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ORIGINAL RESEARCH

A Cross-Sectional Study of the Practice of Orthopedic Specialty Nursing in Hospitals in Jiangsu Province

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Purpose: To evaluate the development status of orthopedic specialty nursing in hospitals in Jiangsu Province in China.

Patients and Methods: This cross-sectional study was conducted from August to September 2024 in the orthopedics departments of secondary and tertiary hospitals in Jiangsu Province, China. Data were collected using a self-designed questionnaire administered through the online platform Wenjuan Xing. Moreover, data on specialty nursing techniques and specialty quality indicators were collected. The Pearson's chi-square test and Mann–Whitney *U*-test were used to identify the differences between the different types and sizes of hospitals.

Results: Data analysis involved 229 hospitals. Nurse-led clinics (8.30%) were the least used format of orthopedic specialty nursing, and there were significant differences in different sizes of hospitals ($P<0.001$). The most commonly implemented specialty nursing technique was coordination and nursing of bone traction (79.23%). Concerning the measures to guarantee the quality of specialty nursing, the nursing ward round was the most common, and there were significant differences in different sizes of hospitals about "specialty nursing goals or evaluation indicators to be developed" ($P<0.001$). 88.21% of the hospitals regularly provided specialized nursing training to nurses, and only 29.26% of hospitals set up specialist nurse positions. Only 90.83% of hospitals regularly monitored, analyzed, and there were significant differences in the improvement of quality through "clinical research" in hospitals of different sizes ($P<0.001$). Specialty nursing activities conducted by nurses were mainly related to performance assessment (73.80%). The standardized prevention rate of venous thromboembolism (62.31%) was the most frequently used indicator. Concerning obstacles to implementing orthopedic specialty nursing, 82.53% of the orthopedic departments expressed dissatisfaction over a lack of nurses.

Conclusion: Hospital managers and policymakers should support the growth of orthopedic specialty nursing, hire more nurses and specialist nurses, address the obstacles of evaluation and incentive mechanisms of orthopedic nurses, and investigate additional strategies for the field's advancement.

Keywords: orthopedic, current situation, specialty nursing, hospitals

Introduction

Orthopedic-related diseases are one of the leading health challenges faced worldwide.[1] Musculoskeletal disorders are defined as any type of discomfort caused by irreversible and disabling damage to muscles, bones, joints, and adjacent connective tissues,[2] such as low back pain, neck pain, fractures, osteoarthritis, rheumatoid arthritis, and other types,[3] and are mainly treated in orthopedics. Musculoskeletal conditions severely limit mobility and flexibility and are a leading cause of disability worldwide.[2] In addition, musculoskeletal conditions frequently result in psychological problems, pain, and depressive symptoms,[4] as well as high absenteeism rates, early retirement, decreased well-being, and reduced ability to participate in society.[5] Therefore, good musculoskeletal health is necessary for individual functioning, economic independence, and social independence throughout an individual's life.

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About 1.71 billion people worldwide suffer from musculoskeletal conditions, with over 1 billion affected between the ages of 15 and 64 years, and low back pain is the main reason for adults to leave the labor market prematurely.[3] The number of people with musculoskeletal disorders and associated functional limitations is rising quickly due to the longer life expectancy and earlier diagnosis of musculoskeletal disorders and related functional limitations with advances in medical care in recent years,[6] which presents an enormous challenge to the global healthcare system, particularly to the orthopedics field.[7,8] As a country of 1.4 billion people, with the aggravation of population aging, rapid economic development, and industrialization, the number of patients with musculoskeletal diseases in the elderly, traffic injuries, and construction site injuries continues to rise.[9–11] The challenges China faces in the field of orthopedics are undoubtedly severe.

Although most orthopedic-related conditions are non-fatal, they can have a significant impact on the physical functioning and mental health of patients. Therefore, orthopedic patients are particularly in need of skilled orthopedic treatment and orthopedic specialty nursing management.[12] Orthopedic patients and their primary caregivers have different degrees of demand for orthopedic nursing knowledge, skills, and emotional regulation.[13] The caring for orthopedic patients is increasingly recognized as a highly specialized field of practice that requires highly skilled nurses.[14] However, nursing is often not fully recognized and a great deal of skills, knowledge, and talent is not used.[12] In China, the level of orthopedic nursing care vary greatly between different regions, the nurse's commitment to orthopedic nursing lack of standardized training,[15] with tertiary hospitals offering the most advanced resources and specialized training. Compared to Western countries, where standardized orthopedic nursing roles are more established, China's system faces challenges such as uneven training standards, limited role autonomy, and regional disparities in resources. The generalization of some of the existing findings is also challenging due to differences in target populations and differences in personnel training, infrastructure, and equipment availability.[16] Therefore, this study aims to investigate the current state of orthopedic specialty nursing across different levels of hospitals, assessing clinical nursing practices, challenges, and opportunities for improvement. The findings will provide evidence to help healthcare professionals and policymakers develop targeted interventions to enhance orthopedic nursing care and optimize patient outcomes.

Materials and Methods

Settings

A cross-sectional survey was conducted from August to September 2024 in Jiangsu Province, China. We used convenience sampling to survey 364 hospitals in 13 cities in Jiangsu Province, China. According to the evaluation by the Health Commission of Jiangsu Province in accordance with the "Interim Measures for Hospital Accreditation" and the "Measures for Hospital Accreditation of Jiangsu Province", these hospitals with 101–500 beds were secondary hospitals, and those with more than 501 beds were tertiary hospitals. The hospitals were further divided into A, B, and C levels according to their service capacity. They were divided into general hospitals and specialized hospitals according to the scope of service.

Sampling

The Nursing Quality Control Center of Jiangsu Province contacted the nursing directors of hospitals with orthopedic wards about this study, and the head nurses of orthopedic wards received the questionnaire to complete. Data on orthopedic wards came from the annual statistics of the hospitals in 2023.

Survey Questionnaire

Data collection used a questionnaire designed by all the researchers in this study, referring to the assessment dimensions evaluated by the Accreditation Standards of the National Clinical Key Specialty,[17] and considering the characteristics of nursing work. The questionnaire had five sections, including single-choice questions, multiple-choice questions, and fill-in-the-blanks: (1) general information about hospitals (4 items): the size, level, type of the hospital, and whether it was a teaching hospital. (2) Orthopedics personnel allocation (7 items): the annual average number of open beds, the number of doctors, the number of nurses, the composition of nurses' education and professional titles, the number of specialist nurses, and the situation of nurses acting as postgraduate tutors or university teachers. (3) Orthopedics specialty nursing practice (2 items): the form of specialty nursing, and multidisciplinary team. (4) Safeguard measures for orthopedic

specialty nursing practice (11 items): specialty nursing quality assurance measures, specialty nursing in the annual nursing work plan, special person or special group responsible for the development of specialty nursing, specialty nursing standard documents, the revision time of specialty nursing standard documents, specialty nursing technology access regulations, specialty nursing training for nurses, specialty nursing post, specialty nursing quality management, specialty nursing practice and nurse assessment, and specialty nursing quality improvement. (5) Difficulties in orthopedic specialty nursing practice (1 item).

