CHAPTER II

LITERATURE REVIEW

2.1 Definition of Epilepsy

2.1.1 Theoretical Definition

Epilepsy is defined by theoretical definition as a condition characterized by recurrent (two or more) seizures unprovoked by any immediate identified cause, drug, alcohol, or fever in a child aged 6 months to 5 years. Multiple seizures occurring in a 24-hour period will be excluded without recourse to electroencephalography (EEG) (International League Against Epilepsy; (ILAE), 1993).

2.1.2 Operational Definition

In published articles, epilepsy has been defined as having two or more seizure episodes, which were not febrile convulsions and were not related to metabolic disturbances, drugs, or alcohol (Cruz, et al., 1985; Gracia, et al., 1990; Li, et al., 1985; Osuntokun, Adeuja, et al., 1987; Osuntokun, Schoenberg, et al., 1982). The theoretical and operational definitions, as well as the operational definitions in the hospital and in the community were largely identical.

2.2 Guideline for Epilepsy Management

The objective of treatment is complete control of seizures for a long period of time (2-5 years) and discontinuation of antiepileptic drug (AED) treatment thereafter (Medical Research Council Antiepileptic Drug Withdrawal Study Group, 1991; Epilepsy Society of Thailand, 1994).

The guideline of treatment is that patients with frequent seizures (more than once a year) need to be treated with monotherapy, which must be specific to their seizure type (Heller, et al., 1995; Mattson, Cramer, and Collins, 1992; Mattson, Cramer, Collins, Smith, et al., 1985; Richens, et al., 1994; Turnbull, et al., 1985). On the other hand, an AED can be applied for some types of seizure, but not all. Some AEDs cannot be used for some types of epilepsy, and if used will make seizure worse. For example, volproic acid, an AED, is used specifically for those with absence seizure (Aguwa, et al., 1990); if carbamazepine is chosen, the patients will get worse (Berkovic, 1998). Monotherapy can control seizure for at least 70-80% of epileptics and has fewer side-effects than polypharmacy. Most of the AEDs are enzyme inducers, which means that, if given, one AED will reduce the drug level of another AED in the blood. The seizure, therefore, cannot be controlled and the drug side-effects will increase.

Monitoring of seizure occurrence and AED adverse effects must be done regularly at every visit, together with determining whether or not the patients adhere to their AED and avoid precipitating factors that will induce seizure(s). The precipitating factors are as follows: sleep deprivation, severe physical or emotional

stress, and exhaustion (Reynolds, 1987). The dose of an AED chosen for treatment needs to be increased gradually until the seizures are completely controlled. If an adverse effect of AED occurs, the drug needs to be gradually withdrawn and a new one substituted (Brodi, Richens, and Yuen, 1995; Heller, et al., 1995; Mattson, et al., 1992; Mattson, et al., 1985; Richens, et al., 1994; Turnbull, 1985). The drug that can control seizures needs to be continued until the patient is seizure-free for at least 2-5 years (Medical Research Council Antiepileptic Drug Withdrawal Study Group, 1991; Emerson, et al., 1981).

Those patients who are seizure-free for 2-5 years without the following criteria--mental retardation, neurological deficit, abnormal electroencephalography, two types or more of seizure (Emerson, et al., 1981)--can stop taking their AED by gradual reduction. Patients who stop treatment also need to know that they have a 20-30% risk of relapse, and if so they will then need to resume treatment.

Treated patients who continue having seizures for a long period will become refractory (Reynolds, Elwes, and Shorvon, 1983). In addition, patients need to comply with their treatment regimen, otherwise they will inevitably have seizures and later become refractory (French, 1994; Relnolds, 1987). Moreover, patients can have seizure(s) or status epilepticus from AED withdrawal.

In real clinical practice, there are many epileptics for whom seizures cannot be easily controlled. The reasons for seizure(s) are the following: 1) high severity of epilepsy on its own, such as epilepsy syndrome, epilepsy related to progressive

neurological conditions, and focal epilepsy (Keranen & Riekkinen, 1990); 2) patient's poor compliance (Schmidt & Leppik, 1988); and 3) GP's lack of knowledge about how to handle patients (Berkovic, 1998).

Seizure severity itself cannot be modified to less severe other than through patient and GP factors. If patients comply with taking AED, follow the schedule regularly and avoid precipitating factors, while at the same time GPs are sufficiently knowledgeable and experienced, the patients' seizure(s) will be better controlled.

2.3 Previous Studies in Epilepsy Care

2.3.1 Non-compliance Rate

Cramer, et al. (1989) studied the compliance rates of epileptics by assessment with pill bottles, with microprocessors installed in the cap to record every bottle opening, presumably indicating a dose taken. They found an average compliance of 76% during 3428 days' observation, with diminishing rates for higher frequency of dosage a day (i.e., 87% for once daily, 81% for twice daily, 77% for thrice daily, and 39% for four times a day). In New Zealand, 37% of 95 patients with epilepsy were non-compliant by self-report. Lisk and Greene' s study (1985) showed compliance in epileptic children was as poor as in adult patients. In Shope's study (1981), by review of long-term oral medication compliance in children between 1960 and 1980, compliance for patients with epilepsy ranged from 25-75%. Also, compliance with dosing regimen for epileptics diminished over time, from an average of 86% five days after a visit, to 67% a month later (Cramer, Scheyer, and Mattson, 1990).

The study of Asawavichienjinda, et al. (2003) sought to determine the frequency of non-compliance, and the factors associated with non-compliance, of AED used in epileptics in a rural district of Thailand. Ninety-three registered epileptics and their caregivers were invited, after informed consent, for an interview and for an examination bye sub-district healthcare officials and the authors, during the period January-May, 1998. The outcome variable measured was whether the level of compliance with AED regimens over the past year was 100% (defined as taking the AED on time, without fail, and without manipulating their dosage) (Gopinath, et al., 2000), as determined during an in-depth interview of the patients and their caregivers. During the same interview, the major reasons for non-compliance were determined.

The results demonstrated that, of the 93 epileptics registered in Paktongchai District, only 83 (89.2%) of the epileptics and their caregivers were interviewed and examined. Of the total 83 epileptics examined, only 11 were children (aged 0-14 years). Of the 72 adult epileptics, the average age was 36.3 years (SD=14.0; median=36; range: 16-75 years) and 59.7% were female. The overall patient-compliance (100%) over the past year was 53.0% (56.9% for adults and 27.3% for children). By multivariate analysis of adults, it found that gender, household income, and whether the patient had health insurance, had a significant correlation with compliance (p-value < 0.05).

