



## **Effect Evaluation of Continuous Quality Improvement in the Management of Surgical Reuse Instrument Cleaning in Disinfection Supply Center**

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### **ABSTRACT**

**Objective:** *To investigate the effectiveness of continuous quality improvement in the management of surgical reuse instrument cleaning.*

**Methods:** *A total of 1000 surgical instruments that were cleaned and disinfected in the hospital disinfection supply center of our hospital from January 2020 to January 2022 were selected and randomly divided into Observation Group (OG) and Control Group (CG), with 500 instruments in each group. The CG was under routine management, while the OG was implemented with detailed interventions. The quality of nursing management, cleaning effect, satisfaction of instrument cleaning and disinfection effect, instrument consumption and adverse events of surgical instrument packaging were compared between the two groups.*

**Results:** *The occurrence of surgical instrument injury in the OG was reduced compared to the CG ( $P < 0.05$ ). The total incidence of adverse events of surgical instrument packaging in the OG was declined relative to the CG ( $P < 0.05$ ). The qualified rate of instrument microscopy, simulated pollutant cleaning and Kjeldahl test in the OG were increased compared to the CG, and the bacterial residue rate was decreased compared to the CG ( $P < 0.05$ ). The satisfaction of instrument use in OG was elevated in comparison with CG ( $P < 0.05$ ). The scores of cleaning process, classification packaging, inventory storage and environmental management quality in OG were increased compared to CG ( $P < 0.05$ ). The scores of safety awareness, risk awareness, service awareness and timely supply of equipment in the OG were increased compared to the CG ( $P < 0.05$ ).*

**Conclusion:** *The use of continuous quality improvement management can significantly improve the quality of surgical mechanical cleaning, decline the occurrence of adverse events as well as instrument damage, and help to improve the quality of instrument management and physician satisfaction, which is worthy of clinical reference.*

**Keywords:** *Disinfection supply center, Surgical reuse instrument, Clean management, Disinfectant, Continuous quality improvement*

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### **INTRODUCTION**

The disinfection supply center is an important department of the hospital, playing a role in cleaning and disinfecting the hospital's equipment and environment [1]. The quality of disinfection has an important relation with the life safety of patients. With the development of medical technology, disinfection supply center, as a crucial department for the control together with prevention of nosocomial infection, has an increasingly important role in hospitals [2]. Disinfection and cleaning of medical equipment exerts a significant role in controlling nosocomial infection. In recent years, people's legal awareness has enhanced, and more attention will be paid to medical disputes. Medical disputes caused by cross infection caused by medical equipment are relatively common, so the quality control of hospital disinfection supply center is very important. Detailed intervention is more detailed and comprehensive and more precise control over all links of the disinfection supply center [3]. Continuous quality improvement is a quality

management mode, which is based on the total quality management and carries out intensive management through analyzing the current situation, establishing objectives, finding and solving problems and evaluating the effect, so as to achieve the purpose of continuous improvement of work quality [4]. The purpose of this study was to investigate the impacts of continuous quality improvement on the cleaning management of surgical reusable instruments.

## MATERIALS AND METHODS

### General data

A total of 1000 surgical instruments that were cleaned and disinfected in the hospital disinfection supply center of our hospital from January 2020 to January 2022 were selected and randomly divided into Observation Group (OG) and Control Group (CG), with 500 instruments in each group. Types of instruments in the CG: 130 Pieces of surgical knives, 102 pieces of surgical scissors, 68 pieces of surgical forceps, 80 pieces of surgical tweezers, 53 pieces of uterine suction tubes, 47 pieces of sterilizing bowls, and 20 pieces of speculums. Types of instruments in the observation group: 128 Pieces of surgical knives, 104 pieces of surgical scissors, 70 pieces of surgical forceps, 76 pieces of surgical tweezers, 51 pieces of uterine suction tubes, 50 pieces of sterilizing bowls, and 19 pieces of speculums. There was no significant difference between the two groups ( $P>0.05$ ), indicating comparability. This study was reviewed and approved by the hospital perception committee.

### Methods

The CG was under routine management, and the nursing staff disinfected and sterilized the surgical instruments according to the operation specifications of the disinfection supply center. The OG was implemented with detailed interventions; the specific processes were as follows: The relevant operation training of nursing staff should be strengthened and the service awareness and safety awareness should be improved. The grouping should be reasonable, the evaluation system should be developed, the group management should be performed, the situation should be summarized every week and the rewards and punishments should be implemented, so that the nursing staff of the disinfection supply center could find errors and review timely. The processing of working process should implement in detail, the relevant personnel should be trained, and the skills of disinfection supply center staff should be improved. The work flow should pay more attention to standardized treatment. The medical instruments are dried and packaged after disinfection. The packaged instruments are sent to relevant departments by special vehicles and the transport vehicles and recovery vehicles are distinguished to avoid confusion. The environment and functional area of the disinfection and supply center should be managed and the disinfection and air purification of the supply center should be conducted regularly every day. A professional map should be made to facilitate the relevant personnel to decompose the equipment and master the cleaning focus. The name and model of the device should be labeled, the details and the requirements of each link should be paid attention to and the relevant information should be made into a manual, followed by distributing it to the relevant personnel for the convenience of learning and searching. A daily summary of the work should be made, any problems and doubts should be reported in time and the problems should be analyzed and proposed solutions through group discussion. The regular quality analysis team meetings should be conducted, the problems related to the recent work should be summarized, followed by analyzing the causes, making corrections and further optimizing the process.

