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Factors affecting evidence-based practice in nursing education in Hainan, China

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Abstract

With medical industry advancements, nurses must ensure patient safety and high-quality care through accurate clinical decision-making. However, in areas like Hainan, where medical resources are relatively scarce, nurses' clinical decisions come from evidence-based practice. Nurses usually rely on work experience and existing professional knowledge to formulate nursing plans. It is crucial for Hainan to achieve better medical care, especially in the use of evidence-based nursing education to improve nurses' evidence-based practice capabilities. This study employed quantitative methods and distributed questionnaires to 354 nurses across three affiliated hospitals of Hainan Medical University. Previous studies utilizing the Tony Bush Institute model have indicated that nurses' professional knowledge, critical thinking, and teamwork significantly and positively impact the implementation of evidence-based practices. The study promotes the development of evidence-based nursing education in Hainan by improving professional knowledge cultivation under the collegial model [1]. Cultivating nurses' critical thinking and strengthening teamwork provide a practical basis for improving nurses' evidence-based practice capabilities. This will not only help improve the overall medical level of Hainan and benefit patients and medical service providers but also contribute to the realization of the United Nations Sustainable Development Goals 3 (good health and well-being) and 4 (quality education).

Keywords: Critical thinking, Evidence-based practice, Good health and quality education, Nursing education, Professional knowledge, Teamwork.

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1. Introduction

With the development of medical technology and the improvement of medical service levels, nurses need to make correct clinical decisions when providing medical services to patients via evidence-based practice (EBP). Nurses are the largest group of healthcare professionals, and their evidence-based practice capabilities have a significant impact on clinical outcomes and overall patient health [2]. Evidence-based nursing practice is a multifaceted activity that requires understanding the scientific principles of nursing, utilizing cost-effective resources, communicating seamlessly with other stakeholders, and creating a supportive environment [3]. Research done by Pathmanathan et al. [4] revealed that the work experience of nurses greatly influences their behavior and mindset. Moderately experienced nurses have developed their clinical expertise over time by gaining practical knowledge and abilities. Their proficiency in interpreting and utilizing research results in clinical settings enables them to adhere to the EBP.

The patient treatment process involves nursing content, from assessing problems to implementing intervention measures, which requires accurate decision-making capabilities, including the ability to execute the nursing process and actual decision-making, as well as a solid foundation of professional knowledge, critical thinking skills, and teamwork skills Bragadóttir et al. [5]. Engle et al. [6] stated that for the past decade, two major trends have evolved within the healthcare sector: evidence-based practice (EBP) and patient-centered care. Often, these aims are interdependent, as one will enhance the performance of the other.

Although Chinese nurses have a high awareness of evidence-based nursing, there are still some potential challenges in implementing evidence-based practice. It is necessary to understand these factors to improve the adoption of evidence-based practices among Chinese nurses [7]. Insufficient knowledge is the biggest obstacle restricting Chinese nurses from applying evidence-based practices [8]. However, there is still a lack of relevant research on the evidence-based nursing education and evidence-based practice capabilities of nurses in Hainan Province under the collegial model. Therefore, Hainan must introduce evidence-based nursing education strategies into continuing education to provide effective healthcare where medical resources are scarce [9-11].

2. Literature Review

Evidence-based nursing education has received widespread attention worldwide. In China, evidence-based medicine as a clinical decision-making method has been better understood and explored by nurses [8]. Although evidence-based practice has multiple advantages, there are still some obstacles in the implementation process in China, such as nurses' insufficient awareness of evidence-based practice and insufficient organizational support [12]. Due to the nature of their work, nurses frequently experience weariness and elevated stress levels, which can negatively affect their decision-making skills [13]. A potential obstacle to evidence-based practice is highlighted by Arsat et al. [14] who found that BSc nurses prioritize organizational and managerial duties over caring behaviors. The decreased amount of time BSc nurses spend with patients may make it more difficult for them to apply evidence-based practice (EBP), as it calls for both direct patient care and the implementation of research findings.

Because of the increasing demand for evidence-based practice, healthcare institutions might need to create structures that allow nurses to balance administrative duties with sufficient patient interaction time to practice EBP effectively. Research on evidence-based nursing education has been widely discussed and paid attention to Bush [1] collegial model is an important educational management concept that emphasizes the importance of joint decision-making and cooperation among members [1]. The collegia model values members' professional knowledge and professional judgment and aims to establish a professional environment where decisions are made collectively and each member's opinion is respected, ultimately improving members' decision-making and practical capabilities [15]. The collegial model emphasizes the shared decision-making process, including the full participation of all members, from doctors to nurses, to influence the treatment process [16].