2.3.2 Failed Appointment Rate

With regard to failed appointments, a search of Medline on the internet using PubMed for the words "failed appointment and outpatient clinic", resulted in 12

studies related to failed appointments. Of these, six were available, but none was specific to epilepsy.

In the study on failed appointments by Oppenheim, et al. (1979), entitled "Failed appointments: a review", the failure rates varied from 5-11 % in family practice centers, 20% for return patients, and 10% for new patients in the University Hospital Medical Clinic. In other studies, failure rates varied from 19 to 52%. The factors for failed appointments were age, social class or patient income, level of education, interval between appointments, and urgency of appointment. It showed that patients aged between 15 and 34 years had over twice as high a failure rate as those over 35 years. Patients who were in a low socio-economic class or did not complete high school had a higher rate of failed appointments compared with those who were in a high socio-economic class or had completed high school. The reasons for failing to keep appointments were communication problems between patients and doctors (34%), too ill to come (18%), forgetting (14%), and not having enough money for the follow-up visit (12%). Compared with Alpert's study (1964), 38% had forgotten; 29% gave family-related reasons (no sitter, illness, no transport, inadequate finances); while 9% claimed hospital error in making the appointment.

The study of Lim, et al. (1995) was entitled "Why patients fail to attend psychiatric out-patient follow-up: a pilot study". Included in the study were: 1) patients who failed to turn up for their appointments despite the allowance of a 2-week period before and after the actual appointment date; and 2) those who had attended the clinic at least six months before the period of the study. These non-

attending patients were contacted to revisit the clinics by phone or letter and asked to answer a self-administered questionnaire for the reasons of non-attendance and for those who did not visit, a community nurse made a domiciliary visit to administer the questionnaire. There were 71 non-attendance cases (4.3%) out of 1664 appointments made during the study period. The top five reasons were "lost appointment card or forgot appointment" (16.9%), "feeling well" (14.1%), "not free for the appointment" (12.7%), "still had the medication" (11.3%), and "occupied by work " (8.5%).

The study of Pal, et al. (1998), entitled "Why do out-patients fail to keep their clinic appointments?: results from a survey and recommended remedial actions", surveyed the reasons for non-attendance by patients at out-patient clinics in two Trust hospitals. The failure rate varied from 12-35%. The total number of non-attending patients during a one-month period in the hospitals was 2555 cases (728 new patients and 1827 old / registered / recorded patients). Questionnaires were sent to the patients and 983 completed questionnaires (38.5%) (189 new patients and 794 old / registered / recorded patients) were returned and analyzed. The top four reasons for non-attendance in new and old / registered / recorded patients were similar: "forgot the appointment" (25% for new patients, 38% for old / registered / recorded patients); "did not receive the appointment card" (20%, 20%); "too ill" (16%, 18%); and "member of family was ill" (13%, 9%, respectively).

The study of Killaspy, et al. (2000) was entitled "Prospective controlled study of psychiatric out-patient non-attendance: characteristics and outcome". The population comprised patients aged 18-65 years living in North Camden, an inner-

London psychiatric catchment area, who had a general adult psychiatric outpatient appointment between September 1996 and April 1997. Subjects were randomly selected by computer-generated random number with sampling fractions calculated on the basis of the previous six months' outpatient activity. The sampling fractions were as follows: new patient non-attendants 1:1; new patient attendants 1:3; follow-up non-attendants 1:7; and follow-up attendants 1:12. The number of samples in each group was as follows: 59 new patient non-attendants (29 of whom were interviewed), 41 new patient attendants (28 of whom were interviewed), 129 follow-up non-attendants (76 of whom were interviewed), and 136 follow-up attendants (91 of whom were interviewed). The top three reasons for non-attendance for follow-up non-attendants was "forgot the appointment" (27%); "too ill to attend" (14%); and "reported clerical error" (11%). The top four reasons for new patient non-attendants was "unhappy with psychiatric referral" (17%); "too ill to attend" (14%); "reported clerical error" (14%); and "forgot the appointment" (11%). After twelve-month follow-up, patients who were non-attendants had much higher chances of admission than those who were attendants. For new patients, there was no difference in medical outcome between the non-attendant and attendant groups.

The non-attendance rate in the study of Macharia, et al. (1992) ranged from 19-52%; the reasons were disruption of the client-care-provider relationship, reduction of the opportunity for patients to receive timely care, and rising healthcare costs.

The study of Asawavichienjinda, et al. (2003) sought to determine the proportion of epileptics with non-compliance to follow-up schedule. All patients and their caregivers were asked whether they had ever forgotten to attend their scheduled follow-up visit over the past one to two years. The results indicated that 43.1% of the total 83 adult patients sometimes forgot to attend their scheduled follow-up visit over the past one to two years.

In summary, low compliance adherence to the AED and to the appointment in epileptics prevailed all over the world and the causes of non-compliance were quite similar.

2.3.3 General Practitioners' Lack of Knowledge

Gomes (2000) studied doctors' perspectives and practices concerning epilepsy. Local GPs and pediatricians, who had been trained in three training hospitals, were surveyed with a 27-question self-administered, structured questionnaire. The result revealed that 93.7% of the respondents were not familiar with the variety of AED, their specific use, and the side-effects of many AED. Only 35.4% of the respondents answered that they had sufficient knowledge about epilepsy and were satisfied with it. Most of the respondents (77.0%) referred their patients with epilepsy to a neurologist and less than half of the respondents (37.1%) started treatment of epilepsy themselves.

In clinical practice, both false positive and false negative diagnoses were common (Sander & Shorvon, 1987). Syncope was, in one review, misdiagnosed as

epilepsy (at least initially) in about one-third of cases (Gastaut, 1974), and it had also been estimated that up to 20% of chronic cases referred to specialized epilepsy units had in fact psychogenic attacks (Lesser, 1985).