### Observation indicators

- Nursing management quality score. Nursing management quality score adopted the way of questionnaire survey to evaluate the nursing staff's safety awareness, risk awareness, service awareness and timely supply of equipment. The full score of each was 100 points, the higher the score, the higher the quality of nursing management.
- The cleaning and disinfection effects of the two groups of instruments were compared and Adenosine Triphosphate (ATP) bio fluorescence detector was used to detect the two groups of instruments. It mainly included the qualified rate of equipment microscopic inspection, the qualified rate of simulated pollutant cleaning, the qualified rate of jell test ( $ATP \leq 45$  was qualified for the light value unit) and the bacterial residue rate (bacterial number  $<20$  cfu/cm<sup>2</sup> and no pathogenic bacteria detected was no bacterial residue).
- The satisfaction of doctors and nurses on the cleaning and disinfection effect of instruments in the two groups was compared. That was, after the completion of instrument cleaning and disinfection, the disinfection supply center sent issue questionnaires to physicians and nurses to evaluate their satisfaction with the effect of instrument cleaning and disinfection. The total score was 100 points, and the higher the score was, the higher the satisfaction with the effect of instrument cleaning and disinfection.
- Statistic of instrument consumption, oral instruments appeared cracks, function loss, mutilation, damage, etc.
- The incidence of adverse events in the packaging of surgical instruments was compared between the two groups.
- The nursing management quality score adopted the questionnaire survey to evaluate the nursing staff's safety awareness, risk awareness, service awareness and timely supply of equipment. The full score of each item was 100 points. The higher the score was, the higher the quality of nursing management was.

**Statistical analysis**

SPSS 20.0 software was used for statistical analysis. T test was used for measurement data and X<sup>2</sup> test was used for counting data. P<0.05 was considered statistically significant.

**RESULTS**

**Comparison of the occurrence of surgical instrument injury between the two groups**

The occurrence of surgical instrument injury in the OG was reduced compared to the CG (P<0.05), as shown in Table 1.

**Table 1.** Incidence of surgical instrument injury in the two groups

Groups	n	Crack	Loss of function	Mutilation	Total
Observation group	500	4	3	5	14 (2.8%)*
Control group	500	11	10	8	41 (8.2%)

Compared with the control group, \* was P<0.05.

**Comparison of the occurrence of adverse events in surgical instrument packaging between the two groups**

The total incidence of adverse events of surgical instrument packaging in the OG was declined relative to the CG (P<0.05), as shown in Table 2.

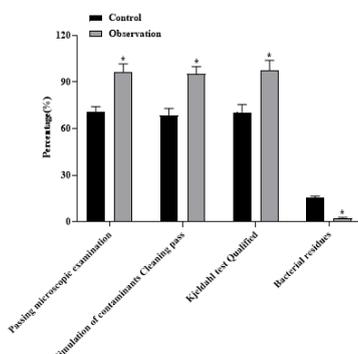
**Table 2.** Incidence of adverse events of surgical instrument packaging in the two groups

Groups	n	Incompletely sealed packing	Wrong type of equipment	Identification error	Total incidence rate
Observation group	500	5	4	7	16 (3.20%)*
Control group	500	13	15	32	60 (12.00%)

Compared with the control group, \* was P<0.05

**Comparison of cleaning and disinfection effect between the two groups**

The qualified rate of the OG was higher than that of the CG for endoscopic examination, simulated pollutant cleaning and Kjeldahl test, while the bacterial residual rate was lower than that of the CG (P<0.05), as shown in Figure 1.



**Figure 1.** Comparison of cleaning and disinfection effect between the two groups. Compared with the control group, \* was P<0.05.

**Satisfaction with the use of the instruments in two groups**

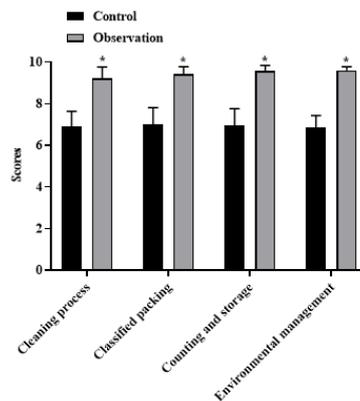
The satisfaction of instrument use in OG was enhanced compared to CG (P<0.05), as seen in Table 3.