Nurses' expertise, critical thinking, and teamwork are essential to evidence-based practice. Improved professional knowledge can enhance nurses' evidence-based practice capabilities. Critical thinking helps make better evidence-based decisions, and good teamwork can promote the implementation of evidence-based practices [17].

3. Problem Statement

Even though evidence-based practices (EBPs) are known to be important for enhancing professional outcomes, there are still a number of influencing factors that make their implementation uneven. It is vital to understand how teamwork, professional expertise, and critical thinking affect the uptake and efficient use of EBPs [5, 18]. Expertise offers the fundamentals for finding and analyzing pertinent research, and critical thinking improves the capacity to assess and utilize this data. Furthermore, collaboration creates an atmosphere that is favorable for discussing, improving, and applying evidence-based practices (EBPs) through shared understanding. To improve professional practice and results, this study intends to investigate the connections between these factors and the effective adoption of EBPs. This research will address the following research questions:

1. What is the impact of the professional knowledge of nurses on evidence-based practice in Hainan?
2. What is the impact of critical thinking on evidence-based practice among nurses in Hainan?
3. What is the impact of teamwork on evidence-based practice among nurses in Hainan?

The conceptual Framework of the study is in Figure 1 below:

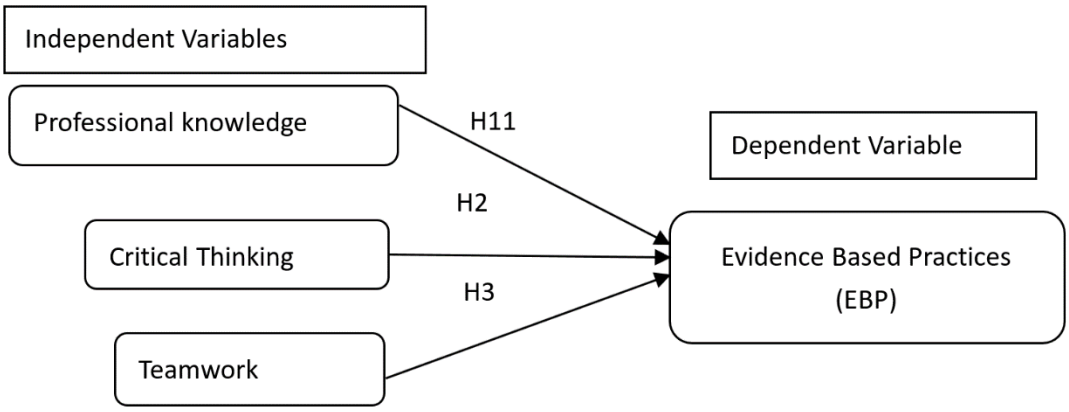

Figure 1.
Conceptual framework of the study.

4. Methodology

This study used a quantitative methodology to investigate the impact of professional knowledge, critical thinking skills, and teamwork of nurses on evidence-based practices in nursing education. In this study, the independent variables are the three factors: professional knowledge, critical thinking skills, and teamwork of nurses, while the dependent variable is evidence-based practices in nurse education. This study employed a cross-sectional research design to gather empirical evidence for the relationships between the independent and dependent variables. The cross-sectional design is adept at investigating the relationships between variables at a certain moment in time [19].

4.1. Research Context and Sampling

The target samples for this study were nurse educators from three healthcare facilities in Hainan Province. The three centers are the Hainan General Hospital, responsible for research and teaching at the Hainan Clinical Medicine Research Institution; the First Affiliated Hospital of Hainan Medical University; and the Second Affiliated Hospital of Hainan Medical University. The number of nurses in these three health centers is 2200, 1200, and 1100, respectively, totaling 4500 nurses across the three healthcare centers. The study employed a cluster sampling technique following the guidelines of Krejcie and Morgan [20] to select a sample of 354 nurses from a population of 4500, representing approximately 12.7% from each healthcare center. Consequently, 174 nurses were selected from Hainan General Hospital, 94 from the First Affiliated Hospital of Hainan Medical University, and 86 from the Second Affiliated Hospital of Hainan Medical University. The nurses were contacted via an online survey, and respondents provided their answers on a self-response basis. The use of an online platform for data collection enhances the reliability and validity of the outcomes, as supported by previous research, McCombes and George [21].

