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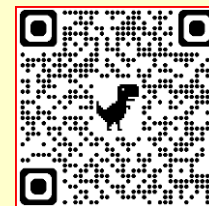
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## Nursing Informatics Competency and Its Associated Factors Among nursing interns: A Cross-sectional Study in Mainland China

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### ABSTRACT

**Objective:** This study aims to explore the current status and influencing factors of nursing interns' competency in task completion, providing insights into effective strategies for enhancing teaching and training methodologies in nursing education.

**Methods:** A convenience sampling approach was utilized, involving 375 nursing interns who graduated in 2023 from a top-tier tertiary hospital. Data were collected using a general information questionnaire and a competency assessment scale designed for nursing interns. This study adhered to ethical guidelines approved by the School of nursing, Pingdingshan University, Henan 467000, China. All participants provided informed consent, and their anonymity was rigorously protected.

**Results:** The overall competency score was  $208.87 \pm 42.87$ , with an average score rate of 77.36%. Key factors influencing nursing interns' competency included their passion for the nursing profession, satisfaction with clinical instructors, participation in career planning training, and exposure to clinical communication skills training.

**Conclusions:** The competency level of nursing interns is at an upper-middle level, indicating room for improvement. Nursing educators should employ diverse strategies to further enhance students' task completion abilities.

**KEY WORDS:** Influencing factors, Nursing intern, Task completion ability.

### 1. Introduction

Competency refers to a set of integrated abilities, including knowledge, skills, and attitudes, that enable individuals to solve problems and complete tasks in specific professional contexts [1]. It serves as a critical measure for evaluating the overall capabilities of nursing interns. The interpretation of competency varies across disciplines. In nursing, competency is a holistic concept, and international standards emphasize the need to assess it from a

comprehensive perspective [2]. This includes four key dimensions: clinical integrated nursing ability, humanistic care ability, professional development ability, and stress management ability. As future contributors to the clinical nursing field, task completion ability is a fundamental requirement for every nursing student. Enhanced competency not only boosts self-efficacy, self-worth, and empowerment among nursing interns but also elevates their technical proficiency in clinical practice, overall nursing quality, and job performance. This, in turn, strengthens nursing safety and

positively impacts patient safety, health outcomes, and satisfaction [4]. Consequently, fostering this ability is crucial for facilitating nursing interns' adaptation to clinical work and their professional socialization [5]. Research into nursing interns' competency is crucial for improving their clinical performance, enhancing patient care quality, and advancing the nursing profession. The competency scale for nursing interns was initially developed by scholars in Taiwan, China, in 2017, and a Chinese version has since been adapted by domestic researchers. However, research in this area within mainland China is still in its nascent stages. Existing studies have explored correlations from perspectives such as academic qualifications [6], metacognition [7], self-efficacy [8], professional identity [9], and career planning [10]. Despite these efforts, the volume of research remains limited. Therefore, this study focuses on assessing the current state of nursing interns' competency during their internships, analyzing influencing factors, and providing insights for educators on strategies to enhance nursing interns' task completion abilities.

## 2. Methods

### 2.1 Research object

This study used a convenient sampling method to survey 382 nursing interns from the 2023 class of a top-tier hospital from 25 November to 2 December 2022. Inclusion criteria: □ nursing interns from the 2023 class of the hospital; □ internship duration of more than one month.

#### Definition of Terms:

nursing interns: In mainland China, nursing interns are students enrolled in undergraduate (bachelor's degree) or graduate (master's degree) nursing programs who are required to complete clinical practice as part of their curriculum. Undergraduates: Students pursuing a bachelor's degree in nursing (typically 4–5 years of study). Graduates: Students pursuing a master's degree in nursing (post-bachelor's advanced training). Student Cadre: Students who held leadership roles (e.g., class monitor, student union officer) during their academic training.

### 2.2 Research tools

#### 2.2.1 General information questionnaire

The questionnaire was designed by the investigator and consists of 14 items, including gender, age, education level, and whether or not they have received training in career planning. Participants were informed of the study's purpose and confidentiality. Questionnaires were completed anonymously, and participants could withdraw at any time. Invalid responses (e.g., incomplete answers, duplicate submissions) were excluded.

