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Improving Organizational Performance by a Quality Control Circle: A Case of Medication Improvement Team at a Hospital in Taiwan

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Abstract: A case study of summarizing how a Quality Control Circle (QCC) team at a hospital in Taiwan has played an important role to carry on TQM activities to improve services are presented. The activities of QCC practices were recorded and described step by step to continuously improve organizational performance by providing the participants and supervisor in identifying, analyzing and solving problems. With the team efforts, the objective of reducing the rate of errors in drug prescriptions was achieved successfully to yield better organizational performance. The standardized process was implemented to provide better services for its patients. Moreover, the participants in this QCC team felt that responsibility and concentration have been improved most among the eight factors. This study has depicted how a QCC team is helpful and practical to improve organizational performance in a hospital. In addition, the procedures conducted by this QCC team were clearly stated to provide insights for those who are interested in QCC.

Key words: Quality control circle, organizational performance, medication, continuously improvement

INTRODUCTION

This case hospital is one of the 35 hospitals belong to Department of Health of Executive Yuan, Taiwan and has passed the verification of IQIP (International Quality Indicator Project) in 2007 and also has revised ISO 9001: 2008 certification in 2008. The general purpose of this hospital is to increase the quality of medical service, provide the welfare of the public medical care, reinforce better management in medical related businesses and, more importantly, provide convenience to the public. In order to become a patient-oriented hospital as well as pursue higher performance, the hospital has determined medical care excellence, kindly service, performance management and continuous improvement as the highest quality policy and has promoted Total Quality Management (TQM) activity since the TQM implementation could improve the process and provide better services to its customers (Chen *et al*., 2004; Wu *et al*., 2005).

Scott (1998) has pinpointed that TQM that has influenced organizational practices in Asia and the United States is one of the two vigorous movements to improve the quality of organizational performance. The focus of TQM places highest priority on outcome measures as defined by customer needs as well as pays much attention to procedural and structural elements, viewed in terms of contributions to quality outcomes. To carry on TQM activities, Quality Control Circles (QCC) at this case hospital play an important role to relentlessly improve organizational performance by providing participants and supervisors to learn in identifying, analyzing and solving the problems. With the use of QCC, the major benefits include fewer problems and better services such that the hospital could obtain better medical care and patients' safety.

Lesar *et al*. (1997) have reported that the overall rate of errors in medication orders was 3.99 errors per thousand and the major errors included incorrect dosage calculations and inappropriate drug therapy. To enhance the safety of drug therapy, medical doctors, physicians and pharmacists are responsible to reduce the number of errors in the hospital. Moreover, understanding the factors that contribute to errors, such as medications with similar names and complicated dosage regimens, is very important and helpful to assist in implementation of more

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effective error prevention strategies to provide zero defects for patients in drug therapy. This study is designed to characterize how a quality control circle was effective in reducing medication prescribing errors by pharmacists' participation.

Quality control circles, also known as quality circle originated in Japan, are one of organizational mechanisms for worker participation to focus specifically on quality (Gryna, 2001; Evans and Lindsay, 2008). A quality control circle is defined as quality improvement or self-improvement study groups composed of a small number of employees, typically 10 or less and their supervisor. The QCC philosophy has been adapted and modified over time to include problem-solving team activities. The participants, often voluntary, receive training in problem-solving techniques, such as cause-and-effect diagram and control charts, determine appropriate problems to work on, develop solutions and establish new procedures to lock in quality improvement (Summers, 2003). Robbins and Decenzo (2001) have defined QCC as work teams consisting of eight to ten employees and supervisors share an area of responsibility and meet regularly to discuss quality programs, investigate the causes of the problem, recommend solutions and take corrective actions but do not have authority. Finally, Gryna (2001) has specified that the members of a QCC are usually from within one department to address quality problems occurred within their department, select the problems and are given training in problem-solving techniques, which are significantly different to a quality project team, where projects are cross functional and are selected by upper management based upon priorities for overall company operations.

