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ORIGINAL RESEARCH

Clinical Significance of Action Research-Based Seamless Care to Improve Imaging Efficiency and Patients' Cognition, and Alleviate Patient Anxiety

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Objective: The present study was undertaken to assess the clinical significance of action research-based seamless care to improve imaging efficiency and alleviate patient anxiety.

Methods: A total of eighty patients who underwent imaging examinations in our hospital between May 2019 and November 2020 were recruited for this study. The patients were randomly assigned to two groups: the control group receiving routine care and the observation group receiving seamless care based on action research. The random assignment was conducted using a simple random sampling technique, ensuring an equal allocation of participants to each group at a 1:1 ratio, resulting in 40 cases in each group. Outcome measures included imaging examination duration, mean nursing duration, examination cognition, and negative emotion scores.

Results: Seamless care provided shorter imaging examination duration and nursing duration, and better ensured uneventful examinations than routine care ($P<0.05$). Patients given seamless care exhibited higher examination cognition versus those receiving routine care ($P<0.05$). Seamless care offered more mitigation of negative emotions for patients than routine care ($P<0.05$).

Conclusion: Action research-based seamless care effectively improves imaging efficiency and patients' awareness of imaging examinations and contributes to alleviating patients' adverse events.

Keywords: action research, seamless care, imaging, anxiety

Introduction

Common imaging techniques include computed tomography (CT), x-ray, ultrasound, and magnetic resonance imaging (MRI), which are performed to help physicians understand the patient's condition, facilitate the implementation of targeted treatment, and enhance the treatment outcome.[1,2] With the continuous development and upgrading of medical care concepts, the issues associated with the traditional care model for imaging examinations gradually emerge. Although specialized nursing protocols, standards, training programs, and performance assessment criteria have been implemented in hospital radiology departments to regulate nursing practices and achieve positive outcomes, there are still some shortcomings,[3] such as inefficient examinations due to poor communication with patients, forced interruptions of examinations, errors due to patients' lack of knowledge about examinations, and patients' resistance, resulting in unsatisfactory clinical outcomes.[4,5] Thus, there exists a need to explore a more effective nursing approach to enhance imaging and diagnostic efficiency.[6] Action research is a method that combines the researcher and the practitioner, the research process and the practice process, and addresses practical problems in a real-world context through autonomous reflective exploration.[7,8] Seamless care, a widely applied novel nursing approach in recent years, has shown improved outcomes in the resuscitation of critically ill traumatic brain injury patients.[9] The Seamless Care Model primarily focuses on optimizing healthcare processes, enhancing collaboration and communication within the healthcare team, thereby enhancing continuity and coordination of care for patients throughout the pre-treatment, treatment, and post-treatment

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phases, so as to better provide medical services and psychological needs for patients.[10,11] The current study was performed to assess the clinical significance of action research-based seamless care to improve imaging efficiency and alleviate patient anxiety.

Materials and Methods

Participants

A total of eighty patients who underwent imaging examinations in our hospital between May 2019 and November 2020 were recruited for this study. The patients were randomly assigned to two groups: the control group receiving routine care and the observation group receiving seamless care based on action research. The random assignment was conducted using a simple random sampling technique, ensuring an equal allocation of participants to each group at a 1:1 ratio, resulting in 40 cases in each group. All processes of this study followed the ethical guidelines of the Declaration of Helsinki on clinical research and were approved by the ethics committee of Nanjing Medical University Affiliated Wuxi People's Hospital.

Inclusion and Exclusion Criteria

Inclusion Criteria

(1) Patients with good treatment compliance. (2) no mental illness or disorders of consciousness. (3) patients could perform self-care. (4) who were informed and consented to this study.

Exclusion Criteria

(1) Patients with serious pathology of the liver, kidney and other organs. (2) mental disorders that prevented cooperation in completing the study. (3) a history of hyperthyroidism, and drug allergy. (4) pregnant patients.

Treatment Methods

Control Group

The patients in the control group received routine care, including registration of patient's basic information, examination precautions, correct breathing exercise guidance, and correct examination position instruction.

Observation Group

The patients in the observation group received seamless care. (1) Patients are provided with educational materials, such as single-site examination brochures, during the appointment booking process. These materials aim to inform patients about the examination and provide instructions on how to cooperate during the procedure. (2) Establishing a positive nurse-patient relationship: Upon patients' registration and admission to the department, dedicated nursing staff members actively engage in conversation with patients. They inquire about the patient's chief complaint and medical history to tailor nursing interventions accordingly. (3) Arranging experienced nurses for patient rounds: Senior nurses are assigned to assess patients' understanding of the examination, identify any concerns or questions, and provide clarification. Patients' anxiety is alleviated only after they have a thorough understanding of the examination. A seamless care team was established, consisting of one chief physician, one medical technicians, and one nursing staff. The personnel involved in the seamless care team, including the chief physician, medical technicians, and nursing staff, received specialized training prior to the study. The training program focused on familiarizing them with seamless care protocols, standardized nursing practices, effective communication strategies, and coordination of care. A questionnaire was designed to survey patients as well as team members to understand the influencing factors of the examination and the status of care in all aspects of the imaging examination to develop a seamless care protocol.[12] Nursing care was supervised, managed and implemented in a standardized manner based on the principles of operability and quantifiability.[13] Regular meetings were held to discuss and resolve problems in the nursing process. The following specifically divides the Seamless care work into three stages: situation judgment, feedback study, and self-participatory study.

