CHAPTER 2

METHODOLOGY

Written permission for the study was obtained from the director of the general hospital which was responsible for subcontracting services to the primary care units. In addition, the work was conducted in compliance with the requirements of the hospital's Institutional Review Board/Human Subjects Research Committee and permission was obtained from this committee to carry out the study.

2.1 Pilot study

The pilot study was conducted during the period 1 July - 30 September 2002 in order to develop and test the research tools and for the pharmacist to develop strategies for performing treatment interventions before proceeding to the main study. These tools involved electronic patient medication records, paper patient medication profiles, and a set of pro formas to measure patient knowledge, quality of life (SF-36), the Digit Span test, and patient satisfaction. Validity and reliability tests were also performed. The processes for collecting the data and conducting the analysis were prepared and revised as appropriate to collect the results and correlating them to the research objectives.

2.1.1 Methodology for the pilot study

Patient selection was undertaken in the cardiovascular clinic of Mahasarakham Hospital, the general hospital in Mahasarakham province, Thailand. This clinic provided medical services only on a Friday for patients who came from any area

except from Tombon Talaad (the market distict). Tombon Talaad is one of the districts in the city area of Mahasarakham. Twenty hypertensive patients were selected depending on volunteers on four consecutive Fridays. All of them had previously signed the consent forms. A table of random numbers was used to assign patients into two groups, the control and the treatment group. Five pro formas were provided for each patient and one pro forma was filled in at a time. In the treatment group of 10 patients, the pharmacist was involved with the patients in advising on lifestyle and by practicing the research tools which would be used subsequently. This was undertaken at the university pharmacy which is located about one kilometer from the hospital and which provides services for people who live in the city area. The control group received the medical care only from the hospital.

Intensive training courses were arranged for the research pharmacist during this time. For example, the research pharmacist practiced taking blood pressure measurements following the research protocol in JNC-6 and with the co-operation of clinic nurses for four months before the main study was begun. Six interviewers, two nurses and four Pharm.D. students were trained to help with the interviewing of patients to understand the meaning of each of the questions used based on the method described by Guenzel and colleagues (Guenzel et al., 1983).They were subsequently tested to ensure a consistency of interviewing technique between interviewers.

2.1.2 Patient medication record developed

An electronic patient medication record was developed by using Microsoft Access. This type of record had many benefits such as saving paper, saving space, saving having to carry documents to three study sites and by giving a quick analysis.

The record contained two main parts. The first part consisted of patient demographics, patient behavior information on self caring and their normal habits in treating illness, past illnesses, past medications, diagnoses, the time of diagnosis of hypertension and other chronic diseases, allergy histories, and family histories. The second part of the record was used as a follow up form which was composed of five items; a progress note, records of an admission, an emergency (ER) visit or other sources for care; a review system sheet beginning from the head and moving to feet; current medications, their doses, frequencies, total number, cost per unit, cost for total, and calculated compliance rate; drug related problems identification with explanations and results from making certain interventions; and subjective, objective, assessment and plan (SOAP) notes of each drug related problem found (Appendix I).

2.1.3 Comparison in reading between mercury sphygmomanometer and digital meter

A new mercury sphygmomanometer, Ergra produced by a German Company, was selected because the hospital and the primary care units used sphygmomanometers manufactured by Ergra. The readings from the new mercury sphygmomanometer were compared with those of the digital meter which was normally used routinely in the hospital. This was in order to check the possible differences in readings. This data provide helpful information for making interventions as a double check of each measurement.

Careful technique guarantees maximum accuracy, measurements performed by a sphygmomanometer followed the protocol as in Appendix I. The measurement with digital meter was also undertaken using the same procedure above. This comparison

was undertaken in one day with 20 persons who were aged over 18 years, with or without hypertension.

2.1.4 Pro formas' construction

Four pro formas were used in this study. Two of them were used for measuring patient satisfaction and patient knowledge and were constructed for this study. The third pro forma was a Thai version of SF-36 and had already been validated (Leurmarnkul and Meetam, 2000). The fourth pro forma was the Digit Span test. This was routinely used in psychology clinics and was used without any changes. The Digit Span test was one used for measuring health related quality of life and is a specific instrument for measuring a dimension of cognitive function (Isabelle et al., 2000).

Patient satisfaction pro forma construction

The interview pro forma was constructed by using the concept of satisfaction as an effect-based assessment (Shommer and Kucukarslan, 1997). Pro forma development benefited from those developed in previous studies (Shommer and Kucukarslan, 1997; Talbot, 1995). Multi-item scales were produced because they are reported to be more reliable than single questions (Ware et al., 1978). Six domains were selected to cover the pharmacy services available in Thailand. These were communication and management, accessibility and convenience, finance, interpersonal relationships and overall satisfaction. Survey items were selected based on previous studies and 16 items were included in the pro forma. There were seven negatively worded statements and nine positively worded statements to reduce the inherent response set bias of the questionnaire (Risser, 1975). A four choice evaluation scale

was selected in order to make respondents decide for or against the statement and so prevent the easy option of saying they don't have an opinion. The scale was scored as Strongly Agree/Agree/Disagree/Strongly Disagree. Items for which agreement was considered desirable were scored with a four for "Strongly Agree" and a one for "Strongly Disagree." Items for which disagreement was considered to be desirable were scored in the opposite direction. Therefore a "desirable" score on each item was represented by a high numerical score.

