

Article

Nurses' Participation in Physician Training: A Mixed-Methods Study of Healthcare Professionals' Perceptions

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Abstract

Aims/Background: In China, the integration of nurses into physician training programs remains inadequately explored despite the international recognition of the critical role of interprofessional collaboration in healthcare education. This study examined healthcare professionals' perceptions of nurses' involvement in developing physicians' clinical competence. **Methods:** An explanatory sequential mixed-methods design was employed, consisting of a cross-sectional web-based questionnaire followed by semistructured interviews to explain and deepen the quantitative findings. Between November 2023 and December 2023, 336 valid respondents from 60 hospitals across all 16 districts of Tianjin, China, were included, spanning primary through tertiary care institutions. Additionally, 15 healthcare professionals with extensive clinical teaching experience participated in face-to-face semistructured interviews. The quantitative data were analyzed via chi-square tests, whereas the qualitative data underwent Colaizzi's seven-step phenomenological analysis. **Results:** Among the 336 respondents (61.0% nurses, 39.0% physicians), the overall awareness, participation, and acceptance rates were 67.3%, 43.2%, and 88.7%, respectively. Statistically significant differences emerged across hospital levels: awareness rates were 57.0%, 69.5%, and 73.7% ($p < 0.05$); participation rates were 32.0%, 45.8%, and 50.0% ($p < 0.05$); and acceptance rates were 79.0%, 91.5%, and 94.1% ($p < 0.05$) for primary, secondary, and tertiary hospitals, respectively. Awareness varied significantly by professional tenure: 80.0% (<5 years), 59.5% (5–10 years), and 66.0% (>10 years) ($p < 0.05$). Notably, a substantial majority (289 participants, 86.0%) believed that nurse involvement effectively enhances physicians' clinical competence. Physicians demonstrated greater perceived benefits (93.1%) than did nurses (81.5%) ($p < 0.05$). Additionally, 298 participants (88.7%) agreed that nurses' participation in physician training also benefits nurses' own professional competence—a recognition rate comparable to that for physicians' competence improvement (86.0%)—suggesting that healthcare professionals perceive bidirectional value in such collaborative educational practices. Qualitative analysis revealed five overarching themes: (1) Nurse participation in physician training is often superficial and informal. (2) Reluctance to participate due to hierarchical and professional barriers. (3) Nurse involvement is perceived to enhance physicians' clinical and professional competence. (4) Participation supports nurses' own professional growth and teaching skills. (5) Enhanced mutual understanding and team collaboration between doctors and nurses. These themes collectively reveal both the challenges (e.g., the sub-optimal nature of training and participation barriers) and potential benefits (e.g., improved competence and teamwork) associated with nurse participation in physician training. **Conclusion:** While healthcare professionals recognize the value of nurse involvement in physician training, notable gaps remain between awareness and participation levels among nurses. The findings underscore the need for systematic institutional support to overcome hierarchical barriers and foster genuine interprofessional education in Chinese medical training programs.

Keywords: interprofessional education; nurse–physician collaboration; physician training; multisource feedback; mixed-methods study; healthcare professionals' perceptions



1. Introduction

Medical education requires continuous professional development to maintain, update, and refine clinical knowledge, technical skills, and professional attitudes. Central to this educational continuum is interprofessional collaboration (IPC), which is widely recognized as fundamental to delivering effective, integrated health and social care systems [1,2,3,4,5,6]. However, IPC competencies remain inadequately addressed within medical curricula in China, creating persistent gaps in physician preparedness for team-based care.

The Chinese Medical Doctor Association's resident training guidelines explicitly recommend multisource feedback (MSF) mechanisms, advocating for comprehensive performance evaluations that incorporate perspectives from diverse healthcare professionals [7,8]. These guidelines specifically endorse nursing colleagues' involvement in assessing residents' clinical and non-clinical performance, including professionalism, communication skills, interpersonal relationships, and systems-based practice. Through structured analysis and feedback, such collaborative assessment aims to prompt reflective practice and continuous improvement among physician trainees [9].

Despite these policy recommendations, nurse engagement in physician training remains uncommon in the Chinese healthcare context [10]. A systematic literature search conducted on 30 October 2023, using the China National Knowledge Infrastructure with the keywords "nurse", "physician", and "training", yielded 2096 records, of which only 19 addressed nurse participation in physician training. Strikingly, only one study specifically examined the role of nursing staff in physician training; the remaining investigations treated nurses as peripheral components of MSF systems without elucidating their unique contributions, implementation challenges, willingness to participate, physician receptivity, or other critical dimensions. This paucity of research highlights an urgent need to investigate current perceptions regarding nurses' roles in developing physicians' clinical competence.

To address this knowledge gap, we employed an explanatory sequential mixed-methods design: the quantitative questionnaire was conducted first to identify general patterns, followed by qualitative interviews to explain these findings. The questionnaire component provided breadth in assessing general perceptions across diverse healthcare settings, whereas semistructured interviews offered depth in understanding individual-level experiences and perspectives. Triangulating these complementary data sources enables a comprehensive characterization of healthcare professionals' perceptions regarding nurse involvement in physician training within the Chinese context.

2. Methods

2.1 Study Design

We conducted an explanatory sequential mixed-methods study. In this design, the quantitative phase (questionnaire) was conducted first to identify general patterns and differences in awareness, participation, and acceptance. The qualitative phase (interviews) was subsequently conducted to explain and deepen these quantitative findings. The two components were: A cross-sectional web-based questionnaire survey followed by semistructured face-to-face interviews [11,12]. The overall research flowchart is shown in Fig. 1.

2.2 Setting and Sampling

Questionnaire component. We employed convenience sampling to recruit participants from 60 medical institutions across Tianjin, a northern Chinese megacity with approximately 13.64 million residents [13] (see Fig. 2). The sampling frame encompassed all 16 administrative districts, including six urban core districts and ten suburban districts, to maximize sample diversity across primary, secondary, and tertiary care facilities. Fig. 2 shows the distribution map.

