RESEARCH

Nurses' knowledge-attitude-practice of the importance of quality control of nursing documents and the influence of intensive training: a study from a tertiary hospital in China

Li Zhang¹, Ren-hua Chen¹, Xue-min Zhong², Meng-yi Xu¹, Yi-ning Sun¹ and Qian Yao^{1*}

Abstract

Objective This study aims to investigate nursing staff's current knowledge-attitude-practice(KAP) regarding nursing document guality control and to explore effective methods to enhance their awareness of nursing documents' importance through intensive training.

Methods We developed the questionnaire based on a systematic literature review and two rounds of Delphi expert consultation. Then, we sent the guestionnaire to the nurses before and after the intensive training. Data processing and statistical analysis were conducted using R 4.4.0 software.

Results Altogether, 722, 701, and 800 nurses participated in the guestionnaire survey before the training and after two training rounds, respectively. There was no statistically significant difference between the respondents' baseline data (gender, age, professional title, position, educational background, and working years) before and after the training. After two rounds of intensive quality control training, the nursing staff's median scores in the knowledge, attitude, and practice dimensions increased from 45 points before the training to 49, 50, and 50 points, respectively, and the difference was statistically significant (P < 0.05). Regression analysis indicated that the longer the working years, the higher the scores of the nursing staff after the training (3–5 years, P < 0.01, 95% Confidence Interval (CI), 0.2-0.57), (6-10 years, P < 0.01, 95% Cl, 0.35-0.73), (> 10 years, P = 0.003, 95% Cl, 0.32-0.72). The nursing staff with the titles of Chief Nurse (P<0.01, 95% CI, 0.2–0.54) and Deputy Chief Nurse (P<0.01, 95% CI, 0.21–0.74) scored higher after the training.

Conclusion This study shows that, after two rounds of training, nurses' KAP of the quality control of nursing documents significantly improved. The training had a positive impact on their KAP, which is conducive to enhancing the quality of nursing documents and nursing care. Therefore, hospitals should emphasize the quality control

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of nursing documents and take effective measures to help nurses continuously improve the quality of nursing documents.

Keywords Nursing medical documents, Quality control, Knowledge, Attitude, Practice, KAP, Intensive training

Background

Nursing documents are an important part of medical records that not only reflect changes in patients' conditions and treatment situations but also provide direct evidence that may be used in future medical disputes [1]. The "Regulations on the Handling of Medical Accidents" issued by the State Council of the People's Republic of China (Order No. 351) also include nursing records as a necessary component of inpatient medical records, stipulating that patients have the right to copy or reproduce medical orders, nursing records, and other relevant materials [2]. High-quality nursing documents have multiple significances. Firstly, they can ensure the accuracy and continuity of patient information, providing reliable references for doctors and other medical professionals, thereby optimizing treatment plans and enhancing patient safety [3-4]. Secondly, they can effectively protect the legitimate rights and interests of healthcare workers and medical institutions [5]. Additionally, they can promote the optimization of nursing practice and improve patient outcomes.By recording and analyzing problems in nursing practice, they provide valuable data support for nursing research and education [6-7]. Therefore, the quality of nursing documents has become increasingly important [8-9]. Research has found that improving the quality control of nursing documents can standardize nursing work processes and improve the completeness, accuracy, and timeliness of nursing records [10-11]. By reviewing nursing documents, the implementation of nursing measures can be effectively monitored, and problems can be discovered and corrected in a timely manner, thereby preventing medical accidents [12]. The nursing education system in China is a multi-level and multitype system that encompasses secondary vocational education, higher vocational education, undergraduate education, and postgraduate education [13-14]. With the continuous improvement of the educational levels of nursing education, the theoretical knowledge and practical abilities of nurses have been significantly enhanced, which has laid a solid foundation for standardizing the writing of nursing documents and improving the quality of nursing documents [15]. Regular training and assessment related to the quality control of nursing documents can help nursing staff improve their document-writing skills and awareness, enhance their sense of responsibility and work enthusiasm, and create a good working atmosphere [16].