The study of Thanin Asawavichienjinda (report, 2001) was conducted to assess healthcare providers' knowledge of epilepsy treatment in Nakhon Ratchasima Province, in 2000. Four community hospitals (CHs) were randomly selected. Nurses at the hospitals were asked to complete a questionnaire when they joined a monthly meeting. Of the 46 nurses at the OPD, Emergency Department, and Health Promotion Department; 40 completed the questionnaire. The questionnaire asked about epileptic treatment, which was specific to nursing care for epilepsy initiated by the author. It was a self-administered questionnaire, composed of four domains, as follows: 20 items on epilepsy symptoms; 16 items on AED adverse effects; 8 items on precipitating factors; and 8 items on general knowledge about epilepsy treatment. All of these items were yes-no questions. The results were as follows: their average knowledge about recognition of seizure symptoms was 63.5%; awareness of AED side-effects was 32.2%; understanding about precipitating factors of seizures was 53.3%; and perception about the need for long-term and regular treatment was 67.5%. The nurses had little knowledge on how to recognize AED side-effects and precipitating factors.

To assess the knowledge of epilepsy management of GPs at CHs, the same questionnaire was administered as with the nurses, with specific modifications for the GPs. The modifications consisted of: 14 items on type of seizure; 10 on how to

manage a patient with a history of seizure; 9 on how to choose and modify AED; and 1 on when to stop treatment. All questions were assessed a one-best-answer basis. Eighteen GPs in 10 CHs completed the questionnaire. Their average knowledge was as follows: recognition of seizure symptoms, 72%; awareness of AED side-effects, 42.8%; understanding about precipitating factors of seizures, 81.3%; perception of the need for long-term and regular treatment, 76.2%; recognition of seizure type, 45.9%; knowledge of how to select an AED, 33.1%; knowledge on how to modify an AED if seizures persisted, 50%; knowledge of when to investigate patients, 60%; and knowledge of when and how to stop treatment, 60%. They had limited knowledge of how to recognize AED side-effects, seizure type, and selection and modification of AED.

In summary, most GPs in clinical practice still had insufficient knowledge of epilepsy management.

2.4 Current Healthcare System at Community Hospitals

When a patient visits a CH, an OPD nurse will ask about the major complaint and measure the vital signs. The patient will then be sent to a GP for physical assessment and the issue of a prescription. Some GPs may give advice to the patient, but some may not. Some GPs do not ask patients for more information or use the additional information to provide specific care to individual epileptics. In addition, some OPD nurses may educate the patient with basic knowledge of the disease, but some may not. The reasons for different provisions of management may be the "different workload at CHs" or "the individual primary healthcare teams' knowledge

about epilepsy". Some GPs do not know when patients need to be referred to a specialist, while in other instances, patients cannot go to the recommended specialist for several reasons, so that they miss their opportunity to consult a specialist. For subsequent visits, patients only receive a small appointment card, which is quite easy to lose. In that case, patients may forget the date and then fail to visit the doctor for the scheduled appointment. For defaulters, a responsible nurse will send a reminder letter to the patient after failure to keep the appointment, maybe a day or up to a month after appointment failure. This process is probably too late for patients because they may already have experienced seizure (s) from drug withdrawal.

In summary, the current healthcare system at CHs has an inadequate follow-up system, resulting in a high default rate and inequity in medical-service provision at CHs, due to the differential services provided by individual healthcare providers.

2.5 Previous Studies of Shared Care

A search for the term "shared care" (SC) on PubMed (Medline) found 2551 articles, and when the search was limited to "clinical trial and human", the result was reduced to 58 articles. Of these, 18 were directly related to studies of SC, and 11 were available online. There were 10 studies specific to chronic diseases, i.e., 5 for diabetes, 1 for hypertension, 1 for depression, 1 for mental illness, 1 for glaucoma, and 1 for rheumatoid arthritis.

There were five randomized control trials for diabetes. The diabetes studies are summarized in Table 2.1, and the meta-analysis of the outcomes (Griffin, 1998)

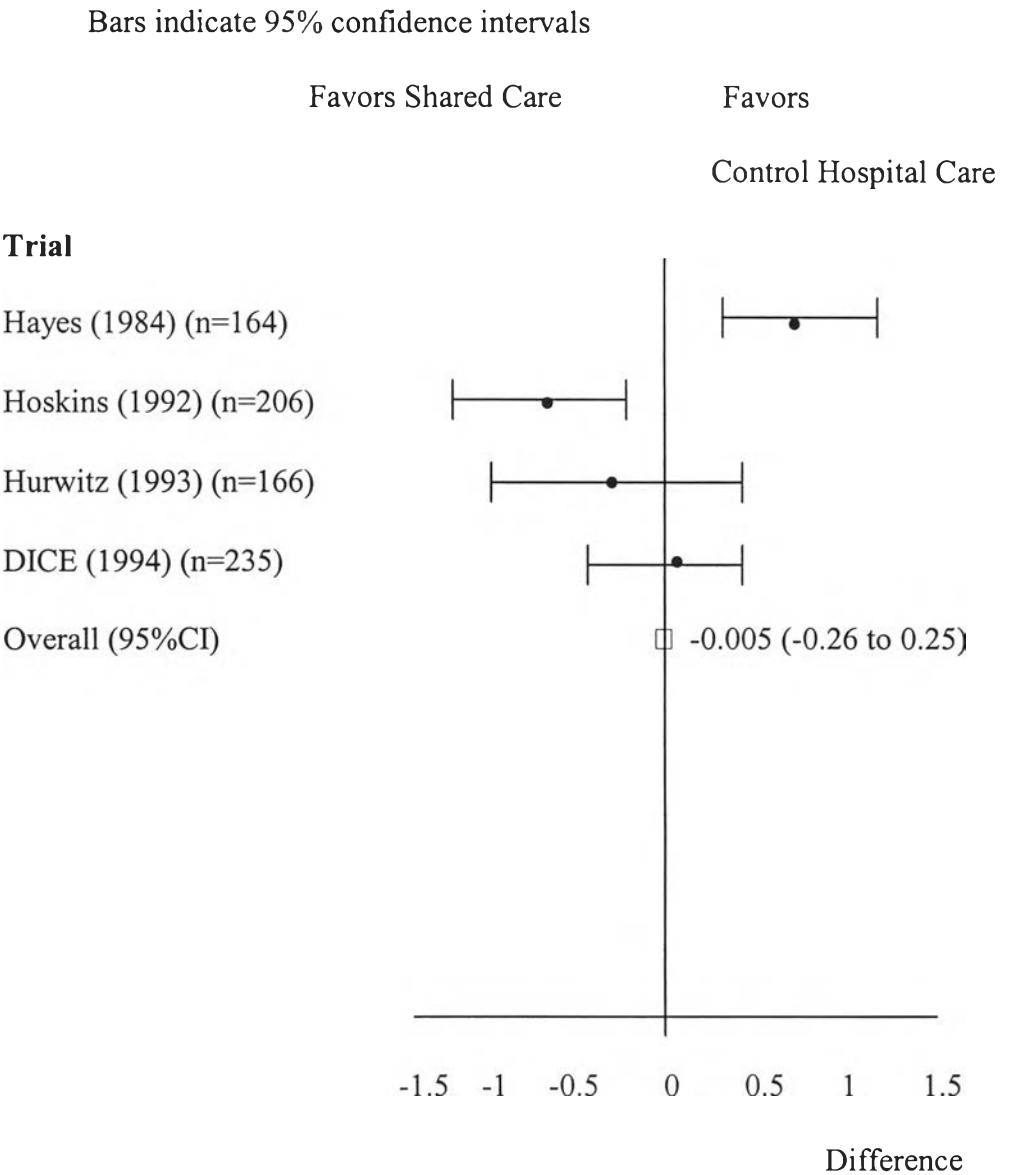
(medical outcome and process of care) is shown in Figures 2.1 and 2.2, and Table 2.2. Because of inter-trial heterogeneity, Peto odds ratio, weighted difference in means and X test were calculated by using the fixed effects model of the Cochrane Review Manager software.

