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A Three-Dimensional Framework of Guidance-Motivation-Governance: Investigating Clinical Nurse Specialists' Management Perceptions

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Abstract

Objective

The aim of this study is to analyze the current status and influential factors pertaining to the management mechanisms of Clinical Nurse Specialists through the lens of a three-dimensional Guidance-Motivation-Governance framework, in accordance with China's 14th Five-Year Plan aimed at enhancing clinical specialty capacities..

Methods

A cross-sectional survey was conducted among 646 Clinical Nurse Specialists using convenience sampling during December 2025-May 2026. Participants completed the self-developed 25-item Guidance-Motivation-Governance Assessment Scale, which was validated through Delphi expert consultation (Cronbach's α = 0.949). Data analysis employed SPSS 24.0 for non-parametric tests and multivariate linear regression.

Results

With non-normally distributed data, the GMGAS score was reported as a median of 84.45 (IQR, 16.04) on a 100-point scale, indicating generally acceptable performance despite the governance dimension scoring critically low at 25.71 (IQR, 4.29). Univariate analysis identified five significant predictors of management efficacy: management position, hospital tier, specialty area, department size of Clinical Nurse Specialists, and dedicated position availability (all $P < 0.05$).Multivariate regression modeling (adjusted $R^2=0.085$, $P < 0.001$) further confirmed four core determinants: managerial position ($\beta = 1.881$), hospital tier ($\beta = 3.178$), specialty area ($\beta = 0.480$), and dedicated positions ($\beta=-5.255$). Notably, the severe shortage of dedicated positions (available in only 17.03% of departments) demonstrated the strongest detrimental effect on management efficacy.

Conclusion

This study shows that establishing dedicated positions, empowering managers, and utilizing tertiary hospital resources are key to optimizing specialty nurse management efficacy. By empirically validating how dedicated position absence and non-managerial roles undermine governance mechanisms, we provide the first evidence-based framework to resolve China's chronic "training-management imbalance" dilemma.

Introduction

China's 14th Five-Year Plan for Clinical Specialty Capacity Building offers strategic guidance with clear objectives for advancing clinical specialties, positioning Clinical Nurse Specialists (CNS) as pivotal drivers of nursing specialization. In today's rapidly evolving healthcare environment, CNS professionals serve as the backbone of high-quality nursing services, with their management effectiveness critically shaping clinical service quality and the broader nursing discipline's growth—impacting research, education, and best practice development. However, despite expanding specialty nurse training programs, an overemphasis on training at the expense of management has limited the optimal utilization of this talent pool. Studies reveal systemic gaps: 45.90% of hospitals lack dedicated CNS positions, and merely 21.50% of certified CNS practitioners work full-time in their specialty—figures far below international standards [1–4]. Further challenges include unclear role definitions and inadequate incentive structures, which collectively hinder the advancement of specialized nursing capabilities [5–6]. Addressing these issues through scientifically grounded management frameworks has emerged as a central priority in strengthening clinical specialty capacity.

This study uses a comprehensive Guidance-Motivation-Governance framework to examine three key aspects of specialty nurse management: current perceptions about how these nurses are managed, the main factors affecting how well management works, and potential ways to develop a management model that fits real-world healthcare settings. The findings offer important theoretical support for three major improvements in nursing care - creating a management approach that works better with healthcare systems, helping clinical nursing shift from simply growing in size to creating more value, and meeting the Healthy China 2030 Strategy's goal of developing highly skilled specialty nursing professionals. The research aims to make nursing management more effective while addressing practical healthcare needs.

Methods

Study Design

From December 2025 to May 2026, CNS working in hospitals across Jiangsu province were recruited through convenience sampling.

Participants

Eligible participants had to meet specific inclusion criteria: holding a valid nursing license, possessing at least one year of specialty nursing experience, and fully understanding the study protocols while providing voluntary consent.Exclusion criteria included working in non-specialty nursing roles, lacking specialty nurse certification, being in rotating or advanced training programs, having unstable employment, or being on extended leave (such as medical, maternity, or personal leave). To ensure robust statistical analysis, the sample size was calculated based on regression analysis guidelines

requiring 10–20 participants per predictor variable, with an additional 15% buffer for anticipated attrition, resulting in a minimum target sample size of 288 participants.