The QCC programs have been widely used in a variety of areas, such as auto industries, brewing companies, hospitals, school systems and even governmental units (Evans and Lindsay, 2008). If the QCC program is carefully planned and supported by management, it is likely to achieve great success. The benefits of using quality control circles fall into two categories: (1) measurable savings and (2) improvement in the attitudes and behavior of people (Gryna, 2001). The latter might be the most important benefits because the enthusiastic reactions of participants are based on their personal involvement in problem-solving. Gryna (1981) has classified the beneficial effects as follows:

- Effects on individuals' characteristics. Teams enable the individual to improve personal capabilities, increase the individuals' self-respect and help workers change certain personality characteristics
- Effects on individuals' relations with others. Teams increase the respect of the supervisor for the workers, increase workers' understanding of the difficulties faced by supervisors and increase management's respect for workers
- Effects on workers and their attitudes toward the company. Teams change some workers' negative attitudes, reduce conflict stemming from the working environment, help workers understand why many problems cannot be solved quickly and instill in the worker a better understanding of the importance of product quality

Case study: In June 2004, Department of Pharmacy at this case hospital has formed a quality control circle with the name of Medication Improvement and the general objective is to reduce the number of medication prescribing errors. In this QCC team, there are one supervisor and ten participants including the chair of Department of Pharmacy. Moreover, the supervisor and participants are all pharmacists. The name of this QCC team was from that the pharmacists are heart-warming persons and willing to take great care of patients by providing the most effective drug therapy. The activities were held once bi-weekly and the duration for each activity lasted 50 min. The members varied by their ages and experiences, shown in Table 1. The eldest and youngest persons were at the ages of 53 and 26 and the average age was 37.9 years old. The experiences were from 1 to 23 years and the average experience was 11.9 years.

The characteristics of this QCC team were as follows:

- The participants were with different ages and experiences. The experienced pharmacists were very familiar with the daily operation flows and able to pinpoint the problems, whereas the inexperienced but young pharmacists were more creative in problem solving
- These pharmacists believe that life-time learning was of great help in doing their jobs better and were willing to face new challenges in the future through this QCC team
- Four participants were inexperienced with 3 or less years in pharmacy. Through this QCC team, these four pharmacists would learn more about this department and the problems and challenges they would face now and in the future

Table 1: The members in this QCC team

	Member										
Factors	1	2	3	4	5	6	7	8	9	10	11
Age	53	53	47	45	47	40	24	26	30	26	26
Experience	22	23	21	20	18	14	2	1	1	3	6

Table 2: The decision to select a topic for this QCC team

		Importance		Urgency		QCC ability		Possibility			
Activity	Weight	No. of agreement	Sub total	No. of agreement	Sub total	No. of agreement	Sub total	No. of agreement	Sub total	Grand total	Rank
Reduction of errors	9	10	90	9	81	8	72	7	63	322	1
for drug prescription	3			1	3	2	6	2	6		
	1							1	1		
Reduction of waiting	9	10	90	6	54	5	45	5	45	258	3
time for receiving drugs	3			2	6	2	6	1	3		
	1			2	2	3	3	4	4		
Improvement of the	9	9	81	3	27	7	63	6	54	264	2
satisfaction of UD activities	3	1	3	6	18	2	6	3	9		
	1			1	1	1	1	1	1		