Table 2.1*: Characteristics of trials included in meta-analysis of diabetes care in general practice

Name, Year reported	Setting	Years of follow-up	Method of random allocation	Exclusion criteria	Number of subjects	Type of diabetes	Mean duration of diabetes; mean age	Interventions	Main outcome measures
Porter 1982	Fife, Scotland	2	Opaque sealed envelopes, independently prepared with random number tables	Insulin treatment	197	NIDDM from hospital clinic	Not stated	Routine GP care, Diabetes team, meetings, record card, recall system for practices	Symptoms, limb function, fundi, weight, blood pressure, blood glucose, urine analysis, costs, mortality
Hayes 1984	Cardiff, Wales	5	Independently prepared by medical research council in sealed envelopes	Diabetes complications, serious medical problems	200	NIDDM from hospital clinic	Not stated; GP 59.7, H 58.4	Routine GP care	Follow-up; reviews and blood test, HbA1c, hospital admissions, mortality
Hopkins 1993	Sydney, Australia	1	Number (1,2,3) drawn from bag by independent person	Diabetes complications, serious medical problems	206	NIDDM, IDDM newly referred to hospital clinic	3 years; GP 54, H 52	Prompt GP care, individual management protocols sent to patient and GP, central liaison nurse, prompting patient and GP	Follow-up; reviews and blood test, weight, blood pressure, HbA1c, costs
Hurwitz 1993	London, England	2	Random number tables	Diabetic complications, serious medical problem, immobility, > 80 years, woman of child bearing age	181	NIDDM from hospital clinic	7 years; GP 62.0 H 63.1	Prompted GP care, GP education sessions, structured review form, fundoscopy by optometrists, central computerized recall, patient and GP prompts	Follow-up; reviews and blood test, weight, blood pressure, HbA1c, consultation rates, hospital admission, satisfaction, mortality
DICE 1994	Grampian, Scotland	2	Opaque sealed envelopes, independently prepared with random number tables	< 18 years, planning pregnancy, serious medical problems	274	NIDDM, IDDM	9 years; GP 58.1 H 59.6	Prompted GP care, Hospital annual review, guideline and structured review form, central computerized recall, patient and GP prompts	Follow-up; reviews and blood test, blood pressure, body mass index, creatinine, HbA1c, costs, knowledge, psychological measures, mortality

* Griffin, S. 1998. Diabetes care in general practice: Meta-analysis of randomised control trials. B.M.J. 317: 390-395.
DICE = Diabetes integrated care evaluation team

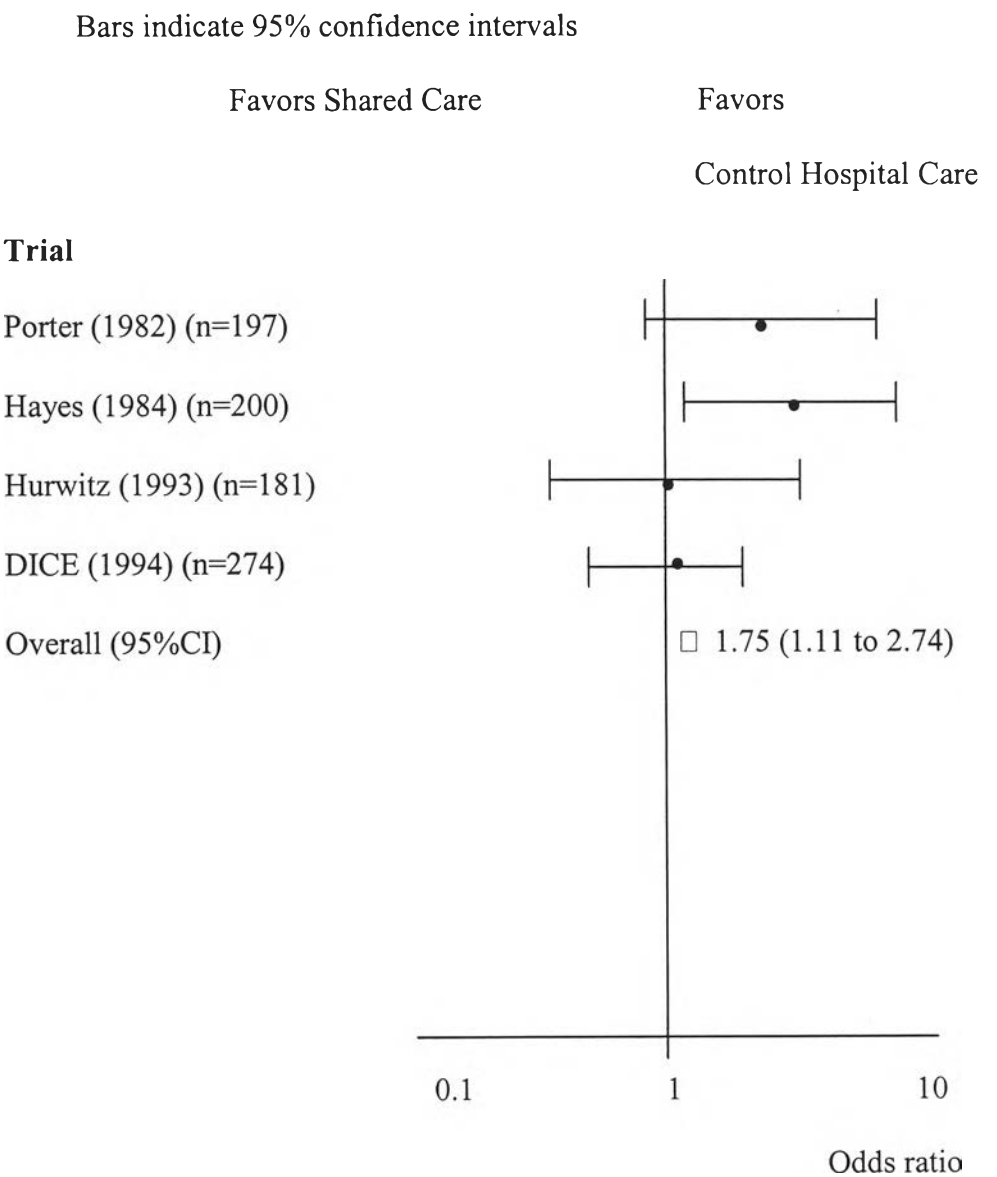
Figure 2.1*: Weighted difference in mean percentage of glycated hemoglobin between Shared Care and Controlled hospital care.