We invited 6 nursing managers and seven clinical nursing experts to participate in the revision of the draft. Content validity was ensured through review by a panel of five experts in pediatric nursing and orthopedic care, who evaluated item relevance, clarity, and comprehensiveness, resulting in a Content Validity Index (CVI) of 0.98, indicating excellent agreement.[18] A pre-survey of six hospitals was conducted, which produced important references for all aspects of data collection and effectively facilitated the revision of the initial questionnaire. In addition, we encourage orthopedics to send the specialty skills and quality of specialty nursing indicators they are using as attachments. The specialty skills are divided into four categories: assessment techniques, equipment usage technology, specialty nursing skills, and traditional Chinese medicine (TCM) nursing technology. The quality indicators of orthopedic specialty nursing collected process and outcome indicators.

Data Collection

An online survey platform called WenjuanXing (https://www.wjx.cn/) was used to generate the QR code for the questionnaire. The survey was distributed to the head nurses of the orthopedic department of the hospital via Email and WeChat (a popular social application in China). Standardized instructions and researcher contact information were provided on the first page of the questionnaire, explaining the purpose and methods of the survey. Each participant had the right to decide whether to participate in the study and could withdraw from the study at any time. Participants' consent to participate was signed in the informed consent field of the questionnaire. If participants had any questions about the questionnaire, they could contact the researcher via telephone, WeChat, or email, which helped to ensure that the questionnaire was comprehensive and valid. All items in the questionnaire were mandatory, and each Internet IP address was restricted to completing the survey only once to prevent duplicate responses. Two investigators reviewed all completed questionnaires.

In addition, orthopedics departments were encouraged to submit the directory of orthopedic specialty nursing techniques that they were using under four categories: assessment techniques, instrument and equipment use techniques, specialist care techniques, and TCM care techniques as attachments by e-mail.

Data Statistics

SPSS24.0 software was used for statistical analysis. Basic information was described using means and standard deviations if normally distributed, or median (interquartile range) if not, and the Mann–Whitney *U*-test was used to identify differences. Categorical data are described by numbers and percentages, and Pearson's chi-square test was used to identify differences, and $P<0.05$ was considered statistically significant.

Ethics Approval

This study was approved by the Ethics Committee of the First Affiliated Hospital of Nanjing Medical University and the ethics approval number is 2023-SR-978. Informed consent was obtained from all participants.

Results

General Information on Surveyed Hospitals

In total, 364 tertiary and secondary hospitals in Jiangsu province were surveyed, 229 hospitals complete responses were received, and the response rate was 62.91%. And 130 hospitals submitted orthopedic specialty nursing techniques and specialty nursing-sensitive indicators. Among the study participants, 58.52% were tertiary in size, 55.90% were Grade A-level, and only 19.21% were specialized in type for orthopedics (Table 1).

Table 1 General Information of Hospitals (n=229)

Item	Number	Percentage (%)
Size		
Tertiary hospital	134	58.52
Secondary hospital	95	41.48
Level		
Grade-A hospital	128	55.90
Grade-B hospital	44	19.21
Unevaluated level	57	24.89
Type		
General hospital	185	80.79
Specialized hospital	44	19.21
Teaching hospital or not		
Teaching	43	18.78
Non-teaching	186	81.22

Staffing Situation

Concerning the staffing condition of the orthopedic wards in the 229 hospitals, the median number of open beds annually was 49 and the median numbers of doctors and nurses were 11 and 14, respectively (Table 2). The majority of nurses (80.76%) had an undergraduate degree, and tertiary hospitals had the largest percentage of nurses with undergraduate degrees (85.91%). The junior title accounts for the biggest percentage of nurses' professional titles (50.26%), particularly in specialized hospitals (85, 60.28%). There are a total of 5157 nurses in the orthopedic wards of the 229 hospitals, among which 773 are specialist nurses. The majority of specialist nurses are employed by general hospitals (88.10%) and tertiary hospitals (78.01%). Additionally, concerning the orthopedic nurses who are educators in colleges and universities, approximately 216 orthopedic nurses served as educators in colleges and universities, with higher proportions observed in tertiary hospitals or general hospitals (Table 2).

Table 2 Allocation of Orthopedic Nursing Staff (n=229)

Variables	Total	Size of Hospital		Type of Hospital	
		Tertiary (n=134)	Secondary (n=95)	General (n=185)	Specialized (n=44)
Number of beds, median (IQR)	49(39.5,85.5)	65.5(45,105.25)	41(35,49)	50(40,90)	44(36.25,78.75)
Doctors, median (IQR)	11(8,21.5)	16.5(10,30)	9(7,12)	12(9,22)	10(7,12)
Nurses, median (IQR)	14(11,26.5)	19(12.75,38)	12(10,14)	14(11,30)	13(11,19.5)
Educational experience of nurses, n(%)					
Master's degree and above	50(0.97)	43(1.29)	3(0.48)	4(0.38)	0(0.00)
Bachelor's degree	4165(80.76)	2872(85.88)	407(65.86)	811(76.94)	75(53.19)
College diploma and lower	942(18.27)	429(12.83)	208(33.66)	239(22.68)	66(46.81)
Professional title of nurses, n(%)					
Chief nurse	116(2.25)	72(2.15)	24(3.88)	19(1.80)	1(0.71)
Co-chief nurse	485(9.40)	334(9.99)	58(9.39)	87(8.25)	6(4.26)
Supervisor nurse	1964(38.08)	1342(40.13)	171(27.67)	402(38.14)	49(34.75)
Junior nurse	2592(50.26)	1596(47.73)	365(59.06)	546(51.80)	85(60.28)
Number of specialist nurses, n(%)	773(100.00)	603(78.01)	170(21.99)	681(88.10)	92(11.90)
Specialist nurse in orthopedic ward, n(%)					
Yes	192(83.84)	116(86.57)	76(80.00)	159(85.95)	33(75.00)
No	37(16.16)	18(13.43)	19(20.00)	26(14.05)	11(25.00)
Teacher or not, n(%)					
Professional degree postgraduate supervisor	7(3.14)	6(2.87)	1(7.14)	6(2.84)	1(8.33)
Undergraduate or junior college teachers	216(96.86)	203(97.13)	13(92.86)	205(97.16)	12(91.67)

Abbreviation: IQR, interquartile range.

Specialty Nursing Practice in Orthopedics

Concerning the current formats of orthopedics specialty nursing practice in the 229 hospitals, this was mainly integrated into normal nursing tasks (98.69%) and organized via nursing consultations (89.08%) (Table 3). Most orthopedic wards (92.58%) organized or participated in multidisciplinary teams, especially tertiary hospitals (95.52%) and specialized hospitals (95.45%). Nurse-led clinics and "Internet plus nursing service" were less carried out, only 8.30% and 41.92%, respectively. The number of nurse-led clinics in tertiary hospitals was significantly more than that in secondary hospitals ($P<0.001$).

Concerning the orthopedic specialty nursing techniques being used in the 130 hospitals, of 58 items (Table 4), hospitals of different sizes differed significantly in the implementation of orthopedic specialty nursing techniques (eg, assessment of neurological function)($P<0.05$). Peripheral circulation observation, the use of unpowered walking aids, and coordination and nursing of bone traction were the most used assessment techniques, equipment use technology, and specialty nursing skills, respectively. 25.38% of orthopedic wards practiced TCM nursing techniques. Notably, none of the surveyed hospitals implemented all orthopedic specialty nursing skills.

