CHAPTER 3

EVALUATION

3.1 Introduction

This research was conducted to examine current situation of the risk to medication error in the Inpatient department of Banprak Hospital. The research also proves the effectiveness of CQI when applying with an appropriate personnel improvement scheme, which is suggested by Hospital Accreditation Thailand, for the reduction of medication errors in Banprak Hospital. Such error is not. In addition, because the result of this research will lead to an important decision for changing the direction of hospital improvement from traditional style to CQI system, a proper evaluation of the research was be considered as the first priority.

3.2 Purpose

- To yield the direction to the reduction of medication error in the Inpatient department.
- To Increase the effectiveness of management of the medication error reduction.

3.3 Evaluation Design

Evaluation design was performed based on Scriven approach. This includes;

Formative Evaluation It is the operation that is ultimately aimed for an improvement. Each of the 9 steps of CQI group activity was closely examined whether the essential mechanism of group activity, which is an understanding of improvement of the process, had proceeded as planned or not.

Summative Evaluation is the operation that was done as soon as Formative Evaluation has finished. It was aimed to verify whether the objectives of the CQI group activity had been achieved or not. See Figure 3.1 for move detail I of evaluation design.

Figure 3.1: Evaluation Design

Assess Surrounding Conditions	Assess Input	Assess Process	Assess Outcomes	Assess Impacts
Advantages - The goal of the activity is pleasantly consistent with the hospital's policy - All sectors in the hospital have similar trend of personnel development. - Heads of each sector act as the coordinators for quality improvement of the hospital.	- Preparation for an improvement of personnel in the hospital, which had been done as a whole, for a duration of 4 years (1997-2000)	Proceed with the plan by - Forming CQI group in organization - Because there is the limitation regarding to time, the process of the 9 steps of CQI in the IP department had been done within for duration of 6 months. - Establish the Cross -Functional Team that comprises of doctors, pharmacists and nurses.	- The percentage of medication error has decreased for 16.41% - Inappropriate medicine dispensing occurred for only 3 times without damaging patient's health. - There was a horizontal-formatted management fashion that means all staffs including executives get more involvement. - Standard of medicine preparation and dispensing. - Policy for placing labels on patient's hands. - System to report unexpected incidences in the hospital. - System to re-examine all unexpected incidence for every months in the IP the IP department.	- Policy for using CQI in every sector to solve at least 1 or 2 problems a year. - There is a clear the risk management system - The revision program for various fields of expertise that has been held every Wednesday lead to a better teamwork across the professions. - Individual become more loyal to organization and more self-important.

Overall activities of the research

Preparation process

It is the overall human recovers development done in the hospital that consists of the following

1. **Head of the Inpatient Department**

    1.1 Attending a 5-day training "Road to Quality Hospital" (The program of Hospital Accreditation Thailand), the program for getting to be development coordinators, with another 4 hospital development leaders.

    1.2 Attending a 3-day training "Advanced development coordinators" " (The program of Hospital Accreditation Thailand), for having supporter skill with another hospital development leader. (19-21 June 2000, 9-11 June 2000).

    1.3 Have been assigned by executives of the hospital to act as development coordinators (secretary of a development coordinator team) since 2001.

2. **All staff in Banprak Hospital had been trained or involved in basic activity for developing quality.**

    2.1 AIC activity. It is for developing the creativity and imaginativeness to analyze present situation of hospital. It helps all staff to be aware of any changes and helps to build up possible imaginative vision of group, which is presented on paper, and, therefore, leading to possible imaginative vision of organization. It encourages all staff to realize that they are parts of organization to

contribute to achieving the goal of organization. The outcomes of this activity created a clear and common direction of quality improvement that had been proceeded and developed between year 1998 – 2000. In the latest development, the hospital announced as the following detail.

2.1.1 The vision of Banprak Hospital is "Banprak Hospital is the quality hospital for everybody".

2.1.2 Share responsibility or commitment is "Banprak Hospital provides customers with holistic, continuous and integrated care".

2.1.3 Vision of the Inpatient Department is "The leader of quality services for 10-bed-size hospital" by having same intention for as commitment of organization.

2.2 A 3-day OD training by Prof. Santhad Sinthuphanprathum and colleges (April 21, 2000 – April 23, 2000) at Rose Garden Hotel, Suan Sam Pran, Nakornpathom. The training was to build up the awareness of new changes that will lead individual to be ready to accept new ideas from colleges, and reinforce communication skill, positive way of thinking, loyalty and creativity for development.

2.3 A 2-day EBS training by Prof. Oath Areeraksa and colleges at the seminar room at Banprak Hospital (June 20, 2000 – June 21, 2000) was to build up a better attitude toward service roles and to amplify their service manners by adhering to customer-centered

management and focusing on customer's satisfaction. After achieving the tasks mention above customers would be able to distinguish and recognize the feature and characteristics of quality service from the hospital.

2.4 CQI seminar and CQI training which comprise of 2 days for theory (May 3, 2000 – May 4, 2000) and 2 days for practice (June 27, 2000 – June 28, 2000) at the seminar room in Banprak Hospital. The seminar and training were hosted by Dotor Watcharaporn Poonual, an TQM/CQI expert for Uttaradit Hospital. These seminar and training were provided to expand knowledge of quality, tools of quality improvement and teamwork. Also to revise the CQI program again on June 27, 2000 – June 29, 2000.

2.5 Practical training on Hospital Accreditation that contains the process in achieving quality hospital by adhering to customer-focus concept, risk management and quality assurance and continuous quality improvement. The training was conducted by 2 of the hospital's development coordinators at the seminar room in Banprak Hospital (July 13, 2000 – July 15, 2000 and July 17, 2000 – July 19, 2000).

