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Influence of Tripartite Handover System on Sterilization Quality of Dressing Packs in Medical Sterile Supply Center

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ABSTRACT: Objectives This paper investigates the impact of implementing a tripartite handover system on the sterilization quality defects of dressings packs in a medical sterile supply center. **Methods** The control group consisted of 235,269 dressing packs routinely sterilized from January to December 2020, while the observation group adopted 245,284 dressing packs routinely sterilized from January to December 2021. All dressing packs were collected from the Synergy Health Suzhou Medical Sterile Supply Center. The paper compared the quality defect control of dressing pack sterilization before and after the implementation of a tripartite handover system, as well as the customer satisfaction evaluation on improving sterilization supply service in twenty hospitals before and after the improvement of sterilization service. **Results** The control and observation groups had total defect rates of 0.47‰ and 0.21‰, respectively, and the four quality defect rates of cleaning, packing, sterilization, and transfer, as well as the nine specific quality defect rates, were all improved (P<0.05). Customer satisfaction increased to 93.8 points, and the total satisfaction rate was 8.44%, among which four evaluation dimensions were improved (P<0.05). **Conclusion** The implementation of the tripartite handover system can effectively improve the sterilization quality of dressing packs in the Medical Sterile Supply Center and improve customer satisfaction, which is worth popularizing and applying.

KEY WORDS: Tripartite handover; Medical sterilization supply center; Sterilization quality; Defect control; Satisfaction

Introduction

The sterile supply center, known as the "heart of the hospital", plays a critical role in the disinfection and sterilization of all reusable medical instruments, appliances, and articles, of which dressing sterilization is one of the important tasks. Many more hospitals prefer to outsource the washing of medical textiles to washing service agencies as the logistics management of medical institutions becomes more socialized in China[1]. Cleaning and folding are handled by washing service agencies, while sterilization is handled by hospitals. Synergy Health Suzhou Medical Sterile Supply Center[2] (hereinafter referred to as the "Medical Sterile Supply Center") is an independent medical institution in charge of sterilizing dressing packs in all hospitals that have outsourced medical textile washing. A tripartite handover of "Hospital-Washing Service Agencies-Medical Sterile Supply Center" is thus generated. Extensive research has analyzed and solved quality defects of sterilizing dressing packs. In this study, Synergy Health investigated the handover content through the tripartite system, and compared and analyzed the improvement of quality defects before and after the system was implemented for effectively enhancing the quality of dressing sterilization.

1. Materials and methods

1.1 Materials

235,269 routinely sterilized dressing packs before improvement were collected from January to December 2020 and used as the control group. 245, 284 routinely sterilized dressing packs after improve-

ment were collected from January to December 2021 and used as the observation group. The types and the control of various quality defects before and after improvement were calculated. The customer satisfaction survey was conducted in 20 hospitals and the results were compared in the two groups, and the changes in each value of the scale were analyzed.

1.2 Methods

The reuse and reprocessing of sterilized medical textiles were sorted out (see Figure 1). In Handover point 1, washing and recycling of medical textiles were handed over between hospitals and washing service agencies; in Handover point 2, cleaning of dressing packs was handed over between washing service agencies and the Medical Sterile Supply Center; in Handover point 3, sterile dressing packs were handed over between the Medical Sterile Supply Center and hospitals. Three points form a closed loop. The procedure in the control group is as follows: washing service agencies depart after delivery → the Medical Sterile Supply Center performs quantity registration, sterilization, and distribution → the hospital receives and uses them, and discovers unclear definitions of responsibility for quality defects during use. The observation group established and implemented a tripartite handover system based on the control group that covered Handover points 2 and 3 which were directly related to the sterilization quality of dressings.

1.2.1 Establishment of a tripartite handover system

The quality defects in the control group were summarized and a tripartite meeting with hospitals and Washing Service Agencies was convened to discuss and assign responsibilities for defects, and a tripartite handover system was established.

(1) Training program: Regular training for relevant personnel who made, sterilized, received, and used dressings was conducted, in which surgical sterility knowledge was popularized so that all participants could strengthen their awareness of the infection control and the safety impact on patients resulted from sterilization failure and absence of sterility barriers caused by quality issues of dressing pack sterilization, thus improving their professional competences and quality awareness. Standardization of the production methods and requirements of dressing packs and procedures improves the efficiency of sterilization, guarantees the quality of dressings, and reduces the occurrence of defects[3].