Hospital-level coordinators facilitated recruitment from November to December 2023: YYR contacted tertiary hospitals, JQH coordinated secondary hospitals, and YS engaged primary care institutions.

Inclusion criteria: (1) Physicians and registered nurses engaged in clinical work in medical institutions of all levels (including primary, secondary, and tertiary hospitals) in Tianjin; (2) currently working on the front line of clinical diagnosis and treatment or nursing, excluding those on long-term sick leave, maternity leave, advanced training, internship, rotation, or other statuses of being off-duty; (3) voluntarily participating in this questionnaire survey and having read and agreed to the informed consent content in the questionnaire.

Exclusion criteria: (1) Personnel in non-clinical positions; (2) those who explicitly refused to participate in the survey, withdrew midway during the questionnaire completion process, or failed to complete all the questions; (3) individuals in the internship or training period who have not yet obtained formal practicing qualifications or long-term official employment status.

Interview component. Using purposive sampling, we selected 15 healthcare professionals with substantial clinical teaching experience from November to December 2023. The selection criteria ensured representation across hospital tiers, professional roles, and career stages. The inclusion criteria were as follows: (1) Current employment in clinical teaching or training coordination, (2) adequate communication skills, (3) voluntary participation, and (4) provision of informed consent.

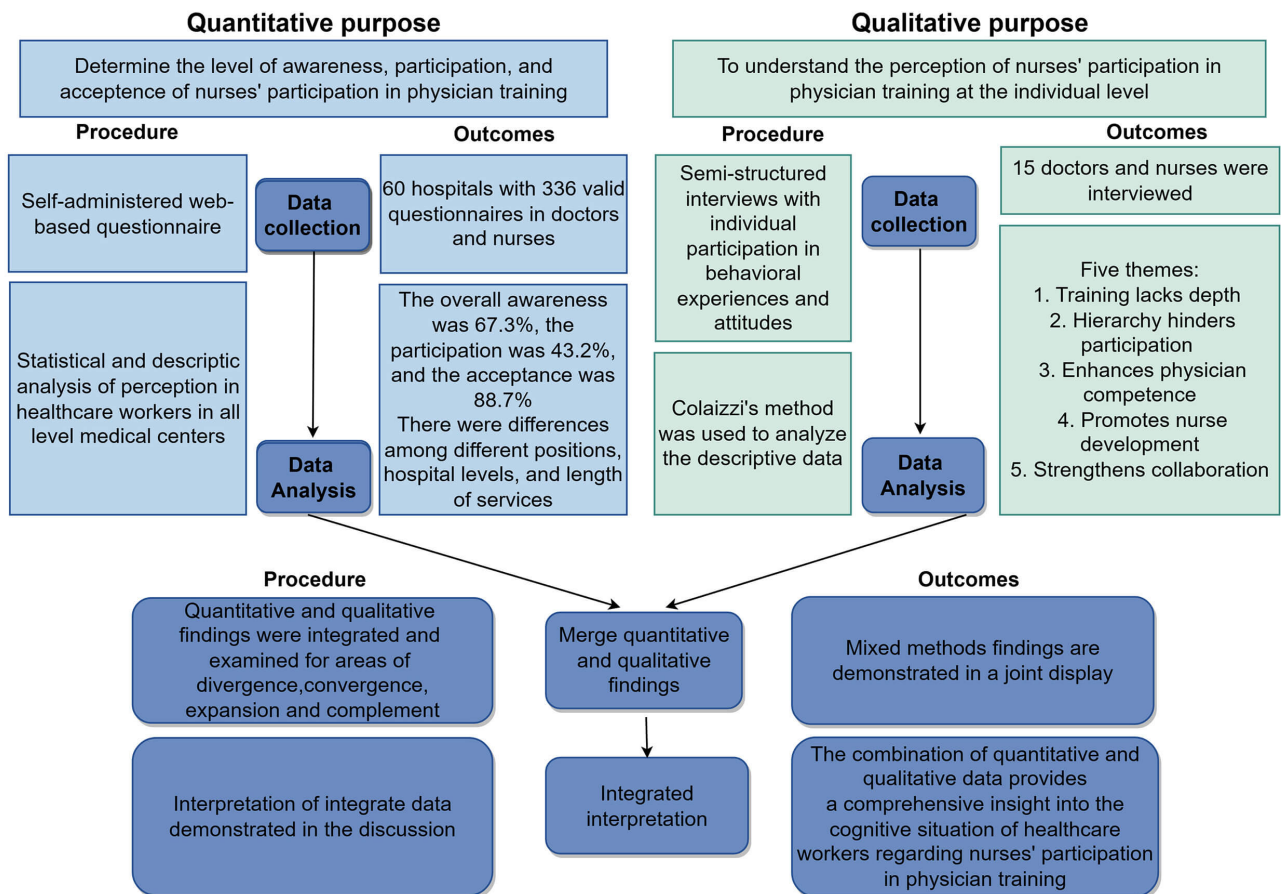


Fig. 1. The overall research flowchart. (Fig. 1 was prepared using the Figdraw online scientific illustration platform, <https://www.figdraw.com/>).

2.3 Data Collection Instruments

Questionnaire development. We developed a self-administered questionnaire based on the nurse assessment scale from China's National Guidelines on 360-degree Evaluation in Resident Training [10]. The instrument comprises 25 items addressing: (1) Demographic and professional characteristics and (2) perceptions regarding the rationality and validity of nurse involvement in assessing specific clinical competencies. All the items utilized single-choice response formats (**Supplementary Table 1**). For the effectiveness evaluation, a 5-point Likert scale was used: 1 = completely ineffective, 2 = ineffective, 3 = average, 4 = effective, and 5 = very effective. For presentation in Table 1, scores of 4–5 were classified as “Effective”, and scores of 1–3 as “Ineffective”. Awareness, participation, and acceptance were assessed using dichotomous (yes/no) questions.