Action process

Proceed with the 9 steps of CQI (a program of Health System Research Institute) for which advised by heads of sectors, simulated and supported for information by trainers. The process has steps as illustrated below.

Group forming

1. **Member gathering.** The members were 11 nurses in the Inpatient Department.
2. **Choose leader and secretary.** Sub-head of the Inpatient Department
3. **Name of group**. Name of the group was "*Angle and magic medicine*". Slogan was "*New decade, medication error free in the Inpatient Department*". Logo was "*Hand-checking*" portrait. Then the group registered with Institute of Quality Coordination in April 2001.

Group activity

Step 1 Seek Opportunities for Improvement.

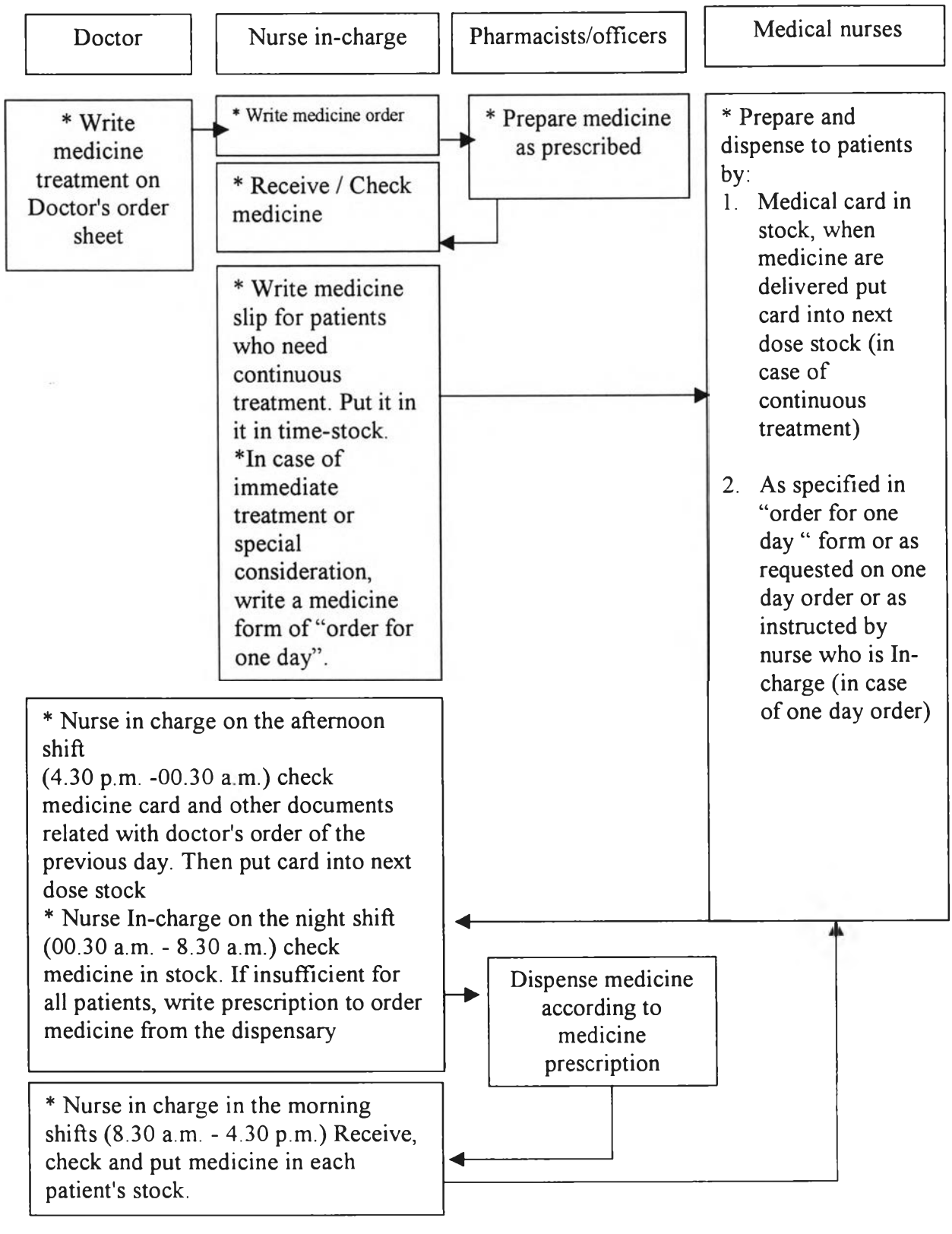
It is obtained from the outcome of brainstorming. The brainstorming had carried out in order to seek for the causes and the reduction of medication error in the Inpatient Department. The procedure started at the meetings and the practical training on Hospital Accreditation (HA).

Step 2 Define the System.

It is the study of matters relevant to medicine dispensing process in the Inpatient Department. The study was carried out by interviewing members of the team, summarizing details and presenting them in the meeting, which was held in April 2001. The process of medicine dispensing was presented in Deployment Flowchart. The result of this step also added on information gathered during the practical training on Hospital Accreditation. The following flowchart illustrates the process of medicine dispensing.