DICE = Diabetes integrated care evaluation

* Griffin, S. 1998. Diabetes care in general practice: Meta-analysis of randomised control trials. B.M.J. 317: 390-395.

Figure 2.2*: Odds ratio of mortality in Shared Care and Controlled hospital care



DICE = Diabetes integrated care evaluation

* Griffin, S. 1998. Diabetes care in general practice: Meta-analysis of randomised control trials. B.M.J. 317: 390-395.

Table 2.2. Process of care evaluation in diabetes between Shared Care and Controlled hospital care

Process of Care	Controlled Hospital Care	Shared Care	p-value
Huwitz B., et al			
- No (%) of patients without doctor diabetes review	14/92 (15.2)	3/89 (3.4)	<0.05
- Mean number of diabetes reviews/pt./doctor (SD)	2.2 (2.0)	3.2 (1.9)	<0.005
Hoskins PL., et al			
- Attendance rate			
% Initial assessment	100	100	NA
% First visit	80	82	
% Second visit	59	75	
% Third visit	53	72	
DICE study			
- Mean number visits (SD)	4.8 (1.7)	5.3 (1.4)	< 0.05

All of the studies compared patients with diabetes receiving SC at GP clinics and those receiving hospital care. The intervention in most of the studies was the SC components (coordination, communication and/or organization), except in the study by Hayes and Harries (1984), where the intervention was routine GP care, but the GPs could consult a specialist and use hospital facilities when necessary. In metabolic control, the overall result for the mean percentage of glycated hemoglobin from four studies, except for Porter's study, showed no significant difference between patients receiving SC and controlled hospital care (Figure 2.1). The Porter study (1982) merely stated that there was no significant difference in mean percentage glycated hemoglobin between the two groups, but no supporting data were explicitly shown. However, the overall mortality results from four studies, except for Hoskins' study (1993), showed higher rates in SC than in controlled hospital care (Figure 2.2) group. The Hoskins' study excluded deaths from the analysis. Significantly higher mortality was found in the Hayes' study, whose intervention was not really made up of SC components. Disregarding the Hayes' study, mortality was not different between the two groups. There were three studies evaluating the SC process. In Hurwitz and colleagues' study (1993), the number of patients without a doctor's review of diabetes was higher, and the mean number of diabetes reviews/pt./doctor was significantly lower in controlled care than in SC. In Hoskins' study, in controlled care, the attendance rate decreased over time at a higher rate than in SC. Moreover, in the Diabetes Integrated Care Evaluation Team study (1994), the mean number of patient visits was significantly lower in controlled care than in SC.

There had been one study by McGhee, et al. (1994) of SC with hypertension. The study compared patients with hypertension receiving SC at GP clinics and those receiving specialist care, and between SC and nurse practitioner care. The SC component included communication, coordination and organization among GPs, specialist, patients, and laboratory services. The population under study was patients with well-controlled hypertension. The sample comprised those attending two outpatient clinics of the Royal and Western Teaching Hospital. The GPs who referred patients to these clinics were invited to participate. Paired patients, matched by age and gender, were randomly assigned to SC or continuing outpatient follow-up and compared with patients matched by age and gender selected from a nurse practitioner clinic.

The results of the study (Table 2.3) showed no significant difference in well-controlled blood pressure, between those receiving SC versus specialist care, and between those receiving SC versus nurse practitioner care. Nevertheless, the process of care in terms of continuity (i.e. the patients still contacted the clinic and completed all the follow-up series) was significantly higher in the case of SC than in specialist care and nurse practitioner care.

Table 2.3*: Results of the Shared Care study for hypertension

Outcome	Shared care	Specialist care	Nurse practitioner care	95% CI Shared VS Specialist care	p-value	95% CI Shared VS Nurse practitioner care	P-value
Mean BP (at starting point)	No difference						
Same grade or move to better grade of BP control	67.8%	63.8%	69.9%	NA	NS	NA	NS
Completeness of information on clinical measurement	79-97%	78-100%	93.1-100%	NA	NA	NA	NA
Completeness of urinalysis	60%	43%	81.2%	NA	NA	NA	NA
Still contact with clinic or scheme	96.6%	85.9%	90.7%	6 to 15.4	<.001	1.8 to 10	<.01
Received complete review	82.4%	54.1%	74.8%	20.8 to 35.8	<.001	0.7 to 14.5	<.05

* McGhee, S.M., Mcinnes, G.T., Hedley, A.J., Murray, T.S., and Reid, J.L. 1994. Coordinating and standardizating long term care: Evaluation of the west of Scotland shared-care scheme for hypertension. Br. J. Gen. Pract. 44: 441-445.

NA = Not applicable NS = no significance

The study of SC for patients with glaucoma, reported by Gray, et al. (2000), aimed to examine the medical outcome in terms of missed points on visual field testing, intraocular pressure and cup disc ratio between Hospital Eye Service and SC with community optometrists. The intervention was in the form of coordination and organization introduced through training, with lectures for a total of 15 hours and practical hands-on examination experience of 10 hours. The results showed no significant difference in the mean number of missed points for visual field testing, intraocular pressure, and cup disc ratio, between the two groups.