Studies have found that nursing staff do not direct sufficient attention to nursing documents, neglect the significant relationship between the quality of nursing document writing and legal responsibility, and fail to recognize the risks involved in writing nursing documents [17-18]. Therefore, it is necessary to improve the quality monitoring of the nursing document process and improve the ability of nursing staff to write nursing documents. Current research on nursing documentation quality control primarily focuses on establishing quality standards, innovating control methods, analyzing influencing factors, investigating quality status, exploring improvement strategies, and assessing impacts on nursing quality and patient safety [3-12, 16-18]. However, there is limited research examining nurses' knowledge, attitudes, and practices (KAP) regarding the importance of documentation quality control, as well as the impact of intensive training programs on these aspects. This study aims to address this gap by investigating nurses' KAP regarding the importance of documentation quality control and evaluating the effectiveness of intensive training interventions. Therefore, this study investigated nursing staff's KAP of the quality control of nursing documents. A follow-up survey was conducted after intensive training to explore methods for enhancing nursing staff's KAP of the importance of nursing documents.

Methods

Questionnaire design

We developed the questionnaire based on a systematic literature review and two rounds of Delphi expert consultation. This study consulted with 15 nursing experts. The selected experts met the following criteria: (1) practicing in a tertiary grade A hospital, (2) working in professional fields including nursing quality control and nursing management, (3) over 10 years of work experience, (4) holding an associate senior professional title or above, (5) familiar with nursing documents and nursing quality control-related content, and (6) voluntarily participated in this research project.

The final questionnaire consisted of two parts with a total of 36 questions. The first part obtained basic information from the respondents (gender, age, educational background, professional title, position, and working years), whereas the second part investigated nurses' KAP regarding the quality control of nursing documents (10 questions each in the cognitive, attitude, and practice dimensions).

Variable		Number of respondents (%)			χ ²	Р
		After the second	After the first	Before training		
		training (N=800)	training (N=701)	(N=722)		
Gender ¹	Male	27 (3.7%)	18 (2.6%)	21 (2.6%)	2.209	0.331
	Female	695 (96.3%)	683 (97.4%)	779 (97.4%)		
Age ² (years)	<25	24 (3.3%)	38 (5.4%)	27 (3.4%)	12.924	0.114
	26–35	524 (72.6%)	519 (74.0%)	572 (71.5%)		
	36–45	123 (17.0%)	101 (14.4%)	155 (19.4%)		
	46–55	50 (6.9%)	42 (6.0%)	46 (5.8%)		
	>55	1 (0.1%)	1 (0.1%)	0 (0.0%)		
Professional title ²	Nurse	39 (5.4%)	42 (6.0%)	40 (5.0%)	5.307	0.724
	Nurse practitioner	355 (49.2%)	322 (45.9%)	393 (49.1%)		
	Chief nurse practitioner	304 (42.1%)	316 (45.1%)	332 (41.5%)		
	Deputy director of nursing	23 (3.2%)	20 (2.9%)	34 (4.2%)		
	Director of nursing	1 (0.1%)	1 (0.1%)	1 (0.1%)		
Position ¹	Nurse	684 (94.7%)	662 (94.4%)	736 (92.0%)	6.151	0.188
	Head nurse of the ward	33 (4.6%)	35 (5.0%)	55 (6.9%)		
	Department head nurse	5 (0.7%)	4 (0.6%)	9 (1.1%)		
Educational background ²	Technical secondary school	3 (0.4%)	3 (0.4%)	3 (0.4%)	4.349	0.630
	Junior college diploma	69 (9.6%)	88 (12.6%)	98 (12.2%)		
	Bachelor's degree	637 (88.2%)	598 (85.3%)	682 (85.2%)		
	Postgraduate degree or above	13 (1.8%)	12 (1.7%)	17 (2.1%)		
Years working ¹	1–2	19 (2.6%)	22 (3.1%)	33 (4.1%)	10.537	0.104
	3–5	156 (21.6%)	191 (27.2%)	196 (24.5%)		
	6–10	194 (26.9%)	172 (24.5%)	218 (27.3%)		
	>10	353 (48.9%)	316 (45.1%)	353 (44.1%)		

Table 1	Basic information	of respondents in t	the three questionnaire rounds

¹Pearson's chi-square test; ² Yates' corrected chi-square test

Reliability and validity tests and structural validity analysis SPSS26.0 software was used to conduct reliability and validity tests of the questionnaire. Reliability tests were used to determine whether the questionnaire was consistent and stable, whereas validity tests were used to assess the rationality of the questions and whether the option design reflected the research topic. Cronbach's alpha was used to calculate reliability, and the Kaiser-Meyer-Olkin (KMO) statistic was used to assess validity. Cronbach's alpha values for knowledge, attitude, and practice were 0.970, 0.970, and 0.955, respectively, and the value for the overall scale was 0.979. The overall KMO value was 0.963. These results indicate that this questionnaire has a high degree of consistency and validity.