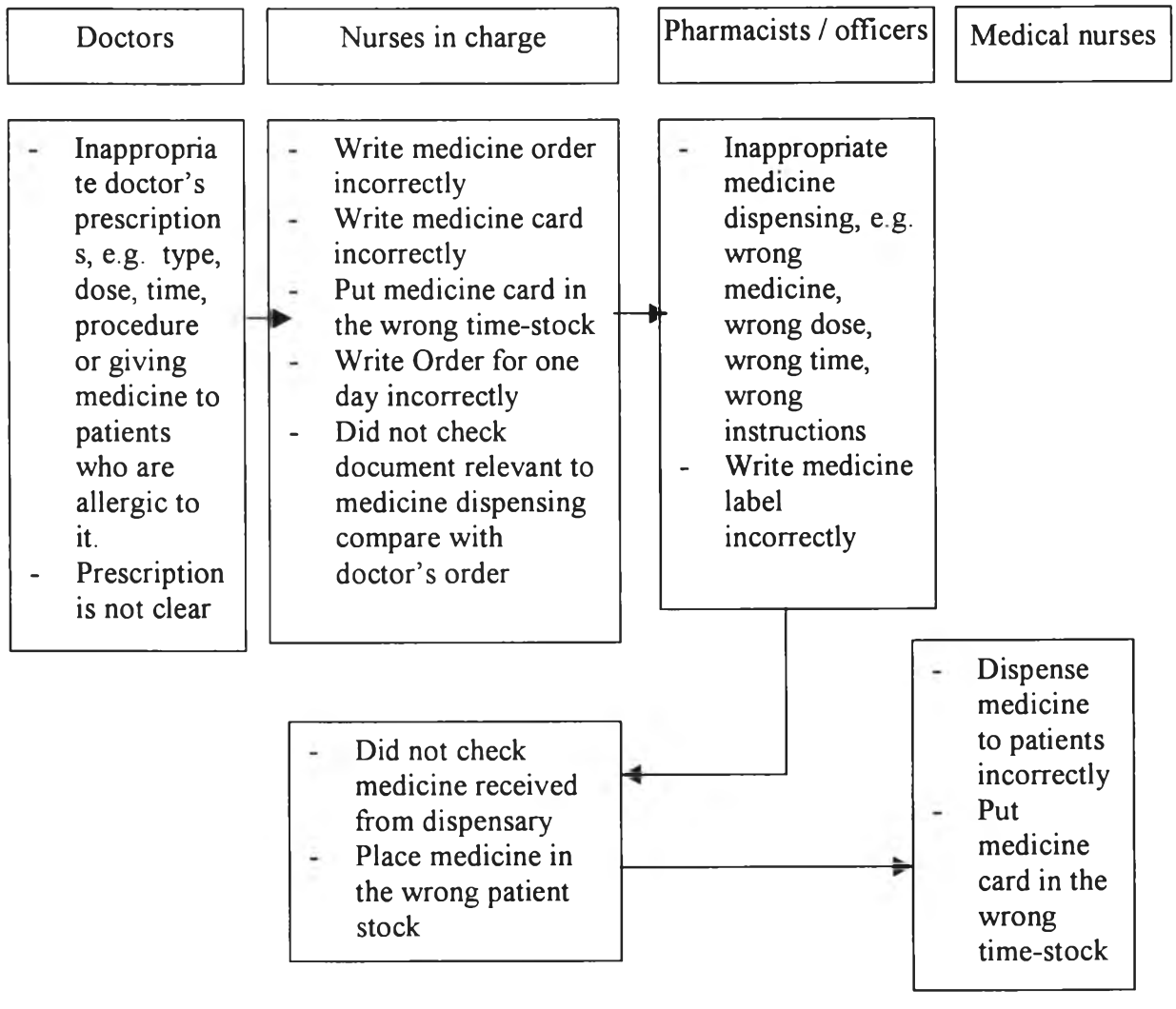
Notice that * indicate steps where medication error risks may occur in subsequent steps.

Figure 3.2: Deployment Flowchart of Medication Dispensing Porous in Inpatient Department



For a clear and better understanding of causes of medication error, a Deployment Flowchart was draw in order to present those steps that medication error in the Inpatient Department might occur, as shown below.

Figure 3.3: Potential Causes for Medication Error



Step 3 Assess Current Situation

This was done by collecting information and assessing the current situation to medication error in the Inpatient Department in 2 ways. Namely,

1. Using risk and medication error Record form to record for 21 days and adhere to the method called Stratified Random Sampling. That was to record in the morning shift for 7 days, afternoon shift for 7 days and night shift for 7 days. Also, in every shift from Monday to Friday in May 2001, made a random checking. During the period of random checking all medicine lists would be checked and the checking was done by one nurse In-charge and 2 sub-head of Medical nurses, head of sector and a pharmacist.
2. Interviewed 5 of Medical nurses without stating their names and collect details about medication error for further study.
3. Coordinated with a relevant profession, namely pharmacists, for unofficial assessment that was done through the inspection of the document processing process, medicine preparation, and medicine dispensing by nurses during closing hours. At the mean time, details were collected through discussion directly with head of sectors. The summary of the details is as shown below.

Table 3.1: Percentage of Medication Error risk by types

Types of medication error risk	Number of Samples	Number of times medication error was detected	Percentage of error
1 Document/Equipment/ Medicine	Medicine 4,335 items	58	1.34
2 Preparation of medicine	Medicine 557 items	7	1.26
3 Techniques of medicine dispensing	Number of times dispensed 237 time	114	48.10

The average percentage of the risk to medication error is 16.9

Details of medication error risk

1. Document/Equipment/Medicine

1.1 Medicine ordering

- Ordered medicine that was not available in the hospital: 2 items.
- Ordered medicine without stating its potency: 2 item.
- Ordered medicine that was over-dose: 1 item.
- Ordered medicine that react to one another: 4 items.

1.2 Medicine card

- Details written on medicine card were inconsistent with doctors' order(5 Right Concept): 5 items
- Medicine cards placed in wrong time-stock: 5 items
- Medicine cards lost: 2 items

- Medicine cards were still in use whilst doctors had already canceled medication: 4 items.

