

# To explore the effect of quality control cricle in reducing puncture site complications after intervention

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**Abstract:** Purpose : To explore the effect of quality control circle in reducing puncture site complications after intervention. Methods: Forming a group and organizing QCC activities. Running statistics and analyzing the causes of puncture site complications after intervention. Making countermeasures on the basis of analysis results and comparing the effectiveness before and after QCC activities. Results : After QCC activities, the incidence of puncture site complications after intervention decreases significantly. Conclusion : QCC activities play a positive role in reducing puncture site complications after intervention

**Key words:** Quality Control Circle, Intervention, Complication, Incidence Rate

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Quality Control Circle (QCC) originated from the United States and evolved in Japan, mainly for enterprises quality management to improve the quality of products and work efficiency. Nowadays, with the mutual penetration of various fields of society, this kind of management method(QCC) is used in different areas. In recent years, QCC began to be widely used in medical service system and hospital management system. QCC also represents a small bottom-up group which is formed spontaneously and composed of 6-10 medical staffs. In line with a certain procedure, QCC encourages medical staffs to cooperate and brainstorm in a lively form with the purpose of solving problems of low medical quality, poor inner management and deficient core culture. In July 2015, our department organized QCC activities and a QCC group to cope with the problem of puncture site complications after intervention. Since QCC activities, we have worked out better care processes, taken lots of effective measures and finally got satisfied results. Now analytic results of QCC activities are as follows:

## 1. Materials and Methods

### 1.1 Materials

156 patients of our department who undergoing interventional operation from July 1 to September 23, 2015 (cumulative

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12 weeks) were enrolled in this study. Postoperative puncture site complications occur in 26 of 156 patients. The incidence rate was 16.67% including 10 cases of puncture site bleeding, 8 cases of skin blisters, 4 cases of hematoma, 2 cases of forearm compartment syndrome (CS) and 2 cases of radial artery occlusion.<sup>1</sup>

## 1.2 Methods

Forming a QCC group in our department and beginning QCC activities. Running statistics and analyzing causes of puncture site complications after intervention. Making countermeasures and brainstorming on the basis of analysis results. Finally comparing the effectiveness before and after QCC activities.

## 2. Concrete Details Of The QCC activities

### 2.1 Plotting Plato

Based on “Pareto's Law”, Screening complications after intervention and calculating their proportion in all to ensure the key points of improvement : puncture site bleeding (38.47%), skin blisters (30.77%), hematoma (15.38%), forearm compartment syndrome (7.69%), radial artery occlusion (7.69%) and more details were shown in Fig.1. Among these complications, puncture site bleeding, skin blisters and hematoma are account for 84.62% thus become the focus of QCC.