Training

We conduct training on the norms of nursing document writing for the nurses. The first round of training was conducted from February 2023 to December 2023, and the second round from January 2024 to June 2024. The training of quality control nurses from each department was based on the basic norms for writing nursing documents as well as unified quality evaluation standards for the writing of nursing documents.

Each selected ward reported the list of quality control nurses to the Nursing Department. The final training list

included 59 quality control nurses. Each time, 8 to 12 quality control nurses are selected to participate in the tertiary quality control of Terminal cases. Training on the final quality control of medical records was conducted offline in batches by full-time nursing document quality control personnel from the nursing department. After each round of training organized by the nursing department, quality control nurses conducted offline training for each nurse in their own department to achieve full training coverage throughout the hospital.

To ensure the quality of the training, after each round of training is completed, the Quality Control Nurses will screen the final medical records and distribute them to the Quality Control Nurses for quality control of the final medical records according to the "Quality Evaluation Standard for Nursing Document Writing" in groups of five per person. The full-time nursing document quality control personnel of the Nursing Department will conduct a review one by one in accordance with the "Quality Evaluation Standard for Nursing Document Writing", and provide feedback on the identified problems in the form of pictures and text one by one.

Questionnaire survey

Before training and after each round of training, we sent the questionnaire to each quality control nurse via

Variable		Total score		H/Z	Р
		Median	Interquartile range		
Gender ¹	Male	135.00	29.00	1.364	0.173
	Female	135.00	30.00		
Age ²	<25	130.00	30.00	51.147	< 0.001
	26–35	135.00	28.00		
	36–45	141.00	27.00		
	46–55	144.50	21.75		
	>55	148.00	2.00		
Professional title ²	Nurse	134.00	29.00	238.905	< 0.001
	Nurse practitioner	134.00	27.00		
	Chief nurse practitioner	145.00	24.25		
	Deputy director of nursing	147.00	20.00		
	Director of nursing	146.00	2.00		
Position ²	Nurse	135.00	29.00	25.839	< 0.001
	Head nurse of the ward	145.00	17.50		
	Department head nurse	146.00	6.75		
Educational background ²	Technical secondary school	140.00	15.00	9.193	0.027
	Junior college diploma	135.00	29.00		
	Bachelor's degree	137.00	29.00		
	Postgraduate degree or above	135.00	25.50		
Years working ²	1–2	120.00	31.50	176.052	< 0.001
	3–5	132.00	29.00		
	6–10	135.00	28.00		
	>10	142.00	25.00		

Table 2 Inter-group differences in the total score of the knowledge, attitude, and practice scale

¹Mann-Whitney U test; ²Kruskal-Wallis test

Wenjuanxing. The quality control nurses then sent the questionnaire to each nurse in the department through Enterprise WeChat.The inclusion criteria for this questionnaire survey and nurse training are as follows: (1) Nurses who were on duty during the training period; (2) Nurses who need to write nursing documents. A total of 957 nurses met the inclusion criteria. Altogether, 722 questionnaires were collected before training, and 701 and 800 after the first and second rounds of training, giving effective recovery rates of 75.4%, 73.2%, and 83.6%, respectively.

Statistical analysis

This study utilized R 4.4.0 software for data processing and statistical analysis. Count data were expressed by frequencies and percentages, while measurement data were represented by medians and quartiles. (1) Differences in the basic information of respondents across different rounds were compared using the chi-square test or corrected chi-square test. (2) Intergroup differences in scores of each dimension (knowledge, attitude, practice) of the scale across different rounds were compared using the Kruskal-Wallis test, and pairwise comparisons (multiple comparisons) were conducted using the Mann-Whitney U test, with Bonferroni correction of P values. (3) Differences in the scores of each dimension (knowledge, attitude, and practice) of the scale across different research factors (round, gender, age, professional title, position, educational background, and years working) were compared using the Mann-Whitney U test or Kruskal–Wallis test. Variables with statistically significant differences in intergroup comparisons (P < 0.05) in step (3) were included in multiple linear regression analysis. Data transformation (square root) was performed on the scores for each dimension (knowledge, attitude, and practice) of the scale before regression. All statistical analyses were conducted using two-tailed tests; differences were considered statistically significant at P < 0.05.

Results

Basic information of the respondents

A total of 722 nurses completed the questionnaire before training, and 701 and 800 nurses completed the questionnaire after first and second rounds of training, respectively. Pre-training questionnaires were returned by 779 women (97.4%) and 21 men (2.6%), first-round questionnaires by 683 women (97.4%) and 18 men (2.6%), and second round training questionnaires by 695 women (96.3%) and 27 men (3.7%). In the three phases there were 35, 21, and 24 nurses, respectively, with senior professional titles. There were no statistically significant differences in baseline data of the respondents (gender, age, professional title, position, educational background, and working years) before and after the training (Table 1).