1.3 Order of One Day form

- Medicine name missing from Order of One Day: 2 items.

1.4 Doctor's Order Sheet

- Medicine description inconsistent with doctor's order: 2 items.
- Medicine missing from doctor's order: 2 items.

1.5 Label on medicine containers/bags

- Details inaccurate / detail missing (5 Right Concept): 10 items.
- Label lost: 4 items. (They happened with patients from Outpatient Department taken pre-pack out of the labeled medicine bass before leaving the hospital. When they come back, labeled medicine bass was lost.)
- IV Fluid was given to wrong patient: 1 item (This is because that patient was transfer to another bed but ID was not changed accordingly.)

1.6 Medicine

- Nurses who delivered medicine delivered medicine improper with doctor's order (5 Right Concept): 2 items
- Placed medicine in wrong patient stocks: 6 items
- Medicine not available for patient: 1 item. (This is because such medicine was not reserved in the hospital and the hospital itself did not inform doctors. Thus medicine card was issued but medicine was not available for it)

2. Preparation of medicine

    2.1 Preparation had completed but medicine not yet been delivered to patients.

    - Medicine was not as specified by doctors: 2 items
    - Some medicines were missed out:2 items
    - Prepare medicine that had already been cancelled by doctors: 3 items

3. Techniques of dispensing

    - Before giving to patients, medicine name was not verified with those in the last recorded: 6 times
    - Patient's names were not asked or checked before giving medicine: 105 times
    - Medicine was not taken half an hour after given to patients: 3 times

Summary of error due to medicine dispensing

There were 8 cases that inappropriate medicine had been taken by patients. However, they did not show the effects. From the inspection and discussion with 5 nurses, the details of incidences were explained below.

1. Patients took inappropriate medicine for 5 cases

    1.1 Patients took medicine for digestive system while had been cancelled by doctors: 2 cases

    1.2 Patient was not able to take medicine to eliminate sputum because it was not in the hospital reserves: 1 case.

1.3 Patients took medicine for digestive system with over-dose amount (1 tablet instead of half a tablet): 2 cases

2. Patient had a wrong injection: 1 case. The case occurred because a nurse was sure that she would give injection to the right patient without attaching a medicine card. Consequently, she gave an antibiotic injection to the patient whom doctor had cancelled for any more injection.
3. A patient had inappropriate IV Fluid: 1 case because a nurse wrote label for Fluid Administration Set incorrectly.
4. A patient took medicine for respiratory system with wrong period (every 4 hours instead of every 6 hours): 1 case

Step 4 Analyze Causes

This step involved the group activity by letting all members identify what the root cause of the medication error was. Deployment Flowchart was used to illustrate medicine-dispensing process where medication error may occur. To do this, different-time brainstorming was performed. That means that, while being on their duty, all members were asked to answer some pre-defined questions by head of section. Then, in order to present a big picture and current status of activity, information that was collected was presented to the members in each monthly meeting. In the meeting, all members had opportunity to present their comments and Cause and Effect Diagram was formed. The portrait of Cause and Effect Diagram is similar to Tree Diagram and it was used to summarize main causes of medication error by categorized into three aspects, namely personnel, document/equipment and system. In terms of personnel, the risk to medication errors contributes to the operation done by doctors, pharmacists,

nurses and medical staff who work in the hospital. Similarly, in terms of document/equipment and system these were all relevant document as well as equipment, and the existing system that were used in hospital, respectively. The Cause and Effect Diagram of medication error in the Inpatient Department in Banprak Hospital is shown below.

Figure 3.4: Tree Diagram illustrates causes of medication error in the Inpatient Department by group activities of CQI.