The questionnaire was developed de novo based on national guidelines because no validated instrument existed in the Chinese context for this specific purpose. To compensate for this limitation, the questionnaire was reviewed by multiple research team members with extensive experience in medical education and interprofessional collaboration, and consensus was reached to confirm its content va-

lidity. The lack of formal pretesting, pilot testing, or quantitative evaluation of reliability and validity (e.g., Cronbach's α , exploratory factor analysis) is further addressed in the Discussion section.

Interview guide. We developed a semistructured interview guide using phenomenological methodology. Following two pilot interviews with experienced clinical educators (>10 years at tertiary training institutions), we refined the interview protocol. All interviews were conducted by two researchers (YYR and TTY), who were trained in mixed-methods research and had substantial experience with qualitative methodologies, particularly in semistructured interviews.

2.4 Procedures

Questionnaire administration. We distributed questionnaires via the wenjuanxing (WJX) e-survey platform through WeChat work groups at participating institutions. Before starting the questionnaire, participants were presented with an electronic informed consent statement and were required to click ‘I agree’ to proceed. All questionnaire items were mandatory except the consent statement. Only completed submissions were recorded. To ensure data

Table 1. Perception of physician training participation among doctors and nurses.

	Cases (%)	Awareness		Participation		Acceptance		Improving doctors' competence		Improving nurses' competence	
		Heard of	Never heard of	Participated	Never participated	Reasonable	Unreasonable	Effective	Ineffective	Effective	Ineffective
Hospital level											
Primary	100 (29.8)	57 (57.0)	43 (43.0)	32 (32.0)	68 (68.0)	79 (79.0)	21 (21.0)	80 (80.0)	20 (20.0)	88 (88.0)	12 (12.0)
Secondary	118 (35.1)	82 (69.5)	36 (30.5)	54 (45.8)	64 (54.2)	108 (91.5)	10 (8.5)	102 (86.4)	16 (13.6)	103 (87.3)	15 (12.7)
Tertiary	118 (35.1)	87 (73.7)	31 (26.3)	59 (50.0)	59 (50.0)	111 (94.1)	7 (5.9)	107 (90.7)	11 (9.3)	107 (90.7)	11 (9.3)
Total	336	226 (67.3)	110 (32.7)	145 (43.2)	191 (56.9)	298 (88.7)	38 (11.3)	289 (86.0)	47 (14.0)	298 (88.7)	38 (11.3)
χ^2		7.29		7.65		13.71		5.16		0.74	
p		0.026		0.022		0.001		0.076		0.689	
Occupation											
Doctor	131 (39.0)	89 (67.9)	42 (32.1)	58 (44.3)	73 (55.7)	122 (93.1)	9 (6.9)	122 (93.1)	9 (6.9)	115 (87.8)	16 (12.2)
Nurse	205 (61.0)	137 (66.8)	68 (33.2)	87 (42.4)	118 (57.6)	176 (85.9)	29 (14.1)	167 (81.5)	38 (18.5)	183 (89.3)	22 (10.7)
Total	336	226 (67.3)	110 (32.7)	145 (43.2)	191 (56.8)	298 (88.7)	38 (11.3)	289 (86.0)	47 (14.0)	298 (88.7)	38 (11.3)
χ^2		0.05		0.11		4.22		9.04		0.18	
p		0.833		0.74		0.040		0.003		0.676	
Length of service											
<5 years	65 (19.4)	52 (80.0)	13 (20.0)	29 (44.6)	36 (55.4)	62 (95.4)	3 (4.6)	60 (92.3)	5 (7.7)	59 (90.8)	6 (9.2)
5–10 years	74 (22.0)	44 (59.5)	30 (40.5)	32 (43.2)	42 (56.8)	62 (83.8)	12 (16.2)	65 (87.8)	9 (12.2)	72 (97.3)	2 (2.7)
>10 years	197 (58.6)	130 (66.0)	67 (34.0)	84 (42.6)	113 (57.4)	174 (88.3)	23 (11.7)	164 (83.2)	33 (16.8)	167 (84.8)	30 (15.2)
Total	336	226 (67.3)	110 (32.7)	145 (43.2)	191 (56.8)	298 (88.7)	38 (11.3)	289 (86.0)	47 (14.0)	298 (88.7)	38 (11.3)
χ^2		6.98		0.08		4.71		3.6		8.76	
p		0.030		0.962		0.095		0.166		0.013	
Professional position											
Junior	143 (42.6)	107 (74.8)	36 (25.2)	67 (46.9)	76 (53.1)	127 (88.8)	16 (11.2)	124 (86.7)	19 (13.3)	131 (91.6)	12 (8.4)
Intermediate	153 (45.5)	95 (62.1)	58 (37.9)	62 (40.5)	91 (59.5)	134 (87.6)	19 (12.4)	130 (85.0)	23 (15.0)	133 (86.9)	20 (13.1)
Senior	40 (11.9)	24 (60.0)	16 (40.0)	16 (40.0)	24 (60.0)	37 (92.5)	3 (7.5)	35 (87.5)	5 (12.5)	34 (85.0)	6 (15.0)
Total	336	226 (67.3)	110 (32.7)	145 (43.2)	191 (56.8)	298 (88.7)	38 (11.3)	289 (86.0)	47 (14)	298 (88.7)	38 (11.3)
χ^2		6.53		1.392		0.768		0.271		2.231	
p		0.037		0.499		0.681		0.873		0.328	

Note: Awareness, participation, and acceptance were assessed with yes/no questions. For “Improving doctors’ competence” and “Improving nurses’ competence”, the 5-point Likert scale was dichotomized for presentation in this table: scores of 4–5 were classified as “Effective”, and scores of 1–3 as “Ineffective”.