#### 2.2.2 nursing interns Competence Instrument (NSCI)

Developed in 2017 by Lin [3], a scholar from Taiwan, and subsequently adapted into Chinese by Yang Zihan in 2019 [9], the scale comprises four dimensions: integrated nursing ability (10 items), guided humanistic care (6 items), enhanced professional development (7 items), and stress management (4 items), totaling 27 items. The scale employs a Likert 10-point rating system, where responses range from 1 ("strongly disagree") to 10 ("strongly agree"). The total score ranges from 27 to 270 points, with higher

scores indicating a greater level of competency among nursing interns. The Chinese version of the scale has a Cronbach's alpha coefficient of 0.909, demonstrating strong reliability and validity in cross-cultural adaptation [11].

### 2.3 Data collection method

This study utilized the software "Questionnaire Star" to survey 2023 intern nursing interns from a top-tier hospital. Participants were informed of the study's purpose and significance, and instructed to provide honest responses, with each participant allowed to complete the survey only once. A total of 382 questionnaires were collected, and after excluding invalid responses, 375 valid questionnaires remained, resulting in an effective response rate of 98.17%.

### 2.4 Statistical methods

The data collected in this survey were analyzed using SPSS 24.0 software. Categorical data are presented as percentages, while continuous data, found to be normally distributed, are expressed as mean  $\pm$  standard deviation ( $\pm$ s). Independent sample t-tests or F-tests were conducted, with a significance level set at  $p < 0.05$ , indicating statistically significant differences.

## 3. Results

### 3.1 General information on nursing interns

Table 2 summarizes the demographic characteristics of the participants (N=375). Key findings include:

Educational Background: 80% were graduate students (master's candidates), while 20% were undergraduates (bachelor's candidates). Student Leadership Roles: 53.6% had served as student cadres (e.g., class representatives or student union officers). Voluntary Career Choice: 85.3% of interns voluntarily chose the nursing profession, while 14.7% were influenced by external factors (e.g., family pressure or employment prospects). Training Exposure: Over 75% of interns had received training in humanistic care (77.3%), clinical communication skills (83.5%), and career planning (76.5%). Unique Observations: Household Location: 78.4% of interns hailed from rural areas, potentially reflecting broader trends in China's nursing workforce. Parental Attitudes: 60.5% of parents strongly supported their child's nursing career, whereas 1.6% expressed disapproval.

Note: Detailed demographic data are presented in Table 2; only key and contextually significant findings are highlighted here to avoid redundancy.

Ethical and Methodological Clarifications: Anonymity: Questionnaires were completed anonymously to protect participant confidentiality. Invalid Responses: Surveys with missing critical data (e.g., competency scores) or duplicate submissions (detected via IP address tracking) were excluded. Sampling Context: All interns were affiliated with the same tertiary hospital but originated from diverse academic institutions across mainland China.

### 3.2 Performance scores of nursing interns

The total competency score of the nursing interns was  $208.87 \pm 42.87$ , with an average score rate of 77.36%. See Table 1 for details of the scores for each item.

**Table 1.** Scores for completion of competencies by student nurses (N=375)

Project	Number of entries	Score ( $\bar{x} \pm s$ )	Average score (%)
Integrated care ability	10	75.53 $\pm$ 17.24	75.53
Guiding humanistic care	6	46.31 $\pm$ 10.07	77.18

Improve employment development	7	55.25±11.73	78.93
Manage stress	4	31.79±7.23	79.48
Total ability score	27	208.87±42.87	77.36

### 3.3 single factor analysis of the completion ability of nursing interns

The results revealed statistically significant differences in scores across 10 variables, such as educational background, student leadership roles, and parental attitudes toward the nursing profession, highlighting key factors influencing competency. For detailed comparisons, please refer to Table 2.