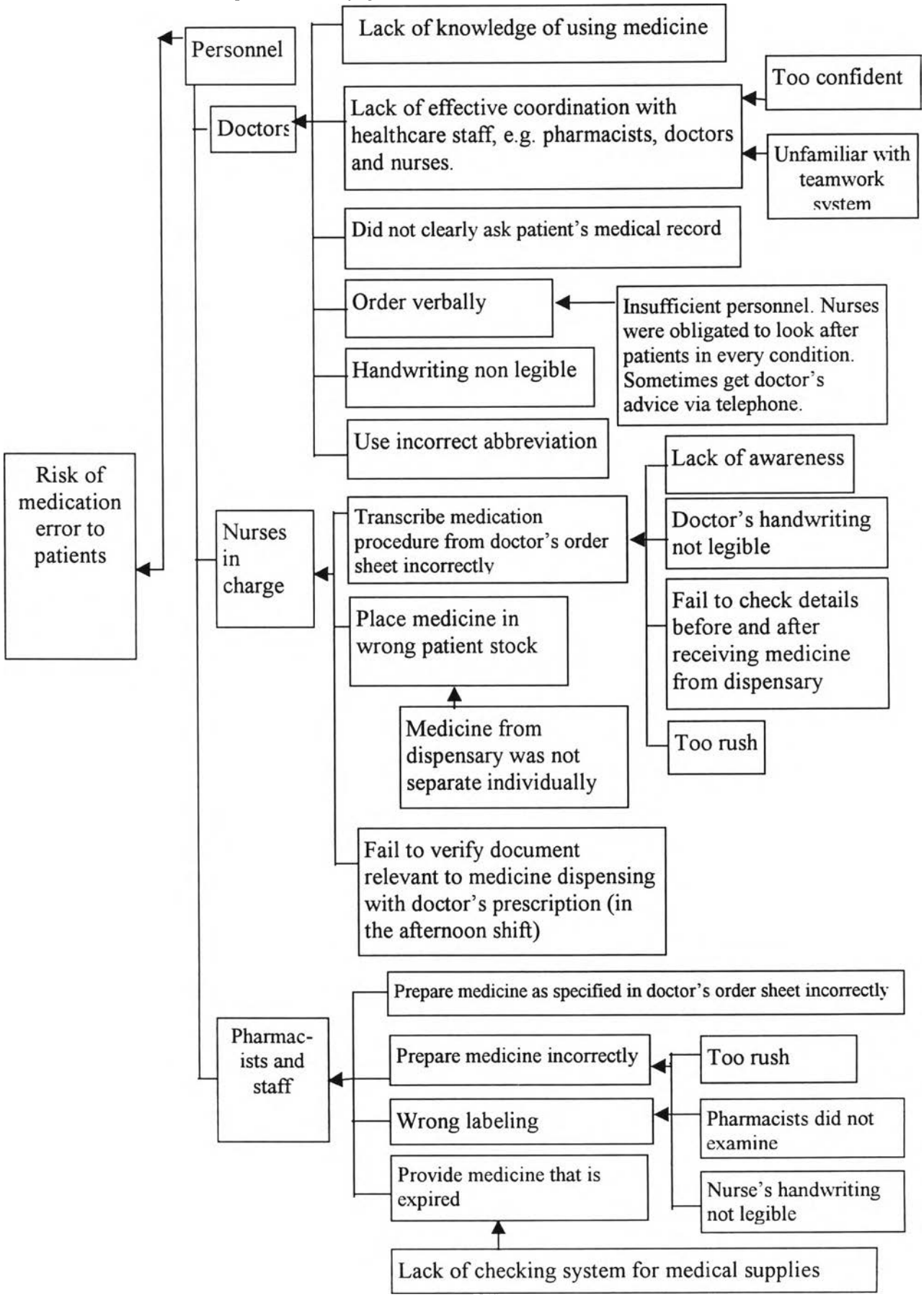
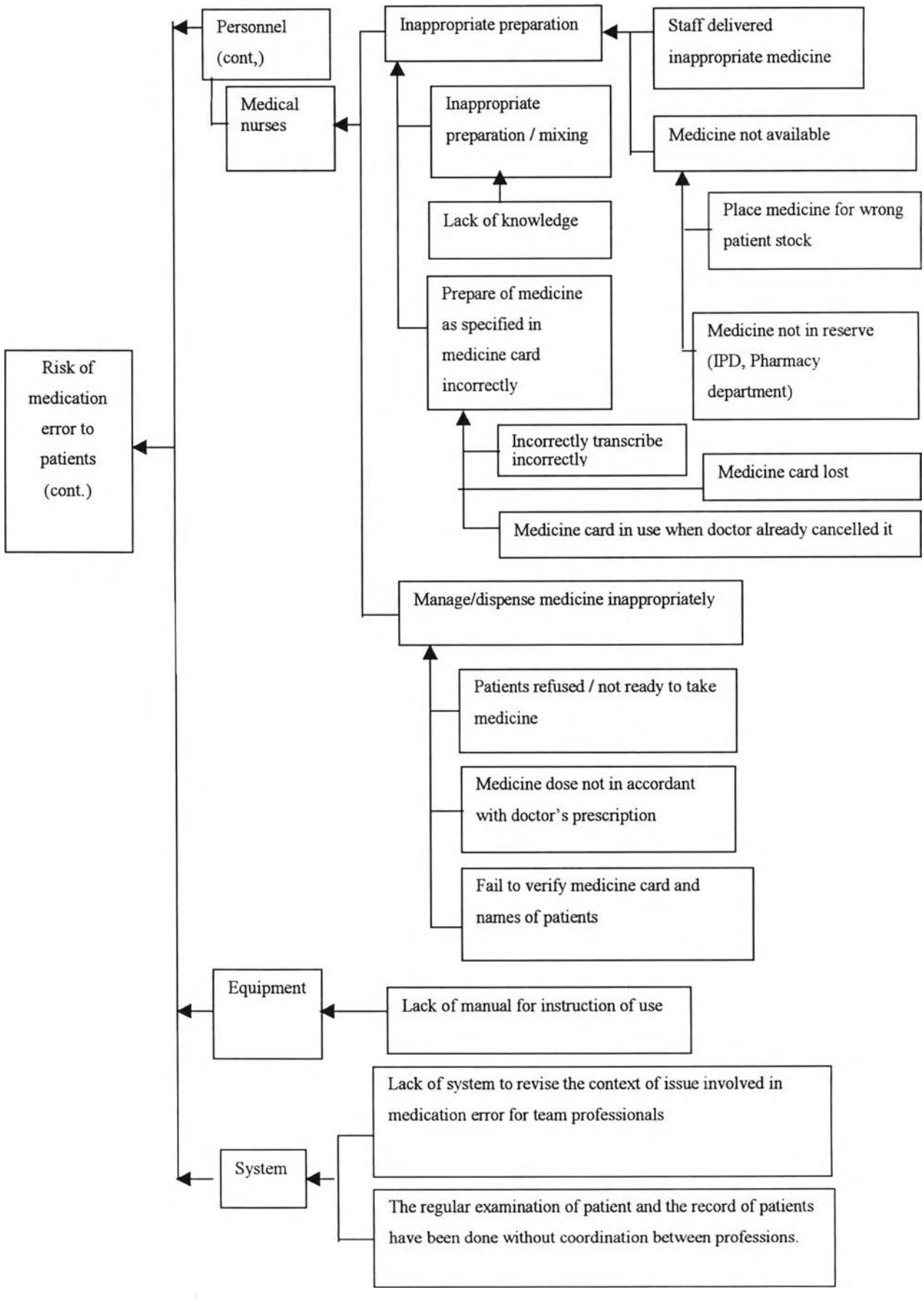


Figure 3.4: Tree Diagram illustrates causes of medication error in the Inpatient Department (Continued)



Step 5 Analyze Alternative

All group members performed brainstorming to consider and analyze the most feasible alternative for solving the problem. Form information collected during step 4 via ask-and-answer approach was done conducted by head of sector. Information to be presented in the monthly meeting are summarized and shown in the table below.