Safeguard Measures for Clinical Practice of Orthopedic Specialty Nursing

In terms of safeguarding measures for ensuring the quality of orthopedic specialty nursing in the 229 hospitals (Table 5), the establishment of a chief nursing supervisor and the linkage of quality control results with nurses' performance appraisals are utilized less frequently, involving just 71.18% and 76.86% of hospitals, respectively. Specialty nursing is either not mentioned at all or is mentioned only briefly in 24.45% of orthopedics' yearly nursing work plans. The number

Table 3 Orthopedic Specialty Nursing Practice in Hospitals of Different Types and Sizes (n=229)

Variables	Total	Sizes of Hospital				Type of Hospital			
		Tertiary (n=134)	Secondary (n=95)	c^2/Z	*P*	General (n=185)	Specialized (n=44)	c^2/Z	*P*
Forms of specialty nursing[a]									
Integrated into normal nursing task	226(98.69)	134(100.00)	92(96.84)	2.193[b]	0.038	182(98.38)	44(100.00)	-[c]	1.000
Nursing consultations	204(89.08)	122(91.04)	82(86.32)	1.278[b]	0.258	165(89.19)	39(88.64)	-[c]	1.000
Nurse-led clinics	19(8.30)	17(12.69)	2(2.11)	8.180[b]	0.004	15(8.11)	4(9.09)	-[c]	0.767
Transitional care	169(73.80)	104(77.61)	65(68.42)	2.429[b]	0.119	140(75.68)	29(65.91)	1.754[b]	0.185
"Internet plus nursing service"	96(41.92)	63(47.01)	33(34.74)	3.442[b]	0.064	81(43.78)	15(34.09)	1.372[b]	0.242
Conduct MDT				4.079[b]	0.043			0.240[b]	0.624
Yes	212(92.58)	128(95.52)	84(88.42)			170(91.89)	42(95.45)		
No	17(7.42)	6(4.48)	11(11.58)			15(8.11)	2(4.55)		

Notes: [a]Multiple-choice question; [b]Chi-square test; [c] Fisher's Exact Test.
Abbreviation: MDT, multidisciplinary team.

Table 4 Application of Orthopedic Specialty Nursing Techniques (n=130)

Category	Item	Total	Tertiary Hospital (n=68)	Secondary Hospital (n=62)	*P*
Assessment techniques	Peripheral circulation observation	49(37.69)	29(42.65)	20(32.26)	0.222
	Assessment of neurological function	48(36.92)	32(47.06)	16(25.81)	0.012
	Limb length and circumference measurement	40(30.77)	23(33.82)	17(27.42)	0.429
	Assessment of joint range of motion	17(13.08)	9(13.24)	8(12.90)	0.955
	Pain assessment and management	17(13.08)	8(11.76)	9(14.52)	0.642
	Swelling assessment	16(12.31)	10(14.71)	6(9.68)	0.383
	Assessment of muscle strength	13(10.00)	7(10.29)	6(9.68)	0.907
	Assessment of thrombosis risk	12(9.23)	6(8.82)	6(9.68)	0.867
	Assessment of swallowing function	8(6.15)	5(7.35)	3(4.84)	0.818

(*Continued*)

Table 4 (Continued).

Category	Item	Total	Tertiary Hospital (n=68)	Secondary Hospital (n=62)	*P*
Equipment use technology	The use of unpowered walking aids	73(56.15)	42(61.76)	31(50.00)	0.177
	Antithrombotic Pressure Pump	73(56.15)	42(61.76)	31(50.00)	0.177
	The use of cervical collar	67(51.54)	44(64.71)	23(37.10)	0.002
	Waist circumference wearing	51(39.23)	37(54.41)	14(22.58)	0.000
	Continuous Passive Motion	44(33.85)	31(45.59)	13(20.97)	0.005
	Plaster external /splint fixation	41(31.54)	25(36.76)	16(25.81)	0.179
	External fixation brace	39(30.00)	23(33.82)	16(25.81)	0.319
	Spectrum therapy apparatus	38(29.23)	21(30.88)	17(27.42)	0.665
	Anti-embolism stocking	36(27.69)	23(33.82)	13(20.97)	0.102
	Orthopedic shoes	19(14.62)	13(19.12)	6(9.68)	0.128
	Infrared lamp	19(14.62)	11(16.18)	8(12.90)	0.598
	Thoracolumbar brace	18(13.85)	13(19.12)	5(8.06)	0.068
	Upper extremity slings	18(13.85)	12(17.65)	6(9.68)	0.189
	Photon therapy instrument	17(13.08)	12(17.65)	5(8.06)	0.106
	Abduction brace	17(13.08)	11(16.18)	6(9.68)	0.272
	Patient controlled intravenous analgesia	10(7.69)	5(7.35)	5(8.06)	1.000
	Multi-frequency vibration expectorator	9(6.92)	7(10.29)	2(3.23)	0.215
	Ultrasonic Therapy Apparatus	7(5.38)	6(8.82)	1(1.61)	0.153
	Ultrasound conductivity apparatus	5(3.85)	3(4.41)	2(3.23)	1.000
	Electric pneumatic hemostatic instrument	4(3.08)	4(5.88)	0(0.00)	0.152
	Autotransfusion device	3(2.31)	1(1.47)	2(3.23)	0.935
	Bone trauma therapeutic instrument	3(2.31)	2(2.94)	1(1.61)	1.000
	Triangle bandage	3(2.31)	1(1.47)	2(3.23)	0.935
	Osteoporosis therapeutic apparatus	1(0.77)	1(1.47)	0(0.00)	1.000[a]
Specialty nursing skills	Coordination and nursing of bone traction	103(79.23)	57(83.82)	46(74.19)	0.176
	Vacuum sealing drainage	74(56.92)	45(66.18)	29(46.77)	0.026
	Skin traction	66(50.77)	35(51.47)	31(50.00)	0.867
	Axial turning over	63(48.46)	30(44.12)	33(53.23)	0.299
	Ankle pump exercise	59(45.38)	27(39.71)	32(51.61)	0.173
	Turning patients with orthopedic	54(41.54)	33(48.53)	21(33.87)	0.090
	Patient Handling and Transfer	49(37.69)	28(41.18)	21(33.87)	0.391
	Instructions for orthopedics patients to get in and out of bed	42(32.31)	29(42.65)	13(20.97)	0.008
	Functional exercise	41(31.54)	24(35.29)	17(27.42)	0.334
	Position placement	35(26.92)	22(32.35)	13(20.97)	0.144
	Cold therapy	34(26.15)	16(23.53)	18(29.03)	0.476
	Nursing of external fixation bracket	32(24.62)	19(27.94)	13(20.97)	0.357
	The use of anticoagulant drug	26(20.00)	15(22.06)	11(17.74)	0.539
	Trachea and esophagus training	25(19.23)	18(26.47)	7(11.29)	0.028
	Occipito-jaw traction	23(17.69)	17(25.00)	6(9.68)	0.022
	Preoperative training and postoperative rehabilitation guidance	22(16.92)	15(22.06)	7(11.29)	0.102
	Nursing of wound drainage tube	19(14.62)	12(17.65)	7(11.29)	0.305
	Manual therapy	15(11.54)	9(13.24)	6(9.68)	0.526
	Continued closed lavage	8(6.15)	6(8.82)	2(3.23)	0.336
	Bloodletting through small incision	7(5.38)	5(7.35)	2(3.23)	0.514
	Continuous irrigation of joint cavity	6(4.62)	3(4.41)	3(4.84)	1.000
	Central venous catheterization and maintenance	5(3.85)	4(5.88)	1(1.61)	0.419
	Intra-knee injection technique	4(3.08)	4(5.88)	0(0.00)	0.152
	Negative-pressure wound therapy	1(0.77)	1(1.47)	0(0.00)	1.000[a]
Traditional Chinese medicine nursing techniques	Traditional Chinese Medicine nursing techniques	33(25.38)	17(25.00)	16(25.81)	0.916

Note: [a]Fisher's Exact Test.