4.2. Research Instruments

The questionnaire used for data collection consisted of three main sections. Section A of the questionnaire solely focuses on the demographic profile of the participants, which includes gender, education level, work experience, and job title. Section B of the questionnaire contains survey items related to the dependent variable, evidence-based practices in nursing education, while Section C contains items related to the independent variables, professional development, critical thinking skills, and teamwork of nurses. The questionnaire used for evidence-based practices is adapted from Kennedy et al. [22], which consists of 5 items. The 4-item scale measuring nurses' professional knowledge was adapted from the previous instruments validated by Kennedy et al. [23] and Majid et al. [24]. Nurses' critical thinking skill was measured using instruments developed by Liu et al. [25] and Dombrowski et al. [26]. Finally, the survey instrument to measure nurses' teamwork has 4 items that were adopted from Lundquist et al. [27] and Titwer et al. [28]. In total, there were 18 statements that required participants to respond to the 5-point Likert scale response options, ranging from strongly disagree to strongly agree. A pilot study using 40 respondents was conducted to verify the reliability and validity of the instruments. The Cronbach alpha scores for four scales were above 0.80, confirming the reliability of the instruments. Additionally, the content validity of the instruments was verified through reviews by a panel of three experts in nursing education and general education backgrounds.

4.3. Data Collection

The data collection was conducted using an online survey questionnaire administered through the WeChat platform. WeChat was chosen due to its popularity in China [29]. The data collection period was from April to May 2024. The research purpose and consent information were provided in the online survey. The willingness of respondents to participate in the survey was confirmed.

4.4. Data Analysis

The research study used SPSS 27.0 to analyze the collected data. The current study involves descriptive and inferential statistics, including multiple linear regression analysis, assessments of reliability, descriptive statistics, and validation outcomes.

5. Findings

The demographic data reveal that out of the 354 respondents, 297 are female, making up 83.9% of the total. The majority of respondents (48.3%) fall within the age range of 31 to 40 years old. Furthermore, a significant proportion (82.8%) of the respondents have completed a college education. The largest group of respondents (39.3%) has 11-20 years of work experience. It is worth noting that the respondents are nurses affiliated with three hospitals. Hainan Provincial General Hospital has achieved the highest intended response rate (49.2%) in terms of the proportion of nursing staff. The Nurse Practitioner was the highest proportion (40.1%) among the respondents [29]. Table 1 shows the distribution of the profile of nursing staff.

Table 1.
Demographic profile of the respondents.

Demographic Variable	Category	Frequency	Percent
Gender	Male	57	16.1
	Female	297	83.9
Age	21-30	102	28.8
	31-40	171	48.3
	41-50	63	17.8
	51-60	18	5.1
Education Level	Bachelor	345	97.5
	Master	9	2.5
Hospital	The First Affiliated Hospital of Hainan Medical University	94	26.6
	The Second Affiliated Hospital of Hainan Medical University	86	24.3
	Hainan General Hospital	174	49.2
Work Experience	＜2	26	7.3
	3-5	41	11.6
	6-10	87	24.6
	11-20	139	39.3
	Above 20	61	17.2
Job Title	Nurse	40	11.3
	Nurse Practitioner	142	40.1
	Supervisor nurse	137	38.7
	Co-chief nurse	29	8.2
	Chief nurse	6	1.7

5.1. Descriptive statistics

Descriptive data included descriptive statistics for four variables: nurse expertise, critical thinking, teamwork, and evidence-based practice. The scale for each variable ranges from 1 to 5, with an average score of 3 indicating agreement with the item. The mean scores for each variable were as follows: nurse expertise 3.802 (SD= 0.675), critical thinking 3.874 (SD= 0.659), teamwork 3.997 (SD= 0.645), and evidence-based practice 3.805 (SD= 0.703).

Table 2.
Descriptive statistics of the variables.