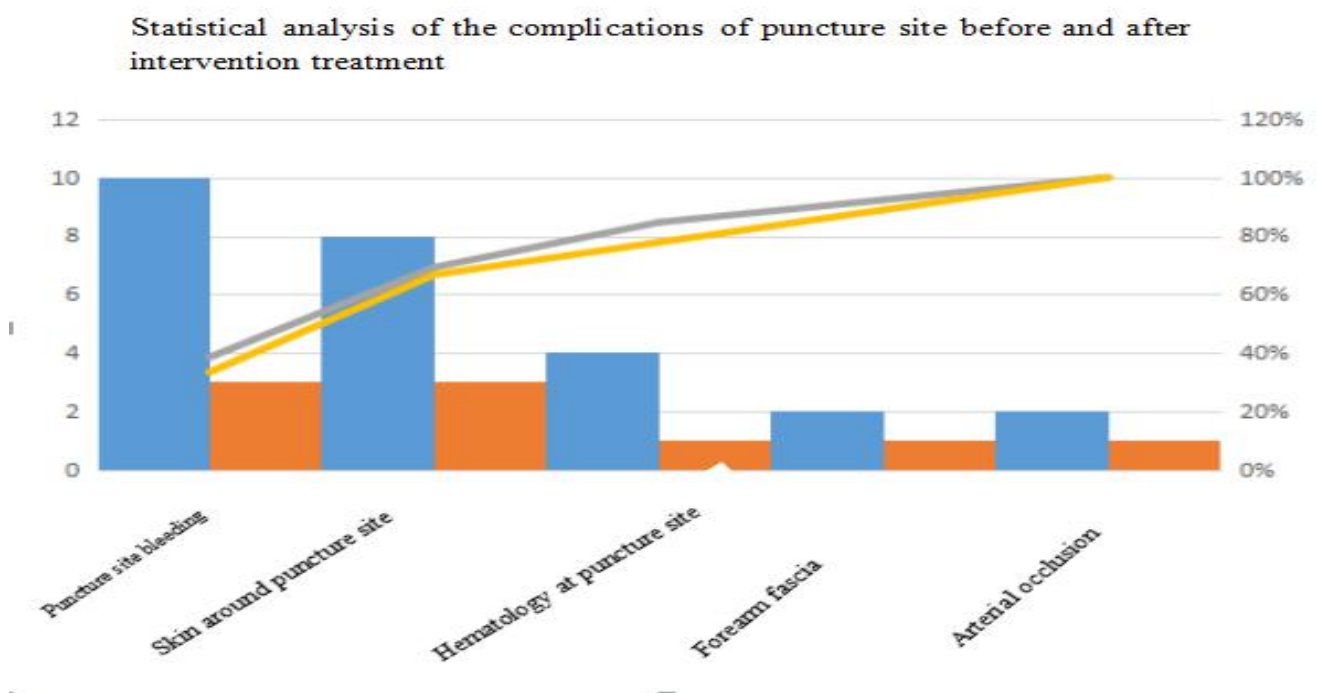


Figure.1

### 2.2 Goal setting

Define the incidence rate of puncture site complications after intervention before improvement as current value, which is 16.67%. According to the setting formulae:  $\text{Targets Value} = \text{Current Value} - \text{Improvement Value} = \text{Current Value} - (\text{Current Value} \times \text{Ability} \times \text{Key Points}) = 16.67\% - (16.67\% \times 76.85\% \times 84.62\%) = 5.83\%$

### 2.3 Main Causes

Analyzing three major complications including puncture site bleeding, skin blister and hematoma. Main factors of three

complications above are: Nursing staffs are incapable of related knowledge about interventional diagnosis and treatment; Few nurses are irresponsible; Substandard postoperative nursing records; Misusing medical equipment like compressors; Lacking of effective communication with relevant departments; Lacking of popular science propaganda about interventional operation and postoperative care.

#### 2.4 Making Countermeasures

Based on the reasons above ,we make 12 corresponding countermeasures. There are 7 members of QCC group, all of whom should score on each countermeasure based on “Pareto's Law”, QCC ability and feasibility. Those score over 75 are considered as practicable countermeasures. In this QCC activities, we selected 6 countermeasures, contents of which are: (1) Organizing periodical training courses on intervention-related knowledge; (2) Making new nursing record lists and standardizing it (3) Communicating effectively with doctors about problems found in practical work and working together to resolve it regularly; (4) Deciding how long to relieve compression according to existing compressors and making normalization of operation; (5) Posting a propaganda poster of which the content is the knowledge of intervention on corridor of the ward; (6) Preparing related-materials of health education during patients' hospitalization.<sup>2</sup>

#### 2.5 Implementation Of Countermeasures

(1) Organizing periodical training courses on intervention-related knowledge; (2) Making new nursing record lists and standardizing it; (3) Communicating effectively with doctors about problems found in practical work and working together to resolve it regularly; (4) Deciding how long to relieve compression according to existing compressors and making normalization of operation; (5) Posting a propaganda poster of which the content is the knowledge of intervention on corridor of the ward; (6) Preparing related-materials of health education during patients' hospitalization

#### 2.6 Making Standard

Making procedural standardized series through countermeasures above to get more standardized procedures and ensure effects of QCC activities.

##### 2.6.1 Standardizing postoperative written documents

Making new nursing records to standardize postoperative nursing procedure. Observing and recording patients' puncture site in different period of time or at different frequency. Detailed methods: In the first hour, observing and recording the situation of puncture site every 15 minutes; In the second hour, recording every 30 minutes; In the course of 3 hours followed, recording every 1 hour. The main contents of the record include: The vital signs of patient; pulsation of dorsalis pedis artery and radial artery; Skin temperature; Whether the fixation of compressor is stable; Whether the puncture site is bleeding; Whether skin blister or hematoma has occurred and so on.