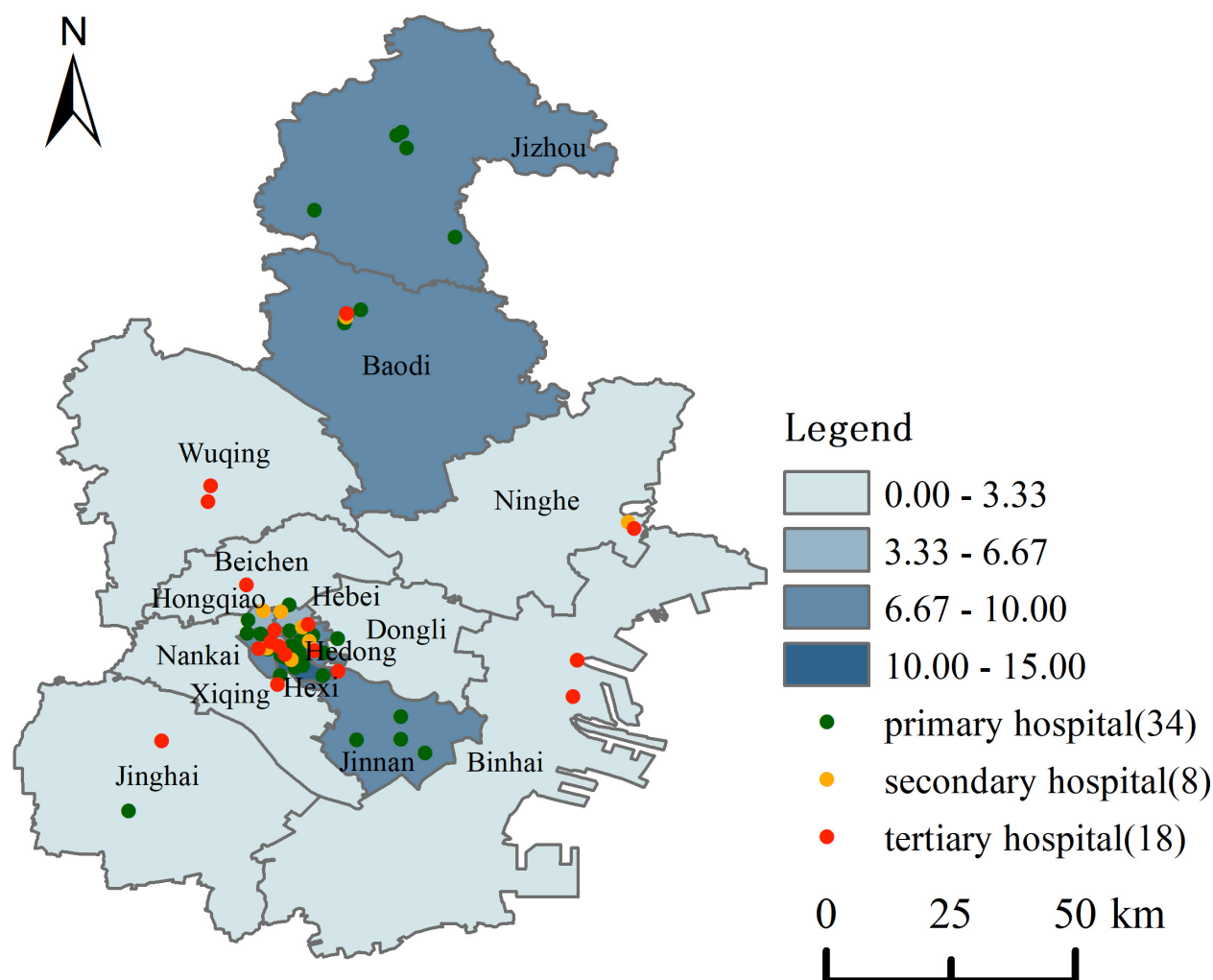


Fig. 2. Distribution map of 60 participating medical institutions in Tianjin. (Fig. 2 was generated using ArcGIS 10.x, ESRI, Redlands, CA, USA). The legend indicates that the blue-shaded areas represent the participation levels of each administrative district in the survey (i.e., the proportion of the number of sampling sites in the district to the total number of 60 sampling sites). Different color intervals correspond to different ranges of participation proportions. The colored dots (green, yellow, and red) represent the sample distribution of hospitals of different levels within each administrative district (green = primary-level hospitals, yellow = secondary-level hospitals, and red = tertiary-level hospitals), and the numbers in parentheses are the total number of sampling sites of hospitals of each level in the corresponding administrative district.

quality, we applied the following criteria to determine the validity of questionnaires: Questionnaires completed in an implausibly short time (e.g., less than 3 minutes for the entire 25-item questionnaire) were excluded. Responses were reviewed for obvious logical inconsistencies (e.g., claiming no awareness of nurse involvement in physician training but subsequently providing detailed evaluations of such involvement). Questionnaires exhibiting such inconsistencies, upon double verification by researchers, were marked as invalid. In cases where the same participant submitted the questionnaire more than once via different channels (such as multiple WeChat workgroups), duplicate entries were identified by comparing system IP addresses and

key response information. Only the first complete and valid questionnaire was retained for analysis, and all subsequent duplicates were discarded.

Interview conduct. We conducted face-to-face interviews in private workplace settings lasting 20–45 minutes. The interviews were audio-recorded with permission. Access to recordings was limited to YYR and TTY. Recordings and transcripts were stored on password-protected computers with encrypted drives and de-identified using participant codes (N1–N15). No third parties were present. Transcripts were returned to participants for verification, and all participants confirmed the accuracy of the transcripts; no corrections were requested. All identifiable in-

formation was removed, and audio recordings will be permanently deleted upon publication.

