrum of views held by individuals in different regions across China. Another limitation of this study is that, despite our efforts to recruit male participants, the majority of participating experts were women. This imbalance can be attributed to the predominance of female practitioners in clinical medicine and medical education in China, particularly within the fields of internal medicine, gynaecology, paediatrics and general practice. Additionally, though the steering group included a broad range of representatives, some stakeholders may have been under-represented. For example, nurses in the general practice department and patients were not represented (as nurses are collaborators with GPs and patients are the customers and beneficiaries of general practice services). It is likely that different indicators will be deemed more or less relevant depending on the stakeholder audience. Finally, the methodology of the Delphi process relies on the perception of experts, which may entail further evidence from implementation in real practice settings.[43]

## CONCLUSION

In this study, the professional competency framework for GPs in tertiary hospitals in China was constructed using a modified Delphi method. The set of indicators describes the roles and competencies of GPs according to the characteristics of general practice department in tertiary hospitals. This framework is expected to be used in medical education, general practice research, quality improvement and more broadly within the healthcare system by self-evaluation by GPs or multisource feedback by others who work with GPs.

**Contributors** YW and QC designed the study. YA, YW and QC participated in Delphi questionnaire preparation and data collection. All authors collaboratively developed and refined the Delphi questionnaire. The database was established and inputted by WF, DZ and DW. QC would check and correct it If there was any difference or error. YW wrote the manuscript and revised it according to the reviewer's comments. QC reviewed and revised the manuscript. All authors read and approved the final manuscript. QC acted as guarantor.

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**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Ethics approval** This study involves human participants, but we sought advice from the ethical committee of Capital Medical University, Beijing, China, who considered that this study did not require formal ethical approval. Participants gave verbal consent to participate in the study before taking part. Exempted this study, participants gave informed consent to participate in the study before taking part.

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**Data availability statement** All data relevant to the study are included in the article or uploaded as online supplemental information.



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