

# Investigating the Effectiveness of Continuous Quality Improvement Methods in Preventing the Phenomenon of Pseudo-Poor Electrocardiogram Procedure by Nurses in an Emergency Care Unit

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**Abstract:** *Objective:* To investigate the effect of applying continuous quality improvement methods on preventing the phenomenon of pseudo-poor electrocardiogram (ECG) procedures by nurses in the emergency care unit. *Methods:* The study was conducted in Shangluo Central Hospital Shaanxi from August 2020 to August 2021, and 200 emergency patients who received ECG during this period were selected for the comparative study, and grouped into two groups: the control group was given routine management, while the experimental group was managed by continuous quality improvement. The two groups were compared in terms of pseudo-differences in ECG procedures. *Results:* The patients in the experimental group had a higher rate of qualified ECG readings and procedures, and a lower rate of pseudo-errors and nursing disputes, all of which were significantly different from the control group ( $P < 0.05$ ), which is significant, and the experimental group had a better effect. *Conclusion:* When ECG examination is carried out in the emergency care unit, the application of continuous quality improvement management methods is conducive to improving the quality of ECG examination, reducing the incidence of pseudo-discrepancy, and providing a reliable reference for clinical diagnosis and treatment.

**Keywords:** Continuous quality improvement; Emergency care unit; Electrocardiogram; Artifact phenomenon

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## 1. Introduction

Electrocardiography (ECG) is a common examination in the clinic and is generally completed by the technicians in the ECG room. However, the emergency room typically lacks a specialized ECG technician. When emergency patients require an ECG examination, ensuring prompt technician arrival at the scene becomes challenging. Moreover, patients' conditions in the emergency room can change rapidly, potentially leading to delays in patient care. Therefore, it is necessary for nurses to perform ECG procedures to assist in the doctor's diagnosis and treatment<sup>[1]</sup>. Nevertheless, in terms of practical implementation, there remains a certain degree of inadequacy among nursing staff when conducting routine ECG procedures. This inadequacy can lead to

pseudo-differential phenomena, potentially biasing the doctor's judgment of the patient's condition and posing a serious threat to the patient's life and health. Continuous quality improvement is developed upon total quality management principles, emphasizing comprehensive and ongoing quality management to enhance overall management quality<sup>[2]</sup>. Based on this, this study explores the effect of giving nursing staff continuous quality management on the incidence of pseudo-differences in ECG examination, taking patients in the emergency care unit of Shangluo Central Hospital Shaanxi as an example.

## **2. Materials and methods**

### **2.1. General information**

A total of 200 patients who received treatment at the emergency department of Shangluo Central Hospital Shaanxi between August 2020 and August 2021 were selected for ECG examination, of which there were 112 males and 88 females, with the oldest of the patients being 89 years old and the youngest being 22 years old, and the mean age was  $45.34 \pm 3.22$ ) years. The patients were divided into two groups and given different management by the examining nursing staff, named as experimental and control groups. The difference between the two groups was that the nursing staff given the ECG examination received different management, and all other general data were not significantly different ( $P > 0.05$ ), and would not affect the comparative test. The study was carried out after passing the approval of the Ethics Committee of the hospital, and all patients signed the informed consent.

### **2.2. Methods**

The nursing staff of the control group received routine management, and during the examination, the patient's position was arranged, the limb lead was connected to the chest lead, and then the ECG machine was activated, the ECG was traced, and the patient's name, gender, and age, etc. were labeled on the ECG paper with the procedure time.

The nursing staff of the patients in the experimental group received continuous quality improvement management, and in the specific implementation process, it was necessary to first promote the establishment of a continuous quality improvement team, which included the head nurse of the emergency department, nurses in charge of the emergency room and nursing staff, and a full-time staff of the equipment department, in which the head nurse of the emergency department acted as the head of the team. In the specific development of the work, the team members clarified the main factors for the occurrence of ECG pseudo-differentials, established a questionnaire, and clarified that the causes mainly included incomplete procedure management, inaccurate setting of ECG monitor parameters, and patient factors. The analysis of its causes concluded that it was mainly related to the lack of training and learning of nursing staff, deficiencies in their knowledge of safety risks, and the hospital lacked specialized training for nursing staff, which made it difficult for personnel to detect abnormalities promptly, and so on. Finally, according to the actual situation, the implementation of continuous quality improvement was carried out. This included strengthening the stratified management of nursing personnel in the emergency intensive care unit (EICU), promoting the staff of the cardiac electrophysiology department to conduct personnel training and explain the knowledge of ECG procedure technology skills to the nursing personnel in EICU, having the head nurse of the EICU explain the parameter settings of ECG and related theories, and conducting on-site demonstration. The instrument manufacturers were invited to explain the instrument parameters, instrument use performance, and procedure precautions. Key nurses in the EICU were also sent to the intensive care unit (ICU) for further study and instructed other EICU nursing staff after completion. It is essential to ensure that the personnel can correctly read the critical ECG report, and strengthen