2.5 Data Analysis

Quantitative analysis. We exported the questionnaire data from WJX to WPS Spreadsheets (WPS Office Version 12.1.0.26895, Kingsoft Office Software Co., Ltd., Zhuhai, China) for initial processing and then imported the data into SPSS Version 26.0 (IBM Corp., Armonk, NY, USA) for statistical analysis. We calculated frequencies and percentages for categorical variables. We used chi-square tests to examine associations between participant characteristics and outcome measures (awareness, participation, acceptance, perceived effectiveness on improving doctors' competence, and perceived benefit on improving nurses' competence). Statistical significance was set at $p < 0.05$.

Qualitative analysis. This qualitative component was grounded in a phenomenological paradigm, as the study aimed to understand the lived experiences of healthcare professionals regarding nurse participation in physician training. A purposive sample of 15 participants is consistent with phenomenological studies, which typically achieve thematic saturation with in-depth interviews. Saturation was discussed among the research team after the 12th interview, as no new themes emerged. The remaining three interviews confirmed existing themes, indicating that saturation had been reached. Two researchers (YYR and TTY) independently transcribed the audio recordings within 24 hours of each interview. We verified transcript accuracy through dual review. Using NVivo 12 (QSR International, Burlington, MA, USA) (Basic version), researchers independently coded transcripts and then compared coding schemes to resolve discrepancies through consensus discussion. The qualitative data were analyzed using Colaizzi's seven-step phenomenological analysis method [14]. This approach involves: (1) reading the transcripts repeatedly to immerse in the data; (2) extracting significant statements that directly reflect participants' lived experiences regarding nurse involvement in physician training; (3) formulating meanings from these statements; (4) clustering meanings into themes that capture shared experiences; (5) synthesizing themes into a comprehensive description of the phenomenon; (6) identifying a fundamental structure that reflects the essence of participants' perceptions; and (7) returning the findings to participants for validation. This method emphasizes understanding the meaning and essence of participants' experiences, rather than merely categorizing content. This qualitative study adheres to the "Consolidated Criteria for Reporting Qualitative Research (COREQ)". Specific rigor strategies included: (1) dual independent coding, (2) member checking, (3) peer debriefing, and (4) audit trail documentation. A completed COREQ checklist has been uploaded as **Supplementary Table 2**.

3. Results

3.1 Questionnaire Findings

Participant characteristics. We collected 338 questionnaires, yielding 336 valid responses (99.4% completion rate) from 60 hospitals. The sample comprised 131 physicians (39.0%) and 205 nurses (61.0%). The hospital distribution included 100 participants from primary medical institutions (29.8%), 118 from secondary hospitals (35.1%), and 118 from tertiary hospitals (35.1%). With respect to professional tenure, 65 respondents (19.4%) had <5 years of experience, 74 (22.0%) had 5–10 years, and 197 (58.6%) had >10 years. Regarding professional position (title), 40 participants (11.9%) were senior, 153 (45.5%) were intermediate, and 143 (42.6%) were junior. The associations between professional position and awareness, participation, acceptance, perceived effectiveness in improving doctors' competence, and perceived benefit in improving nurses' competence are presented in Table 1.

Awareness, participation, and acceptance. Overall, 226 respondents (67.3%) reported awareness of nurse participation in physician training, 145 (43.2%) reported actual participation, and 298 (88.7%) expressed acceptance of this practice (Table 1).

Significant differences emerged across hospital tiers (Table 1, Fig. 3). Awareness rates increased with hospital level: 57.0% (primary), 69.5% (secondary), and 73.7% (tertiary) ($p < 0.05$). Similarly, the participation rates demonstrated a gradient of 32.0%, 45.8%, and 50.0%, respectively ($p < 0.05$). The acceptance rates followed the same pattern: 79.0%, 91.5%, and 94.1% ($p < 0.05$).

Professional tenure was significantly associated with awareness ($p < 0.05$): Early-career professionals (<5 years) demonstrated the highest awareness (80.0%), followed by senior professionals (>10 years: 66.0%) and middle-career professionals (5–10 years: 59.5%). No significant tenure differences emerged for participation or acceptance rates.

Professional role analysis revealed comparable awareness between physicians (67.9%) and nurses (66.8%). Participation rates were also comparable between physicians (44.3%) and nurses (42.4%), with no significant difference ($p = 0.740$). However, physicians reported significantly greater acceptance (93.1%) than did nurses (85.9%) ($p < 0.05$).

Perceived impact on clinical competence. A substantial majority (289 participants, 86.0%) believed that nurse involvement effectively enhances physicians' clinical competence. The perceived benefit rates increased across hospital tiers: 80.0% (primary), 86.4% (secondary), and 90.7% (tertiary). Physicians demonstrated greater perceived benefits (93.1%) than did nurses (81.5%) ($p < 0.05$). In terms of tenure, early-career professionals reported the greatest percentage of perceived benefits (92.3%), followed by middle-career (87.8%) and senior (83.2%) professionals. No significant association was found between professional position and perceived effectiveness on improving doctors' com-