Variables	Mean	SD	Skewness		Kurtosis	
			Statistic	SE	Statistic	SE
Professional knowledge	3.802	0.675	-0.008	0.130	-0.421	0.259
Critical thinking	3.874	0.659	0.046	0.130	-0.483	0.259
Teamwork	3.997	0.645	-0.077	0.130	-0.535	0.259
Evidence-based practice	3.805	0.703	-0.119	0.130	-0.535	0.259

Skewness measures the symmetry of data distribution. In Table 2, the skewness for nurses' professional knowledge is -0.008, for critical thinking is 0.046, for teamwork is -0.077, and for evidence-based practice is -0.119. Overall, with skewness values close to zero, this indicates that the distribution of the scoring data is roughly symmetrical.

Kurtosis describes the shape of the distribution of data. In Table 2, the kurtosis for nurses' professional knowledge is -0.421, for critical thinking is -0.483, for teamwork is -0.483, and for evidence-based practice is -0.535. Kurtosis values close to zero indicate that the data have a relatively normal distribution, so the data for these variables show some deviations from perfect normality, but they are generally quite close to a normal distribution.

5.2. Relationships Between the Variables: Pearson Correlation Coefficients

The relationship between the study variables was analyzed using Pearson's correlation coefficient. The results indicated that evidence-based practice has a significant, positive, and high correlation with nurses' professional knowledge ($r=0.706$, $p < .001$), critical thinking ($r=0.704$, $p < .001$), and teamwork ($r=0.646$, $p < .001$). The inter-correlation matrix is presented in Table 3.

Table 3.
Pearson's Correlation between the variables.

Variables	Professional Knowledge	Critical Thinking	Teamwork	Evidence-based Practices
Professional knowledge	1	-	-	-
Critical thinking	0.784**	1	-	-
Teamwork	0.691**	0.786**	1	-
Evidence-based Practices	0.706**	0.704**	0.646**	1

Note: **. Correlation is significant at the 0.01 level (2-tailed).

5.3. Multiple Linear Regression

Table 6 provides a summary of the regression analysis model offers a clear overview of the factors influencing evidence-based practices among nurses. The model considers variables such as professional knowledge, critical thinking, teamwork, and evidence-based practices. The findings from the multiple regression analysis reveal significant relationships between these factors and evidence-based practice in nursing education. The R-value of 0.754 indicates a strong positive correlation between the independent variables and the dependent variable, evidence-based practices. The R^2 value of 0.568 suggests that approximately 56.8% of the variability in evidence-based practices can be explained by professional knowledge, critical thinking skills, and teamwork. After adjusting for the number of predictors, the adjusted R^2 value of 0.564 confirms the model's explanatory power. The standard error of the estimate, 0.46427, reflects a moderate level of prediction accuracy. Additionally, the Durbin-Watson statistic of 2.078 indicates no significant autocorrelation in the residuals, supporting the model's reliability. Overall, the results underscore the importance of nurses' professional knowledge, critical thinking, and teamwork in promoting evidence-based practices in nursing education.

Table 4.
Model summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.754[a]	0.568	0.564	0.46427	2.078

Note: a. Predictors:(Constant), Teamwork of nurse, Professional knowledge of nurse, Critical thinking of nurse
Dependent Variable: Evidence-based practice

The ANOVA table helps to assess the overall significance of the regression model. The F-statistic value of 153.263, with a significance level (p-value) of .000, indicates that the regression model is statistically significant. This suggests that the combined effect of teamwork, professional knowledge, and critical thinking significantly predicts the perceived efficacy of evidence-based practice. The large F-value and the corresponding low p-value imply that the model is well-constructed and the predictors collectively have a strong influence on the dependent variable.

Table 5.
ANOVA.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	99.108	3	33.036	153.263	0.000[b]
	Residual	75.443	350	0.216		
	Total	174.551	353			

Note: a. Dependent Variable: Evidence-based practice.
b. Predictors:(Constant). Teamwork of nurse, Professional knowledge of nurse, Critical thinking of nurse.

Table 6.
Coefficient Table.

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	SE	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	0.441	0.163		2.712	0.007		
	Professional knowledge of a nurse	0.381	0.06	0.366	6.335	0	0.371	2.699
	Critical thinking of nurse	0.3	0.072	0.281	4.164	0	0.271	3.687
	Teamwork of nurses	0.189	0.063	0.173	2.99	0.003	0.368	2.715

Note: Dependent Variable: evidence-based practices.