Sociodemographic Information

This instrument was developed through a comprehensive literature review and qualitative interviews to assess key sociodemographic and work-related factors that might influence the Guidance-Motivation-Governance framework. It includes variables such as years of work experience, level of education, professional title, specialty area, the size of the CNS department, and whether dedicated CNS positions are available, along with other relevant factors. The design ensures a thorough evaluation of these elements to better understand their impact within the framework.

Guidance-Motivation-Governance Assessment Scale (GMGAS)

- This 25-item instrument was developed through comprehensive, scientific, and practical principles to evaluate specialty nurse management across three key dimensions: Guidance (10 items), Motivation (8 items), and Governance (7 items). The development process included two rounds of Delphi expert consultation, pilot testing, and rigorous psychometric validation.
- The Guidance Mechanism assesses career development pathways by examining the clarity of progression routes, autonomous decision-making authority through department-granted empowerment, and intrinsic motivation via job satisfaction and value perception. The Motivation Mechanism measures reward fairness and effectiveness in terms of transparency and performance impact, promotion opportunities focusing on accessibility and equity, and incentive diversity through multidimensional approaches. The Governance Mechanism evaluates evaluation fairness and transparency based on standard clarity and performance reflection, workload pressure concerning excessive burden, and regulatory effectiveness in terms of quality and performance enhancement.
- Responses were recorded on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The composite score weighted the three dimensions as follows: Guidance 35%, Motivation 35%, and Governance 30%. Scores were categorized into four levels: excellent (90–100), good (75–89), significant concerns (60–74), and major deficiencies (< 60). Psychometric testing demonstrated excellent internal consistency, with an overall Cronbach's α of 0.949 (Guidance α = 0.907, Motivation α = 0.859, Governance α = 0.863) and split-half reliability of 0.935, indicating strong reliability and consistency of the instrument.

Data Collection

- The finalized questionnaire was administered via Wenjuanxing (an online survey platform) with standardized instructions that explained the study's purpose, significance, and key concepts. Participants completed anonymous questionnaires requiring mandatory responses to all items

before submission. Electronic survey links were disseminated through WeChat professional groups of academic committees, and specialty committee members forwarded them to hospital workgroups nationwide. Upon retrieval, the research team screened all responses, excluding questionnaires completed in less than 5 minutes or showing patterns of non-serious engagement (e.g., straight-lining, duplicated answers).

Statistical Analysis

- The finalized questionnaire was distributed using Wenjuanxing, an online survey platform, with clear instructions that outlined the study's purpose, significance, and key concepts. Participants filled out the questionnaires anonymously, and all items were mandatory to ensure complete responses before submission. The survey links were shared through WeChat professional groups associated with academic committees, and specialty committee members further forwarded these links to hospital workgroups across the country. Once the responses were collected, the research team carefully reviewed them, removing any questionnaires that were completed in less than five minutes or displayed signs of careless responses, such as straight-lining or duplicated answers, to maintain data quality.

Results

Comprehensive Scores of the GMGAS

- The overall composite score of 84.45 (IQR 16.04) suggests that the hospital management systems for CNS are generally well-structured and effective. However, there is room for improvement in certain areas, as isolated issues may be impacting the overall efficacy of these systems. For a more detailed breakdown, the GMGAS scores can be found in Table 1, while Table 2 provides a closer look at performance at the individual item level, highlighting specific strengths and potential areas needing attention.

Table 1
Comprehensive GMGAS score and scores of each dimension for specialty nurses (n = 646)

Dimension	Score [M (IQR)]	Maximum	Minimum
Composite Score	84.45(16.04)	100.00	38.44
Guidance Mechanisms	30.80(6.30)	35.00	13.30
Motivation Mechanisms	28.88(6.12)	35.00	13.13
Governance Mechanisms	25.71(4.29)	30.00	6.00

Table 2
Item-level scores of GMGAS for specialty nurses (n = 646)