Table 5 Safeguard Measures for Orthopedic Specialty Nursing (n=229)

Variables	Total	Size of Hospital				Type of Hospital			
		Tertiary (n=134)	Secondary (n=95)	c^2	P^b	General (n=185)	Special (n=44)	c^2	P^b
Measures to ensure the quality of specialty nursing[a]									
Develop specialty nursing technical processes and standards	217(94.76)	131(97.76)	86(90.53)	4.493	0.034	175(94.59)	42(95.45)	0.000	1.000
The post of chief nursing supervisor was established	163(71.18)	94(70.15)	68(71.58)	0.013	0.910	134(72.43)	29(65.91)	0.737	0.391
Bedside nurses were assigned according to patients' condition and nurses' ability level	203(88.65)	124(92.54)	79(83.16)	4.859	0.028	165(89.19)	38(86.36)	0.282	0.595
Regular specialized nursing training	213(93.01)	126(94.03)	87(91.58)	0.514	0.473	171(92.43)	42(95.45)	0.143	0.706
Discussion of difficult cases	204(89.08)	121(90.30)	83(87.37)	0.491	0.484	164(88.65)	40(90.91)	0.027	0.870
Nursing ward round	219(95.63)	126(94.03)	93(97.89)	1.171	0.279	176(95.14)	43(97.73)	0.120	0.729
Nursing consultation	200(87.34)	120(89.55)	80(84.21)	1.434	0.231	162(87.57)	38(86.36)	0.047	0.829
Specialist care standards were incorporated into routine quality control	192(83.84)	118(88.06)	74(77.89)	4.240	0.039	156(84.32)	36(81.82)	0.165	0.685
The results of quality control were linked to the performance of nurses	176(76.86)	103(76.87)	72(75.79)	0.104	0.747	145(78.38)	31(70.45)	1.255	0.263
Specialty nursing content in the annual nursing work plan[a]									
No or vague description	56(24.45)	27(20.15)	29(30.53)	1.383	0.240	45(24.32)	7(15.91)	1.597	0.206
The number of specialty nursing techniques to be carried out	129(56.33)	82(61.19)	47(49.47)	3.104	0.078	105(56.76)	24(54.55)	0.174	0.677
Specific names of specialty nursing techniques to be developed	144(62.88)	91(67.91)	53(55.79)	3.499	0.061	114(61.62)	30(68.18)	0.415	0.519
The main measures of specialty nursing technology to be carried out	140(61.14)	46(34.33)	43(45.26)	2.797	0.094	111(60.00)	29(65.91)	0.316	0.574
Specialty nursing goals or evaluation indicators to be developed	133(58.08)	91(67.91)	42(44.21)	12.824	0.000	106(57.30)	27(61.36)	0.115	0.735
A special group or person is responsible for promoting the development of specialty nursing				9.110	0.003			0.647	0.421
Yes	177(77.29)	113(84.33)	64(67.37)			145(78.38)	32(72.73)		
No	52(22.71)	21(15.67)	31(32.63)			40(21.62)	12(27.27)		
Specialty nursing specification documents[a]									
Specialty nursing routine	223(97.38)	132(98.51)	91(95.79)	0.721	0.396	180(97.30)	43(97.73)	0.000	1.000
Standards of care for specialty disease	169(73.80)	103(76.87)	66(69.47)	1.571	0.210	143(77.30)	26(59.09)	6.094	0.014
Specialty nursing technology process	207(90.39)	124(92.54)	83(87.37)	1.710	0.191	169(91.35)	38(86.36)	0.525	0.469
Technical standards for specialty nursing	195(85.15)	115(85.82)	80(84.21)	0.115	0.736	162(87.57)	33(75.00)	4.441	0.035
Specialty nursing-sensitive indicators and standard measures	176(76.86)	111(82.84)	65(68.42)	6.494	0.011	144(77.84)	32(72.73)	0.522	0.470
Others	5(2.18)	4(2.99)	1(1.05)	0.278	0.598	4(2.16)	1(2.27)		1.000[c]
Currently used versions of specialty care-related norms				1.914	0.590			7.516	0.057
2017–2019	7(3.06)	5(3.73)	2(2.11)			3(1.62)	4(9.09)		
2019–2021	34(14.85)	17(12.69)	17(17.89)			27(14.59)	7(15.91)		
2021–2023	147(64.19)	86(64.18)	61(64.21)			123(66.49)	24(54.55)		
2024	41(17.90)	26(19.40)	15(15.79)			32(17.30)	9(20.45)		
Access regulations for specialty nursing skills				0.125	0.724			0.147	0.701
Yes	188(82.10)	109(81.34)	79(83.16)			151(81.62)	37(84.09)		
No	41(17.90)	25(18.66)	16(16.84)			34(18.38)	7(15.91)		

(*Continued*)

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Table 5 (Continued).

Variables	Total	Size of Hospital				Type of Hospital			
		Tertiary (n=134)	Secondary (n=95)	c^2	P^b	General (n=185)	Special (n=44)	c^2	P^b
Specialized nursing training was carried out regularly for nurses				5.817	0.016			0.888	0.346
Yes	202(88.21)	124(92.54)	78(82.11)			165(89.19)	37(84.09)		
No	27(11.79)	10(7.46)	17(17.89)			20(10.81)	7(15.91)		
The post of specialist nurses				0.679	0.410			0.615	0.433
Yes	67(29.26)	42(31.34)	25(26.32)			52(28.11)	15(34.09)		
No	162(70.74)	92(68.66)	70(73.68)			133(71.9)	29(65.91)		
The quality of specialty nursing was monitored, analyzed and improved regularly				3.971	0.046			0.725	0.253
Yes	208(90.83)	126(94.03)	82(86.32)			170(91.89)	38(86.36)		
No	21(9.17)	8(5.97)	13(13.68)			15(8.11)	6(13.64)		
Forms to improve the quality of specialty nursing[a]									
Project management	101(44.10)	68(50.75)	33(34.74)	5.779	0.016	81(43.78)	20(45.45)	0.040	0.841
Quality control circle	154(67.25)	97(72.39)	57(60.00)	3.873	0.049	131(70.81)	23(52.27)	5.546	0.019
Continuous quality improvement	227(99.13)	133(99.25)	94(98.95)	0.060	0.806	183(98.92)	44(100.00)		1.000[c]
Clinical research	53(23.14)	44(32.84)	9(9.47)	17.057	0.000	45(24.32)	8(18.18)	0.754	0.385
The effects of specialized nursing projects on nurse assessment[a]									
Performance appraisal	169(73.80)	98(73.13)	71(74.74)	0.074	0.786	139(75.14)	30(68.18)	0.889	0.346
Bonus	77(33.62)	47(35.07)	30(31.58)	0.304	0.581	64(34.59)	13(29.55)	0.406	0.524
Special allowance	29(12.66)	19(14.18)	10(10.53)	0.671	0.413	22(11.89)	7(15.91)	0.519	0.471
Promotion	111(48.47)	69(51.49)	42(44.21)	1.180	0.277	92(49.73)	19(43.18)	0.610	0.435
Evaluation of talents	119(51.97)	78(58.21)	41(43.16)	5.045	0.025	101(54.59)	18(40.91)	2.667	0.102
Training of talents	123(53.71)	82(61.19)	41(43.16)	7.273	0.007	101(54.59)	22(50.00)	0.302	0.583
Others	12(5.24)	5(3.73)	7(7.37)	0.839	0.360	9(4.86)	3(6.82)	0.273	0.601