##### 2.6.2 Standardizing the application of medical equipment

To some extent, standardizing the use of compressor will reduce complications. Pay attention to the time of compression which should be adjusted by dose of heparin, types of sheath, operating time and patients' physiological condition. If vago-vagal reflex appears when using the compressor, nursing staffs should readjust even stop using it and immediately call for a consultation.

##### 2.6.3 Standardizing care processes for cardiovascular intervention

Making standardized flow charts of preoperative and postoperative care procedure. Nurses and doctors should make a comprehensive assessment of the patient before operation, which includes pulsation of radial artery and dorsalis pedis artery. Pay attention to the special conditions such as whether the female patient is in the menstrual period; When patients were transferred to the ward, nursing staffs should monitor changes in physiological status, fixation of gauze, blood oozing and so on; Nurses in the intervention room and nurses in the ward should guarantee the integrity and standardization of handover procedure: Whether nursing staffs are serious about handover procedure; Whether completely introducing intraoperative situation including the name and dose of medicines in the operation; Duration of clinostatism which should be determined by puncture site; Making new postoperative nursing records; Following

doctors' orders to treat patient; Observing and recording drug efficacy.

### 2.6.4 Popularization of scientific knowledge to promote health

Making a propaganda process. Dividing therapeutic process of interventional operation into several steps to propagandize : Before operation, nurse-in-charge should do propaganda and one-on-one education work about preoperative procedure and medical care towards patients and their family members; After operation, nurse-in-charge or night nurses should do propaganda about postoperative nursing procedure. Propaganda content involves: immobilization, appropriate time to exercise, scientific diet during hospitalization, excretion time, bedridden elimination training and so on. At the same time, taking advantage of show windows in the ward. For instance, making propaganda poster of procedure of intervention, considerations, basics of care and lots of related knowledge.

## 3. Results

Confirming the effect of QCC activities and evaluating the effect respectively from tangible and intangible aspects.

### 3.1 Tangible Results

After implementation of serial countermeasures, incidence rate of puncture site complications after intervention decreased from 16.67% to 9.62% ( complications occur in 5 of 52 cases ) , finally down to 4.81% ( complications occur in 5 of 104 cases ) -a drop of 71.15%. The achievement rate is based on the formula : The achievement rate = ( before-after ) / ( targets-before ) ×100%=(4.81%-16.67%)/(5.83%-16.67%)×100%=109%. 109% means that we achieved the desired goal.

### 3.2 Intangible results

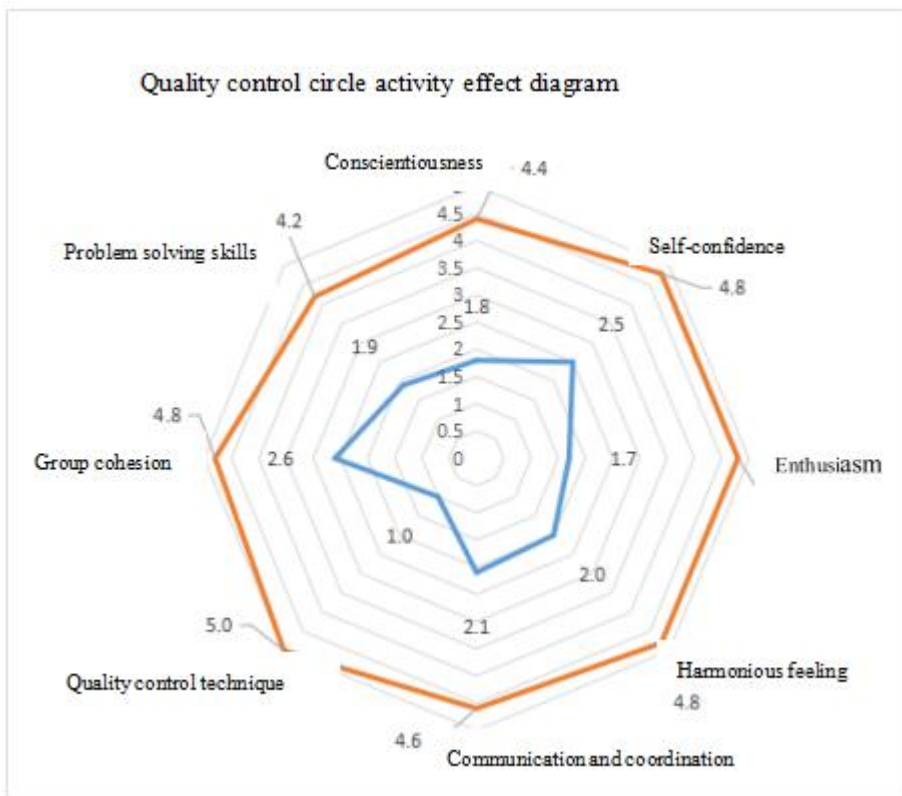
Intangible results are evaluated by seven members of QCC from eight aspects: responsibility, self-confidence, enthusiasm, harmony, coordination, quality control, team cohesion and problem-solving skills. The scoring method is: Each item was scored by each member numerically on a scale of 1-5 and the aggregate score is 35. Details are listed in Table.1 and Figure.2. <sup>3</sup>