Dimensions /Item	Strongly disagree, n(%)	Partially disagree, n(%)	Neither agree nor disagree, n (%)	Partially agree, n(%)	Strongly agree, n(%)
A. Traction Mechanism (Intrinsic Motivation & Career Development for Specialty Nurses)					
A1 Is there a clearly defined career progression pathway in your department to support specialty nurse development?	2(0.31)	60(9.29)	175(27.09)	184(28.48)	225(34.83)
A2 Does departmental management provide adequate professional growth opportunities and decision-making authority for specialty nurses?	1(0.15)	50(7.74)	112(17.34)	269(41.64)	214(33.13)
A3 Do specialty nurses have opportunities to lead or participate in key departmental decisions, research initiatives, or project management?	2(0.31)	7(1.08)	43(6.66)	169(26.16)	425(65.79)
A4 Does the department encourage independent critical thinking and innovation in proposing nursing care solutions?	0(0.00)	5(0.77)	22(3.41)	151(23.37)	468(72.45)
A5 Does the department support self-directed learning, interdisciplinary collaboration, and implementation of novel nursing technologies?	1(0.15)	3(0.46)	106(16.41)	228(35.29)	308(47.69)
A6 Are specialty nurses' professional development needs incorporated into departmental goal-setting processes?	1(0.15)	9(1.39)	67(10.37)	308(47.68)	261(40.41)
A7 Is the professional status of specialty nurses valued within the department, with demonstrable team support and respect?	2(0.31)	26(4.02)	81(12.54)	273(42.26)	264(40.87)
A8 Has the Nursing Division established career development plans with	5(0.77)	12(1.86)	99(15.33)	226(34.98)	304(47.06)

Dimensions /Item	Strongly disagree, n(%)	Partially disagree, n(%)	Neither agree nor disagree, n (%)	Partially agree, n(%)	Strongly agree, n(%)
A. Traction Mechanism (Intrinsic Motivation & Career Development for Specialty Nurses)					
corresponding support mechanisms for specialty nurses?					
A9 Does the Nursing Division conduct regular specialized training and continuing education programs for specialty nurses?	3(0.46)	18(2.79)	71(10.99)	195(30.19)	359(55.57)
A10 Does the Nursing Division facilitate experience-sharing, research discussions, and innovation forums through conferences/symposiums?	2(0.31)	6(0.93)	61(9.44)	226(34.98)	351(54.34)
B. Incentive Mechanism (Recognition & Rewards for Specialty Nurses)					
B1 Does the department implement performance-based evaluation and reward systems?	4(0.62)	55(8.52)	90(13.93)	204(31.58)	293(45.35)
B2 Are departmental incentive measures (e.g., bonuses, promotions, honors) perceived as equitable and effective?	3(0.46)	19(2.94)	101(15.63)	254(39.32)	269(41.65)
B3 Which reward mechanisms are most motivating for specialty nurses?	55(8.53)	86(13.33)	141(21.86)	140(21.71)	224(34.57)
B4 Does the Nursing Division provide specialized incentives (e.g., specialty nurse certifications, academic awards)?	6(0.93)	51(7.91)	194(30.08)	146(22.64)	249(38.44)
B5 Are promotion opportunities tied to clinical performance and research output for specialty nurses?	6(0.93)	18(2.79)	147(22.76)	300(46.44)	175(27.08)

Dimensions /Item	Strongly disagree, n(%)	Partially disagree, n(%)	Neither agree nor disagree, n (%)	Partially agree, n(%)	Strongly agree, n(%)
A. Traction Mechanism (Intrinsic Motivation & Career Development for Specialty Nurses)					
B6 To what extent do reward systems enhance teamwork and overall care quality among specialty nurses?	2(0.31)	6(0.93)	44(6.81)	294(45.51)	300(46.44)
B7 Are incentive measures periodically evaluated and optimized to align with specialty nurses' evolving needs?	8(1.24)	20(3.10)	98(15.18)	215(33.29)	305(47.19)
B8 Do reward structures positively impact your work motivation and engagement?	8(1.24)	40(6.20)	87(13.47)	292(45.20)	219(33.89)
C. Accountability Mechanism (Performance Assessment & Responsibility)					
C1 Does departmental evaluation comprehensively cover specialty nurses' clinical competencies and responsibilities?	4(0.62)	17(2.63)	83(12.85)	331(51.24)	211(32.66)
C2 Are regular performance feedback and improvement guidance provided to specialty nurses?	7(1.08)	16(2.48)	78(12.07)	251(38.85)	294(45.52)
C3 Does the assessment system effectively promote care quality standardization?	5(0.77)	13(2.00)	67(10.31)	306(47.08)	255(39.24)
C4 Are there concerns regarding excessively stringent or unreasonable evaluation criteria?	8(1.24)	7(1.08)	58(8.99)	318(49.23)	255(39.46)
C5 Does the Nursing Division maintain specialized performance appraisal systems with periodic reviews?	7(1.08)	17(2.63)	51(7.89)	201(31.11)	370(57.29)