(2) Procedure standardization: ① A receiving check system and its procedure of clean dressing were established at Handover point 2 to sample, inspect and record on the cleaning and packing quality of washing service agencies. The daily sampling quantity of dressing packs per customer is 5%, with requirements of no blood stains, stains, damage, moisture, moderate packing tightness, color-changing tape outside the pack, correct pack name, no more than 50 cm*30 cm*30 cm in size, and no more than 5 kg in weight[4-5]. ② A sterilization quality inspection and distribution system was made. The quality compliance criteria include passing the annual performance verification of sterilizers, annual quality test-

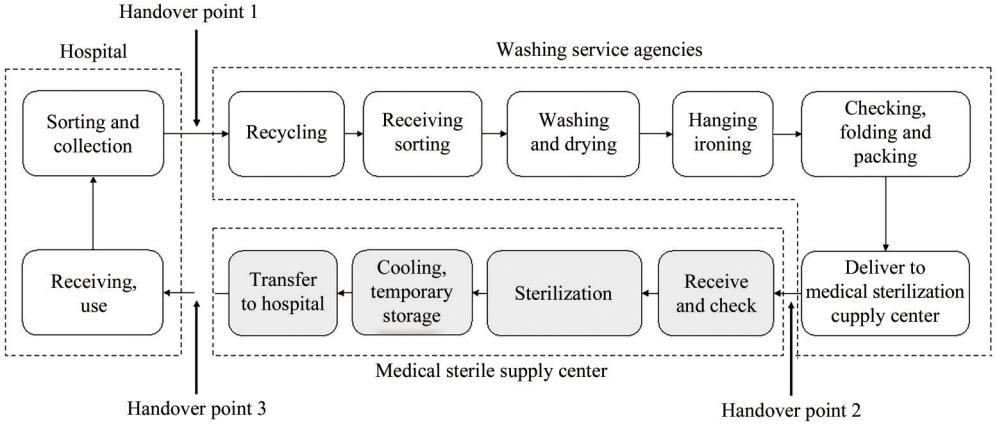

Figure 1 Reprocessing for reuse of medical textiles

ing of steam, biomonitoring and air leakage testing for the week, and BD testing for the day. The above requirements should be all qualified before proceeding to the next step. After the sterilization equipment is started, any abnormalities in the sterilization process should be monitored. After the sterilization, the sterilization release parameters should be checked and reach the set value (that is, the temperature is 134 ℃, the relative pressure is 201.7-229.3 kPa, and the time is 4 min 30 s) and the appearance of the aseptic pack should be inspected (color change of sterilization indicator is qualified; no broken bag, dirty bag and wet bag). All indicators should be passed before release. ③ An aseptic dressing pack transportation system and its procedure were formulated. It requires that the distributors can load the dressing packs only after they have cooled down thoroughly; the transfer trolley (material and airtightness follow *Technical Guidelines: Transport of Infectious Clinical Waste* (UN 3 291)[6]) needs to be cleaned, disinfected and dried thoroughly before use, otherwise, it will produce contamination and wet packs; the delivery logistics vehicle should be cleaned and disinfected following the specifications, and the intra-hospital transfer needs to be kept steady; the transfer trolley should be draped with a waterproof cover on a rainy day to prevent the packs from getting wet. ④ A feedback system and its procedure for receiving sterile dressings in the hospital were set at Handover point 3. The hospital must confirm the safety and effectiveness of aseptic dressing packs through visual inspection before receiving and using the packs[7]. Inspection items should conform to requirements, including appearance (e.g. qualified indicator color change, no broken, dirty, and no wet pack) and label information (e.g. the delivery site, product name, and expiration date). When opening the packs, the hospital should check if the contents are clean, unbroken, and dry, and if the color change of the chemical indicator card is qualified. Any abnormalities should be fed back timely and be recorded in the service report registration form.

(3) Defining responsibilities and communication: ① Responsibilities should be clearly defined, and washing service agencies should be accountable for quality issues related to dressing cleaning and packing (such as oversized and overweight dressing packs, residual blood stains, stains, holes, and wet bags caused by humidity, etc.). The Medical Sterile Supply Center is in charge of sterilization quality issues (such as label errors, expiration errors, delivery errors, wet packs outside, sterile article transportation pollution, etc.). The hospital should be in charge of determining the size and weight of dressing packs so that oversized and overweight bags are avoided due to arbitrary addition. ② The handover personnel should be fixed and they should remain cautious on quality issues for finding out errors. ③ Communication channels, such as a WeChat group and an online customer service platform should be set to identify issues and provide feedback timely and thus to communicate fast and effectively and prevent further baneful effects.