Situation Evaluation

The evaluation of patients, medical and nursing staff of related departments and imaging department personnel on the nursing work of imaging examination was obtained: ①Patient feedback: Long waiting time; unclear examination-related content, unable to actively and effectively cooperate with the examination; a long time to obtain the examination report. ②Feedback from the medical staff of related departments: Patients showed nervousness and fear during the examination; patients were not familiar with the examination process and related contraindications; interruption of patient transition before and after the examination. ③ Feedback from imaging department staff: Lack of communication between imaging nursing staff and patients; lack of standardization of the examination procedure.

Feedback Study

The first phase of the research was discussed, and Seamless care measures were developed to facilitate a systematic and comprehensive nursing process.

(1) Before the examination: ①Environmental management. A neat and comfortable examination environment was prepared for the patients, Examination tools and resuscitation items were orderly placed, and room temperature and humidity were appropriately adjusted. ②Health education. The patients were provided with health education and were instructed in terms of correct breathing, precautions of examinations, and medication details. The patient's understanding of health knowledge was timely evaluated.[14,15] ③ Psychological care. The principle of the examination, the safety of the examination method, and the significance of the examination for clinical treatment and physical rehabilitation were explained to the patients before the imaging examination to alleviate their negative emotions about the imaging examination.[16,17]④ Examination preparations. Before the examination, the allergy history, disease history, and medication history of the patients were understood in detail, and the number of patients waiting for the examination was made known to the doctor.[18,19]

(2) During the examination: Nursing staff paid close attention to the transition of the patient before and after the examination, assisted the patient to adjust the position required for the examination, guided the patient to perform three breathing exercises, and closely monitored the physiological and mental status of the patient. Emergency treatment was timely provided in the event of adverse reactions in patients.[20]

(3) After the examination: The nursing staff informed the patients about the time, the specific location, the procedure, and the consultation department they should attend after obtaining the examination report.[21]

Self-Participatory Study

Two months after the implementation of the seamless care, the research was performed again, and the problems found in the second phase, such as the adverse reactions of some patients including high blood pressure and rapid heartbeat during the examination, and the sloppy work of nursing staff in the evening section, were discussed with feedback in order to improve the Seamless care measures and process: ① Patients were classified into mild, moderate and severe levels according to their conditions. Patients with unstable physiological indicators and who have just undergone surgery were examined under the supervision of health care personnel, and after the examination, the patient was kept under close observation in the waiting area for half an hour before leaving. Patients were instructed to drink more water to speed up the excretion of drugs from the body.[22,23] ② Members of the Seamless care team were arranged to carry out effective rounds of nighttime nursing care.

Outcome Measures

Examination Efficiency

The mean examination duration, mean nursing duration and the number of interrupted examination cases (the number of interrupted examinations due to abnormalities in blood pressure, respiration, heart rate and other physiological indicators before and after the examination) were recorded.

Examination Cognition

Patients' cognitive level of the examination was evaluated by using our homemade "Imaging Examination Cognitive Scale", which includes four aspects: examination procedure, precautions, examination position required, and breathing exercise method, and the score of each dimension was 100. The higher scores represent higher examination recognition.

Negative Emotion Score

The Symptom Checklist 90 (SCL-90) was used to assess negative emotions before and after care in both groups, including anxiety and depression, with scores ranging from 0 to 40 with a critical value of 20 for the anxiety scale and from 0 to 52 with a critical value of 26 for the depression scale. The higher the score, the more severe the anxiety and depression.

Statistical Analysis

SPSS 22.0 software was used for data analyses. Measurement data were expressed by ($\overline{x} \pm s$) and were examined using the *t*-test. Count data were expressed as the number of cases (rate) and were tested using the chi-square test. Significant differences were indicated by $P<0.05$.

Results

Patient Characteristics

In the observation group, there were 22 males and 18 females, aged 41–73 (56.4±2.18) years, with 16 cases of head examination, 14 cases of chest examination, and 10 cases of abdominal examination. In the control group, there were 21 males and 19 females, aged 42–75 (57.01±3.34) years, with 15 cases of head examination, 13 cases of chest examination, and 12 cases of abdominal examination. The two groups did not differ in terms of patient characteristics ($P>0.05$) (Table 1).

Examination Efficiency

Seamless care provided shorter imaging examination duration and nursing duration, and better ensured uneventful examinations than routine care ($P<0.05$) (Table 2).