Table 3.2: Causes and its proposed solution

Causes	Solutions
❑ Inappropriate prescription done by doctors	1. Policy ❑ Set a team called "Patient Care Team" to revise and study for solution ❑ Problems and progressive report on patients should be done in the sheet so personnel from different fields can share their problems and solution. ❑ Doctors check whether his or her order is effective within 24 hours by telephone 2. Doctors, Pharmacists and Nurses use the same abbreviation standard for medicine name. 3. Pharmaceutical unit produces manual of medicine usage for children in the hospital. A manual should be the guideline for using medicine by nurses and other concerned staffs.
❑ Nurse transcribe doctor's order incorrectly, prepare document for medicine dispensing incorrectly and fail to examine the result of jobs	1. Use Check list for routine tasks and Complete-Chart as reminder for nurse. 2. When receive medicine from dispensary, verify it with medicine slip. 3. Use Order for One Day form instead of deliver messages verbally because Order for One Day has enough details of a patient and use non-complete box. 4. Hold monthly meeting to revise the problems, causes and solutions of medication error. Set a procedure to detect any error and each time error occurs, head of sector should be informed immediately. 5. Coordinate with other pharmaceutical units to set standard of mixing and preparation of medicine.

Table 3.2: Causes and Proposed solution (Continued)

Causes	Solutions
❑ Pharmacists and pharmaceutical staff prepare inappropriate medicine	1. Policy ❑ Pharmacists verify if medicine before delivering to the Inpatient department. ❑ Pharmaceutical staffs check medicine in stock in the Inpatient Department every 3 months 2. In case handwriting is difficult to read, ensure it by asking directly. 3. Prior to delivery, separate medicine in separate containers for each patient
❑ Medical nurses prepare / deliver medicine to patients incorrectly	Policy 1. Checking a patient's identification armband with medicine card and call patient's name. 2. Prepare medicine for patients within 30 minutes before taking. After medicine was given to patients, medicine should also be taken to the patient records unit for double check. In case of giving wrong medicine or wrong dose, consult doctors immediately.
❑ No standard procedure for revising the problems and for developing solution.	1. Coordinate with pharmaceutical units to follow the progress of technology concerning to medicine usage and keep informing staffs and professional teams from concerned fields of expertise.
❑ Management system is not clear	1. Establish policy to cover regulations concerning with head of Medical nurses and Medical nurses. Publish policy about procedure for handling medication error or procedure to report when working process is not carried out as pre-specified regulations. The policies should be published and distributed to all staffs for revision in the monthly meeting.
❑ System that is used for coordination between professionals form different fields of expertise is not clear.	1. Set system for linkage between teams of professionals form different fields of expertise. The system should simulate all concerns to perform their duty properly as specified in the Professional Certificate, including inspection, record, security and solution to medication error. Also, the system should increase the effectiveness of providing services to patients and their relatives as well as increase security for preventing error that may occur in later time. 2. Set standard to the management system for medicine dispensing in the Inpatient Department.

Step 6 Try out improvement alternative

The alternative that had been chosen from step 5 as the best solution was put into practice. Its details were used to set the basis of operation process and guideline for practicing. The practice carried on for 2 month (July 1, 2001 – August 31, 2001) and it included the official discussion in each monthly meeting and unofficial discussion throughout this practicing period. In such process, supervisors checked the results and energized all members to create productive results. New policies were established from time to time and, thus, system was changed accordingly. The results would be collaborated and transformed into methods for quality improvement and they are presented as follows.

Table 3.3: Existing causes of medication error and new policy for addressing causes

Existing process to the risk of Medication error	New Policy / New Regulations / New Practice
Doctors	
1. Coordination with other fields of expertise still ineffective.	- Set Patient Care Team to be the opportunity to discuss and revise problems concerning with medication error. Policy with 12 issues to be revised when unexpected incidences, including medication error, occur.
2. When a doctor gives orders via telephone, a nurse who takes the orders should sign as "waiting for doctor's order..."	- Such orders will be re-checked and signed by the doctor as soon as he or she comes to examine patient's condition or within 24 hours.
Nurses In-charge	
1. Complete Charge, which is the procedure to verify doctor's order and document concerning with medication, was still forgotten to be done.	- Use Check-list for routine tasks and signed on it before passing on duty.
2. In most case, Order for One day was not used. Medical nurses usually delivered doctor's order verbally or via short memo.	- Set policy to propel staff to use Order for One day as the way to pass on the messages for preparation of medication. To do this, setting 2 boxes which include : 1. Non Complete Box for Order for One whose task is to be completed by Medical nurses. 2. Complete Box for Order for One day whose task had been completed by Medical nurses. One day should be signed by a nurse who performed tasks and it will be delivered to patient's record.
Pharmacists/Pharmaceutical staffs	
1. Sometimes pharmacist's assistants were the one who examined medicine.	- Set policy for pharmaceutical unit to examine medicine.
2. Medicine expired still left in stock	- Pharmacists and pharmaceutical staffs coordinate in checking medicine regularly-once every 3 months. Color stickers on medicine container are used to specify medicine life. There are 7 colors; red, yellow, pink, green, orange, blue, violet for medicine expired in 1, 2, 3, 4, 3, 5, 6 and 7 years, respectively
3. Sometimes medicine delivered to the Inpatient Department is put in the same container for all patients	- Set policy that specifies that medicine for different patient should be contained in separate containers.