1.2.2 Classification of dressing packs quality defects

There are numerous causes and links for quality defects in dressing packs, and the same defect can occur in multiple links. For example, wet and dirty bags can occur before and after sterilization, or inside and outside the bag. To analyze causes and improve the procedures, quality issues are classified into four categories: ① Cleaning defects such as dirty bags, broken bags, and wet bags inside bags (e.g. fabric becomes wet during packing). ② Packing defects, such as broken pack, dirty pack, loose pack, oversized or overweight pack, incorrect label, incorrect expiration date, etc. ③ Sterilization defects, such as wet pack inside (due to sterilization), wet packs outside (due to insufficient cooling time), dirty pack, etc. ④ Transfer defects, pollution, damage, wet pack outside of the pack, etc. (wet pack caused by non-drying transfer tools).

1.3 Observation indicators

1.3.1 Quality defects

The service report registration form was used to record the quality defects of dressing packs in two groups, including the time of complaint feedback, hospital, complainant, complaint channel, dressing

pack name, production serial number, defect type, defect quantity, relevant details description, immediate measures, improvement measures, relevant responsible units, responsible persons, recorders, etc. Statistics and observations were made on the changes in defect types, frequencies, defect rates, and effects before and after improvements in cleaning, packing, sterilization, and transfer.

1.3.2 Defect control condition

Four types of quality defects were further investigated in two groups of dressing packs, all of which included nine types of specific quality defects, namely oversized and overweight packs, wet packs inside, dirty packs, broken packs, delivery errors, label errors, expiration errors, transfer pollution, and wet packs outside. Statistics and observations of specific quality defects before and after the implementation of the tripartite handover system were compared and analyzed.

1.3.3 Customer satisfaction

The Customer Satisfaction Survey and Analysis Table were used by both groups to investigate, analyze, and compare the service quality of dressing sterilization, which was evaluated on four dimensions: professional ability, product quality, timeliness, and service quality. The Likert scale was used with a full score of 25 assigned to each dimension and a total score of 100. The higher the score, the more satisfied the customer.

1.4 Statistical analysis

Relevant statistical software was adopted for data processing and analysis. The counting data is expressed as n (‰), and the difference is statistically significant (P<0.05).

2. Results

2.1 Comparison of quality defects of dressing packs between two groups

The results show that the defect rate of the control group is 0.47‰ and that of the observation group is 0.21‰. The defect rate and total defect rate of the observation group in cleaning quality, packing quality, sterilization quality and transfer quality are lower than those of the control group, with statistical significance (P<0.05), as shown in Table 1.

2.2 Comparison of defect control of dressing packs between two groups

Nine types of specific quality defects are compared between the control group and the observation group. The results show that the incidence of all quality defects in the observation group is statistically lower than that in the control group (P< 0.05), as shown in Table 2.

2.3 Comparison of customer satisfaction scores between the two groups

According to the survey results of customer

Table 1 Comparison of quality defects of dressing packs between two groups

Group	Total number of defects in the dressing packs	Total defect rate (‰)	Quality defect rate of each item [n(‰)]			
			Cleaning quality defects	Packing quality defects	Sterilization quality defects	Transfer quality defects
Control group (n=235,269)	110	0. 47	16(0. 07)	40(0. 17)	27(0. 11)	27(0. 11)
Observation group (n=245,284)	51	0. 21	8(0. 03)	18(0. 07)	13(0. 05)	12(0. 05)

Comparison between two groups when P =0. 03

Table 2 Comparison of defect control of two groups of dressing packs [n(‰)]

Group	Oversized and overweight	Wet packs inside	Dirty packs	Broken packs	Delivery errors	Label errors	Expiration date errors	Transfer pollution	Wet packs outside
Control group (n=235,269)	30(0. 13)	6(0. 03)	10(0. 04)	10(0. 04)	12(0. 05)	12(0. 05)	15(0. 06)	10(0. 04)	5(0. 02)
Observation group (n=245,284)	14(0. 06)	3(0. 01)	5(0. 02)	4(0. 02)	5(0. 02)	6(0. 03)	7(0. 03)	3(0. 01)	4(0. 02)

Comparison between two groups when P =0. 04

satisfaction between the observation group and the control group, the improvement rate of total customer satisfaction is 8.44%, and the scores of professional ability, product quality, timeliness and service quality of the observation group are better than those of the control group (P<0.05), as shown in Table 3.