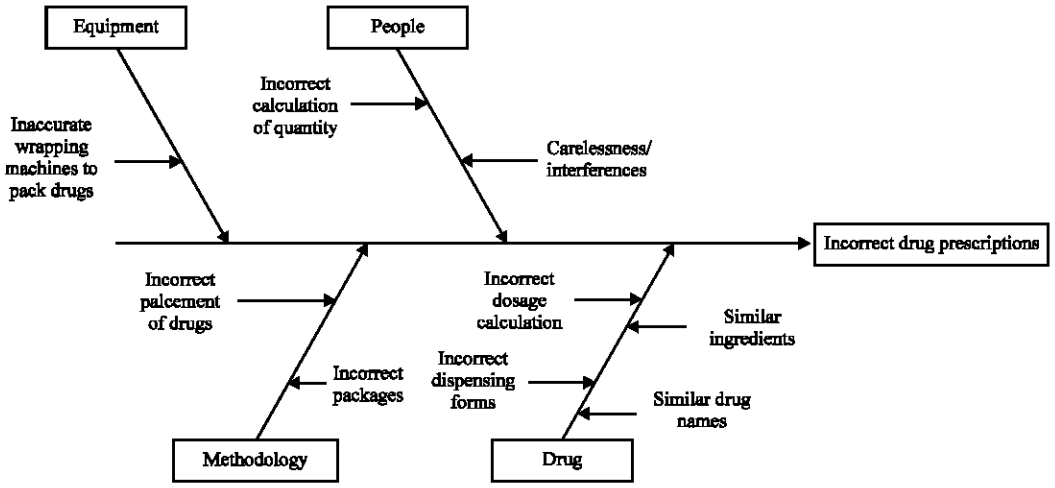

Fig. 1: The cause-and-effect diagram to analyze incorrect drug prescriptions

During June 2004-October 2004, this QCC team has identified three major problems in the Department of Pharmacy. These problems were to (1) reduce the rate of errors for drug prescription, (2) reduce the waiting time for receiving drugs and (3) improve the satisfaction of Unit Dose (UD) activities. In order to tackle one problem at a time, the participants decided to prioritize their importance by considering the criteria of importance, urgency, QCC ability and possibility. The final decision was summarized in Table 2, where the issue of reducing the rate of errors for drug prescription was the first priority. There were two major reasons that this issue was chosen. First, with the proper use of drugs, diseases could be cured or controlled for patients. However, with the abuse of drugs, the patients' physical and psychological aspects could be hurt badly. Second, the public, media and upper management in the hospital have paid much attention to the issue recently, especially the correct drug prescriptions.

When the topic was chosen, the QCC team has decided that the objective was set to reduce 50% of errors for drug prescription. To identify the root causes for errors of drug prescription, a cause-and-effect diagram was formed and depicted in Fig. 1 by considering drug, methodology, people and equipment. After the further group discussions, the major causes were concluded as follows:

- **Errors of quantity calculations:** The quantity of drugs may be more or less
- **Errors of dispensing forms:** Same ingredients but different types of drugs
- **Error of incorrect dosage calculations:** Same ingredients but different dosages
- **Similar drug appearances:** Drugs might be similar in package, dosage, size and color
- **Similar drug names:** Drug brands and names might be similar
- **Similar ingredients:** Drugs might be similar in ingredients
- **Incorrect packages**
- **Others:** Errors that could not be classified into the above causes

The group decided to narrow down the topic into errors of quantity calculations, similar drug names and

Table 3: The partial analysis of causes and proposed methods

Major cause	Minor cause	Proposed method	QCC ability	Feasibility	Cost	Execution	Activity duration	Person in charge
Drugs with similar name		Lower and capital letter	A	A	B	Y	July 26-October 31	XXX
		Use commercial name to replace scientific names or to use scientific names to replace commercial names	A	A	B	Y	July 26-October 31	XXX
Similar ingredients	Too many items	Notify the committee on drugs	C	B	B			XXX

Table 4: The data collection and analysis

Causes	June 26	July 10	July 24	Aug . 7	Aug. 21	Sep. 4	Sep. 18	Oct. 2	Oct. 16	Oct. 30
A. Incorrect quantity calculation	10	12	17	9	10	8	7	14	10	8
B. Similar drug names	8	7	5	5	4	6	10	5	3	5
C. Similar ingredients	3	4	5	3	4	3	0	1	0	1
D. Incorrect dispensing forms	0	15.6	5.2	10.2	0	0	0	0	0	0
E. Similar drug appearances	0	0	0	0	0	0	0	0	0	0
F. Others	2	1	1	0	1	0	0	1	0	0
G. Incorrect dosage calculation	0	0	0	2	1	2	2	1	0	0
H. Incorrect packages	2	0	4	1	7	0	3	4	2	5

Table 5: The documentation of errors per thousand

Causes	June 26	July 10	July 24	Aug . 7	Aug. 21	Sep. 4	Sep. 18	Oct. 2	Oct. 16	Oct. 16
A. Incorrect quantity calculation	53.4	52.3	87.7	45.9	48.5	39.8	32.4	63.2	41.7	36.6
B. Similar drug names	4.3	3.6	2.6	2.5	1.9	3.0	4.6	2.3	1.3	2.3
C. Similar ingredients	16.0	20.8	25.8	15.3	19.4	14.9	0.0	4.5	0.0	4.6
D. Incorrect dispensing forms	0.0	15.6	5.2	10.2	0.0	0.0	0.0	0.0	0.0	0.0
E. Similar drug appearances	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F. Others	10.7	5.2	5.2	0.0	4.9	0.0	0.0	4.5	0.0	0.0
G. Incorrect dosage calculation	0.0	0.0	0.0	1.0	0.5	1.0	0.9	0.5	0.0	0.0
H. Incorrect packages	10.7	0.0	20.6	5.1	34.0	0.0	13.9	18.1	8.3	22.9
Total	95.0	107.5	146.9	80.0	109.2	58.6	51.9	93.0	51.3	6.3