The coefficient table provides detailed information about the contribution of each predictor to the model. The intercept value of 0.441 is the predicted value of evidence-based practice when all predictors are zero. Furthermore, the tolerance

values (all above 0.1) and VIF (Variance Inflation Factor) values (all below 10) indicate that multicollinearity is not a concern in this model, meaning the predictors are not excessively correlated with each other. The results indicate that all three independent variables are significant predictors of evidence-based practices. Firstly, the unstandardized coefficient (B) for nurses' professional knowledge is 0.381, indicating that for each unit increase in professional knowledge, evidence-based practice increases by 0.381 units, holding other factors constant. The standardized coefficient (Beta) of 0.366 and a t-value of 6.335 with a significance level of .000 show that professional knowledge is a significant predictor. Secondly, the unstandardized coefficient for nurses' critical thinking skills is 0.3, meaning that a one-unit increase in critical thinking skills results in a 0.3 unit increase in evidence-based practice. The standardized coefficient of 0.281 and a t-value of 4.164 with a significance level of .000 indicate its strong predictive power. Finally, the unstandardized coefficient for teamwork is 0.189, suggesting a 0.189 unit increase in evidence-based practice for each unit increase in teamwork. The standardized coefficient of 0.173 and a t-value of 2.99 with a significance level of .003 confirm its significance as a predictor. Overall, the regression model demonstrates that teamwork, professional knowledge, and critical thinking of nurses significantly predict and positively influence evidence-based practice.

In addition, the results indicated that among the three factors that significantly contribute to the outcome variable, professional knowledge of nurses is identified as the most influential factor, followed by critical thinking and teamwork. The statistical significance of the predictors and the overall model underscores the importance of these factors in enhancing evidence-based practice among nurses.

6. Discussion

RQ1: What is the impact of the professional knowledge of nurses on evidence-based practice in Hainan?

Using data analysis, the correlation coefficient is 0.698 with a beta of 0.366, and p=0. Research indicates a positive correlation between nurses' professional knowledge and evidence-based practice in Hainan. Professional knowledge significantly affects evidence-based practice, positively impacting the quality and effectiveness of nursing education. As nurses' professional knowledge increases, their participation in and effectiveness of evidence-based practice also improve [30]. This can be attributed to the collaborative nature of professional knowledge growth and application in the clinical setting, aligning with the principles of the college model. From the perspective of the college model, the importance of cultivating professional knowledge among nurses is emphasized to enhance evidence-based nursing education and ultimately improve patient care outcomes. Bragadóttir et al. [5] concluded that teamwork-focused education and training programs in nursing and healthcare have proven to be successful, especially when role-playing and simulation exercises are included. Furthermore, Liu et al. [25] also explained that updating nursing knowledge through professional development and lifelong learning is a requirement and an effective way for the preservation and development of the profession's knowledge. Continuing education for executives and personnel regarding such practices is crucial for the effective application of EBP, as it is based on the latest research findings. Liu et al. [25] further revealed that the use of EBP was significantly more effective among nurses who participated in professional development activities. This supports the notion that funding nurses' education and development is crucial for progress in evidence-based practice in the clinical arena.

RQ2: What is the impact of critical thinking on evidence-based practice among nurses in Hainan?

Using data analysis, the correlation coefficient is 0.672 with a beta of 0.281, and p=0. Research indicates a positive correlation between nurses' critical thinking and evidence-based practice in Hainan. Critical thinking significantly impacts evidence-based practice and is essential for it. The cultivation of critical thinking contributes to enhancing the quality of evidence-based practice Dombrowski et al. [26]. Katowa-Mukwato et al. [31] noted that teaching and evaluating EBP using critical thinking skills can be difficult. As a result, creative teaching strategies are needed to encourage learning, and tactics to keep process supporters and limit critics are necessary for successful implementation. By fostering critical thinking, evidence-based nursing education can better achieve shared decision-making within the college model, reinforcing the common goals of education and ultimately improving the quality of nursing education and patient care outcomes. Besides, Tanner's [32] study also supports the aspect of critical thinking as a subject for reflection among nurses. The rationale is associated with the concept of reflective practice, which implies the deliberate consideration of one's experiences and activities. Tanner [32] suggested that this consolidation of critical thinking into clinical reasoning derived from authors' reflection incorporated into practice, as nurses who engaged in reflective practice more frequently made more effective use of critical thinking in the processes of decision making, essential to the implementation of evidence-based practice. Hence, the stress on the need to incorporate reflective practices in nursing curricula and staff development programs to enhance critical thinking and, in extension, evidence-based practice in nursing.

