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A pilot study on the application of ISOBAR combined with case teaching method in pediatric resident nurses' clinical handover

HongMei Yang[1], ZhiYing Li[1], AoXue Feng[1], SuPing Li[1*] and LingLing Xu[1*]

Abstract

Objective To design and evaluate the model combining ISOBAR communication tool with case teaching method, and to explore its influence on the nursing handover level, clinical work ability, nursing teaching quality and nurses' satisfaction of pediatric resident nurses.

Methods A total of 84 pediatric resident nurses were selected by random sampling and divided into the experimental group ($n=40$) and the control group ($n=44$). The experimental group implemented the ISOBAR combined with case teaching method, while the control group adopted the traditional lecture method combined with case teaching method. After 2 months of pediatric standardized training, the nursing handover level was evaluated by the Nursing Assessment of Shift Report (NASR) scale, the clinical nursing ability was evaluated by the pediatric and hospital-wide standardized training assessment results, the teaching satisfaction and willingness to continue in nursing work were evaluated by a 10-point satisfaction questionnaire, and the incidence of nursing adverse events in the two groups was recorded.

Results The experimental group was significantly better than the control group in dimensions (including patient safety assurance, patient participation promotion, enhancement of nurses' supervision, cooperation and responsibility) and the total score of the NASR scale ($P<0.05$). The experimental group also had significantly higher scores in the pediatric and hospital-wide standardized training assessment results and willingness to continue in nursing work ($P<0.05$). However, there was no significant difference in the incidence of nursing adverse events and teaching satisfaction between the two groups.

Conclusion The combination of ISOBAR and case teaching method effectively improves the nursing handover level and clinical nursing ability of resident nurses, and increases their willingness to continue in nursing work. Simple to implement, this model is well worth further promotion.

Clinical trial registration number Not applicable, as the study is not a trial.

Keywords ISOBAR, Case teaching method, Resident nurses, Nursing handover

*Correspondence:
SuPing Li
lisuping@mail.sysu.edu.cn
LingLing Xu
xulingl2@mail.sysu.edu.cn
[1]Department of pediatrics, The First Affiliated Hospital of Sun Yat-Sen University, Guangzhou 510080, Guangdong, China

Introduction

Nursing handover is crucial in the medical and nursing field. It is the key to ensuring the continuity and safety of medical work and can ensure the accurate implementation of subsequent nursing care and provide high-quality and safe services [1]. However, in practice, handover faces problems such as insufficient information, communication barriers, and unclear or ambiguous information. These hidden dangers affect the quality of nursing care and may lead to serious adverse events, even threatening the lives of patients [2]. Therefore, optimizing the nursing handover process has become an area urgently in need of improvement, and systematic training of new nurses' handover skills should be the core content of nursing standardized training.

Nursing standardized training (referred to as resident training) aims to help newly graduated nurses smoothly transition from the student role to the clinical nurse role. In China, nursing standardized training is independently carried out by each hospital, resulting in significant differences in training content, methods, and assessment standards [3]. Current training mostly focuses on clinical theory and practical skills, and there is a relative lack of specific training for nursing handover. There are also few research data on the handover training of resident nurses.

Currently, standardized communication tools play an important role in clinical nursing. Among them, SBAR and its subsequent versions such as ISBAR and ISOBAR are widely used. ISOBAR is derived from the SBAR communication model developed by the US Navy nuclear submarines and aviation industry. It effectively avoids the omission of important information during handover and communication through the modular processing of clinical information, thus reducing the occurrence rate of medical errors [4]. The ISOBAR communication tool, which was further studied by Australian scholars includes: Identification (I), Situation (S), Observation (O), Background (B), Agreed Plan/Action (A), and Read Back/Responsibility (R). The application range of this tool is wide, involving communication between medical staff and between medical staff and patients' families. It has a significant effect on improving patient safety and clinical nursing quality, especially in emergency, ICU, and critical patient transfer scenarios [5–8]. However, there has been no research report on the application of the ISOBAR tool in the clinical teaching of pediatric resident nurses.