**Table 3.** Satisfaction with the use of the instruments in two groups.

Groups	n	Satisfaction	Partial satisfaction	Dissatisfaction	Satisfaction rate
Control group	500	220 (44.00)	180 (36.00)	100 (20.00)	80.00
Observation group	500	270 (54.00)	21 (42.00)	20 (4.00)	96.00*
χ <sup>2</sup>				6.061	6.061
P				0.014	0.014

**Comparison of the management quality of surgical instruments between the two groups**

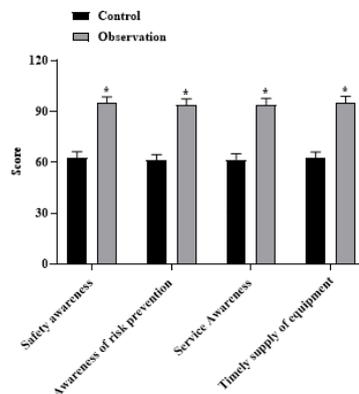
The scores of cleaning process, classification and packaging, inventory and storage and environmental management quality in the OG were all increased compared to the CG (P<0.05), as shown in Figure 2.



**Figure 2.** Comparison of the management quality of surgical instruments between the two groups. Compared with the control group, \* was P<0.05.

**Comparison of nursing management quality scores between two groups**

Scores of safety awareness, risk awareness, service awareness and timely supply of equipment in the OG were all higher relative to those in the CG (P<0.05), as shown in Figure 3.



**Figure 3.** Comparison of nursing management quality scores between two groups. Compared with the control group, \* was P<0.05.

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## DISCUSSION

As an important department of the hospital, the disinfection supply center is responsible for the cleaning and disinfection of the entire hospital's medical instruments and the elimination of the environment [5]. The nursing management of disinfection supply center plays an important part in the control of nosocomial infection as well as the safe use of medical equipment [6]. Therefore, the nursing management of the disinfection supply center is very important. It is essential to ensure the effective management and control of each link of the supply room.

Conventional management is more scattered, lack of unified management, many drawbacks. Detail management reduces the occurrence of bad behaviors by standardizing the details of the disinfection supply center and standardizing the technical operation of personnel from the details [7]. The implementation of detail management can reduce the defect rate and improve the quality of disinfection work by combining specific work and refining the management of environment and goods [8]. Continuous quality improvement is standardize the relevant system and management scope on the basis of scientific management to achieve excellence and strictly implement process control, plan and improve each link and detail, clarify the operation process, improve the overall operation efficiency and constantly improve and optimize the process to ensure the effectiveness of execution. Studies have shown that the intervention of continuous quality improvement management can reduce the occurrence of nosocomial cross infection and increase the recovery of patients [9]. The application of continuous quality improvement management measures in the disinfection supply center should be through clearer and more detailed standardized operations on management details and processes and perform relevant group training. In particular, the decomposition and cleaning key points of the finer instruments were explained and the methods of acute separation were guided, so that the staff could have a better understanding of the medical instruments. Clarify the division of labor, handle the continuity of each link and the effectiveness of work and avoid medical disputes by formulating potential risk prevention and treatment countermeasures. Optimize the process, timely pretreatment and avoid cleaning difficulties and equipment loss caused by dry dirt. The results of this study showed that the qualified rates of cleaning, packaging and sterilization of surgical instruments in the OG were higher than those in the CG ( $P<0.05$ ), suggesting that the application of continuous quality improvement management could improve the qualified rates of cleaning, packaging and sterilization of surgical instruments in the disinfection supply center and improve the management effect of surgical instruments. This conclusion was basically consistent with the research results of Sun, et al. [10-12]. The results of this study showed that the total qualified rate of surgical instrument cleaning in the OG was higher than that in the CG ( $P<0.05$ ). The total incidence of adverse events of surgical instrument packaging in the OG was lower than that in the CG ( $P<0.05$ ). The total incidence of surgical instrument injury in the OG was lower than that in the CG ( $P<0.05$ ). The scores of safety awareness, risk awareness, service awareness and timely supply of equipment in the OG were higher than those in the CG ( $P<0.05$ ). These results were very close to related literature reports. It could be seen that continuous quality improvement management played a very positive role in improving the qualified rate of surgical instrument cleaning and disinfection, reducing the occurrence of adverse packaging events and instrument damage and improving the quality of nursing management. The reason is that continuous quality improvement management can optimize the surgical instrument processing process, strengthen the inspection and management of special personnel, ensure the scientific and standard operation of the receiving, cleaning, disinfection and maintenance of surgical instruments, reduce the occurrence of instrument defects and losses and ensure the cleaning quality of instruments to the maximum extent. Besides, regular special training of nursing staff, increase nurses' understanding of the knowledge of surgical instruments, effectively reducing the gap between nursing staff, improve nursing staff safety awareness, risk prevention consciousness, service consciousness, etc., can further improve the comprehensive quality of nursing staff, ensure the quality of surgical instruments cleaning standards. In addition, regular evaluation of the work of nursing staff can sustainably improve the professional quality of nursing staff, regular analysis of the management of surgical instruments, check the gaps, summarize and analyze the existing problems in the work, and put forward effective rectification measure can provide a reference for continuous improvement of the management quality of surgical instruments, as well as ensure the qualified rate of surgical equipment cleaning and disinfection can be further improved.

## CONCLUSION

In summary, the application of continuous quality improvement management can significantly improve the quality of surgical mechanical cleaning, reduce the occurrence of adverse events and instrument damage, and help to improve the quality of instrument management and physician satisfaction, which is worthy of clinical reference.

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