RQ3: What is the impact of teamwork on evidence-based practice among nurses in Hainan?

Using data analysis, the correlation coefficient is 0.634 with a beta of 0.173, and p=0.003. From the research, we can conclude that there is a positive correlation between teamwork and evidence-based practice in Hainan, making teamwork crucial for achieving the goals of evidence-based practice. By promoting cooperation and communication among interdisciplinary teams, the quality of evidence-based practice can be effectively improved [33]. This collaborative nature of education and practice models aligns fully with the principles of Tony Bush's collegial model, highlighting the importance of fostering a spirit of teamwork in evidence-based nursing education to facilitate knowledge sharing, enhance the evidence basis of nursing practices, and thus serve patients better. Moreover, Salmond and Echevarria [34] underscore that a synthesis of knowledge found in the literature implies that if properly employed, teamwork is a valuable asset in improving the chances of putting EBPs into practice because of the diverse expertise to be expected from the team members. For example, Salmond and Echevarria [34] demonstrated that teams with strong unity and highly effective communication were distinguished by their successful implementation of research findings in clinical practice, leading to

improved patient outcomes. This supports the existing knowledge that promoting a culture of teamwork and collaboration within nursing environments is the key factor that will help the implementation of EBP. This approach also justifies that when other professionals in the organization support nurses, they are able to make proper use of research findings to enhance clinical practice.

7. Conclusion

The survey showed a correlation between nurses' professional knowledge, critical thinking, teamwork, and evidence-based practice. This is consistent with the concepts of "shared decision-making" and "teamwork" emphasized by the collegial model, indicating the mutual influence of these factors in the implementation of evidence-based practice. The standardized coefficient of nursing professional knowledge is the highest (0.366), indicating that among the predictors, nurses' professional knowledge has the greatest impact on the implementation of evidence-based practice, which aligns with the characteristics of the collegial model that focuses on professional development. Therefore, this study considers the collegial model to be suitable for this study.

Moreover, given that critical thinking has a beta of 0.281, it was found that there is a need to emphasize teaching critical thinking skills in nursing education programs. This complements the collegial model in developing the analytical skills of its staff as well as promoting reflectiveness as a means of improving evidence-based practice.

Moreover, the result which specifically focuses on the employees' level of teamwork and evidence-based practice, showing a beta of 0.173, exhibits the need to develop the culture of teamwork within the healthcare teams. Teamwork enhances not only the sharing of knowledge among the team members but also problem-solving and critical reflection, which are factors important towards the implementation of EBP. In terms of this learning outcome, this finding accentuates the collegial model's architecture that emphasizes the established professional nursing education tenets of collaboration and interdisciplinary cooperation.

Hence, the collegial model [1] underpins the components of professional knowledge, critical thinking, and teamwork, all of which can enhance the quality of evidence-based practice among nurses. This process not only cultivates personal and professional competencies of employees but also preserves the culture of the organization and fosters an atmosphere that encourages willingness to strive for the enhancement of patient care consistently.

8. Limitations

This study has several limitations: geographical limitations, as it is only concentrated in Haikou, the capital city of Hainan Province, which makes it difficult to represent the situation of the entire Hainan Province, thereby limiting the general applicability of the research results. Sample limitations include that the sample is mainly from three affiliated hospitals of a medical university, lacking diversity and potentially not fully reflecting the actual situation of nursing staff in different types of medical institutions. Limitations of the research design involve the use of quantitative methods; although the relationship between variables can be determined, it is difficult to explore the influencing factors in depth, which limits the understanding of causal relationships. Additionally, reliance on self-reported data may introduce bias, as participants may overestimate or underestimate their abilities and practices.

9. Future Research

In response to the limitations of this study, future research can be improved from the following aspects: First, the research scope can be expanded to cover not only Haikou, the capital city of Hainan Province, but also other regions in Hainan to more comprehensively reflect the situation of the entire Hainan Province. This will improve the general applicability of research results. Secondly, the diversity of the research sample can be increased, not only limited to the hospitals affiliated with a certain medical university, but also covering different types of medical institutions, such as regional hospitals, specialized hospitals, etc., to better represent the needs of nursing staff in different backgrounds and the actual situation. Finally, a research method that combines quantitative and qualitative methods can be used to not only determine the relationship between variables but also to explore the influencing factors in depth to better understand the causal relationship.

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