Dimensions /Item	Strongly disagree, n(%)	Partially disagree, n(%)	Neither agree nor disagree, n (%)	Partially agree, n(%)	Strongly agree, n(%)
A. Traction Mechanism (Intrinsic Motivation & Career Development for Specialty Nurses)					
C6 Are accountability management protocols transparent, equitable, and quality-enhancing?	6(0.93)	8(1.24)	62(9.60)	295(45.66)	275(42.57)
C7 Do managerial constraints generate excessive pressure affecting work motivation?	4(0.62)	10(1.55)	43(6.66)	406(62.87)	183(28.30)

Participants

- A total of 646 CNS participated in the study. Sociodemographic and Occupational Characteristics of CNS are listed in Table 3.Of these, 629 (97.37%) were female. The majority of participants, totaling 411 (63.62%), were aged between 31 and 50 years, including 202 (31.27%) in the 41–50 age group. Educationally, 619 (95.82%) held bachelor's degrees, and 584 (90.40%) were married. In terms of professional titles, 350 (54.18%) were senior nurses, 235 (36.38%) were associate chief nurses, and 41 (6.35%) were chief nurses. Administratively, 279 (43.19%) held non-managerial roles, while 183 (28.33%) served as nursing team leaders and 182 (28.17%) as unit managers. Most participants—580 (89.78%)—worked in tertiary hospitals, with 464 (71.83%) in Grade III-A and 116 (17.95%) in Grade III-B facilities. Additionally, 623 (96.44%) had provincial-level certification. Specialty distribution revealed 151 (23.38%) in gastroenterology nursing, 130 (20.12%) in hemodialysis care, and 90 (13.93%) in infusion therapy. Notably, 470 (72.75%) departments had five or fewer CNS, and only 110 (17.03%) had dedicated specialty positions, highlighting structural gaps in workforce allocation.

Table 3
Comparison of GMGAS scores across specialty nurse characteristics (n = 646)

Items	Participants n/N (%)	Score [M (IQR)]	*F*	*P*
Age			1.234	0.745
26 ~ 30	13(2.01)	79.11(15.75)		
31 ~ 40	411(63.62)	84.39(15.97)		
41 ~ 50	202(31.27)	85.71(15.91)		
51 ~ 60	20(3.10)	82.50(15.95)		
Gender			5036	0.683
Female	629(97.37)	84.36(15.86)		
Male	17(2.63)	86.09(21.01)		
Education				
Associate degree	1(0.15)	-	0.148	0.929
Bachelor's degree	619(95.82)	84.39(15.87)		
Master's or higher	26(4.03)	85.07(16.90)		
Marital status			0.029	0.985
Unmarried	46(7.12)	84.00(15.38)		
Married	584(90.40)	84.43(16.07)		
Divorced	16(2.48)	85.64(18.66)		
Professional title			4.037	0.258
Junior nurse and below	20(3.09)	87.32(16.04)		
Senior nurse	350(54.18)	83.74(15.91)		
Associate chief nurse	235(36.38)	85.11(15.96)		
Chief nurse	41(6.35)	89.26(13.48)		
Management position			22.988	0.000
Non-managerial	279(43.19)	84.39(17.25)		
Nursing team leader	183(28.33)	81.03(15.68)		
Unit/Ward manager	182(28.17)	87.66(13.04)		
Director of nursing	2(0.31)	89.82(0.00)		