Notes: [a]Multiple-choice question; [b]Chi-square test; [c]Fisher's Exact Test.

of tertiary hospitals mentioning "specialty nursing goals or evaluation indicators" in the nursing work plan was significantly more than that in secondary hospitals ($P<0.001$). Just 67.37% of secondary hospitals have devoted staff members or formed specialty teams to promote specialty nursing growth. The majority of hospitals (97.38%) possess routine documents related to specialty nursing. The majority of these nursing documents (64.19%) were updated by 2021 to 2023, and some specialized hospitals (59.09%) have also created disease-specific nursing standards. Regarding newly initiated specialty nursing techniques or projects, only 82.10% of hospitals have established access systems. 70.74% of orthopedics are without orthopedic specialist nurse positions. Merely 90.83% of hospitals regularly monitored, analyzed, and improved the quality of specialty nursing. The number of tertiary hospitals improving nursing quality by carrying out "clinical research" was significantly more than that of secondary hospitals ($P<0.001$). These statistical differences remained significant after applying Bonferroni correction (data not shown). Specialty nursing activities of nurses are mainly correlated with performance appraisals (73.80%) (Table 5).

Of the nursing-sensitive indicators (NSIs) used in the 130 orthopedic departments (Table 6), the standardized prevention rate of venous thromboembolism (VTE) (62.31%) and the incidence of postoperative delirium in elderly patients (41.54%) were the most commonly used process indicators and outcome indicators, respectively.

Obstacles to Conducting Specialty Nursing

The obstacles to conducting specialty nursing orthopedic wards included lack of staff (82.53%), hospitals or nursing departments not paying attention to personnel training (18.78%), lack of incentive mechanism (62.01%), performance appraisal not reasonable (23.14%), the charges of specialty nursing programs are unreasonable (44.10%), lack of necessary equipment (21.40%), and lack of talent to lead the development of specialty nursing (52.84%). Among the different sizes of hospitals, significantly more secondary hospitals than tertiary hospitals faced obstacles related to hospitals or nursing departments not paying attention to personnel training (27.37% versus 12.69%, $P=0.005$) (Table 7).

Table 6 The NSIs of Orthopedic Specialty (n=130)

Type	Item	Total	Tertiary Hospital (n=68)	Secondary Hospital (n=62)	*P*
Process indicators	Standardized rate of VTE prevention	81(62.31)	45(66.18)	36(58.06)	0.340
	Prevention rate of DVT	26(20.00)	19(27.94)	7(11.29)	0.018
	Rate of functional exercise implementation	29(22.31)	15(22.06)	14(22.58)	0.943
	Coincidence rate of body position	29(22.31)	14(20.59)	15(24.19)	0.622
	Effective traction rate	27(20.77)	13(19.12)	14(22.58)	0.627
	Accuracy of axis turning	18(13.85)	11(16.18)	7(11.29)	0.420
	The correct rate of the functional exercise implementation	15(11.54)	8(11.76)	7(11.29)	0.933
	Correct rate of rehabilitation training measures	13(10.00)	8(11.76)	5(8.06)	0.482
	The implementation rate of bone traction nursing measures	7(5.38)	6(8.82)	1(1.61)	0.069
	The correct rate of pain assessment	9(6.92)	5(7.35)	4(6.45)	1.000
	Accuracy of limb blood circulation assessment	8(6.15)	5(7.35)	3(4.84)	0.818
	Accuracy of drainage tube nursing	7(5.38)	5(7.35)	2(3.23)	0.514
	The standard rate of brace-wearing	10(7.69)	5(7.35)	5(8.06)	1.000
	The correct rate of using walking AIDS	6(4.62)	5(7.35)	1(1.61)	0.255
	Correct rate of waist circumference wearing	8(6.15)	4(5.88)	4(6.45)	1.000
	Accuracy of neck brace-wearing	3(2.31)	3(4.41)	0(0.00)	0.276
	Early ambulation rate after operation	5(3.85)	3(4.41)	2(3.23)	1.000
	Accuracy of risk assessment for VTE	6(4.62)	3(4.41)	3(4.84)	1.000
	The correct rate of implementation of pain measures	3(2.31)	2(2.94)	1(1.61)	1.000
	Standard rate of postoperative knee range of motion	4(3.08)	2(2.94)	2(3.23)	1.000
	Oral nutrition goal attainment rate	1(0.77)	1(1.47)	0(0.00)	1.000[a]
	Nutrition assessment rate	1(0.77)	1(1.47)	0(0.00)	1.000[a]
	Standard rate of wearing upper extremity sling	1(0.77)	1(1.47)	0(0.00)	1.000[a]

(*Continued*)

Table 6 (Continued).

Type	Item	Total	Tertiary Hospital (n=68)	Secondary Hospital (n=62)	*P*
Outcome indicators	Incidence of postoperative delirium in elderly patients	54(41.54)	34(50.00)	20(32.26)	0.040
	Incidence of pressure injuries	29(22.31)	15(22.06)	14(22.58)	0.943
	Incidence of prosthetic dislocation	31(23.85)	15(22.06)	16(25.81)	0.616
	Incidence of VTE	23(17.69)	11(16.18)	12(19.35)	0.635
	Incidence of DVT	21(16.15)	11(16.18)	10(16.13)	0.994
	Incidence of plaster/external fixation complications	13(10.00)	11(16.18)	2(3.23)	0.014
	Incidence of falls	20(15.38)	11(16.18)	9(14.52)	0.793
	Adverse effects of subcutaneous anticoagulants	14(10.77)	10(14.71)	4(6.45)	0.129
	Incidence of needle site infection in bone traction	28(21.54)	10(14.71)	18(29.03)	0.047
	Incidence of respiratory obstruction in high-risk patients	10(7.69)	7(10.29)	3(4.84)	0.403
	Unplanned extubation rate	9(6.92)	7(10.29)	2(3.23)	0.215
	Incidence of constipation	8(6.15)	5(7.35)	3(4.84)	0.818
	Incidence of burns related to TCM nursing techniques	8(6.15)	3(4.41)	5(8.06)	0.617
	Incidence of grade II and III swelling after total knee arthroplasty	3(2.31)	3(4.41)	0(0.00)	0.276
	Proportion of discharged patients using TCM techniques	7(5.38)	3(4.41)	4(6.45)	0.900
	Proportion of TCM nursing skills implemented according to the indications	5(3.85)	2(2.94)	3(4.84)	0.916
	Incidence of non-thermal skin injury related to TCM nursing techniques	7(5.38)	2(2.94)	5(8.06)	0.366
	Incidence of orthostatic hypotension	1(0.77)	1(1.47)	0(0.00)	1.000[a]
	Implementation rate of cold therapy standards	1(0.77)	1(1.47)	0(0.00)	1.000[a]
	Pulmonary infection rate	1(0.77)	1(1.47)	0(0.00)	1.000[a]
	Incidence of pain aggravation after handling	1(0.77)	0(0.00)	1(1.61)	0.477[a]
	Incidence of burns related to TCM nursing techniques	1(0.77)	0(0.00)	1(1.61)	0.477[a]

Note: [a]Fisher's Exact Test.
Abbreviations: VTE, venous thromboembolism; DVT, deep vein thrombosis; TCM, traditional Chinese medicine.