similar ingredients, propose alternatives for improvement and solve the problems before a setup deadline, i.e., July 26-October 30, 2004. Each alternative was charged by at least one member of participants depending upon the difficulty of each alternative. Moreover, the alternative was traced by a variety of criteria, including QCC ability, feasibility, cost and execution. To evaluate QCC ability and feasibility, the symbols of A, B and C were applied to represent easiness, medium and difficulty, respectively. In addition, cost was classified into three categories of A, B and C to represent lower, unchanged and increased costs, respectively. Finally, the symbol of Y in execution column means the alternative is executable. The partial analysis of causes and proposed methods were shown in Table 3.

Data collection and analyses were established bi-weekly, shown in Table 4 from June 26 to October 30, 2004 and the unit was the number of errors. In order to monitor the progress of implementing proposed methods into practice, a 20 week period was observed and data collection measured by errors per thousand was shown in Table 5. Figure 2 summarizes before, underway and after the improvement as well as maintaining the current improvement achieved by this QCC team. Before and in the early stage of the implementation of proposed methods, the total errors were relatively high. However, as time went by, the total errors went down significantly except in October 2.

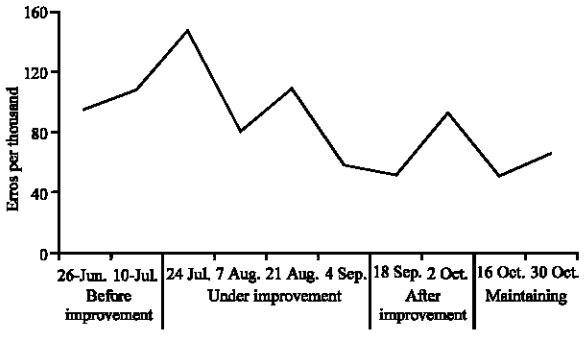

Fig. 2: The plot to summarize before, underway and after improvement

When the improvement has been maintained, it would be of help to check the outcomes generated by this QCC team. The objective of reducing the rate of errors in drug prescriptions was 56.9% and the improvement rate was measured as 28.4%. For individuals, the improvement was determined by a radar plot, shown in Fig. 3, from a variety of factors, including Emotional Quotient (EQ), communication, self-study, coordination and cooperation, achievement, responsibility, job-sharing and concentration. The participants felt that responsibility and concentration have been better improved.

The last stage of the QCC activities is to standardize the improvement into practices. In this case, the drugs

Table 6: The drugs might cause incorrect quantity in drug prescription

Drug name	Package	Drug name	Package	Drug name	Package
Acetril	30	Efexor XR	14	Oflocin	8
Amaryl	15	Genurin	15	Phyllcontin	14
Aricept	7	Glucophage	20	Premarin	21
Blopress	14	Hamalidage	14	Premelle	28
Cipram	14	Imuran	25	Proscar	15
Covina	28	Isoptin	20	Sectral	14
Cozaar	7	Kerlone	14	Sinequan	25
Divina	21	Komeni	28	Takepron	14
Doxaben	20	Lasix	15	Viagra	4
Duphaston	20	Minipress	26	Zestril	14
Efexor	14	NovoNorm	15	Zoloft	14

Table 7: The similar drug names for possible incorrect drug prescription

Drug item	Commercial name (Take precautions)	Ingredients
Fenspride	FENCaine	Oxethazaine
Premarin	PREMelle	Premarin 0.625 mg/MPA 2.5 mg
Diltelan	DILAtrend	Carvedilol
Sedes	SESDen	Propyphenazone
Dramamine	DORMicum	Midazolam
Gendergin	GENAdine	Loratadine
Nicarpin	NIFEpin	Nifedipine
Carbelone	CARDiobren	Nifedipine
Euclidan	EUGLucon	Glibenclamide
Doxaben	DOSAbin	Doxazosin