The application effect of ISOBAR in clinical ICU and critical patient transfer is significant, and the case teaching method can truly simulate the clinical scene. The combination of the two may bring more meaningful research results. The case teaching method selects typical cases to create situations, prompting students to analyze, make decisions, and solve problems in the situations, so as to achieve the purpose of in-depth understanding of knowledge [9]. Therefore, this study introduced ISOBAR into the training of pediatric resident nurses and combined it with the case teaching method, aiming to explore the impact of this teaching model on the nursing handover level, clinical teaching quality of pediatric nursing, nurses' satisfaction, and their willingness to continue working in nursing, and to provide new ideas for improving the quality of pediatric nursing and training effects.

Research methods

Study participants

Sample size calculation When using a one-sided test and assuming equal sample sizes for both groups, the sample size calculation formula is $n_1 = n_2 = 2\left[\frac{(z_\alpha + z_\beta)\sigma}{\delta}\right]^2$. Based on the pre-experiment measurement of the NASR score of resident nurses, the standard deviations of the scores were 2.8 and 4.2, respectively. With $\alpha = 0.05$ and β a= 0.20, and a detected difference of 1.4 between the two groups' scores, for a two-sided test: $\sigma^2 = 16.66$. When conducting a one-sided test, $Z\alpha = Z_{0.05} = 1.64$ and $Z\beta = Z_{0.20} = 0.84$. Therefore, $n_1 = n_2 \approx 104.98$, which rounds up to 105 people. The total sample size for both groups is 210 people. Finally, 84 nurses undergoing resident training were selected as research participants. The smaller sample size than initially calculated makes this a pilot study.

Inclusion criteria ①Newly recruited nurses undergoing the two-year standardized training program at the hospital; ②Those who voluntarily agreed to participate after receiving a comprehensive program orientation from the chief pediatric training instructor during their first-day induction training in the pediatric department.

Exclusion criteria Absence for more than one-third of the duration of the pediatric standardized training.

In this study, six nurses were excluded because they took leave due to resignation or preparation for postgraduate entrance examinations, resulting in insufficient time for pediatric training. Ultimately, 84 nurses who received resident training in the First Affiliated Hospital of Sun Yat-sen University were selected as the research participants, including 80 females and 4 males. The duration of pediatric resident training was 2 months, and the hospital-wide resident training lasted for 2 years.

Collection of general information

On the first day of pediatric resident training, information such as entry time, gender, age, only-child status, number of rotated departments, educational background, willingness to continue in nursing work, and score of

Nursing Assessment of Shift Report of the resident nurses was collected.

Grouping

The 84 resident nurses were grouped according to the order of pediatric rotation, with 6–8 people in each group. Groups were randomly assigned to the experimental group and the control group using a random number table. The random number table was generated by a computer, producing a sequence of random numbers using statistical software (SPSS 25.0). Each group was assigned a unique number (1 to N). Based on the parity of the random numbers, Groups with even numbers were assigned to the experimental group ($n = 40$), while those with odd numbers were assigned to the control group ($n = 44$). The grouping process was conducted by an independent research assistant. The instructors, resident nurses, and evaluators were all unaware of the allocation results before the grouping was completed to ensure the implementation of a double-blind design. After the grouping was completed, we compared the baseline characteristics of the two groups and found no significant differences ($p > 0.05$), indicating that the randomization process was effective.

Teaching arrangement

The control group adopted the combination of traditional lecture teaching method and case teaching method, while the experimental group used the combination of ISOBAR communication tool and case teaching method for nursing handover training. The two groups were taught by teachers with similar teaching years and experience. According to the nursing training syllabus, the same cases (such as pneumonia, diarrhea, nephrotic syndrome, etc.) were used for clinical teaching.

