Facilities and Services for People with Epilepsy-A Survey from the Northeast Thailand

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Background: *Availability of antiepileptic drugs and diagnosis facilities in hospitals contributes to accessibility to and efficiency of treatment for epileptic patients and their good quality of life.*
Objective: *To survey the facilities and services for people with epilepsy in the Northeast of Thailand.*
Material and Method: *Questionnaires were sent to 318 hospitals to obtain information about the facilities of epilepsy services in terms of availability of antiepileptic drugs and epileptic diagnostic facilities. The data were analyzed in percentages.*
Results: *Out of the 318 hospitals, 277 hospitals (87.1%) returned the questionnaires. In all, 51.51% were the general hospitals and 91.23% were community hospitals. In the general hospitals, 4 standard antiepileptic drugs (AEDs) were available, including carbamazepine, phenobarbital, phenytoin, and sodium valproate of 100, 88.24, 88.24, and 82.35%, respectively. For the community hospitals, the standard AEDs were available of 91.54, 78.85, 84.23, and 85.38%, respectively. The surveyed hospitals had the standard original AEDs, namely, carbamazepine, phenytoin, and sodium valproate of 3.61, 36.46, and 38.63%, respectively. The hospitals had at least one of the new AEDs of 40.07%. The most common type of intravenous AEDs used in the general hospitals was phenytoin (82.35%), followed by sodium valproate and phenobarbital (76.47 and 58.82%, respectively). In community hospitals type of used IV AEDs was phenytoin, phenobarbital, and sodium valproate (58.08, 22.69, and 9.23%, respectively). At the general hospital level, the most common available type of diagnostic facility was CT scan (66.7%), followed by electroencephalography (EEG) (21.20%) and MRI (18.2%); whereas at the community hospital level, CT scan was available in 12.30% of the hospitals and no EEG or MRI.*
Conclusion: *Not all of the antiepileptic drugs are available at the hospitals in the Northeast Thailand, especially the new and original AED group. There is also a shortage of epileptic diagnostic facilities. Thus, appropriate solution should be involved creation of a network of treatments and services for epileptic patients in the Northeast Thailand in order to have access more quality services.*

Keywords: *Facilities of services, Epilepsy, the Northeast, Antiepileptic drugs*

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Epilepsy is a chronic neurological disease and one of the public health problems. Worldwide, approximately 50 million people suffer from epilepsy while 85% of them live in developing countries[1]. A study in 2000 found a prevalence of 5.9-7.2 per 1,000 people in Nakhon Ratchasima, Thailand[2]. According to the 2015 data of the Governing Department, Ministry of the Interior[3], 473,249 persons out of a total population of 65,729,098 had experienced at least a single episode of convulsion

Nowadays, Thailand's national health security system covers as high as 95% of the population by either universal coverage, Civil Servants, or Social Security System. Management of epilepsy under the support from Thai health security system, including CT, MRI-brain, and EEG scans, standard antiepileptic drugs (AEDs), some new AEDs, and inpatient charges. It could be said that the services are relatively good when compared to many other countries in the

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Southeast Asia. However, there are still limitations in terms of accessibility to neurologists, especially neurological physicians and neurological pediatricians. These specialists are often found working only in big hospitals, and hence difficulties to be accessed by general patients[4]. Shortage of specialized doctors is a key problem in epileptic patient health services in many countries, especially developing ones. A study performed on epileptic patient services in the Southeast Asia revealed that in Thailand, the ratio of neurologists to population was 1: 420,000[5]. In the Northeast Thailand, in which the population is approximately 21,916,034[3], there are only 22 neurologists who serve 22 million people or an average of one neurologist per one million population[6]. The survey of facilities of epilepsy services in the hospital under the National Health Security Office Area 7 (NHSO) showed limitations in medical personnel, antiepileptic drugs, diagnostic facilities and referral system management. This limits the patients' access to treatment and hence their quality of life is relatively low[7-9]. In conclusion, neurologists in Thailand clearly have very heavy workloads and hence medical treatment and care given to patients is of low level coverage.