Patient knowledge pro forma

Fourteen questions were constructed to measure patient knowledge in three domains; hypertension knowledge, risk factors management, and the proper use of medications. The pro forma was designed to use three choices of Yes/No/I don't know.

2.1.5 Test for reliability and validity

Content validity was performed by submitting the 18 questions to seven experts five of whom were involved in the pharmacy field and two were involved in health science. The experts rated each statement as to whether it was directly associated with pharmaceutical care and with what the study was designed to measure. A pilot test was performed in order to adjust the readability and understandability of the questionnaire. Sixteen hypertensive patients were interviewed on three consecutive visits to the hypertensive clinic at Mahasarakham Hospital. Cronbach's alpha was calculated to assess reproducibility.

2.1.6 Data collection

Blood pressure measurements were recorded for 20 patients at the first meeting during a clinic visit in the hospital and all of them had their blood pressure measured again on a subsequent clinic visit.

To test the pro formas for patient satisfaction and patient knowledge, a different group of hypertensive patients was selected. This was because the pro formas needed to be revised three times and it was difficult to arrange for the same patients to come back again during the pilot period. Face to face interviews were performed during a morning clinic visit at the hospital. Tape recordings were made of each interviewer to assess the consistency of the interviewing and to determine patients' understanding. Souvenirs were given as a small reward to the hypertensive patients who took part.

2.2 Main study

2.2.1 Study sites

The study was carried out in Mahasarakham University community pharmacy, near Mahasarakham Hospital in the center of the provincial capital, and in two primary care units in Takonyarng and Kharmrieng villages. The university community pharmacy served a city area and the two primary care units served rural areas located in an area of about three kilometers around Mahasarakham University.

The health workers in the PCUs consisted of two groups. The first group rotated twice a month and consisted of a doctor, a nurse and a pharmacist from the hospital. These two clinic visits provided rural patients equivalent treatment to that

provided to city patients by the outpatient department of the hospital. The other group of health workers practising in the PCUs was health workers who worked in the PCUs every day. This group in each PCU usually consisted of a nurse who had qualified after four years study, another nurse who had a two year qualification and two nurses who had a one and a half year nursing qualification plus a bachelor degree in public health or a related subject. These four provided nursing care and medication for common diseases and referred severe cases to the hospital. A fifth person was involved in a clerical capacity in the day to day organization of each PCU. The research pharmacist provided pharmaceutical care in the morning and in the evening for three days a week at the university community pharmacy and in the morning for four days a week in the PCUs. The pharmacists who attended the PCUs twice a month and the pharmacists in the university pharmacy were not involved with taking care of patients in the treatment group. Each patient in the treatment group was seen once a month. Occasionally, home visits were made in the afternoons to those few patients who missed their monthly appointment. At the pre and post tests, patients were separated to have their BP measured in a different area from the clinic treatment room of the hospital or the PCUs in order to avoid the busy and noisy environment disturbing the BP measurements.

2.2.2 Research design

The main study had the same design as the pilot study but there were more study samples. A randomized pre test post test controlled group design was carried out between October, 2002 and February, 2004. The pre test was undertaken during October, 2002 - December, 2002. A simple randomization technique was used to

assign the patients to a treatment group and a control group. BP was measured using a sphygmomanometer.

2.2.2.1 Treatment Group

Patients in the intervention group were monitored by the research pharmacist for a period of 1 year (January, 2003-January, 2004). BP measurement and a set of pro formas were completed at the pre test period, after 6 months and after 1 year as the post test periods. Moreover, the patients had their BP measured every month as scheduled by the research pharmacist at the university pharmacy and primary care units on separate days from the clinic days. The measurements were performed in a separate room of the clinic in the morning between 8.00 am-12.00 noon as this was the normal time of the clinic. The technique for BP measurement followed the Handbook of nonprescription drugs 12th ed and JNC-6 (National high blood pressure education program, 1997; Rosenthal and Briggs, 2001). An adjustable level table top, for the patients to rest their arm on, was used and different sphygmomanometer cuff sizes were available to ensure the appropriate size for the arm of each patient. Each patient's pharmacy record consisted of the following: demographic data, clinical and therapeutic data, patient behavior, lifestyle, and BP record.

The controlled BP in hypertension without concomitant cardiovascular disease was defined as having a benchmark of $\leq$135/85 mm Hg because the conditions of BP measurement were similar to the conditions for self measurement at home as stated in JNC-6 and all other BP goals followed JNC-6 guidelines (National high blood pressure education program, 1997).