Table 3.3: Existing causes of medication error and new policy for addressing causes (Continued)

Existing process to the risk of Medication error	New Policy / New Regulations / New Practice
Medical nurses	
1. All nurses have the same manner of mixing medicine for injection.	- Coordinate with pharmaceutical unit to set standard procedure in mixing and diluting of medicine before giving injection to patients.
2. Sometimes during night shift the preparation of medicine was completed 1 hour before giving to patients.	- Set policy to prepare medicine not sooner than 30 minutes before giving to patients.
3. Before giving medicine to a patient, a patient's name was not checked.	- Use and check a patient's identification arm band and call for their name before giving medicine.
4. Sometimes nurses in charge on duty signed on document for each time of giving medicine but a Medical nurse was the one who delivered medicine and after given medicine to patient this nurse put medicine card back in box card.	- Set policy to specify that Medical nurses are the ones who give medicine to patients and should bring medicine card back and sign in the record. This is for convenience of checking medication errors in each shift.
Management and System	
1. Procedure to report unexpected incidences in the hospital and in each sector is not clear. This caused misunderstanding between staffs.	- Set regulation that is understood by all staffs. So all staffs will be able to react to unexpected incidences properly. This will lead to better-organized error checking preventing procedure in the hospital. - Design a form for recording unexpected incidences for each shift for a nurse In-charge to check and record before passing on duty. This is for preventing staffs forget to record unexpected incidences and report.
2. The existing follow-up procedure for medication error was not effective. Usually, done by discussion without written.	- In each monthly meeting or in the PCT meeting, present the value of medication error obtaining from the hospital and set it as a benchmark for other hospitals to study and follow up.

Step 7 Study the Result

The result was collected during September 1, 2001 – September 30, 2001 after proceeded with step 6 above for 2 months. The method of collecting information in this step is also the same as the method used in step 3 – Assess current situation. The results represent in percentage of error as shown below table below.

Table 3.4: Percentage of Medication error risk by types

Medical error risks' types	Number of samples	Frequency	Percentages of error
1 Document/Equipment/Medicine	4,723 Items	26	0.55
2 Preparation of medicine	630 Items	3	0.48
3 Techniques of medicine dispensing	278 Times	4	1.45

An average percentage of medication error risk was 0.83 which dropped for 16.07 %

Medication error's characteristics

1. Document/Equipment/Medicine

1.1 Prescription ordering

- After talked with the pharmacist, the doctor confirmed to order 4 consecutive interaction items that was up to his/her consideration.

1.2 Medicine card

- Information error by the doctor, 2 items

- Placed on the wrong timetable box, 2 items.
- No bed's number, 1 item.
- Medicine card remaining, yet the doctor stopped to provide medicine, 1 item.

1.3 Prescription Sheet

- Prescription (error) different from the doctor's ordering, 2 items.
- Incomplete prescription and its details different from the doctor's ordering, 1 item.

1.4 Label on medicine bags

- Error information/Lack of information (5 Right), 6 items.
- No label on medicine bags, 2 items (After the patients received the treatment at out patient department, when they went homes and brought pre pack out of label pack, they did not sent it back to label pack when return to the hospital.)

1.5 Medicine

- Preparation team made medical error, 4 items.
- The officers kept patients' medicine in the wrong lock, 1item.

2. Medicine preparation

2.1 Provided medicine did not delivery to the patients.

- Provided medicine differenced from the doctors' ordering (5 Right), 2 items and from medicine card.

- Because of failing to eliminate error medicine card, there was providing medicine that the doctor stopped to provide 1 item.

3. Techniques of medicine dispensing
    - There was no final check between medicine card and medicine before delivery to the patients, 3 times.
    - The patients did not have the medicines within half an hour after received because they have not had a meal yet and they were waiting their relative people to bring them a meal.

The conclusion of medical error, the patients received medical error to their bodies dropped to 3 times from 5 times on the first data collection. However, after evaluation the researcher found that there was no danger and effect to the patients due to the following details.

1. The patients had the medicines that the doctors stopped to provide, 1 time. Fortunately the medicines that they had were very helpful to their intestine systems.
2. The patient was injected wrong medicine, which prepared to another patient to his/her vein because the nurse injected to the wrong patient. The point was the nurse did not bring medicine card with her, 1 time
3. The patient was injected headache medicine, which supposed to inject to other patient to his/her muscle because the nurse misread

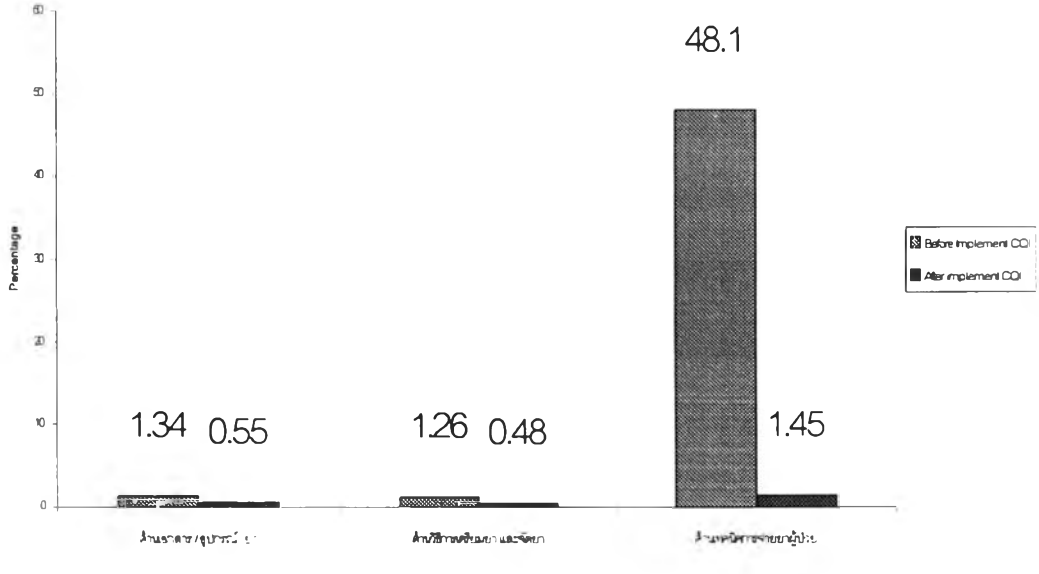
the number 1 to 2 on the note over the patient' s bed and she had a background that the patient number 2 also had an headache.