The study on SC for patients with depression, reported by Llewellyn-Jones, et al. (1999), aimed to compare SC at GP clinics and GP care in terms of the extent to which the care provided reduced the levels of depression. The study was a randomized controlled trial with 9.5-months' study. The intervention was in the form of collaboration, coordination, and communication, with 111 patients in the control group and 109 in the intervention group. The results showed significantly reduced levels of depression in the SC compared with the control.

Warner, et al. (2000), in a study of SC for mental illness, aimed to evaluate the utility of patient-held SC records for individuals. This study was a cluster randomized controlled trial by random practices in SC at GP clinics and standard GP care. The intervention was in the form of communication. This was a 12-month study. For use of SC records, only 44% of patients used it, with a range of entries of 2-8 per booklet. The number of entries by professionals in the 12 booklets was as follows: hospital doctor = 9, GP = 5, social worker = 4, community nurse = 3. For

professionals' report of record use, of a total of 33 professionals, 14 reported that they remembered having seen a record during the study; 8 recalled that the records were volunteered by the patients; 5 reported that they asked the patient for the record and the rest did not use the record at all.

The study on SC for rheumatoid arthritis reported by Helliwell and O'Hara (1995) aimed to evaluate and compare the use of an ideal protocol of disease-modifying drug in monitoring, between GP clinic and hospital care. The process of SC intervention was through communication. Two hundred and forty-nine patients who met the inclusion criteria. The results showed that only 65% of the cases were followed by the ideal protocol.

In conclusion, intervention only through communication, one component of SC, could not improve the process of care (SC with mental illness and rheumatoid arthritis). SC with a systematic approach improved the process of care in terms of continuity of care for diabetes and hypertension cases. In addition, SC improved medical outcomes in depression and glaucoma cases and had the same medical outcome as hospital care in diabetes and hypertension cases.

Epilepsy is a chronic disease like diabetes, hypertension, rheumatoid arthritis, depression, mental illness and glaucoma, which need the same long-term care to prevent long-term complications. However, epilepsy, rheumatoid arthritis, depression, mental illness and glaucoma were a little different from diabetes and hypertension in short-term outcome. If patients with the former diseases were non-

compliant even for a short period of time, seizure, arthritis, depressive mood, symptoms of abnormal behavior and glaucoma would attack immediately and be harmful to them. In contrast, patients with diabetes or hypertension would only have silent consequences. So, with epilepsy, arthritis, depression, mental illness and glaucoma, patients need to adhere strictly to medication and to the follow-up schedule, otherwise, they would induce an immediate short-term effect, which might in turn accumulate to long-term complications. SC that improved medical outcomes and the process of care in some chronic diseases would plausibly improve epilepsy care in Nakhon Ratchasima Province, due to similar characteristics.

2.6 Suggested Shared Care

In the current study, on the basis of the defects in conventional care and the systematic approach of SC, it is suggested that SC would have the following: 1) SC provided to patients by a specialist through a reminder letter (to remind patients to keep their appointment); 2) SC provided to GPs by a specialist through treatment review and immediate feedback with problem-based education, to improve GPs' care; 3) SC provided to patients by primary healthcare teams to improve patients' self care and compliance through physical assessment (communication between GPs and patients) and health education provided through a pamphlet (communication between nurses and patients).

If this system benefited the epileptics, it should be effective with other chronic diseases and would ultimately improve the public health system in Thailand.

2.7 Outcome Measurement

2.7.1 Continuity of Care

As a consequence of the objectives of SC, continuity of care in terms of percentage regular follow-up was measured (McGhee & Hedley, 1996).

2.7.2 Medical Outcomes

2.7.2.1 Primary Medical Outcome

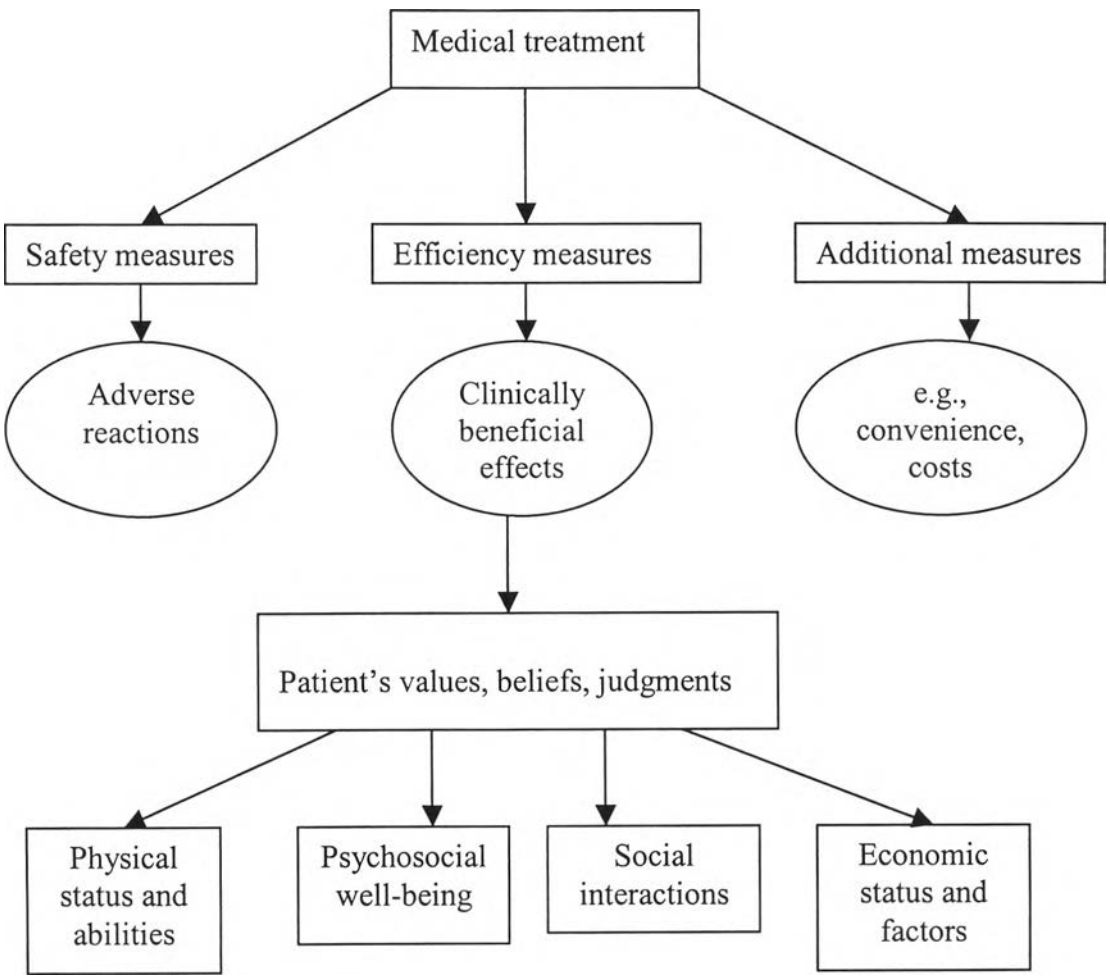
The general goal for epilepsy treatment is seizure reduction and a seizure-free status (ILAE, 1993). Therefore, seizure frequency was measured by using patient diaries or patient self-report, or eyewitness reports by relatives, and seizure frequency was then investigated by the PI for evaluation.