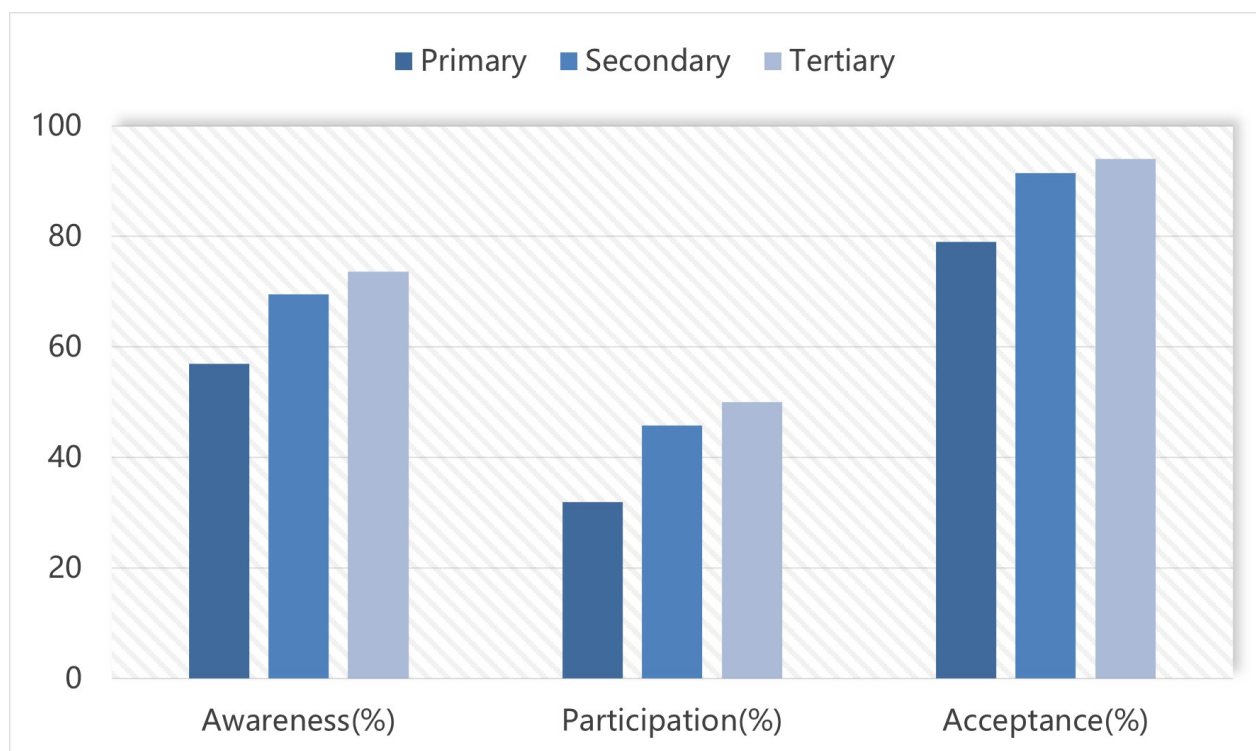


Fig. 3. Differences in awareness, participation, and acceptance across different hospital tiers. Fig. 3 was created using WPS Spreadsheets (WPS Office Version 12.1.0.26895, Kingsoft Office Software Co., Ltd., Zhuhai, China).

petence ($p = 0.873$) (Table 1). Similarly, no significant association was found between professional position and perceived benefit on improving nurses' competence ($p = 0.328$) (Table 1).

With respect to nursing professional development, 298 participants (88.7%) agreed that participation benefits nurses. No significant differences emerged across hospital tiers (88.0% primary, 87.3% secondary, 90.7% tertiary) or professional roles (87.8% physicians, 89.3% nurses). However, tenure differences were significant ($p < 0.05$): middle-career professionals (5–10 years) reported the highest perceived benefit (97.3%) compared with early-career (90.8%) and senior (84.8%) professionals.

3.2 Interview Findings

Participant characteristics (see **Supplementary Table 3**). The 15 interviewees included 8 physicians and 7 nurses. The hospital distribution included 2 primary institutions, 4 secondary institutions, and 9 tertiary institutions. In terms of experience, 1 participant had <5 years, 1 had 5–10 years, and 13 had >10 years of professional experience. No participants withdrew or required repeat interviews.

3.3 Thematic Analysis

Through this in-depth analysis, five overarching themes emerged (see **Supplementary Material 1** Interview guide), each shedding light on different aspects of the phenomenon.

Theme 1: Nurse participation in physician training is often superficial and informal.

The first theme captures the participants' experiences regarding the current state of nurse-led training in physician training programs. Across the interviews, it became evident that such training is often ad hoc and lacks a well-defined structure. Training sessions are irregularly scheduled, and there are no clear learning objectives. The content presented is frequently superficial, failing to cover the depth and breadth required for comprehensive physician training.

Nurses themselves report feeling ill-prepared to conduct these training sessions. They cite a lack of time to prepare adequately and a perception that the training is not relevant to their core responsibilities. This lack of enthusiasm and preparedness on the part of nurses contributes to the overall superficial nature of the training.

Formulated meaning: Nurse-led training in physician training is characterized by its ad hoc organization, absence of clear objectives, and superficial content. Nurses' lack of preparation and perceived irrelevance of the training lead to a lack of engagement and a sub-optimal training experience.

Illustrative quote: "There isn't enough time to prepare lessons, and the training is arranged too hastily, so the content ends up being quite superficial." (N3); "Never heard of nurses' involvement in doctors' training. As far as I can remember there is no such thing." (N9); "Nurses are not willing to spend time preparing for the training and do not want the training to take up their resting time." (N7).

Theme 2: Reluctance to participate due to hierarchical and professional barriers.

This theme highlights the significant barriers that prevent nurses from actively participating in training doctors. Hierarchical relationships within the medical field, where physicians are traditionally seen as superior to nurses, play a major role. Nurses feel that their professional opinions and contributions are not fully recognized, which reduces their motivation to participate.

In addition, existing tensions between doctors and nurses further exacerbate the situation. These tensions create an uncomfortable working environment, making nurses reluctant to engage in activities that involve close collaboration with doctors, such as training. The combination of hierarchical barriers and professional tensions forms a significant obstacle to nurse participation.

Formulated meaning: Hierarchical relationships and professional tensions, including a lack of professional recognition and interprofessional conflicts, act as major barriers to nurses' willingness to participate in training doctors.