Notice

1. The Medical nurses have shown their responsibilities by reporting 3 times medical error to their 'in-charge' and supervisor themselves.
2. Even though, the number of medical error decreased, there was no guarantee about the serious effect of error injection, which raised up from 1 to 2 times.

Figure 3.5 below shows the comparing percentage of medical error risk between before and after implement continuous quality improvement (CQI).

Figure 3.5: Percentage of medication risk before and after CQI implementation



Document/Equipment/Medicine Preparation method /Medicine Providing Techniques of medicine dispensing

Conclusion: The average percentage of medical error risk was decreased to 16.07 % (16.9 % reduced to 0.83%). Specifically there are 0.79 % related to document and equipment, to 0.79 % related to preparation method dropped to 0.78 %, and 46.65 % related to techniques of medicine dispensing, respectively.

Step 8. Standardize Improvement

In order to have eternal improvement, medicine dispensing standard was established in inpatient department to reduce medical error. There was rule of medicine dispensing, named 5 Rights, Right Patient, Right Drug, Right Dose, Right Time, and Right Method

Medicine dispensing standard in inpatient department, Banprak Hospital

Objective : Decrease medical error risks to the patients

Policy : Follow on the rule of medical dispensing (5 Rights), namely Right Patient, Right Drug, Right Dose, Right Time, Right Method

Role

The nurse in-charge

1. Transcribe Doctor' s Order Sheet to prescription sheet, overdue payment bill, and involved medicine documents such as, medicine card and Kardex. In case, the nurse does not completely understand the doctor's handwriting, lack of information or has any questions the nurse must immediately consults the doctor. The nurse has to crosscheck all of document before keep in files or send prescriptions /overdue payment bills to dispensing room.

2. Responds to receive medicine from dispensing room and ensure that all medicine, label and overdue payment bill are right by using 5 rights rule. Then, puts medicine in each patient's locker.
3. The nurse in charge of the morning shifts (Sub-head) cooperates with pharmacy department to examine expired medicine and suppliers nearly expire medicine less than 3 months to other departments where use more medicine; such as, dispensing room and emergency room by last Friday of the end of March, June, September and December.
4. The nurse in charge in the afternoon has responsibilities to examine the administration documents (Complete Chart); such as, medicine card, Kardex, medicine list sheet compared with Doctor's Order and corrects all missing documents.
5. The nurse in-charge at night responds for:
    - Examine medicines in packages and recheck label on medicine package which compare with the doctor's ordering before write daily medicine order patient on the for next day patient.
    - Crosscheck medicines in the stock and put medicines to the patient's locker.

Medical nurses

1. Prepares medicines before dispense to the patient not longer than 30 minute.
    - Mixing medicine for injection has to follow the hospital's standard.
    - For the rest of mixed medicine injection which can use for next time, the nurse has to write the details about date of mixing and

amount with a red pen on the bottle's label then keep it in a refrigerator.

- In case, there is mixed medicine injection remains in the syringes and it is potential to use with same old patient, the nurse has to write down patient's name, bed number, medicine's name and date of expire before keep it in a refrigerator (6 hours after pulled in to syringes) exclude some medicine that expires quicker than 6 hours.
- If the nurse finds out any errors between medicine card and label, she has to correct those errors from the doctor's ordering by cooperation with the head of nurse in-charge.

2. Medicine's handover and medicine providing to the patient.
   - Attach medicine card with syringe (use a rope to tight syringe and medicine card together also keep syringe disposable's plastic bag. Then put the syringe in the tray before go to the patient's bed.
   - Before hand out medicine, the nurse has to recheck medicine card and medicine. The nurse also has to call patient's name from medicine card compares with patient's identification armband and make sure that she gives medicine to the right patient. The nurse must wait until the patient has all medicine then collects all dispensing equipment back.
   - In case, the patient has the medicine that has side effect, the nurse must not only wait and observe each patient' reaction in appropriate time; but also has to tell each patient to observe his/herself.

- In order to recheck medicine card compared with the doctor's ordering after giving medicine to the patient, the nurse has to record the details in medicine card to listed dispensing slip, which is in the patient's file.

Then, puts medicines card into next dose stock and must not leave it in a tray (in order to avoid re-dispensing to the patient by other nurse)

Step 9 Plan Continuous Improvement

Due to the existing problems, plan continuous improvement was pasted to solve the problems. The main points as following:

1. People who receive medication error, doctors and pharmacists together set the group of high potential medicine problem in order to create the efficient ways to deal with medicine in that group.
2. A pharmacist receives an order directly from the doctor without transcribes copy from the nurse, in order to reduce medication error risk process by using computer in medicine's ordering process to decrease misreading problems.