Table 3 Group differences in scores of each questionnaire dimension among respondents	for the three rounds
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Dimension	After the second training session	After the first training session	Before training	Н	Ρ
Knowledge ¹	49.00 (10.00)	45.00 (10.00)	45.00 (10.25)	145.097	< 0.001
Attitude ¹	50.00 (7.00)	47.00 (10.00)	45.00 (9.00)	231.087	< 0.001
Practice ¹	50.00 (8.00)	47.00 (9.00)	45.00 (10.00)	187.220	< 0.001

¹Median (quartile range); comparison between groups by Kruskal-Wallis rank sum test





Inter-group differences in questionnaire scores among the three rounds

The median total score of the knowledge, attitude, and practice questionnaire increased from 134 points before training to 139 and 146 points after the two rounds of training, respectively, with a statistically significant difference among the values (P < 0.01). The median scores of the knowledge, attitude, and practice dimensions increased from 45 points for each dimension before training to 49, 50, and 50 points, respectively, with statistically significant differences among the timepoints (P < 0.01; Tables 2 and 3; Figs. 1 and 2, and 3).

Differences in scale dimension scores according to basic participant factors

Differences in knowledge dimension scores

The average scores of the respondents before training and after two rounds of training were 41.75 ± 7.34 , 42.16 ± 7.64 , and 45.08 ± 6.93 , respectively. Factors associated with respondents' cognitive dimension scores were age, professional title, position, educational background, and years working (Table 4). Regression analysis indicated that the longer the years worked, the higher the score after training (3–5 years, P < 0.01, 95% CI: 0.3–0.62; 6–10 years, P < 0.01, 95% CI: 0.37–0.7; > 10 years,



Fig. 2 Scores of the attitude dimension for each round

P < 0.01, 95% CI: 0.38–0.73). Professional title influenced the scores after training (chief nurses, P = 0.014, 95% CI: 0.04–0.34; deputy chief nurses, (P = 0.017, 95% CI: 0.05–0.51).

Differences in attitude dimension scores

The average scores of the respondents on the attitude dimension before training and after two rounds of training were 43.34 ± 6.09 , 44.33 ± 5.79 , and 47.03 ± 4.68 , respectively. Respondents' scores on the knowledge dimension were influenced by age, professional title, position, educational background, and years working (Table 5). Regression analysis indicated that the longer the years working, the higher the score after training (3–5 years, P = 0.017, 95% CI: 0.02-0.23; 6-10 years, P < 0.01, 95% CI: 0.11-0.32; > 10 years, P = 0.003, 95% CI: 0.06-0.29). Professional title was a factor associated with the scores after training, with higher scores being reported by chief nurses (P < 0.01, 95% CI: 0.13-0.35) and deputy chief nurses (P < 0.01, 95% CI: 0.13-0.43).

Differences in practice dimension scores

The average scores of the respondents on the practice dimension before training and after each of two rounds of training were 42.93 ± 6.33 , 44.05 ± 5.97 , and 46.38 ± 5.35 respectively. Factors associated with respondents' scores on the practice dimension were age, professional title, position, educational background, and years working (Table 6). Regression analysis indicated that the longer the years working, the higher the score after training (3–5 years, P = 0.023, 95% CI: 0–0.23; 6–10 years, P < 0.01, 95% CI: 0.02–0.25; > 10 years, P < 0.01, 95% CI: 0.12–0.36). Professional title influenced the scores after training: higher scores after training were reported by chief nurses (P < 0.01, 95% CI: 0.09–0.3) and deputy chief nurse (P < 0.01, 95% CI: 0.08–0.41).

Discussion

Our research revealed that before the training, nurses' scores on the three dimensions of KAP regarding the quality control of nursing documents were not high.



Fig. 3 Scores of the practice dimension for each round

After two rounds of training, nurses' scores on all three dimensions significantly improved. The longer the years worked, the higher the scores after training. For nurses with supervisor titles, the improvement in scores after training was clear.