Measures of specific teaching plans (Fig. 1 showed study flowchart)

Preparation stage

Establishment of a research group

Before the start of the study, a research group was established to clarify the responsibilities of members, review the literature, and determine the experimental plan and implementation plan of the project. According to the characteristics of pediatrics, typical cases (pneumonia, diarrhea, nephrotic syndrome) were selected. The teachers of the two groups prepared relevant courseware according to the nursing teaching syllabus. The teachers in the experimental group mastered the ISOBAR handover mode and skillfully applied the ISOBAR tool to case nursing handover.

Strategy for constructing the consistency of the nursing handover scale

The research participants were selected, and the members of the group were organized to learn the scale. Through explanation, examples, and other methods, a unified understanding was promoted. Then, a pre-survey was carried out among the group members, focusing on interpreting the items and refining the standards to achieve a unified understanding of the scoring standards.

Implementation stage

Training method of the control group

During the pediatric resident training, the teachers in the control group explained the key and difficult points of nursing handover of cases through a combination of online and offline traditional lecture methods. For example, for patients with severe diarrhea, attention should be paid to vital signs, stool conditions, perianal skin, etc. The specific training steps included: (1) The teacher introduced the clinical case and diagnosis and treatment process; (2) Two teachers demonstrated the nursing handover on the spot according to the previous clinical nursing handover mode; (3) The resident nurses analyzed the patient's clinical data, put forward the main nursing problems and solutions, and practiced the nursing handover with team members on the spot; (4) The teachers gave feedback and solved the problems raised by the resident nurses.

Training method of the experimental group

During the pediatric resident training, the theoretical knowledge of ISOBAR was first taught online. Then, the same cases as those in the control group were used, and the application of the ISOBAR tool in nursing handover was added to the courseware. For example, when applying ISOBAR to the nursing handover of a patient with severe diarrhea, the main nursing problem - diarrhea was put forward, and the clinical symptoms and data were structured described: the patient's vital signs, stool conditions, intake and output and diet, family history, past medical history, allergy history, and other data, as well as the evaluation of treatment measures and effects. The specific training steps included: (1) The teacher introduced the clinical case and diagnosis and treatment process; (2) The teacher explained how to use the ISOBAR tool to analyze the patient's clinical data; (3) Two teachers demonstrated how to use ISOBAR for structured nursing handover; (4) The resident nurses analyzed the clinical data, put forward nursing problems and measures, and practiced the nursing handover with team members on the spot; (5) The teachers gave feedback and solved the problems raised by the resident nurses.