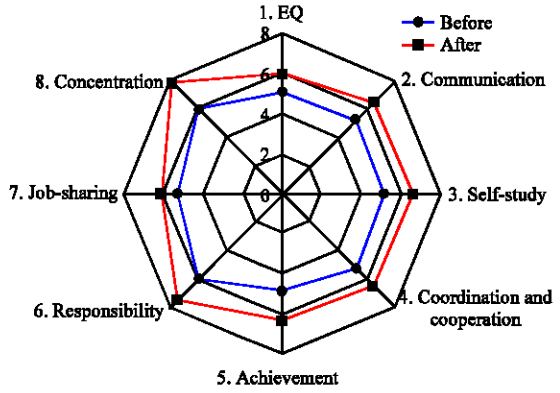

Fig. 3: The radar plot to show the individuals' improvement of this QCC team

without a package of 10 tablets were listed on the web and updated monthly. Moreover, the information was provided in drug prescription areas, shown in Table 6. The similar drug names were shown in Table 7 by their commercial names with the first four capitalized letters or by their scientific names in front of the commercial names. When wrapping machines finished the drugs packages, pharmacists had to check residues and examined the checklist for drugs preparing packages, shown in Table 8.

When the selected topic was successfully finished, the organization might face new challenges to better improve the quality of its performance. The individuals and groups in this hospital might be forced to learn by identifying, analyzing and solving new problems to

Table 8: The checklist for drugs preparing package

Tablets per package	Package	Residue	Added tablets for package (unit)
500 Tablets			
21	23	17	4
28	17	24	4
42	11	38	4
56	8	52	4
1000 Tablets			
21	47	13	8
28	35	20	8
42	23	34	8
56	17	48	8

achieve better organizational performance. Eventually, a new QCC team could be formed and a new activity would be chosen for improvement.

CONCLUSIONS

A case study of summarizing how this QCC team performed at this case hospital was presented. To carry on TQM activities of improving services, this QCC team has played an essential role to continuously improve organizational performance by providing the participants and supervisor in identifying, analyzing and solving the problems. The activities of QCC practices were recorded and described step by step. With the team efforts, the objective of reducing the rate of errors in drug prescriptions was achieved successfully to yield better organizational performance. The standardized process was implemented to this hospital to provide better services for its patients. Moreover, the participants in this QCC team felt that responsibility and concentration have been improved most among the eight factors.

REFERENCES

Chen, H.K., H.Y. Chen, H.H. Wu and W.T. Lin, 2004. TQM implementation in a healthcare and pharmaceutical logistics organization: The case of Zuellig Pharma in Taiwan. Total Qual. Manage. Bus. Excel., 15: 1171-1178.

Evans, J.R. and W.M. Lindsay, 2008. The Management and Control of Quality. 7th Edn., Thomson Publishers, Southern Western, ISBN-13: 9780324382358, pp: 848.

Gryna, F.M., 1981. Quality Circles: A Team Approach to Problem Solving. AMACOM, New York, ISBN-10: 0814435033, pp: 96.

Gryna, F.M., 2001. Quality Planning and Analysis: From Product Development Through Use. International 4th Edn., McGraw-Hill, New York, USA., ISBN-10: 0071181660,.

Lesar, T.S., L. Briceland and D.S. Stein, 1997. Factors related to errors in medication prescribing. J. Am. Med. Assoc., 277: 312-318.

Robbins, S.P. and D.A. Decenzo, 2001. Fundamentals of Management. 3rd Edn., Prentice Hall, New Jersey, USA., ISBN-10: 0130651338.

Scott, R.W., 1998. Organization: Rational, Natural and Open Systems. 4th Edn., Prentice Hall, New Jersey, USA., ISBN-10: 0132663546.

Summers, D.C.S., 2003. Quality. 3rd Edn., Prentice Hall, New Jersey, USA., ISBN-10: 0130419648.

Wu, H.H., A.Y.H. Liao and P.C. Wang, 2005. Using grey theory in quality function deployment to analyse dynamic customer requirements. Int. J. Adv. Manufac. Technol., 25: 1241-1247.