**Table 2** .Results of the univariate analysis of the completed competency list of nursing interns (N=375)

Independent variable	Number of people (n)	Percentage (%)	Score ( $\bar{x}\pm s$ )	t/F	P
Gender					
Male	33	8.80	214.91±42.55	0.848	0.397
Female	342	91.20	208.28±42.92		
Age					
18-20 years	154	41.07	213.88±43.48	2.135	0.12
21-23 years	216	57.60	205.74±42.20		
>23 years	5	1.33	189.80±42.98		
Educational background					
Undergraduate course	75	20.00	197.03±36.22	-3.026	0.003
College	300	80.00	211.83±43.92		
Have you ever been a student leader while in school?					
Yes	201	53.60	213.56±42.29	1.982	0.048
No	174	46.40	204.80±43.05		
Location of household					
City	81	21.60	203.75±42.72	-1.213	0.226
Countryside	294	78.40	210.28±42.87		
Are you an only child?					
Yes	28	7.47	200.86±35.84	-1.028	0.305
No	347	92.53	209.51±43.37		
Parents' attitude towards the nursing profession					
Strongly agree	227	60.53	218.07±41.55	14.323	<0.001
Neutral	142	37.87	194.42±41.45		
Strongly disagree	6	1.60	202.50±33.87		
Whether or not they chose the nursing profession voluntarily					
Yes	320	85.33	211.42±41.54	2.810	0.005
No	55	14.67	194.00±47.66		
Satisfaction with clinical instructors					
Very satisfied	276	73.60	213.74±38.59	11.508	<0.001
Neutral	84	22.40	200.52±45.12		
Not satisfied	15	4.00	165.93±70.14		
Love for the nursing profession					

Quite like it	217	57.87	222.02±38.45	28.243	<0.001
Neutral	143	38.13	191.78±42.42		
Don't like it	15	4.00	181.40±39.53		
Whether or not they have experienced training in humanistic care skills					
Yes	290	77.33	214.21±42.42	4.573	<0.001
No	85	22.67	190.65±39.47		
Have you received training in clinical communication skills?					
Yes	313	83.47	213.19±41.98	4.505	<0.001
No	62	16.53	187.02±40.89		
Have you received training in career planning?					
Yes	287	76.53	217.15±39.25	7.202	<0.001
No	88	23.47	181.85±43.27		
Do you plan to work in the nursing profession after graduation?					
Yes	331	88.27	212.24±41.12	4.269	<0.001
No	44	11.73	183.52±47.60		

3.4 Multifactor analysis of the completion ability of nursing interns

The total score of nursing interns' task completion ability was used as the dependent variable, while the 10 variables showing statistically significant differences in the univariate analysis were used as independent variables for stepwise multiple linear regression analysis. The results revealed that the degree of affinity for the nursing profession, satisfaction with clinical teaching staff, participation in career planning training, and exposure to clinical communication skills training were significant factors influencing nursing interns' task completion ability. The detailed results of the multiple linear regression analysis are presented in Table 4.

Table 3 .Assignment of independent variables

Independent variable	Assignment
Educational background	Junior college=1 ; Undergraduate course=2
Whether or not they have served as student cadres	No=1 ; Yes=2
Parents' attitude towards the nursing profession	Strongly disagree=1; Disagree=2; agree=3
Whether or not they voluntarily chose the nursing profession	No=1 ; Yes=2
Satisfaction with clinical teaching staff	Dissatisfied = 1; Average = 2; Very satisfied = 3
Degree of fondness for the nursing profession	Dislike = 1; Neutral = 2; Like = 3
Whether or not they have experienced training in clinical communication skills	No=1 ; Yes=2
Whether or not they have received training in humanistic care skills	No=1 ; Yes=2
Whether or not they have received training in career planning	No=1 ; Yes=2
Whether or not they plan to work in the nursing profession after graduation	No=1 ; Yes=2

Table 4.Results of multiple linear regression analysis of factors affecting the completion ability of nursing interns

Independent variable	Regression coefficient	Regression coefficient	Regression coefficient	t	P
Constant	308.614	9.365	—	32.953	0.000
Liking degree of nursing profession	21.059	3.471	0.282	6.066	0.000
Whether or not received training in career planning	22.756	4.793	0.225	4.748	0.000
Satisfaction with clinical instructors	15.529	3.568	0.196	4.352	0.000

Whether or not received training in clinical communication skills	17.701	5.263	0.154	3.363	0.001
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Note:  $R=0.509$ ,  $R^2=0.259$ , adjusted  $R^2=0.251$ ,  $F=32.267$ ,  $P<0.001$ .