2.7.2.2 Quality of Life

The current standard endpoint for epilepsy treatment is determined based on quality of life (QOL) measurement (Fayers & Machin, 2000). The normal therapeutic evaluation of any disease is physical outcome. In a real situation, from the patients' perspective, the physical outcome alone is not enough for assessing any intervention. For example, an epileptic patient who achieves the desired physical outcome (no occurrence of seizure) remains concerned about the unpredictable future occurrence of seizure. Whenever epileptic patients are diagnosed, their work or activities (driving, swimming, or working at high altitude) are restricted. Their family and relatives will treat them as an ill person from the time the diagnosis is established. They cannot do anything alone because of the worry of their family or relatives about the occurrence of seizure. In addition, long-term treatment with an antiepileptic drug

may incur some adverse effects and disturb the patient's function. There is not only the physical outcome, but also many additional aspects of clinical evaluation, i.e., psychological, social outcomes, and safety measurement, as shown in Figure 2.3.

Figure 2.3*: Health-related quality of life



* Source: Cramer, J.A. 1994. Quality of life for people with epilepsy. Neurologic Clinics 12: 1-13.

The evaluation outcome of physical, mental, and social aspects in this manner was defined by the World Health Organisation (WHO) as "health-related quality of life" (HRQOL). The definition of HRQOL is a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity.

The WHO developed an instrument to measure HRQOL, which included the following five general domains:

1. Physical health

This topic included assessment of seizure frequency, seizure severity, activities of daily life (ADL), physical functioning, and adverse drug effects.

2. Psychological health

Cognitive function (thinking, learning, memory, and concentration) and emotional state (anxiety, depression, and fear of exposure to seizure), and self esteem, were assessed as one HRQOL.

3.Level of independence

The level of independent mobility, ADL, communication capacity, work capacity and dependence on substances, especially antiepileptic drugs, were also evaluated.

4.Social relationships

Social relationships with the family, classmates, coworkers, society, and fulfillment in marriage were assessed, including family and/or social support.

5. Environment

A physically safe and secure home environment, work satisfaction, health and social care, financial resources, leisure activities, and transportation were also evaluated.

There are many scales for general QOL assessment (McDowell & Newell, 1996). However, in the field of epileptology, there had been only six internationally published scales that assessed the QOL of epileptic patients. This study would assess both general and epilepsy-specific QOL.

2.7.2.2.1 Quality of Life for Epilepsy

2.7.2.2.1.1 Previous Studies

A search using the words "QOL and epilepsy" on Medline retrieved 44 articles, but only 28 papers were actually related to QOL studies. Of these, six papers studied QOL with a focus on specific type of seizure, such as complex partial seizure, newly-diagnosed patients, active and inactive epilepsy or intractable epilepsy; six for surgery; and 16 for general patients. Of these 28, 15 papers were available. However, the QOL questionnaire that was utilized had been derived from eight scales: the Washington Psychosocial Seizure Inventory, MOS SF-55, QOL in epilepsy 89 items, 31 items, 10 items, QOL in Epilepsy Inventory for Adolescents (QOLIE-AD-48), the Liverpool Initiative, the Queen Square Initiative and the Epilepsy Surgery Inventory (Chadvick, 1996). Only four questionnaires with the full text of the QOL questionnaire were presented. These were:

1. Quality of life in epilepsy (QOLIE) instruments. The QOLIE-89 (Devensky, et al., 1995) inventory was developed to assess a broad spectrum of issues for the general epilepsy population. It included the RAND 36-item Health Survey 1.0 as a generic core, coupled with 53 epilepsy-specific items grouped into 17 multi-item scales in four domains: epilepsy-targeted, cognition, mental health, and physical health. Content validity was based on the input of clinicians, patients and the review of the literature. Construct validity was conducted by factor analysis, then by correlation with patient, proxy responses, neuropsychological scale, neurotoxicity and systemic toxicity scale, and seizure severity. Internal consistency and test-retest reliability were established by Cronbach's alpha for each sub-scale of 0.78-0.97, and intraclass correlation (ICC) of 0.64-0.88. It aimed to assess interventions (e.g. drug(s), surgery) and compared populations (low versus high seizure frequency), showing significantly better scores for people whose seizures were well-controlled, as compared with those with low, moderate or high seizure frequency.

2. The QOLIE-31 was an abbreviated instrument of QOLIE 89 focusing on 7 epilepsy-specific domains. The Cronbach's alpha for each sub-scale ranged from 0.77-0.93. The ICC was 0.64-0.89. It was designed for the assessment of interventions and comparing populations with change over time (Cramer, et al., 1998).

3. The QOLIE-10 was an abbreviated instrument of the QOLIE 89, focusing on 7 epilepsy-specific domains. The Cronbach's alpha for each sub-scale ranged from 0.48-0.51. The ICC was 0.48-0.81. It was designed for screening purposes (Cramer, et al., 1996).

4. The Quality of Life in Epilepsy Inventory for Adolescents (QOLIE-AD-48) was specifically for adolescents with epilepsy (Cramer, et al., 1999).

The other two were (those without the questionnaire):

1. The Liverpool HRQOL Battery was composed of 8 independent scales, some generic, and some epilepsy-specific. The design had to be done before the aspects to be measured, then some combinations specific to the study were selected. Some scales were developed to assess epileptics, but all had been validated with epileptics. Only two of the eight scales were reproducible. There was no further detail apart from this (Baker, et al., 1998).