Items	Participants n/N (%)	Score [M (IQR)]	*F*	*P*
Hospital tier			20.584	0.000
Grade II-B	2(0.31)	77.12(0.00)		
Grade II-A	45(6.97)	79.28(12.12)		
Grade III-B	116(17.95)	81.66(15.60)		
Grade III-A	464(71.83)	85.93(15.78)		
Other Levels	19(2.94)	84.36(13.21)		
Geographic region			2.474	0.480
Southern Jiangsu	380(58.82)	85.43(15.62)		
Central Jiangsu	104(16.10)	83.21(16.01)		
Northern Jiangsu	153(23.69)	83.60(17.06)		
Other Regions	9(1.39)	78.81(16.51)		
Work experience (Years)			5.626	0.131
<5	1(0.16)	-		
5 ~ 9	42(6.50)	81.23(17.98)		
10 ~ 15	242(37.46)	83.75(15.40)		
>15	361(55.88)	85.91(16.06)		
Specialty practice tenure (Years)			5.554	0.135
1 ~ 3	265(41.02)	83.66(16.43)		
4 ~ 6	92(14.24)	85.81(14.48)		
7 ~ 10	159(24.61)	84.01(15.68)		
>10	130(20.13)	87.76(16.26)		
Certification level			1.324	0.516
Hospital-level	5(0.77)	79.63(14.71)		
Provincial-level	623(96.44)	84.39(16.03)		
National-level	18(2.79)	87.31(18.92)		
Specialty area			22.414	0.004
Neurosurgical nursing	11(1.70)	92.39(11.72)		

Items	Participants n/N (%)	Score [M (IQR)]	*F*	*P*
Critical care nursing	29(4.49)	85.04(16.77)		
Respiratory nursing	56(8.67)	83.23(16.93)		
Infusion therapy nursing	90(13.93)	82.69(13.26)		
Gastroenterology nursing	151(23.38)	83.60(16.80)		
Hemodialysis nursing	130(20.12)	82.68(18.32)		
Orthopedic nursing	66(10.22)	86.29(16.31)		
General surgery nursing	29(4.49)	87.66(10.08)		
Other Specialties	84(13.00)	88.07(16.22)		
Department size of specialty nurses			6.354	0.042
1 ~ 5	470(72.75)	83.94(15.64)		
6 ~ 10	60(9.29)	87.66(15.79)		
>10	116(17.96)	86.89(16.83)		
Dedicated position availability			20454	0.000
Yes	110(17.03)	90.11(12.77)		
No	536(82.97)	83.50(16.13)		

Univariate Analysis of GMGAS

- The analysis revealed statistically significant variations in GMGAS scores based on several key factors, including managerial position, hospital tier, specialty area, department size of CNS, and dedicated position availability ($P < 0.05$). These differences in scores across these organizational and professional characteristics are comprehensively detailed in Table 3with detailed distributions presented in Table 3.The findings suggest that these institutional and role-related factors may meaningfully influence GMGAS outcomes.

Multivariate Analysis of GMGAS

- In our multivariate regression analysis, we used GMGAS scores as the dependent variable and included variables that showed significance in the univariate analysis as independent predictors (with detailed coding for independent variables provided in Table 4). The analysis revealed several significant independent predictors of GMGAS scores: managerial position (β = 1.881), hospital tier (β = 3.178), specialty area (β = 0.480), and the availability of dedicated positions (β=-5.255). The complete regression outputs can be found in Table 5.

Table 4
Independent variable coding scheme (n = 646)

Variable	Coding Assignment
Management position	Non-managerial = 1; Nursing team leader = 2; Unit/Ward manager = 3; Director of nursing = 4
Hospital tier	Grade II-B = 1; Grade II-A = 2; Grade III-B = 3; Grade III-A = 4; Other Levels = 5
Specialty area	Neurosurgical nursing = 1; Critical care nursing = 2; Respiratory nursing = 3; Infusion therapy nursing = 4; Gastroenterology nursing = 5; Hemodialysis nursing = 6; Orthopedic nursing = 7; General surgery nursing = 8; Other Specialties = 9
Department size of specialty nurses	1 ~ 5 = 1; 6 ~ 10=2; >10 = 3
Dedicated position availability	Yes = 1; No = 2

Table 5
Multivariate linear regression analysis of GMGAS scores (n = 646)

Items	*β*	*SE*	*β'*	*t*	*P*
Constant	74.845	3.733	-	20.048	0.000
Management position	1.881	0.507	0.146	3.709	0.000
Specialty area	0.480	0.207	0.088	2.319	0.021
Hospital tier	3.178	0.644	0.192	4.933	0.000
Dedicated position availability	-5.255	1.101	-0.183	-4.772	0.000
$F = 12.976$, $R = 0.303$, $R^2 = 0.092$, Ajusted $R^2 = 0.085$, $P = 0.000$.					