## 4. Discussion

### 4.1 Analysis of the current situation of the completion ability of nursing interns

According to the results presented in Table 1, the total score for the task completion ability of the 375 nursing interns surveyed in this tertiary hospital was  $208.87 \pm 42.87$ , with an average score rate of 77.36%. The total competency score (77.36%) reflects an upper-middle level. All participants were final-year nursing interns, including undergraduates completing their final clinical practicum and graduates undergoing advanced training. These findings align with the results reported by Zheng Kaifeng [12].

An analysis of the four dimensions of the nursing interns' task completion ability scale revealed that the stress management dimension scored the highest, with a score rate of 79.48%. Stress management involves employing methods and techniques to cope with stress, thereby mitigating its negative effects. The high score in this dimension may be attributed to the increased emphasis schools have placed in recent years on building students' psychological resilience. Most institutions now offer psychology courses and have established counseling centers. Additionally, all participants in this survey were graduating nursing interns, most of whom possess relatively mature mindsets. They are capable of recognizing and addressing pressures from various sources independently [13], which likely contributed to the high score in stress management ability.

In contrast, the integrated nursing ability dimension scored the lowest, with a score rate of only 75.53%. Integrated nursing, as a work model, requires a human-centered approach, focusing on nursing procedures and guided by modern nursing concepts. It systematically integrates nursing management and clinical care into all aspects of work. In this model, the patient's physical condition is no longer the sole focus of nursing. Beyond physical health, the patient's psychological state, environmental adjustments, and the impact of other factors on recovery also require nursing intervention and care. In essence, this model demands the systematic application of nursing procedures in both clinical care and nursing management.

The low score in integrated nursing ability among interns may be attributed to limited clinical experience, insufficient emphasis on holistic care during training, and the impact of the COVID-19 pandemic on internship opportunities. First, prior to their internships, most nursing interns focus primarily on theoretical learning in school and lack sufficient hospital work experience. This often leads to hesitation in independently assessing and performing tasks. Additionally, the impact of the COVID-19 pandemic, which caused hospitals to suspend internships, further reduced the clinical practice time for nursing interns. Second, clinical instructors often emphasize technical skill demonstrations over holistic patient care. They may also avoid assigning challenging nursing assessments and operations to students. These factors may contribute to the students' limited ability to independently perform clinical nursing tasks, failing to meet the standards of integrated nursing and resulting in a low score in this dimension.

### 4.2 Analysis of factors influencing the completion ability of nursing interns

#### 4.2.1 Degree of liking for the nursing profession

As shown in Table 4, nursing interns who have a stronger affinity for the nursing profession exhibit greater task completion ability. Those who are more passionate about nursing often demonstrate higher enthusiasm for learning, stronger motivation, a positive attitude toward learning, and a greater willingness to immerse themselves in their roles and perform role-specific behaviors during clinical practice [14]. This intrinsic motivation encourages nursing interns to actively understand and reflect on the multi-dimensional, holistic, and comprehensive requirements of competency. They continuously refine their skills to better integrate clinical care, humanistic care, and other abilities essential for their roles. This leads to improved service quality for patients, better nursing outcomes, and a higher level of demonstrated competence. Therefore, it is recommended that nursing educators pay special attention to students who have chosen the nursing major but lack enthusiasm for it. Providing them with appropriate professional guidance can enhance their professional identity and passion for nursing, ultimately improving their task completion ability.

#### 4.2.2 Whether or not they have received career planning training

As shown in Table 4, participation in career planning training is a significant factor influencing nursing interns' task completion ability. Interns who have undergone career planning training demonstrate a higher level of task completion proficiency. Career planning training in China is typically integrated into nursing curricula (e.g., workshops, seminars) and reinforced during internships. Hospitals may also provide supplementary sessions. Career planning aims to help individuals clearly define their future development direction and establish a series of effective steps and plans in a timely and organized manner to achieve their career goals efficiently. Interns are at the starting point of their careers, and having a clear and well-structured career plan during this critical period is crucial for their professional development. Career planning training can guide interns to acquire relevant knowledge and assist them in formulating their own career plans. This process enables them to set appropriate career goals [15]. By understanding the nature of their professional work, the requirements of their profession, and its development prospects, nursing interns can better align their personal circumstances with their work and study plans [16]. This helps them gain a clearer understanding of the professional standards and responsibilities required to excel in the nursing field, define their roles more precisely, and enhance their ability to meet professional development requirements. Consequently, nursing interns who have received career planning training exhibit stronger task completion abilities. It is recommended that schools and hospitals provide training on career development planning for nursing interns, deepen their understanding of the nursing industry, and guide them in creating suitable career plans. This approach will help improve their task completion abilities and better prepare them for their professional roles.