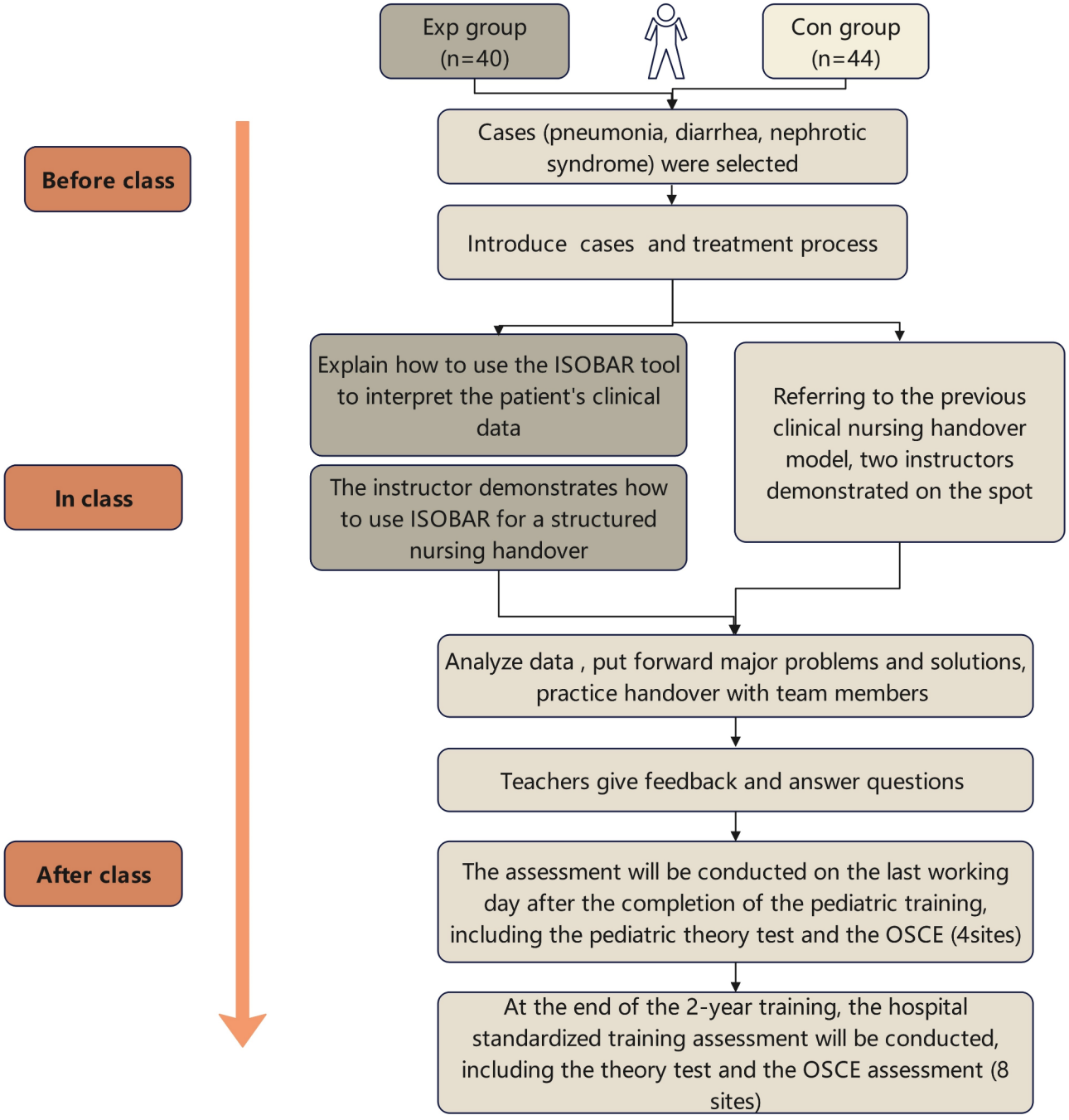

Fig. 1 Study flowchart

Evaluation of teaching effect

Evaluation of nursing handover level

In the last two weeks of pediatric resident training, two evaluators blindly scored the resident nurses using the NASR (Nursing Assessment of Shift Report) scale (designed by Sand - Jecklin [10], translated into Chinese by Lin Yanping [11], with good reliability and validity, Cronbach's α coefficient of 0.84, and each dimension ranging from 0.855 to 0.975). The scale covers five dimensions (effective and efficient communication, patient safety assurance, patient participation promotion, enhancement of nurses' supervision, cooperation and responsibility, and provision of patient-required information) and 17 items. The Likert five-point scale was used, and the total score ranged from 17 to 85 points. The higher the score, the better the nurse's handover level. The weighted Kappa coefficient between the two

evaluators using the NASR scale was 0.803, indicating a strong consistency.

Evaluation of clinical nursing ability

The pediatric resident training assessment was conducted on the last working day of the pediatric resident training. The pediatric resident training assessment included the pediatric theory test (assessing the knowledge of common pediatric diseases and skills) and OSCE (4 stations, involving oral administration, intradermal injection, measurement of infant length, weight, and head circumference, and case writing) to reflect. The hospital-wide resident training assessment was conducted at the end of the 2-year training. The hospital-wide resident training assessment consisted of a theory test (assessing the knowledge of common diseases and skills in internal medicine, surgery, gynecology, pediatrics, emergency, and critical care medicine) and OSCE (8 stations, including history taking, nursing case writing, physical examination, basic and first aid skills). The theory test was scored on a 100-point scale. In the OSCE assessment, the pass rate of each station checklist needed to be converted into a percentage form, and then the OSCE total score (in percentage form) was calculated according to the predetermined proportion of each station in the assessment system. The final comprehensive score was synthesized according to the weight of 50% for the theory score and 50% for the OSCE total score. Through the comprehensive assessment of these two scores, the clinical nursing ability of the resident nurses could be comprehensively evaluated.