Illustrative quote: "I just do my job; I do not want to be involved in too many irrelevant things." (N7); "Nurses are reluctant to participate and are not sure if doctors are interested." (N14); "There is a conflict between doctors and nurses in our department, and the nurses think that doctors' training is not relevant to me." (N8).

Theme 3: Nurse involvement is perceived to enhance physicians' clinical and professional competence.

Despite the challenges in implementation, participants recognized that nurse participation in physician training has a positive impact on physicians' clinical and professional competence. Nurses bring unique perspectives and expertise, particularly in areas such as communication, aseptic techniques, and procedural details. These contributions help physicians standardize their practices, improve patient safety, and enhance their overall professionalism.

Formulated meaning: Nurse participation in physician training contributes to the improvement of physicians' clinical and professional skills by providing unique professional insights that promote standardized practices and better patient care.

Illustrative quote: "Communication skill is essential for nurses to train." (N10); "If nurses train doctors, it will help them standardize their procedures and strengthen the concepts of checking and asepsis." (N12).

Theme 4: Participation supports nurses' own professional growth and teaching skills.

The process of participating in training doctors also offers significant benefits for nurses themselves. By preparing and delivering training sessions, nurses are required to deepen their knowledge of specialized diseases and teaching methods. This not only enhances their professional knowledge but also improves their teaching skills. More-

over, the experience boosts their confidence and motivation for further professional development.

Formulated meaning: Nurse participation in training doctors serves as an opportunity for professional growth, enabling nurses to expand their knowledge, improve teaching skills, and increase confidence in their professional abilities.

Illustrative quote: "Nurses would prepare the lessons carefully, which would enable us to improve our professional knowledge and teaching ability." (N10); "It can improve their (nurses') knowledge of specialized diseases, and... the level of clinical expertise of the nursing teachers." (N7).

Theme 5: Enhanced mutual understanding and team collaboration between doctors and nurses.

Nurse participation in physician training fosters better mutual understanding and trust between doctors and nurses. Through joint training activities, both parties gain a deeper understanding of each other's roles and responsibilities. This leads to improved communication, fewer misunderstandings, and stronger collaboration within the healthcare team.

Formulated meaning: Nurse-physician joint participation in training promotes interprofessional collaboration by enhancing mutual understanding, trust, and communication between doctors and nurses.

Illustrative quote: To help doctors get to know the nurses' work better. Every specialty has its strengths—nursing is hard work and very valuable. When doctors and nurses collaborate well, the work runs smoothly. (N9); "We can communicate better and reduce misunderstandings or conflicts." (N10); "One action of the nurse, the doctor may know what to go for next, that is, to improve the cooperation and team spirit." (N12).

In conclusion, these five themes comprehensively illustrate the complex landscape of healthcare professionals' perceptions of nurse participation in physician training. They not only reveal the existing challenges but also emphasize the potential benefits that can be realized through effective implementation of nurse-led training programs.

4. Discussion

This mixed-methods investigation reveals a paradox in Chinese healthcare education: While healthcare professionals universally acknowledge the importance of nurse participation in physician training, actual implementation remains limited and inconsistent. Our findings demonstrate modest awareness (67.3%) and participation (43.2%) rates, alongside high acceptance (88.7%), suggesting that attitudinal barriers have been largely overcome, but that structural and systemic obstacles persist.

Our findings align with international research confirming the critical role of nursing professionals in medical education [15,16]. The traditional Chinese medical education model emphasizes didactic instruction and appren-

ticeship with senior physicians, often neglecting the inter-professional competencies essential for modern healthcare delivery [17,18]. This study extends previous work by documenting specific contextual barriers within China's hierarchical healthcare system, namely, that nurses play a key role in patient care by delivering fundamental hands-on patient care so that they can play a supportive and nurturing role in the professional development of medical students and junior doctors [19].

The MSF guidelines of the Chinese Medical Doctor Association explicitly recommend that nurse evaluators, consistent with international best practices, identify nursing assessments as particularly valuable for evaluating resident communication, professionalism, teamwork, and patient-centered care—competencies distinct from medical knowledge acquisition [7,20,21,22,23]. However, our data reveal substantial implementation gaps between policy and practice.

The observed gradient across hospital tiers—where tertiary institutions demonstrated significantly greater awareness, participation, and acceptance—reflects resource and infrastructure inequalities within China's healthcare system. Tertiary hospitals' superior medical standards, established training infrastructures, access to current educational resources, and greater exposure to international best practices are likely to facilitate nurse involvement [24]. Conversely, primary care settings face resource constraints that limit innovative educational programming [25]. These findings suggest that promoting nurse participation requires targeted support for under-resourced institutions [26].

The counterintuitive finding that early-career professionals (<5 years) demonstrated the highest awareness (80.0%) challenges assumptions that experience correlates with exposure to innovative practices. This pattern likely reflects generational shifts in medical and nursing education: Recent graduates have completed training emphasizing interprofessional collaboration, whereas mid-career professionals (5–10 years) may represent a transitional cohort trained under more traditional paradigms [27]. The slight rebound in awareness among senior professionals (>10 years) may indicate accumulated exposure to fixed training modalities over extended careers.

Our finding that physicians reported significantly greater acceptance (93.1%) than nurses did (85.9%) contrasts with previous research suggesting residents may resist nursing guidance [28]. This difference likely reflects cultural specificity in the Chinese context: physicians highly value nursing perspectives on communication and professionalism, recognizing that nursing expertise supports safe, effective care. However, despite physicians' high surface-level acceptance, qualitative data revealed persistent hierarchical perceptions that could undermine actual implementation. This paradox is further reflected in nurses' own reluctance to participate—rooted in traditional “physician-superior, nurse-subordinate” cultural constructs [29] and

compounded by insufficient professional self-confidence in their educational capabilities relative to physicians, even as the nursing workforce expands in size and quality. Such internalized hierarchy represents a critical barrier requiring targeted intervention.