Table.1

The Effect Of QCC Activities Confirmation

		Sum	Mean	Sum	Mean	
1	Responsibility	12.6	1.8	30.8	4.4	↑
2	Self-confidence	17.5	2.5	33.6	4.8	↑
3	Enthusiasm	11.9	1.7	33.6	4.8	↑
5	Coordination	14.7	2.1	32.2	4.6	↑
6	Quality control	7	1.0	35	5.0	↑
7	Team cohesion	18.2	2.6	33.6	4.8	↑
8	Problem-solving	13.3	1.9	29.4	4.2	↑

Figure.2



Tabel.1 and Figure.2 show that after QCC activities, the score of each evaluation item has increased to varying degrees. QCC activities play a benign role in interrelationship between medical teams and obtain excellent results, especially in optimizing quality management methods and enhancing the sense of harmony of medical staffs.

#### 4. Discussion

Changes in social life and work patterns leading to climbing morbidity rate of cardiovascular diseases year by year . The development of science and technology has led to the continuous improvement of intervention technology. Today, interventional operation has become the main treatment for cardiovascular diseases in major hospitals nationwide. With the increasing adoption rate of interventional operation, postoperative puncture site complications have been becoming the focus of medical staffs. According to specific situation of our department, statistical analysis shows that main complications are puncture site bleeding, skin blisters and hematoma. Using anticoagulants, inadequate compression hemostasis, displacement of gauze, reducing stress blindly and overactivity including doing activities in unscientific way are main reasons for puncture site bleeding. Patients may misuse the compressor. For example, main factor for skin blister after intervention is that local skin be squeezed into the gap of compressor and go unnoticed. Improper puncture, improper compression, no compression on injured vessels after pulling out the sheath are main reasons for puncture site hematoma. Through making corresponding countermeasures and standardized implementation, incidence rate of puncture site complications after intervention decreased from 16.67% to 4.81%, which indicates effect of QCC activities in reducing complications after intervention is remarkable. [4] QCC activities increase medical staffs' competency to find and solve problems, improve their self-management level and standardize the quality management of health-care department. Meanwhile, in harmonious and friendly atmosphere, QCC team members can spontaneously start brainstorming and adopt a bottom-up management model. QCC activities have achieved a significant reduction in incidence of complications after intervention as tangible results. Moreover, it enhances cohesion and cooperation of medical teams, mobilizes the enthusiasm of medical staffs, realizes their fully potential preliminarily, optimizes working environment and improves the medical quality and work efficiency as intangible results. QCC

activities can further improve the life quality of patients, hospital's core competitiveness, and to a certain extent, rebuild the doctor-patient relationship thus improving the medical staffs' satisfaction. In conclusion, with the development of science and medical technology, QCC, which is a dynamic and sustainable activity that is conducive to service quality and core management of hospital, will be carried out continuously for a long time.<sup>5</sup>

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