Incidence of nursing adverse events

Based on the data of the hospital adverse event reporting system, the probability of nursing adverse events occurring in each nurse during the pediatric resident training was counted.

Evaluation of pediatric nursing teaching satisfaction

At the end of the pediatric resident training, an online questionnaire survey was used to collect data to investigate the resident nurses' satisfaction with the pediatric teaching teachers, teaching plan arrangements, and teaching content. The evaluation was scored on a 10-point scale, with 1 point indicating extremely dissatisfied with the pediatric nursing teaching work and 10 points indicating extremely satisfied.

Evaluation of willingness to continue in nursing work

At the end of the pediatric resident training, an online questionnaire survey was also used to collect data. The evaluation was scored on a 10-point scale, with 1 point indicating extremely unwilling to continue working in nursing and 10 points indicating extremely willing to continue working in nursing.

Statistical analysis

Data analysis was performed using R software and Empower Stats statistical software. Continuous variables were expressed as means and standard deviations, and the Mann–Whitney U test was used to compare the differences between the experimental group and the control group. Count data were expressed as frequencies and percentages "n (%)" and analyzed using the chi-square test. $P<0.05$ was used as the criterion for determining a statistically significant difference.

Results

General information of resident nurses

The lowest and highest educational backgrounds of the resident nurses in the experimental group and the control group were both undergraduate. The *P* values of gender, age, only-child status, number of rotated departments, and the willingness to continue in nursing work before pediatric resident training were all >0.05, indicating no significant difference (see Table 1).

Table 1 General information of resident nurses comparison between experimental and control groups

Item	Experimental Group $n=40$	Control Group $n=44$	F/Z Value	*P* Value
Age (years)	21.45 ± 0.84	21.20 ± 0.55	*2.521*	*0.116*
Gender [n (%)]			*2.678*	*0.102*
Male	4 (10)	0 (0)		
Female	36 (90)	44 (100)		
Only-child [n (%)]			*1.143*	*0.310*
Yes	7 (17.5)	12 (27.3)		
No	33 (82.5)	32 (72.7)		
Number of Rotated Departments	2.95 ± 1.52	2.41 ± 1.59	*2.482*	*0.119*
Willingness to Continue in Nursing Work Before Training	9.13 ± 1.81	9.50 ± 0.72	*1.575*	*0.213*
Score of NASR	70.93 ± 12.00	69.91 ± 8.90	*-0.943*	*0.346*

Note (NASR: Nursing Assessment of Shift Report)

Comparison of teaching effects of the two groups of resident nurses

The weighted kappa coefficient of the two evaluators of the NASR scale was 0.803 (95% CI: 0.689–0.916), $P<0.001$, indicating a strong consistency. As shown in Table 2, the *P* values of patient safety assurance, patient participation promotion, enhancement of nurses' supervision, cooperation and responsibility, and the total score in the NASR, as well as the scores of the willingness to continue in nursing work after pediatric training, the pediatric standardized training results, and the hospital-wide standardized training total results were all

Table 2 Teaching effects of resident nurses comparison between experimental and control groups