2. The Epilepsy Surgery Inventory (ESI-55) was developed to assess the HRQOL outcomes of patients who underwent surgical treatment for intractable epilepsy. It was a combination of a generic core measure, the RAND 36-item Health Survey 1.0, with a 19-item supplement tapped area, of particular importance to the person who underwent epilepsy surgery. It contained 11-multi-item scales. It did not assess some domains, such as social isolation or driving limitations (Baker, et al., 1998).

In this study, the QOLIE 31 was chosen as the model to evaluate QOL in these patients because it was an almost perfect instrument with high content and construct validity; had perfect Cronbach's alpha and ICC values, and was designed for intervention assessment and evaluation of the adult epileptic. The other reason was

that the QOLIE-31 did not have too many items for the patients to complete (Cramer, et al., 1998).

However, the original QOLIE-31 questionnaire was an English version and had never been applied to Thai people. The validity and reliability of this questionnaire were tested before implementation.

2.7.2.2.1.2 Validity of the Thai version QOLIE-31

The original QOLIE-31 consisted of 7 multi-item scales and a single item (item 31) for overall health. The multi-item scales included: Seizure Worry (SW) (items 11, 21-23, 25); Emotional Well Being (EWB) (items 3-5, 7, 9); Energy/Fatigue (EF) (items 2, 6, 8, 10); Cognitive Functioning (CF) (items 12, 15-18, 26); Medication Effect (ME) (items 24, 29, 30); Social Functioning (SF) (items 13, 19, 20, 27, 28); Overall Quality of Life (OQOL) (items 1, 14).

The adaptation process of the QOLIE-31 into Thai included the following phases: translation into Thai; assessment of item comprehension; back-translation into English; cross-cultural modification; formal assessment of its validity.

The PI performed the translation into Thai phase. However, for some of the original English phrases it was difficult to find a perfectly-matched translation; for example, "pep", "downhearted and blue".

A clinical neurologist (Phanthumchinda K) and a clinical epidemiologist (Sithi-amorn C) assessed item comprehension after translation and refined content equivalence.

A translator (Niramitranon U) did the translation back into English. For the cross-cultural modification process, the meaning of each item of the questionnaire was explained to three active rural villagers by the local neurologist (T.A.). The wording of the questions was modified to suit the local context and to retain the same meaning. Items that referred to uncommon activities in rural Thailand were modified to be more common activities and, therefore, more understandable tasks. For example, "riding a motorcycle" and "operating a machine" (e.g. machines used in agriculture) were selected for addition to the definition of "driving".

The modified questionnaire was tested by participating epileptics who visited the Neurologic Outpatient Department of Maharaj Nakhon Ratchasima Hospital. During the test, the epileptics were asked for their understanding of each item. Items that were not understood were changed again through consultation involving the neurologist (T.A.), the epileptics and the rural villagers, until the epileptics clearly understood the meaning of the whole questionnaire (language equivalence). In doing so, the layout of the questions was also modified. For example, the "horizontal" visual analog scale to assess overall QOL (from best to worst possible QOL) was replaced by a "vertical" stair format with "best possible QOL" at the top of the ten stairs because rural villagers could relate to "higher" QOL better if it was presented vertically. For some items (15,19,20,26,29 and 30), the subjects did not recognize the

meaning of "not at all". For these items, the "zero" responses were later added to the "not at all" responses.

The Thai version had the same content and was language-equivalent to the original English version. Therefore the validity of the Thai version was considered equivalent to the original version.

2.7.2.2.1.3 Reliability of the Thai version QOLIE-31

To assess the reliability, in terms of internal consistency, of the QOLIE-31, epileptics who visited six participating CHs in Nakhon Ratchasima Province, Thailand, were chosen. The epileptics were considered eligible if: 1) they had been registered as epileptics at the CHs and had been taking antiepileptic medications; 2) their ages were between 18-65 years; 3) they had no mental or speech problems; and, 4) they signed a written consent form. This questionnaire was self-administered, but for illiterate patients, their escorting relatives or rural hospital nurses would read the questionnaire for them. The internal consistency of the QOLIE-31 scales and the overall score were analyzed by Cronbach's alpha coefficient.

For overall health, there was only one item (item 31) so it could not be tested for internal consistency. The mean overall score (OS) and internal consistency were computed from items 1-30, according to the formula in the original paper.

The result of the test for internal consistency reliability of the QOLIE-31 demonstrated that all 199 epileptics who visited the CHs from 13 May to 21 June 2002, submitted written consent. Of these, 163 met all inclusion criteria, while 22 were excluded from the study because their age was above or below the study criteria, and 14 were excluded because they had mental or speech problems. Of the 163, two did not complete the demographic data. The gender and age of the 163 people with epilepsy and their characteristics are shown in Appendices 1 and 2, respectively. As shown in Appendix 3, of the 161 people with epilepsy, there were no significant differences in gender or age, or by gender and the other socio-demographic and clinical data examined.

Most of the respondents (88.2%) answered all of the items in the QOLIE-31 Scales, with the maximum number of items not answered being 5 by 2 respondents (Appendix 4). Although the non-response rates for the items and scales were generally higher among the females, these differences were not statistically significant (Appendix 5). For the total respondents, only education below or just meeting the requirements of the Thai compulsory program was significantly related (p-value $<$ 0.05) to the unanswered items (Appendix 6).

The mean score, internal consistency by gender, multi-item scales, and overall scores are presented in Appendix 7. The females had lower mean scores than the males in all multi-item scales, but the differences were only significantly lower for overall quality of life and energy/fatigue and for the overall score. The internal consistency for the multi-item scales of the QOLIE-31 was generally similar for both

genders, with the following exceptions: for the males, cognitive functioning was less than 0.7 (0.64) and less than that of the females (0.69), while among the females, social functioning was considerably lower (0.55) than the males (0.64).

2.7.2.2.2 General Quality of Life

For the QOL assessment of general health, (McDowell & Newell, 1996), the Short-Form-36 Health Survey has been widely applied, compared with other questionnaires (Gandek, et al., 1998). In addition, this questionnaire was available in a Thai version and its validity and reliability had been tested. To prepare this Thai version questionnaire for use in this study, cross-cultural modification was done using the same process as for the QOLIE-31.

In summary, these two questionnaires, the QOLIE-31 and the SF-36, were used to assess QOL in this study.

2.7.3 Overall Patient Satisfaction

If the SC improved continuity of care and medical outcomes, the epileptics would be satisfied with it. Patient satisfaction was measured via a questionnaire.