Discussion

- The National Nursing Development Plan (2021–2025) explicitly mandates standardized management of CNS[7], yet our study uncovers a significant paradox in its implementation. While the composite management score of 84.45 (categorized as good) reflects phased achievements under national policy guidance, a tri-dimensional analysis reveals critical imbalances. The governance dimension scored lowest at 25.71, primarily due to an evaluation system that still relies on quantitative metrics for basic nursing while neglecting specialty-specific value indicators such as complication reduction rates. Motivation mechanisms face substantial barriers in promotion, with career advancement emphasizing publications and seniority rather than measurable specialty contributions like care pathway optimization. Although guidance mechanisms scored relatively higher at 30.80 out of 35, non-managerial nurses reported 23.7% lower decision-making autonomy compared to nurse managers, indicating that career development benefits are disproportionately

concentrated among leadership. This disparity highlights systemic gaps between policy intentions and practical implementation, particularly in governance structures and equitable career incentives.

- China currently trains more than 50,000 clinical nurse specialists (CNS) across various medical fields [8], yet management practices continue to rely on outdated approaches by applying generic nursing frameworks to these specialized professionals. This mismatch creates several problems, including unclear competency levels, poorly defined job responsibilities, and oversimplified performance measures [8–10], all of which fail to properly support their role as healthcare value creators. A promising solution comes from Huo et al.'s [11] evidence-based pyramid model, which introduces structured tiered training programs and comprehensive evaluation methods. This innovative approach highlights the need to develop a new three-dimensional management system specifically designed for these value-driven specialty nurses. The model represents a significant step forward in how we can better organize and support these crucial healthcare professionals.
- The multivariable regression analysis revealed two key intrinsic factors influencing outcomes: holding a managerial position ($\beta = 1.881$, $P < 0.001$) and working in specific specialty areas ($\beta = 0.480$, $P = 0.021$). The authority gap created by managerial roles was particularly striking - nurse managers scored 3.27 points higher on average than non-managerial staff (87.66 versus 84.39), primarily because their control over resources and involvement in evaluation processes boosted their sense of autonomy and perceptions of fairness. Specialty differences also played a major role, with disease-centered specialties like neurosurgery (scoring 92.39) and orthopedics (86.29) outperforming procedure-focused areas such as hemodialysis (82.68) and infusion therapy (82.69). This gap occurs because disease specialties' unique expertise leads to greater equipment investments and collaborative opportunities, while procedural specialties risk having their professional value undermined as their work becomes standardized and fragmented. These results highlight the need for tailored evaluation approaches across specialties to address resource imbalances and prevent the concentration of professional authority that stems from these structural differences.
- Regression analysis revealed that hospital tier ($\beta = 3.178$, $P < 0.001$) and the availability of dedicated positions ($\beta=-5.255$, $P < 0.001$) were the most significant external predictors. Specifically, Grade III-A hospitals scored 6.65 points higher than Grade II-A hospitals (85.93 vs. 79.28), a difference primarily attributed to policy advantages and economies of scale that enable better resource allocation. The presence of dedicated positions plays a critical role in strengthening professional identity and belonging by clearly outlining responsibilities and implementing specialized performance evaluations, which helps protect the value created by specialty nursing. Despite these benefits, current specialty nursing roles tend to focus mainly on clinical tasks, with limited engagement in advanced practice activities [12].
- A concerning 82.97% (536 out of surveyed) CNS in China lack dedicated positions, creating persistent role confusion despite the country's growing specialty nurse training programs that have certified more than 50,000 nurses. Without proper position-based platforms, these specialists struggle to effectively apply their clinical reasoning, technical skills, and research innovations to

improve patient care—a stark contrast to international models where CNS roles are clearly defined to include education, research, audits, service development, and leadership training [13–15], often with prescriptive authority [16]. Such structured roles empower CNS professionals to lead interdisciplinary care teams and fully utilize their expertise [17–19]. The disparity between China's current CNS framework and these global standards underscores an urgent need for systemic reforms to maximize the potential of specialized nursing professionals. Given the evolving landscape and challenges in China's healthcare sector, implementing a carefully designed, multi-faceted dual-path strategy is crucial for a comprehensive overhaul of the specialty nursing system.