3. Discussion

Dressing disinfection and sterilization is gradually highly valued by medical staff as an important means of controlling exogenous infection in hospitals[8]. Several links to it, such as cleaning, manufacturing, sterilization, loading, transfer, and receiving, are prone to errors. Thus, issues such as ambiguous responsibility definitions and communication barriers may lead to quality defects in dressing sterilization or even impede the diagnosis and treatment and put patients' lives in danger. According to the findings of this study, the total defect rate before and after the implementation of the tripartite handover system is 0.47‰ and 0.21‰, respectively, indicating that the tripartite handover system effectively controls dressing sterilization defects and integrally improves the sterile supply quality of dressing packs.

The defect rates of dressing cleaning quality, packing quality, sterilization quality, and transfer quality were reduced to 0.03‰, 0.07‰, 0.05‰, and 0.05‰, respectively, through training, standardizing and refining procedures and processes, and clarifying responsibilities and communication mechanisms. Oversized and overweight, wet pack inside, dirty pack, broken pack, delivery error, label error, expiration date error, transfer pollution, and wet packs outside the packs quality defect rates were lowered to 0.06‰, 0.01‰, 0.02‰, 0.02‰, 0.02‰, 0.03‰, 0.03‰, 0.01‰ and 0.02‰ respectively. All defects have been improved (P<0.05).

Furthermore, four dimensions of customer satisfaction were investigated: ① Professional ability, which is to evaluate employees' professional knowledge, speed in answering professional questions, problem-solving effectiveness, etc. ② Product quality, which is to assess the quantity, frequency, and responsibility for quality defects in dressing pack cleaning, packing, sterilization, and transfer. ③ Timeliness, which is to evaluate customer feedback approaches, tripartite communication methods, problem-solving timeliness, etc. ④ Service quality, with emphasis on evaluating response time, flexibility, and effectiveness in dealing with problems, as well as the attitude and behavior of service personnel who directly contact with the hospitals. The evaluation results revealed that overall customer satisfaction increased to 93.8 points, with an improvement rate of 8.44% (P<0.05), and the sterilization quality of dressing packs was improved. These findings indicate that overall customer recognition of the medical sterile supply center is gradually enhanced.

4. Conclusion

To summarize, a tripartite handover system is worth popularizing and putting into application because it can effectively improve the sterilization quality of dressing packs in medical sterile supply centers and increase customer satisfaction, thus contributing to controlling infections and guaranteeing patient safety. However, the system should be established and implemented scientifically and effectively due to the differences in the actual situation and needs of each sterilization and supply center, as well as certain distinctions in the procedures related to handover.

Table 3 Comparison of customer satisfaction scores between the two groups

Group	Number of customers	Overall satisfaction (points)	Satisfaction in all dimensions (points)			
			Professional ability	Product quality	Timeliness	Service quality
Control group	20	86. 5	21. 70	21. 30	22. 50	21. 00
Observation group	20	93. 8	23. 40	22. 90	24. 50	23. 00

Comparison between two groups when P =0. 01

References

[1] DUAN Wei, ZHANG Shuling, HAO Xuean. Comprehensive investigation report on disinfection quality of medical fabric washing agencies[J]. Chin J Disinfect, 2019, 36(5): 356-358.

[2] National Health Commission of the People's Republic of China. Basic Standards and Management Specifications of Medical Sterilization Supply Center(Trial), 2018-06-11.

[3] CAO Meifeng. Application of standardized management in surgical dressing supply[J]. Modern Nurses, 2017,(10):152-154.

[4] LOU Liqiong, LI Yunxia. The application effect of the management mode of dressing packing team leader responsibility system in sterile supply center[J]. China Modern Medicine, 2021,28(6):187-190.

[5] National Health Commission of the People's Republic of China. Central Sterile Supply Department Part 2: Standard for operation procedure of cleaning, disinfection and sterilization, WS310.2-2016[S]. Standards Press of China, 2017.

[6] UNITED NATIONS. Recommendations on the transport of dangerous goods Model Regulations[M]. Clinical waste, UN3291.

[7] ZHAO Xili, BAI Li, CAI Tingting, et al. Influencing factors of defective packs in sterile supply center[J]. Chinese journal of nosocomiology. 2022,32(15):2397-2400.

[8] CAO Yang, LIU Kun, YUAN Xiaoning, et al. Investigation on the management of surgical instruments and dressings in 187 hospitals in 14 provinces of China[J]. China Journal of Infection Control. 2018,(7).