The patient consultation consisted of a 30-50 minute face to face interview. The research pharmacist assessed the patient's understanding of his or her medications, counseled on the use of their medications, assessed compliance and lifestyle habits, reviewed for adverse events due to drug related problems, discussed factors associated with uncontrolled BP and disease state control. This assessment was made from the written patient history and the interview. Drug related problems were identified, resolved and prevented following the protocol (Appendix I). The pharmacist's recommendations for medication regimen changes, due to detecting drug related problems, were made to physicians, usually by letter from the university pharmacy to the hospital, but also by recording a note in the patient medical record in the PCUs.

The research pharmacist also adopted a non pharmacological approach in providing relevant information and advice for each patient. This covered exercise, fatty diet, salty diet, smoking, alcohol, and weight reduction. The patient's record was updated monthly to include medication provided from the hospital and PCUs.

Educational leaflets and a diary to record life style were handed out during the patient's first visit. The educational leaflets and the life style record book were developed by the research pharmacist. Areas covered were information about hypertension and possible complications, medicines information and a blank table to record notes each day on food eaten, medication taken, alcohol intake, exercise undertaken and any unusual symptoms.

2.2.2.2 Control group

This group had no research pharmacist involvement. Control patients received the traditional service provided by the hospital or the PCUs without seeing the research pharmacist. Traditional service represented the normal service provided.

BP measurement and a set of pro formas were completed at the pre test period, after 6 months and after 1 year as the post test periods. The same method of BP measurement was used as in the intervention group.

2.2.3 Study population and patient selection

The databases from the hospital and two PCUs were screened for patients diagnosed as hypertensive. They could be men or women who were aged over 18 years and who signed the informed consent form. The eligible patients could also be those who were newly diagnosed during the pre test period, October-December 2002, and had the following criteria as determined by reviewing their medical records: an average DBP of 90 mm Hg or above, or average SBP of 140 mm Hg or above: hypertensive patients with diabetes having an average DBP of 85 mm Hg or above, or and an average SBP of 130 mm Hg or above: or, receiving current therapy with antihypertensive drugs (controlled or uncontrolled BP). Patients were excluded if they had secondary causes of hypertension which were determined by a review of the patient's medical history and from their other diagnoses, or if they were unwilling or unable to return to the PCUs or pharmacy for scheduled appointments, or if they planned to move out of the area during the study, or if they had another family member enrolled in the study, or if they had a BP exceeding either 210 mm Hg systolic or 115 mm Hg diastolic, or if they had a serious complicating disease that was

so disabling that BP control was a secondary or minor consideration (terminal cancer, New York Heart Association class III or IV congestive heart failure, end-stage renal disease, severe hepatic condition such as cirrhosis, uncontrolled angina pectoris, ventricular arrhythmia, dementia).

2.2.4 Research tools

From the pilot study, four pro formas were used in the main study. Those were patient knowledge, patient satisfaction, SF-36 and The Digit Span test. The reliability and correlation tests of patient knowledge, patient satisfaction and SF-36 at the pre test, after six and 12 months were assessed as shown in the Appendix II.

2.2.5 Outcome measurements

The clinical outcomes were compared both between groups and between pre and post tests where there were BP reductions, BP controls, compliance rates, and patient knowledges. BP controls were classified as 'controlled' and 'uncontrolled', compliance rates were divided to be 'good compliance' and 'poor compliance' and patient knowledge was grouped as 'know' and 'not know', the latter included the answer choices of 'N' and 'Not know'

The humanistic outcomes were also compared as clinical outcomes. The pro formas of patient satisfaction, quality of life and the Digit Span test, were used.

The economic outcome was identified as the costs of medications. These were only compared between groups in the period of post test.

2.2.6 Data analysis

Sample size was calculated from the pilot test by using the formula of two groups of independent subjects. We set alpha at 0.05 and beta at 0.1 (power of 90%) and the effective size of systolic change at 10 mm Hg. The target size of the study sample was thus calculated to be 95 patients. An additional 30% was added to allow for patient drop outs, making a total of 124 patients per group.

Statistical analysis was performed using SPSS 10.0. Blood pressure reduction between groups was determined using the analysis of covariance in the multiple regression model. If interactions were found, only significant interactions were included in the model. BP differences and quality of life differences between pre test and post test were analyzed by using the paired t test and categorical data by using chi-square. Continuous variables in demographic data were analyzed using mean and standard deviations. The significance level was set at $p < 0.05$. Blood pressure controls, compliance rate controls patient knowledge, patient satisfaction and clinical factors were analyzed by multiple logistic regression using the pre test as a covariate in the model.

Compliance rate was calculated by the number of medicines taken divided by the number of medicines supplied, multiplied by 100. If the compliance rate was ≥ 80 we concluded a good compliance rate but if compliance was <80 it was taken to represent a poor compliance.

Intention to treat represented the total numbers of patients recruited. That is a total of 235 patients' BPs were included in the data analysis. Intention to treat was used as the basis for inclusion in the study to reduce the bias that would occur if those patient's who dropped out of the study were not included in the total numbers. Patients

who dropped out of the study were determined from the most recent data on the patient history card.