	Item	Experimental Group $n=40$	Control Group $n=44$	Z Value	*P* Value
Nursing Handover Level	Effective and Efficient Communication	9.10 ± 0.93	8.48 ± 1.50	*−1.87*	*0.062*
	Patient Safety Assurance	8.93 ± 0.92	8.18 ± 1.11	*−3.048*	*0.002*
	Patient Participation Promotion	27.75 ± 1.41	24.07 ± 3.91	*−5.043*	*< 0.000*
	Provision of Patient-Required Information	8.43 ± 1.63	7.57 ± 2.83	*−1.21*	*0.226*
	Enhancement of Nurses' Supervision, Cooperation and Responsibility	23.23 ± 1.21	20.55 ± 3.06	*−4.814*	*< 0.000*
	NASR Total Score	77.43 ± 3.83	68.84 ± 7.89	*−5.723*	*< 0.000*
Clinical Nursing Ability	Pediatric Standardized Training Results	80.85 ± 5.79	78.27 ± 5.13	*−2.715*	*0.007*
	Hospital-wide Standardized Training Total Results	91.60 ± 1.94	88.38 ± 3.85	*−3.995*	*< 0.000*
	Pediatric Nursing Teaching Satisfaction	9.93 ± 0.35	9.89 ± 0.44	*−0.36*	*0.719*
	Willingness to Continue in Nursing Work	9.48 ± 0.99	8.20 ± 1.24	*−5.356*	*< 0.000*
	Incidence of Nursing Adverse Events	0.00	0.00		

Note (NASR: Nursing Assessment of Shift Report)

< 0.05, indicating a significant difference. The *P* value of the comparison of the satisfaction of resident nurses with pediatric teaching was > 0.05, indicating no significant difference (see Table 2).

Discussion

Resident nurses face significant challenges in managing different patients and making decisions in the face of unfamiliar conditions in actual work. Moreover, current nursing handovers have problems such as incomplete or ambiguous information, which can easily lead to safety hazards. The introduction of standardized communication tools such as SBAR, ISBAR, and ISOBAR is expected to improve the efficiency and accuracy of handovers and enhance the quality of nursing care [12]. This study combined ISOBAR with the case teaching method and confirmed that its structured modules can improve the nursing handover level and clinical nursing ability of resident nurses. This is consistent with the research results of Tania Beament [13], who focused on adult comprehensive departments. Moreover, since this study focused on the group of pediatric resident nurses and adjusted the case design and teaching implementation details according to the characteristics of pediatrics, it is more targeted and practically guiding in the field of pediatric nursing.

In nursing work, ensuring patient safety is of the utmost importance. When it comes to patient safety, traditional teaching has notable drawbacks. It lacks systematicness and completeness in information transfer, potentially resulting in doctors making improper treatment plans or nurses providing subsequent care without sufficient information, thereby increasing patient safety risks [5]. In contrast, ISOBAR's structured process plays a crucial role in enhancing patient safety. It precisely defines the identities in the Identification process, details patient problems in the Situation process, offers comprehensive data in the Observation process, and supplements background details in the Background process, ensuring the comprehensiveness and accuracy of information for medical staff to make accurate judgments [6–8]. Additionally, in the risk prevention and control mechanism, ISOBAR prompts nurses to actively think and evaluate in each step. For example, in the Action/Assessment process, nurses take measures based on the patient's condition and assess the effects promptly. In the Read Back/Responsibility process, the key points of subsequent care and responsibilities are clearly stated. This effectively helps nurses identify and respond to risks. In this study, the experimental group's higher score in the "patient safety assurance" dimension of the nursing handover assessment scale indicates that the combination of ISOBAR and the case teaching method effectively enhances patient safety.

In the medical and nursing field, promoting patient participation is extremely critical for improving the effect of nursing care and facilitating patient recovery. Regarding patient participation, traditional teaching also shows many deficiencies. It mainly adopts a one-way information dissemination approach, only presenting simple disease and nursing details without covering the causes, trends, and background of the disease, making it difficult for patients and their families to deeply understand and actively participate. The communication method is also rigid, ignoring the psychological and cognitive characteristics of patients and their families, which may lead to misunderstandings and reduced participation willingness. However, ISOBAR's structured process ensures the integrity and logical clarity of information transfer, enabling patients and their families to comprehensively understand the disease, reducing anxiety, and enhancing their confidence and ability to participate in care [14]. The higher score of the experimental group in the "patient participation promotion" dimension strongly validates the effectiveness of this teaching method in promoting patient participation.