#### 4.2.3 Satisfaction with clinical teaching staff

As shown in Table 4, nursing interns who are more satisfied with their clinical teaching staff demonstrate higher task completion abilities. During the clinical learning process, clinical teaching staff not only impart professional knowledge and clinical operation skills but also teach students how to handle clinical emergencies, communicate effectively in clinical settings, and develop humanistic care abilities. The quality of teaching provided by clinical instructors

directly impacts the learning outcomes, skill development, and professional growth of nursing interns [17].

The level of satisfaction interns have with their teaching staff influences their learning attitudes. Higher satisfaction with teaching staff correlates with greater willingness among interns to follow their guidance and instructions, leading to better clinical teaching outcomes. Since the guidance provided by teaching staff is multifaceted, the learning outcomes of interns are reflected not only in their nursing skills but also in their ability to handle unexpected situations, clinical communication skills, and humanistic care abilities. Increased satisfaction with teaching staff enhances nursing interns' humanistic care and integrated nursing skills, which are essential for task completion, thereby improving their overall competency.

In light of this, it is recommended that hospitals select highly competent nursing staff as teaching assistants, enhance their overall quality, and enable them to teach students according to their individual needs. This includes providing more opportunities for observation and practice [18]. Additionally, teaching assistants should be attentive to attitude issues during the teaching process, build positive relationships with students, and effectively supervise and provide feedback on teaching quality. These measures can increase student satisfaction with teaching assistants and ultimately improve the task completion abilities of nursing interns.

#### 4.2.4 Whether or not they have received training in clinical communication skills

As shown in Table 4, participation in clinical communication skills training is a significant factor influencing task completion ability, with nursing interns who have undergone such training demonstrating higher competency. Communication skills are taught through dedicated courses (e.g., role-playing, patient simulations) and evaluated via standardized assessments. During the medical treatment process, patients not only expect high-quality medical and technical services but also seek support at the humanistic care level. Possessing strong clinical communication skills can significantly enhance patient satisfaction and overall experience, contributing to improved nursing service quality and a reduction in nurse-patient disputes [19].

Patients may experience various negative emotions due to their illnesses or concerns about the financial burden of medical treatment. Inappropriate language or ineffective explanations during communication can exacerbate patients' anxiety, fear, anger, and other psychological states. Additionally, effective communication between nursing interns and hospital staff is crucial for coordination and collaboration among healthcare providers. Poor communication among medical staff can lead to nursing issues or even errors, ultimately affecting patient health and the ability to meet high operational standards. A lack of clinical communication skills not only diminishes the level of humanistic care provided to patients but also compromises the overall quality of nursing services, thereby impacting nursing interns' task completion abilities.

Training in clinical communication skills enhances humanistic care, integrated nursing, and career development, thereby improving task completion abilities. It is recommended that schools strengthen the development of communication skills training courses for nursing interns [20], establish assessment criteria for these courses, and increase the emphasis on this area in talent development programs. These measures aim to improve nursing interns' clinical communication skills and, consequently, their task completion abilities.

## 5. Conclusion

This study was conducted in a single hospital, limiting generalizability. The cross-sectional design precludes causal inferences. Future research should include multi-center longitudinal studies. The findings of this study indicate that the task completion ability of nursing interns is at an upper-middle level. Key factors influencing this ability include their affinity for the nursing profession, participation in career planning training, satisfaction with clinical teaching staff, and exposure to clinical communication skills training. To enhance the task completion ability of nursing interns, nursing educators should adopt a multifaceted approach, including strengthening career planning, improving clinical communication skills, and enhancing the quality of clinical teaching staff. Schools should strengthen career planning and clinical communication skills through targeted courses and lectures. Additionally, they should provide focused guidance to students who lack enthusiasm for the nursing profession. Hospitals, on the other hand, should improve the overall quality of clinical teaching staff and implement mechanisms for supervising and providing feedback on teaching quality. These measures collectively contribute to improving the task completion ability of nursing interns.

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