Table 7 Obstacles to Conducting Orthopedic Specialty Nursing (n=229)

Variables	Total	Size of Hospital				Type of Hospital			
		Tertiary (n=134)	Secondary (n=95)	c^2	*P*	General (n=185)	Special (n=44)	c^2	*P*
Lack of staff	189(82.53)	108(80.60)	81(85.26)	0.840	0.360	151(81.62)	38(86.36)	0.554	0.457
Leaders do not focus on staff training	43(18.78)	17(12.69)	26(27.37)	7.857	0.005	33(17.84)	10(22.73)	0.557	0.455
Lack of incentive system	142(62.01)	85(63.43)	57(60.00)	0.278	0598	111(60.00)	31(70.45)	1.649	0.199
Performance appraisal is not reasonable	53(23.14)	26(19.40)	27(28.42)	2.542	0.111	44(23.78)	9(20.45)	0.221	0.638
The charges of specialty nursing programs are unreasonable	101(44.10)	62(46.27)	39(41.05)	0.613	0.433	81(43.78)	20(45.45)	0.040	0.867
Lack of necessary equipment	49(21.40)	25(18.66)	24(25.26)	1.443	0.230	41(22.16)	8(18.18)	0.335	0.563
Lack of talent to lead the development of specialty nursing	121(52.84)	65(48.51)	56(58.95)	2.431	0.119	100(54.05)	21(47.73)	0.571	0.450

Discussion

Our survey of orthopedic specialty nursing in Chinese hospitals found that such work differed greatly in 229 hospitals. The integration of specialty nursing work was the main form of specialty nursing work in normal nursing tasks. However, there are few other forms of nursing clinics and "Internet plus nursing service" in orthopedics. Coordination and nursing of bone traction is the most used specialty nursing skill. Specialty nursing routine documents have been prepared in most hospitals. The shortage of nurse human resources and the lack of leaders are the primary obstacles to the development of specialist nursing. Furthermore, specialized nursing was reported not to receive enough attention from hospital management, and its growth was hampered by the absence of an efficient incentive system and associated supplies. Therefore, our results suggest that the development and management of specialty nursing need to be further improved, and adequate nursing staff, funding, and equipment, as well as more attention from management, should contribute to the development of nursing specialization.

The Content and Scope of Specialty Nursing in Orthopedics Vary Greatly

The results showed that the 229 hospitals carried out various forms of specialty nursing in practice, most of which were integrated into normal nursing tasks, while nurse-led clinics and "Internet plus nursing service" were carried out less, especially in secondary hospitals. The nurse-led clinic is a mature product of specialty nursing talents.[19] It not only meets the nursing needs of patients but also expands the scope of nursing practice.[20,21] A previous study showed that nurse practitioners in nurse-led clinics were more likely to be highly qualified and experienced nurse specialists.[22] Furthermore, there are few training bases for orthopedic specialist nurses in China, and the training needs 2–3 months full-time. The remaining nurses have to undertake the workload of nurses going out for further study, which poses a great challenge to the human resource reserve of the department.[23] The "Internet plus nursing service" may also require certain Internet technical support. In addition, previous studies pointed out that the fee rationality of specialty nursing services and the salary mechanism of nurses need to be actively explored. The value of services based on nurses' professional knowledge and experience is, otherwise, difficult to reflect fully, which will affect the enthusiasm of nurses to a certain extent.[19,24,25]

A multidisciplinary team (MDT) is a collaboration between healthcare personnel from different specialized professionals to improve treatment efficiency and patient care.[26] The proportion of tertiary hospitals organizing or participating in MDT is higher than that of secondary hospitals. The reason may be that tertiary hospitals have more advantages in technology, talent, and resources. Nie S-x[27] pointed out that X pointed out that due to technical limitations, it is more common for some specialized hospitals or primary hospitals to require consultation from superior hospitals with larger sizes, higher levels, and greater comprehensive capacity. The study showed that none of the orthopedic specialty nursing skills were implemented in all hospitals. First of all, due to the differences in the sizes and types of hospitals, the specialty nursing skills carried out by hospitals vary. Secondly, As the data were self-reported by head nurse, there may be underreporting due to variations in documentation practices or awareness of specific nursing protocols. Coordination and nursing of bone traction was the most frequent specialty nursing technique. Bone traction is a common method for the effective reduction and fixation of patients with fractures and dislocations in orthopedics. The results showed that hospitals of different sizes had differences in the use of some specialty nursing techniques, such as neurological function assessment, neck brace wearing, waist circumference wearing, lower limb movement apparatus, low-frequency therapeutic apparatus, bed and bed guidance, tracheoesophageal movement training, and occiput jaw traction. The differences were statistically significant. Hospitals of different sizes had statistically significant differences in the use of assessment of neurological function, the use of cervical collars, waist circumference wearing, continuous Passive Motion, vacuum sealing drainage, instructions for orthopedics patients to get in and out of bed, trachea and esophagus training, occipital-jaw traction. The reason is that the nursing skills are different due to the differences in the sizes and types of hospitals in Jiangsu province, the types of orthopedic diseases, medical technology resources, and hardware.

Orthopedic Specialty Nursing Management Needs to Be Standardized

The standards of nursing practice are an authoritative statement of duties that all registered nurses, regardless of role, population, or specialty, are expected to competently perform.[28] To ensure clinical quality of specialty nursing, hospitals implemented multiple measures including: nursing ward round (95.63%), develop specialty nursing technical processes and standards (94.76%), regular specialized nursing training (93.01%), and so on (Table 4). But not all hospitals have formulated clear technical procedures and standards of specialty nursing, can assign bed nurses according to patient conditions, and incorporate the quality of specialty nursing into the routine quality control. The Scope and Standards of Orthopedic Nursing Practice (3rd Edition) by the National Association of Orthopedic Nurses (NAON) pointed out that the specialty of orthopedic nursing should establish the highest standards of nursing practice for optimum patient care.[29] These standards provide a framework for which orthopedic nurses should be held accountable They describe the minimal competence level of professional nursing care or activity common to all nurses who care for patients with actual or potential orthopedic conditions. These differences in management reflect the attitudes of different managers towards orthopedic specialisation and may also be reflected in the quality of care. Ramadan[30] stated that differences in standards of clinical practice may limit orthopedic nurses from providing high-quality care. The annual nursing plan is designed to solve some problems and new tasks, which has a direct guiding

effect on nursing management activities.[31] In this study, 24.45% of the hospital nursing annual work plans had no orthopedic specialty nursing content, and even if there was, it was only vaguely described, without specific projects and goals. Due to the lack of specialty content in the annual plan, there is no clear goal when the department carries out nursing work. What to carry out, when to carry out, how to carry out, and what goals need to be achieved will affect the development of specialty nursing to a certain extent. Managers should pay attention to the development of specialty at the superstructure level, plan the specialty work in detail, standardize the practice standards of specialty nursing to promote the homogeneity of specialty nursing quality.