The interview data highlighted physician–nurse relationship quality as a moderating factor. Previous research has identified mutual professional role misunderstandings and respect deficits [28]. Our findings suggest that creating psychological safety—workplace cultures validating nursing input and ensuring safe contribution opportunities—is essential for meaningful nurse engagement [30]. The lower willingness among nurses to participate, combined with their lower acceptance rates compared to physicians, reflects realistic appraisals of undervaluation within current team structures and internalized hierarchical norms that position physicians as superior to nurses in educational contexts.

An equally noteworthy finding is that 88.7% of participants believed nurse participation in physician training also enhances nurses' own professional competence—a recognition rate comparable to the 86.0% who acknowledged benefits for physicians. This bidirectional perceived value suggests that healthcare professionals view such collaborative educational practices as mutually beneficial rather than unidirectional. The qualitative data further corroborated this quantitative finding: Participants reported that preparing and delivering training sessions deepened nurses' knowledge of specialized diseases, improved their teaching skills, and boosted their professional confidence. This finding adds a crucial dimension to the existing literature, which has predominantly focused on benefits to physicians while overlooking the reciprocal developmental value for nurses themselves. The high recognition of nurse-directed benefits, particularly among nurses (89.3%) and early-career professionals (90.8%), suggests that participation may serve as a valuable professional development tool for nursing staff, potentially enhancing job satisfaction and retention.

This study addresses a significant research gap in the Chinese medical education literature. The mixed-methods design provides both statistical generalizability and contextual depth. However, these limitations warrant consideration. The Tianjin-specific sample limits national generalizability; China's healthcare system exhibits substantial regional variation. The exclusion of medical school settings restricts the understanding of early educational socialization. The modest sample size constrained subgroup analyses. Future research should employ nationally representative sampling and longitudinal designs to track implementation progress. The questionnaire used in this study was developed for the specific purposes of this investigation and did not undergo a formal pretest, pilot testing, or quantitative evaluation of reliability and validity (e.g., exploratory factor analysis, Cronbach's α). This lack of formal val-

idation limits the interpretability of the quantitative findings; results should therefore be considered preliminary. Future studies should validate the instrument in larger and more diverse samples using established measurement procedures before applying it in other settings. To address the aforementioned limitations, future research should adopt a multicenter, nationally representative sampling strategy across diverse regions and healthcare settings. This should be complemented by longitudinal designs to track changes in nurse participation and the long-term impact of relevant policies or interventions. Additionally, the questionnaire should undergo formal psychometric validation, including pilot testing, to establish its reliability and validity in larger, more heterogeneous samples before wider application.

Our findings suggest that increasing nurse participation requires multifaceted interventions addressing structural, cultural, and educational dimensions. Institution-level strategies should standardize nurse involvement through formal curriculum integration rather than ad hoc arrangements. Faculty development programs must enhance nurses' educational self-efficacy while sensitizing physicians to the unique value of their nursing expertise. National policy should provide implementation guidance and resource allocation for under-resourced institutions [31].

5. Conclusion

The underdevelopment of nurse participation in Chinese physician training stems not from professional disagreement regarding its importance—indeed, healthcare professionals recognize its bidirectional value for both physicians and nurses—but from low actual participation rates rooted in hierarchical cultural constructs and insufficient structural support. Effective implementation requires comprehensive efforts to increase nurse willingness, foster genuine interprofessional learning, and cultivate positive perceptions of interprofessional roles across healthcare hierarchies. Success in this domain promises not only improved physician competence and strengthened healthcare team collaboration, but also enhanced professional growth and teaching capacity among nurses.

Key Points

- Healthcare professionals in China show high acceptance (88.7%) but low actual participation (43.2%) of nurses in physician training.
- Tertiary hospitals have significantly higher awareness, participation, and acceptance than primary and secondary institutions.
- Physicians are more accepting (93.1%) than nurses (85.9%) of nurse involvement, yet nurses remain reluctant due to hierarchical barriers.
- Qualitative themes reveal training is often superficial, but nurse involvement can enhance physicians' competence, nurses' own growth, and team collaboration.

- Healthcare professionals recognize bidirectional value: 88.7% believe nurses' participation benefits nurses' own professional growth, comparable to the 86.0% who acknowledge benefits for physicians.

- Systemic institutional support is needed to move from policy to practice and to realize both physician and nursing benefits.

Availability of Data and Materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions

YYR: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, validation, visualization, and writing—original draft. ZD: Writing—original draft, funding, and validation. JQH: Investigation, project administration, resources, and supervision. TTY: Data curation, formal analysis, investigation, software, and validation. YS: Investigation, project administration, resources, and supervision. XML: Writing—original draft and validation. XLZ: Writing—original draft, data analysis and interpretation. TYZ: Conceptualization, funding acquisition, investigation, project administration, resources, supervision, and validation. All authors contributed to revising the manuscript critically for important intellectual content. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study received ethical approval from the Ethics Committee of Tianjin Second Hospital (approval number: 2023-10-23-1). All procedures adhered to the ethical standards of the Declaration of Helsinki. For the questionnaire survey, given its minimal-risk nature, written informed consent was waived by the Ethics Committee of Tianjin Second Hospital; however, all questionnaire respondents provided electronic informed consent by clicking “I agree” before proceeding. For interview participants, written informed consent was obtained prior to data collection, detailing the voluntary nature of participation, audio recording procedures, confidentiality measures, data usage, and retention protocols.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

An artificial intelligence (AI) tool (DeepSeek) was used solely for language polishing of this manuscript. No AI was employed in the study design, data analysis, figure creation, or scientific interpretation. After its use, the authors thoroughly reviewed, verified, and revised all content to ensure accuracy and originality.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at <https://doi.org/10.31083/BJHM50784>.

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