Table 1 Patient Characteristics

	Observation Group (n=40)	Control Group (n=40)	t/x^2	P
Sex			0.050	0.823
Male	22	21		
Female	18	19		
Age (year)	41–73	42–75		
Mean age (year)	56.4±2.18	57.01±3.34	0.967	0.336
Examination area				
Head	16	15	0.01	0.986
Chest	14	13	0.199	0.656
Abdomen	10	12	0.195	0.659

Table 2 Examination Efficiency

Group	n	Mean Examination Duration (min)	Mean Nursing Duration (Min)	Number of Interrupted Cases (%)
Observation group	40	8.69±1.30	14.37±3.81	0(0.00)
Control group	40	10.44±1.37	18.59±4.22	5(12.5)
t	–	5.86	4.694	16.543
P	–	<0.001	<0.001	0.021

Table 3 Examination Cognition

Group	n	Examination Procedure	Precautions	Required Position for Examination	Breathing Exercise
Observation group	40	92.45±6.02	91.18±8.78	93.56±7.82	92.57±6.24
Control group	40	81.28±9.27	80.92±9.55	78.62±9.02	82.72±8.33
t	–	6.391	5.002	7.915	5.985
P	–	<0.001	<0.001	<0.001	<0.001

Table 4 Negative Emotion Scores

Group	n	Anxiety		Depression	
		Before Intervention	After Intervention	Before Intervention	After Intervention
Observation group	40	24.18±1.30	18.23±1.14	31.10±2.33	25.07±1.04
Control group	40	24.11±1.29	21.30±1.08	31.24±2.18	27.23±1.15
t		0.242	12.364	0.277	8.811
P		0.809	<0.001	0.783	<0.001

Examination Cognition

Patients given seamless care exhibited higher examination cognition versus those receiving routine care (P<0.05) (Table 3).

Negative Emotion Scores

Before the intervention, there was no significant difference in the anxiety and depression scores between the two patient groups (P>0.05). After the intervention, both groups showed a decrease in anxiety and depression scores compared to before the intervention, and the Observation group had significantly lower scores than the Control group (P<0.05) (Table 4).

Discussion

Seamless Care Based on Action Research Improves the Imaging Efficiency

The present study followed action research to understand the influencing factors of the examination and the nursing status of each segment of the examination through clinical investigation and discussed the feedback on the existing problems to develop a targeted and complete Seamless care program. The problems identified during nursing care were solved in practice, and the nursing process was further standardized.[24,25] First, health education for patients can reduce the occurrence of prolonged, interrupted, or postponed examinations due to the unfamiliarity of patients with examination-related contents. Secondly, the nursing staff provided proper post-examination care to ensure a smooth transition between patients with pre- and post-examination.[26] In the present study, seamless care provided shorter imaging examination duration and nursing duration, and better ensured uneventful examinations than routine care (P<0.05), suggesting that seamless care based on action research could effectively improve the examination efficiency. The reason may be that after the seamless care, patients are clearly aware of the examination principle, examination purpose, examination process and examination precautions, allowing for a smooth and effective examination process and saving limited medical resources and time.[27]

Seamless Care Based on Action Research Improves Patient Awareness of Imaging Examinations

It has been shown that imaging has a high demand for patients in terms of relevant examination information. Seamless care based on action research provides high executability and operability, solves the issues faced by patients through clinical practice and continuously improves and revises the care measures to fully meet the care needs of patients in

various treatment stages. Here, patients given seamless care exhibited higher examination cognition versus those receiving routine care (P<0.05), indicating that seamless care based on action research could promote the patients' awareness and acceptance of imaging examination. The reason for this is that the implementation of seamless care provides assistance and guidance to patients in understanding the examination content and contributes to quickly and effectively passing cognition of the imaging examination.[28]

Seamless Care Care Based on Action Research Alleviates Patients' Negative Emotions

Seamless care based on action research provides patients with complete and continuous humanistic care by integrating all examination sessions, which mitigates patients' negative emotions about imaging examinations. The results of the current research showed that seamless care offered more mitigation of negative emotions for patients than routine care (P<0.05), indicating the therapeutic benefits of seamless care in alleviating psychological stress. The possible reason is that patients were supported by professional nursing staff during the whole process of imaging examination, including the explanation of examination principles, precautions and possible adverse reactions before the examination, facilitating the establishment of correct knowledge. In addition, the nursing staff informed the patients of the possible adverse reactions during the examination, which were promptly managed by the nursing staff, which to a certain extent eased the nurse-patient relationship, enhanced the patient's sense of security, and alleviated the patients' negative emotions. Thus, the implementation of seamless care based on action research contributes to alleviating patients' negative emotions, which was consistent with the findings of Wu L, Zhang L et al.[29]

The limitation of the present study lies in the small sample size, which will be extended in future studies to provide more reliable data and validate the current findings.

Conclusion

The study found that seamless care, compared to routine care, resulted in shorter imaging examination and nursing durations, improved examination cognition, and better mitigation of negative emotions for patients. These findings support the recommendation for the widespread implementation of seamless care in clinical practice.

Data Sharing Statement

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

Ethics Approval and Consent to Participate

This study has been approved by Nanjing Medical University Affiliated Wuxi People's Hospital ethics committee and Patients and their families were informed of the research content and voluntarily signed the informed consent consent. All the methods were carried out in accordance with the Declaration of Helsinki.

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Disclosure

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