Orthopedic Nursing Human Resources are Insufficient

The results showed that the ratio of orthopedics nurses and beds in Jiangsu Province of China was not ideal. According to the "Guiding Opinions on the Implementation of Hospital Nurse Post Management" issued by the Ministry of Health,[32] the allocation ratio of beds and nurses in medical institutions is 1: 0.4, indicating a slight shortage of nursing staff. A study[33] showed that an increase by 1 registered nurse per patient would save 5 lives per 1000 hospitalized patients in ICUs, 5 lives per 1000 medical patients, and 6 per 1000 surgical patients. Higher nurse enrollment rates were associated with lower hospital-related mortality, hospital-acquired pneumonia, and other adverse events.[34] The need for medical human resources in orthopedics is obvious, and increasing the number of orthopedics nurse practitioners is expected to alleviate the care needs of orthopedic patients.[35–37] Major hospitals hardly ever implement the nurse-led clinic and "Internet plus nursing services" described above. The primary limiting factor is the lack of nurse human resources, which includes a shortage of registered nurses and specialist nurses with rich clinical experience and excellent specialist technical level, in addition to the brief development period of these two types of specialty nursing forms.[37] To deliver the best outcomes for patients, healthcare personnel, and health systems, while taking into account the realities of labor costs and nurse shortages, it is important to ensure that the right people, with the right skills, are in the right place at the right time and that human resources are used more efficiently.[38]

In this study, a large proportion of hospitals did not have a specialty nursing team or person responsible for promoting the development of specialty nursing, especially in secondary hospitals (32.63%). Previous studies[39–41] have shown that an orthopedic specialty team plays an important role in orthopedic specialty nursing work, including the formulation and implementation of orthopedic specialization nursing plans, and the guidance and training of nurses. A specialist nurse is one of the core members of the specialty nursing team, which plays a positive role in improving the level of specialty nursing service and reducing the incidence of adverse events.[23,42] In our survey, 192 of 229 hospitals (83.84%) had specialist nurses in the orthopedic ward, and the total number of specialist nurses was 773, mainly concentrated in tertiary hospitals (78.01%) and general hospitals (88.10%). Each hospital or orthopedic ward should set up a specialty nursing team, determine the sizes and operation mode of the specialty nursing team according to its work characteristics, and pay attention to the training and use of specialist nurses, to promote the improvement and development of orthopedic nursing work and improve the level and quality of specialty nursing.

Obstacles to Conducting Specialty Nursing

The obstacles to implementing specialty nursing orthopedic wards included lack of staff, management not paying attention to personnel training, lack of incentive mechanism, performance appraisal is not reasonable, the charges of specialty nursing programs are unreasonable, lack of necessary equipment, and lack of talents to lead the development of specialty nursing. Among these obstacles, lack of staff is the primary obstacle, as well as a serious problem in China. Therefore, the government should continue to strengthen the training of nursing personnel, increase enrollment, and increase the education of nurses. Other hospitals reported that the development of specialty nursing had not received sufficient attention from the management. Perception of nursing is a core barrier to empowerment and utilization of nursing staff, and nurses are not supported to reach their potential or are not given opportunities to develop leadership skills.[12] If hospital managements attach importance to the development of specialties, recognize the role and contribution of nurses in medical care,[14] and support the cultivation and use of specialists, the quality of nursing can be improved and the prognosis of patients can be further improved. Furthermore, many hospitals also reported a lack of effective reward

mechanisms and the charge of specialty nursing projects, which also affected the development of specialty nursing. Hence, hospitals should pay more attention to ensuring appropriate nursing staff, funding, and equipment to promote the development of specialty specialization.

This study has some limitations. First, the survey was conducted in secondary and tertiary hospitals in Jiangsu Province, and the primary care institutions were not included. The results of the study are not representative of all sizes and the national situation. Second, the questionnaire is answered by head nurses, which may lead to response bias. Future research can consider investigating the practice of orthopedic specialty nursing in hospitals from the perspective of clinical nurses and patients, to present the practice status of orthopedic specialty nursing more comprehensively. Third, this study was a cross-sectional study, and the relationship between hospital size and orthopedic specialty care needs to be confirmed by prospective studies. In addition, the study used multiple testing; uncorrected multiple testing may exaggerate "significant" results, and some "significant" results may be due to chance.

Conclusion

This study gives an overview of orthopedic specialty nursing in Chinese hospitals. The results showed that a shortage of staffing for orthopedic nursing, and nurses' professional titles and educational backgrounds must be enhanced. Although specialized nursing has many different forms and techniques, it is rarely sufficiently promoted. In the future, it is still necessary to increase the training of nurses, increase the number of advanced education or skills, unify the compilation and update of orthopedic specialty nursing standard documents, and standardize the promotion and use of specialty nursing technique. Furthermore, the hospital administration did not give nursing specialization enough consideration, and the absence of a suitable incentive system and associated resources hindered the growth of specialty nursing. To support the growth of nursing specialization, hospital policymakers should focus more on guaranteeing adequate nursing staff, financing, and equipment.

Data Sharing Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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References

1. Flores MJ, MacKechnie MC, Brown KE, et al. The current state of international academic partnerships in orthopaedic surgery between high-income and low and middle-income countries: a systematic review. *JB JS Open Access*. 2024;9(3). doi:10.2106/JBJS.OA.24.00033
2. World Health Oranization. Musculoskeletal health. Available from: https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions. Accessed April 29, 2025.
3. Cieza A, Causey K, Kamenov K, Hanson SW, Chatterji S, Vos T. Global estimates of the need for rehabilitation based on the global burden of disease study 2019: a systematic analysis for the global burden of disease study 2019. *Lancet*. 2021;396(10267):2006–2017. doi:10.1016/S0140-6736(20)32340-0
4. Heikkinen J, Honkanen R, Williams L, et al. Depressive disorders, anxiety disorders and subjective mental health in common musculoskeletal diseases: a review. *Maturitas*. 2019;127:18–25. doi:10.1016/j.maturitas.2019.05.011
5. Etuknwa A, Daniels K, Nayani R, Eib C. Sustainable return to work for workers with mental health and musculoskeletal conditions. *Int J Environ Res Public Health*. 2023;20(2):1057. doi:10.3390/ijerph20021057