Meanwhile cooperation and responsibility are crucial for ensuring patient safety and improving the quality of nursing care. In terms of cooperation and responsibility, traditional teaching lacks a unified standard process in information transfer. During shift handovers or doctor-patient communications, information presentation is random, key points are not prominent, and it is difficult to convey all patient information systematically. The responsibility definition is also vague, often resulting in unclear divisions of labor and potential shirking of responsibilities or duplication of work when dealing with patient condition changes, affecting the efficiency and quality of nursing work. ISOBAR, on the other hand, has a structured process that ensures the integrity and accuracy of information. Each process clearly defines the tasks and responsibilities of nurses. For instance, after implementing measures in the Action/Assessment stage, the subsequent observation key points and responsibilities are clearly specified in the Read Back/Responsibility stage, effectively promoting team cooperation and ensuring the smooth progress of nursing work [15–16]. This study verified that the experimental group using the ISOBAR model had a significant advantage in the " enhancement of nurses' supervision, cooperation and responsibility " dimension.

There are various teaching methods in clinical nursing teaching. Among them, evidence-based and PBL teaching methods are relatively good at improving students' critical thinking ability [17], but they have high requirements for the level of teaching teachers. The ISOBAR tool combined with the case teaching method in this study significantly improved the clinical nursing ability of pediatric resident nurses. It is easy to implement and has strong operability. Through the unified training of ISOBAR communication tools for teaching teachers in the early stage and the selection of classic pediatric cases, teaching teachers can easily master and apply them. Resident nurses analyze case data through the ISOBAR structured method, modularize the information, and solve clinical problems systematically, thus significantly improving their clinical nursing ability and learning effect.

In this study, there was no significant difference between the experimental group and the control group in the "effective and efficient communication" and "provision of patient-required information" dimensions of the nursing handover assessment scale. This may be because both groups used the same typical cases, and nurses relied on their existing experience to deal with communication about patients' conditions and obtaining patient information, thus weakening the impact of the differences between traditional teaching methods and ISOBAR teaching methods.

Limitations

Despite the promising results of our study, several limitations should be acknowledged. First, the relatively small sample size and single-center design limit the generalizability of our findings. Second, some data were missing for certain variables, which may have introduced bias into our analyses. Third, our study focused on resident nurses, and the results may not be applicable to other populations. Finally, the lack of long-term follow-up restricts our ability to draw conclusions about the sustained effects of the intervention. Future research should address these limitations by incorporating larger, more diverse cohorts, minimizing data loss, and conducting long-term follow-up studies.

Conclusion

The integration of ISOBAR and case - teaching method effectively enhances resident nurses' nursing handover proficiency and clinical nursing capabilities. Concurrently, it boosts their inclination to persist in nursing work. Characterized by its simplicity in implementation, this model is highly deserving of further promotion.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-07132-8.

Supplementary Material 1

Supplementary Material 2

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No.

Author contributions

YHM and LZY significantly contributed to the design and drafting of the manuscript. FAX was responsible for data collection and analysis. XLL and LSP were responsible for the overall planning of the study, methodological guidance, data interpretation, and the review and revision of the final manuscript. All authors participated in various stages of the research and reviewed and approved the final manuscript.

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Data availability

Data is provided within the supplementary information files in excel 2025-1-9.

Declarations

Ethics approval and consent to participate

Informed consent was obtained from all participants. This study was approved by the Ethics Committee of the First Affiliated Hospital of Sun Yat-sen University(No.IIT-2024-417[2024] No.589). All experiments were performed in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants. Each pediatric resident nurse was briefed on the study's purpose, procedures, and risks. Participation was voluntary.

Consent for publication

Not applicable.

Competing interests
The authors declare no competing interests.

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