The nurses' initially low scores on the three dimensions of KAP indicated that the nurses had problems such as lack of knowledge, lack of proactive attitude, and lack of standardization in practice in terms of nursing document quality control. Consistent with our results, previous studies have found that some nurses do not realize the important role of electronic nursing documents in diagnosis and treatment, medical disputes, and medical accident identification [19–24]. A research conducted in Rwanda indicates that there are deficiencies in the documentation of nursing care. For instance, some records lack crucial information such as the specific contents of nursing measures and the assessment of their effects; some records suffer from non-standard writing and inaccurate information; moreover, the matching degree between the documentation of nursing care and the nursing needs of patients also needs to be improved [22]. A study conducted in Uganda indicates that the documentation of nursing records still faces challenges in many government hospitals and private hospitals, mainly manifested as the incompleteness of the records and the lack of technical support [23]. The research conducted in Denmark also indicates that they have been making continuous efforts to improve the quality of the documentation in nursing care [24]. Similarly, with the widespread adoption of electronic medical record systems, studies in Australia, Jordan and Sweden have found that some nurses have an insufficient understanding of the norms and legal significance of nursing document writing and lack a full recognition of the importance of the quality of nursing document writing [19–21].

This study found that after two rounds of training, the scores on all three dimensions significantly improved, indicating that the training had a positive impact on nurses' KAP and was conducive to improving

Variable		Knowledge Dimension		F/t	Р
		Average	Standard deviation		
Gender ¹	Male	43.01	7.38	-1.520	0.133
	Female	41.23	9.45		
Age ²	<25	40.15	8.38	8.022	0.000
	26–35	42.69	7.32		
	36–45	44.22	7.28		
	46–55	44.34	8.12		
	>55	49.00	1.41		
Professional title ²	Nurse	40.59	8.32	40.379	< 0.001
	Nurse practitioner	41.23	7.49		
	Chief nurse practitioner	44.97	6.62		
	Deputy director of nursing	45.68	8.17		
	Director of nursing	48.33	0.58		
Position ²	Nurse	42.80	7.44	7.736	< 0.001
	Head nurse of the ward	45.33	7.02		
	Department head nurse	45.44	9.39		
Educational background ²	Technical secondary school	40.11	13.04	4.057	0.007
	Junior college diploma	41.53	8.50		
	Bachelor's degree	43.15	7.29		
	Postgraduate degree or above	43.50	5.61		
Years working ²	1–2	36.15	10.12	52.622	< 0.001
	3–5	41.01	7.15		
	6–10	42.79	7.14		
	>10	44.58	7.02		

Table 4 Differences in knowledge dimension scores by participant characteristics

¹Independent samples Welch's t-test; ² One-way analysis of variance

Variable		Attitude Din	Attitude Dimension		Р
		Average	Standard deviation		
Gender ¹	Male	44.89	5.72	-1.543	0.128
	Female	43.47	7.42		
Age ²	<25	41.80	7.42	15.287	< 0.001
	26–35	44.60	5.74		
	36–45	45.80	5.55		
	46–55	47.06	4.43		
	>55	49.50	0.71		
Professional title ²	Nurse	42.51	6.68	54.997	< 0.00!
	Nurse practitioner	43.33	5.93		
	Chief nurse practitioner	46.64	4.95		
	Deputy director of nursing	47.31	4.22		
	Director of nursing	49.33	0.58		
Position ²	Nurse	44.68	5.84	13.924	< 0.001
	Head nurse of the ward	47.23	4.17		
	Department head nurse	47.89	3.60		
Educational background ²	Technical secondary school	47.67	3.04	4.098	0.007
	Junior college diploma	43.88	6.32		
	Bachelor's degree	44.93	5.72		
	Postgraduate degree or above	46.26	5.09		
Years working ²	1–2	40.82	7.30	52.776	< 0.001
	3–5	42.91	6.14		
	6–10	44.89	5.37		
	>10	46.14	5.26		

¹Independent samples Welch's t-test; ² One-way analysis of variance

variable		Practice Dim	Practice Dimension		Р
		Average	Standard deviation		
Gender ¹	Male	44.45	6.03	-1.518	0.134
	Female	43.03	7.50		
Age ²	<25	42.12	7.13	11.815	< 0.001
	26–35	44.09	6.07		
	36–45	45.52	5.87		
	46–55	46.43	5.02		
	>55	49.50	0.71		
Professional title ²	Nurse	42.63	6.82	47.646	< 0.001
	Nurse practitioner	42.84	6.28		
	Chief nurse practitioner	46.16	5.27		
	Deputy director of nursing	47.03	4.42		
	Director of nursing	48.33	2.08		
Position ²	Nurse	44.23	6.15	14.219	< 0.001
	Head nurse of the ward	46.93	4.31		
	Department head nurse	47.67	3.65		
Educational background ²	Technical secondary school	48.78	1.92	3.603	0.013
	Junior college diploma	43.50	6.39		
	Bachelor's degree	44.50	6.05		
	Postgraduate degree or above	44.60	5.81		
Years working ²	1–2	40.51	7.50	53.720	< 0.001
	3–5	42.31	6.64		
	6–10	44.36	5.62		
	>10	45.82	5.44		