- Integrating dedicated position coverage rates into hospital accreditation core metrics is crucial for assessing and standardizing hospital quality and service levels. By incorporating specialty nursing coverage rates, hospitals are incentivized to strengthen their specialty nursing teams [20–21]. The accreditation process should establish detailed, scientific evaluation indicators across departments like surgery, internal medicine, and ICUs to accurately assess specialty nursing allocation. Additionally, these metrics require ongoing monitoring and dynamic adjustments to align with evolving medical industry developments and patient needs, ensuring continuous improvement in specialty nursing care [22]. This approach maintains relevance while promoting consistent enhancements in nursing specialization.
- To address the significant disparities in specialty nursing resources across different regions and hospital levels, it is crucial to implement targeted fiscal compensation mechanisms that allocate financial support based on specific needs[23]. Large tertiary hospitals in developed areas often have ample human, material, and financial resources, while smaller hospitals in less-developed or remote regions struggle with shortages. By tailoring compensation levels to factors such as local economic conditions, population density, and disease prevalence, these mechanisms can direct funds to hospitals with weaker specialty nursing resources[24]. For instance, higher-level fiscal subsidies can assist underdeveloped areas in recruiting and training specialty nursing staff, acquiring advanced equipment, and enhancing overall service quality. These funds can be utilized in multiple ways, including supporting personnel development through advanced training programs, on-site expert guidance, and online courses, as well as improving nursing environments and purchasing essential medical supplies. Such measures help reduce inter-hospital resource gaps and foster a more balanced and equitable development of China’s specialty nursing system[25–26].

Limitations

- This study has certain limitations that should be acknowledged. The use of convenience sampling resulted in a sample primarily drawn from tertiary hospitals (89.78%),with a high proportion of female participants (97.37%). Such sampling may restrict the generalizability of the findings, as it may not adequately represent CNS working in secondary-level hospitals, primary healthcare facilities with different socioeconomic conditions. Additionally, the study's reliance on cross-sectional surveys without qualitative interviews makes it difficult to explore the underlying

mechanisms behind management challenges or to provide actionable insights for optimizing the "three-dimensional management model".

- Future research could benefit from employing multistage stratified random sampling to enhance sample representativeness and improve the generalizability of results. Expanding the scope to include macro-level factors such as policy implementation effectiveness and social support systems would also contribute to developing a more comprehensive model of influencing factors.

Declarations

Ethics approval and consent to participate

This study received approval from the Institutional Review Board (IRB) of the First Affiliated Hospital with Nanjing Medical University (Approval No. 2023-SRFA-500) for both the primary research and subsequent secondary data analysis. Before conducting the analysis, all participant data were carefully anonymized to ensure privacy. Each individual voluntarily provided informed consent after being fully briefed about the study's purpose and procedures, confirming their comprehension of the information. Throughout the study duration, participant information was securely linked to maintain confidentiality, with all identifiers being permanently removed upon study completion.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and analyzed during the current study are not publicly available because they contain identifiable information on participating nurses and are subject to institutional confidentiality restrictions. De-identified data are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

ZY contributed to the conception and design of the study, the literature review, the development of the questionnaire, data collection, and drafted the initial manuscript. SL contributed to the conception and design of the study, the literature review, the development of the questionnaire, and data collection. QG contributed to the statistical analysis and interpretation of data. LC contributed to the statistical analysis and interpretation of data. QW contributed to the conception and design of the study, supervised the study, and critically revised the manuscript for important intellectual content. BX contributed to the conception and design of the study, supervised the study, provided administrative and technical support, and critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

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