the daily maintenance and inspection of the ECG machine. Secondly, the procedure of ECG needs to be revised, and the procedure of the ECG machine should be printed and posted beside the ECG machine, instructing personnel to operate according to the procedure. Moreover, regular quality inspection was organized, and the group conducted quarterly spot checks on the ECG inspection of EICU nurses to clarify their deficiencies and formulated new corrective measures to promote the continuous improvement of quality.

### 2.3. Observation indexes

The procedures of ECG and the incidence of nursing disputes in the two groups were compared and analyzed.

### 2.4. Statistical analysis

Data analysis was conducted using SPSS 20.0 software. The statistical content of data information mainly involves measurement data and count data, which are expressed by mean  $\pm$  standard deviation (SD) and [ $n$  (%)], respectively. After the completion of the data statistics, the results need to be verified, and the process mainly applies the  $t$ -test and the  $\chi^2$  test, and the comparison and analysis are completed. The difference between the results of the two groups was considered statistically significant if the  $P$  value was less than 0.05.

## 3. Results

**Table 1** shows that the experimental group has a higher rate of qualified ECG readings, a higher rate of qualified procedures, a lower incidence of pseudo-discrepancy, and a lower incidence of nursing disputes as compared to the control group ( $P < 0.05$ ).

**Table 1.** Comparison of ECG pass rate and nursing disputes between the two groups [ $n$  (%)]

Group	ECG reading pass	Qualified in ECG procedures	Pseudo-poor ECG procedures	Nursing disputes
Control group ( $n = 100$ )	98 (98.00)	97 (97.00)	3 (3.00)	1 (1.00)
Experimental group ( $n = 100$ )	85 (85.00)	86 (86.00)	11 (11.00)	6 (6.00)
$\chi^2$	8.607	7.596	5.449	3.294
$P$	< 0.05	< 0.05	< 0.05	< 0.05

## 4. Discussion

EICU is an important department in the clinic, and the patient's condition is usually critical and changes rapidly, which requires timely diagnosis and treatment of the patient<sup>[3]</sup>. Nursing staff are the first observers of the patient's condition changes, their accurate mastery of the ECG procedure method ensures timely judgment of the patient's ECG situation and provides judgment guidance for doctors. However, according to relevant data, EICU nursing staff are still deficient in the use of electrocardiograms, with weak awareness and non-standardized skills, resulting in a high incidence of pseudo-differential electrocardiograms, which is not conducive to clinical diagnosis and treatment<sup>[4]</sup>. Continuous quality improvement is a comprehensive quality management method that emphasizes more on the management of quality links and quality processes, which can improve the deficiencies in the work, and promote the continuous improvement of service quality, thereby better meeting people's expectations and improving nursing satisfaction. When applying the continuous quality improvement method to the work of nursing staff in EICU, the skills training of nursing staff can be carried out to improve the operating skills and knowledge of ECG monitors and promote the ECG monitoring ability of

nursing staff<sup>[5]</sup>. At the same time, continuous quality improvement can strengthen the nursing staff's memory of the ECG values and their impression of the ECG, which is more conducive to improving the staff's operating skills. Finally, continuous quality improvement can improve the safety awareness of nursing personnel in EICU, revise the procedure specification of ECG, ensure that nursing personnel implement it according to the protocol, and effectively avoid the occurrence of pseudo-differential phenomenon<sup>[6]</sup>. Therefore, its clinical application effect is remarkable.

In summary, the application of continuous quality improvement management methods in the work of ECG examination in the emergency care unit has a remarkable effect, which is conducive to improving the quality of ECG examination and reducing the incidence of pseudo-differentials. Hence continuous quality improvement management methods should be widely promoted and utilized.

## Disclosure statement

The author declares no conflict of interest.

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