Table 6 Differences in practice dimension scores by participant characteristics

¹Independent samples Welch's t-test; ² One-way analysis of variance

the quality of nursing documents, thereby enhancing the quality of nursing. Previous studies have also found that by strengthening training and education, the cognitive and application abilities of nurses toward electronic medical record systems can be enhanced, and the quality of nursing documents improved accordingly [25]. Previous studies have found that different training methods have their own advantages. The comprehensive application of multiple training methods (such as conventional training, stratified training, the Define-Measure-Analyze-Improve-Control (DMAIC) model, and continuous quality improvement) can better meet the diverse needs of nurses and improve the quality of nursing documentation [26–28]. This study enhanced the quality control of nursing documents through a "training - assessment re-training" cycle model. During the intervention period of over 12 months, the quality control nurses underwent standardized assessment after each training session. Those who failed to meet the standards were assigned to the next round of intensive training. The results indicated that with the increase in training rounds, the scores of the knowledge, attitude and practice dimensions of the nursing staff continued to rise, verifying the feasibility and long-term effectiveness of the training on continuous quality improvement methods.Compared with nurses who had worked for 1-2 years, those with more working experience scored higher after training. This might be because nurses with longer work tenure have accumulated more clinical experience and a profound understanding of nursing work. Through training, they can combine new knowledge with their experience, thereby improving the quality control of nursing documents more effectively [29–31].

Among nurses who were rated as chief nurse and deputy chief nurse after training, the improvement in their scores was more significant. Previous studies have found that senior nurses and deputy chief nurses are usually the backbone of the nursing staff, possessing stronger learning abilities and pursuing professional development [32]. At the same time, they undertake more responsibilities and management tasks in their work and have a clearer understanding of the importance of quality control of nursing documents. Therefore, they are more proactive in training and can better convert their knowledge into practical work abilities [26–27]. Meanwhile, our research aligns with the characteristics of advanced-level nurses as described in Benner's theory. According to Benner's theory, advanced-level nurses have the following advantages: they can quickly identify the key control points of the quality of nursing documents, possess stronger clinical decision-making abilities, and can assume the role of a mentor [33]. Based on this, we suggest introducing a hierarchical driving mechanism into the theory of nursing document quality control to fully leverage the role of advanced-level nurses and further enhance the overall quality of nursing documents.

Our study has some limitations. The scope of this study was limited to one tertiary hospital, which restricts the generalizability of our results. Second, because this survey was conducted through an electronic questionnaire, it was not as in-depth as interviews would have been. Third, the respondents' answers involved subjective self-judgment and there were no objective or unified standards.

Conclusions

Quality control of nursing documents not only concerns the safety of patients and the quality of nursing services but also constitutes an important part of hospital management and legal liability. In this study, after nurses received two rounds of training, their cognition of the quality control of nursing documents significantly improved, indicating that the training had a positive impact on nurses' knowledge, attitude, and practice and helped to enhance the quality of nursing documents and, consequently, the quality of nursing services. Therefore, hospitals should attach great importance to the quality control of nursing documents, take effective measures to improve the quality of nursing documents, and assist nurses in continuously improving and enhancing the quality of the nursing documents that they produce.

Abbreviations

CIConfidence intervalDMAICDefine-measure-analyze-improve-controlKMOKaiser-meyer-olkinKAPKnowledge-attitude-practice

Supplementary Information

The online version contains supplementary material available at https://doi.or g/10.1186/s12909-025-07168-w.

Supplementary Material 1

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Author contributions

Li Zhang and Qian Yao were responsible for the study conception and design. Li Zhang, Ren-hua Chen, Xue-min Zhong, Meng-yi Xu, and Yi-ning Sun were responsible for the data collection and the first draft of the paper. Li Zhang, Ren-hua Chen, and Qian Yao were responsible for the final manuscript and data analysis. All authors have read and approved the final manuscript for publication.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study design was approved by the Medical and Health Research Ethics Committee of the Second People's Hospital of Chengdu, China (Ethics approval number: PJ2025062).Informed consent was obtained before participating in the study. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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