6. Liu S, Wang B, Fan S, Wang Y, Zhan Y, Ye D. Global burden of musculoskeletal disorders and attributable factors in 204 countries and territories: a secondary analysis of the global burden of disease 2019 study. *BMJ Open*. 2022;12(6):e062183. doi:10.1136/bmjopen-2022-062183
7. Hernigou P, Bumbasirevic M, Pecina M, Scarlat MM. Eight billion people, sixteen billion Hip joints today: are future orthopedists prepared to treat a world of ultra-old patients and centenarians in 2050? *Int Orthop*. 2024;48(8):1939–1944. doi:10.1007/s00264-024-06245-x
8. Greenstein AS, Gorczyca JT. Orthopedic surgery and the geriatric patient. *Clin Geriatr Med*. 2019;35(1):65–92. doi:10.1016/j.cger.2018.08.007
9. Zhang YZ. Innovations in Orthopedics and Traumatology in China. *Chin Med J*. 2015;128(21):2841–2842. doi:10.4103/0366-6999.168015
10. Chen W, Lv H, Liu S, et al. National incidence of traumatic fractures in China: a retrospective survey of 512 187 individuals. *Lancet Glob Health*. 2017;5(8):e807–e817. doi:10.1016/S2214-109X(17)30222-X
11. Zhou M, Wang H, Zeng X, et al. Mortality, morbidity, and risk factors in China and its provinces, 1990-2017: a systematic analysis for the global burden of disease study 2017. *Lancet*. 2019;394(10204):1145–1158. doi:10.1016/S0140-6736(19)30427-1
12. Klunder-Rosser J. Should the development of orthopaedic trauma nursing be a priority in low to middle income countries? A scoping review. *Int J Orthop Trauma Nurs*. 2019;100749. doi:10.1016/j.ijotn.2019.100749
13. Manghui S, Yingxue M, Mengyue H, Jiannan L. Continuous care needs of patients after major orthopedic surgery based on theoretical domains framework a systematic evaluation. *Chin Nurs Res*. 2023;37(17):3152–3162.
14. Brent L, Hommel A, Maher AB, hertz K, Meehan AJ, Santy-Tomlinson J. Nursing care of fragility fracture patients. *Injury*. 2018;49(8):1409–1412. doi:10.1016/j.injury.2018.06.036
15. Jiang B. The challenges faced in the field of trauma care in China. *Chin J Surg*. 2015;53(6):401–404.
16. Wang Y, Wu XJ, Ma YF, et al. Chinese orthopaedic nurses' knowledge, attitude and venous thromboembolic prophylactic practices: a multicentric cross-sectional survey. *J Clin Nurs*. 2021;30(5–6):773–782. doi:10.1111/jocn.15615
17. China NHCotPsRo. National clinical specialty competence assessment system (Trial implementation). Available from: https://www.gov.cn/zhengce/zhengceku/202403/content_6939209.html. Accessed December 15, 2024.
18. Almanasreh E, Moles R, Chen TF. Evaluation of methods used for estimating content validity. *Res Soc Administrative Pharm*. 2019;15(2):214–221. doi:10.1016/j.sapharm
19. Yufen M, Liyun Z, Qiaodan L, Jianjun C. Research on the innovation development path of nurse-led clinics. *Chin Nurs Manage*. 2020;20(10):1441–1444.
20. Connolly C, Cotter P. Effectiveness of nurse-led clinics on healthcare delivery: an umbrella review. *J Clin Nurs*. 2023;32(9–10):1760–1767. doi:10.1111/jocn.16186
21. Faxiu T, Xiangyu C, Liping C. Investigation and analysis of advanced nursing practice in orthopedics nurse-led clinic. *J Nurs Sci*. 2018.
22. Binling R, Wen G, Feiling Y. The present situation of orthopedic nursing clinic in China. *Modern Nurse*. 2021.
23. Luman C. Study on orthopedic specialized nursing service capacity construction in XX provincial hospital. 2018. Available from: https://link.cnki.net/doi/10.27414/d.cnki.gxnju.2018.000073. Accessed April 29, 2025.
24. Fengli G, Shu D, Jing H, et al. The establishment and advanced nursing practice status of nurse-led clinics in tertiary hospitals in China: findings from a national survey. *Chin Nurs Manage*. 2017;17(10):1297–1302.
25. Shengxiao N, Jin Z, Hong S. A survey of current working situation of specialist nurses in 226 secondary and tertiary hospitals in mainland China. *Chin J Nurs*. 2019;54(11):1677–1682.
26. Taberna M, Gil Moncayo F, Jane-Salas E, et al. The multidisciplinary team (MDT) approach and quality of care. *Front Oncol*. 2020;10:85. doi:10.3389/fonc.2020.00085
27. Shengxiao N, Lu Z, Jin Z. A survey of current working situation of specialist nurses. *Chin J Nurs*. 2017;52(07):858–862.
28. Marion L, Douglas M, Lavin MA, et al. Implementing the new ANA standard 8: culturally congruent practice. *Online J Issues Nurs*. 2016;22(1):9. doi:10.3912/OJIN.Vol22No01PPT20
29. Harvey CV, David J, Eckhouse DR, Kurkowski T, Mains C, Roberts D. The national association of orthopaedic nurses (NAON) scope and standards of orthopaedic nursing practice, 3rd edition. *Orthop Nurs*. 2013;32(3):139–152. doi:10.1097/NOR.0b013e3182920e7d
30. Ramadan OME, Hafiz AH, Elsharkawy NB, et al. Effectiveness of the pediatric nursing excellence model on nurses' knowledge and practice in pediatric orthopedic surgery care: a randomized controlled trial. *Children*. 2024;11(12):1457. doi:10.3390/children11121457
31. Wenqin Y. Practice of making annual nursing work plan in the nursing department of a hospital. *Chin Nurs Manage*. 2006;(10):58–59.
32. Ministry of Health PsRoC. Guidance on the implementation of post management of hospital nurses. Available from: https://www.gov.cn/gzdt/2012-05/04/content_2130145.htm. Accessed April 29, 2025.
33. Kane RL, Shamliyan TA, Mueller C, Duval S, Wilt TJ. The association of registered nurse staffing levels and patient outcomes: systematic review and meta-analysis. *Med Care*. 2007;45(12):1195–1204. doi:10.1097/MLR.0b013e3181468ca3
34. Kane RL, Shamliyan T, Mueller C, Duval S, Wilt TJ. Nurse staffing and quality of patient care. *Evid Rep Technol Assess*. 2007;(151):1–115.
35. Day CS, Boden SD, Knott PT, O'Rourke NC, Yang BW. Musculoskeletal workforce needs: are physician assistants and nurse practitioners the solution? AOA critical issues. *J Bone Joint Surg Am*. 2016;98(11):e46. doi:10.2106/JBJS.15.00950
36. Manning BT, Bohl DD, Hannon CP, et al. Patient perspectives of midlevel providers in orthopaedic sports medicine. *Orthop J Sports Med*. 2018;6(4):2325967118766873. doi:10.1177/2325967118766873
37. Tian F, Xi Z, Ai L, et al. Investigation on nurses' willingness to "internet + nursing service" and analysis of influencing factors. *J Multidiscip Healthc*. 2023;16:251–260. doi:10.2147/JMDH.S396826
38. Tate K, Penconek T, Booth A, et al. Contextually appropriate nurse staffing models: a realist review protocol. *BMJ Open*. 2024;14(5):e082883. doi:10.1136/bmjopen-2023-082883
39. Song L, Shijun N. Study on the influence of orthopedic specialized nursing training on the quality of orthopedic nursing. *Laboratory Med Clinic*. 2019;16(17):2508–2511.
40. Yafeng W, Xu L, Lei W, Liming Z, Ting L. The effects of professional nursing group combined with language arousal on early postoperative cognitive function in elderly patients after orthopedic surgery under general anesthesia. *Pract J Clin Med*. 2023;20(03):96–100.
41. Zhong H, Zhou L, Liao S, et al. Effects of a fixed nurse team in the orthopaedic surgery operating room on work efficiency and patient outcomes: a propensity score-matched historically controlled study. *BMC Nurs*. 2022;21(1):248. doi:10.1186/s12912-022-01027-5
42. Lu Z, Hong Y, Tian Y, Zhang L, Li Y. The effectiveness of a specialized nursing team intervention in the unplanned interruption of continuous renal replacement therapy. *Iran J Public Health*. 2022;51(3):544–551. doi:10.18502/ijph.v51i3.8930