Using antiepileptic drugs is the principle means of epilepsy treatment. A patient is usually required to take an antiepileptic drug from a period of 2 to 5 years for his or her chance to have complete recovery at 50-70%[10]. In general, most patients having epilepsy start receiving treatment at a community hospital with a general practitioner. If a patient is not able to control his or her seizures, the practitioner will refer the patient to a hospital with higher potential for additional investigation such as by CT scan, MRI, or EEG. Some patients may need to meet a neurologist. The past epilepsy services at Srinagarind Hospital revealed that most of the patients used their universal health coverage. When a patient had been treated until seizures could be controlled, the patient was referred back to the hospital near their home to receive the prescribed AED. However, owing to the shortage of information related to AED availability in the hospitals in Northeast Thailand, especially the hospitals that the patients were referred to, the researcher was interested to study the facilities of epilepsy services in the hospitals in Northeast Thailand in terms of the availability of antiepileptic drugs and diagnostic facilities in order to obtain the approaches for development of AEDs and patient referral management systems. The expected outcomes would result in higher efficiency of treatment, more accessibility of patients to treatment and a better quality of life.

Objective

To survey the facilities of epileptic patients services in the Northeast Thailand in order to develop antiepileptic drug administration, epileptic patient referral system, and guidelines for epilepsy treatment for general practitioners and multi-disciplinary medical teams in the Northeast Thailand.

Material and Method

This was a descriptive study conducted by compilation of information from the survey for facilities of epilepsy services based on the questionnaires sent out to 318 hospitals in the Northeast Thailand. The completed forms were sent back via Google, FAX, or mail. Telephone conversation was also conducted for direct data collection. Data collection was conducted between January 1, and July 31, 2016.

Research Instrument

The survey form on facilities of epilepsy services[8] was used. The data were collected by means of mailing, online (Google form) and telephone interviews.

Ethical consideration

The present study was approved by the Ethic committees of Khon Kaen University (HE591267).

Definition of Terms[7]

A general hospital refers to a provincial hospital that provides services at a tertiary level in which 150 beds or more are available.

A community hospital refers to a district hospital that provides services at a primary level in which 10 to 150 beds are available.

Data analyses

The data were analyzed in percentages.

Results

The questionnaires were sent to a total of 318 hospitals in the Northeast Thailand; 277 hospitals completed and returned the forms (87.10%). The hospitals that returned the forms comprised 17 (51.51%) general hospitals out of 33 and 260 (91.23%) community hospitals out of 285.

The results showed that the general hospitals had 4 main AEDs in the standard group, namely, carbamazepine, phenobarbital, phenytoin, and sodium

valproate of 100, 88.24, 88.24, and 82.35%, respectively. The community hospitals own these medications of 91.54, 78.85, 84.23, and 85.38%, respectively. The hospitals had the standard AEDs in the original group as follows: carbamazepine, phenytoin, and sodium valproate of 3.61, 36.46, and 38.63%, respectively. At least one of the new AEDs group was available in 40.07% of the hospitals. The most used new AED in general hospitals was gabapentin (100%), followed by pregabalin, levetiracetam, topiramate, and lamotrigine of 64.71, 52.94, 35.29, and 29.41%, respectively. The most new AEDs available in the community hospitals was gabapentin (35.38%), followed by pregabalin, levetiracetam, lamotrigine, and topiramate (3.08, 1.54, 1.15, and 0.77%, respectively). The intravenous-administered AEDs were available of 73.65%. The most available intravenous (IV) AED in the general hospitals was phenytoin (82.35%), followed by sodium valproate and phenobarbital (76.47 and 58.82%, respectively). Community hospitals had IV AEDs for treating status epilepticus, including phenytoin, phenobarbital, and sodium valproate (58.08, 22.69, and 9.23%, respectively), as shown in Table 1.

The information related to diagnostic facilities were as follows: most of the general hospitals owned CT scan equipment (66.7%), followed by EEG (21.2%), MRI (18.2%), whereas 12.3% of the community hospitals had CT scan, but no EEG or MRI facility, as shown in Table 2.

Discussion

The survey of the facilities of epileptic patient services in the hospitals located in the Northeast Thailand indicated that the most available type of antiepileptic drug is carbamazepine. The general hospitals were found to have the 4 main standard AEDs: carbamazepine, phenobarbital, phenytoin, and sodium valproate, respectively; and the community hospitals also had these medications in the same order quantitatively, but in a smaller proportion. The 2007 survey of available AEDs in the public hospitals countrywide revealed that the center hospitals possessed 100% of these AEDs; the general hospitals or provincial hospitals had these drugs of 98.2, 100.0, 94.5, and 89.1%, respectively; while the community hospitals had 86.9, 99.1, 88.5, and 45.1%, respectively[8]. Another survey conducted in 2011 at the center and provincial hospitals under the NHSO Area 7

Table 1. Percentage of the hospitals having antiepileptic drugs in of the Northeast Thailand

Antiepileptic drugs	General hospital (n = 17)	Community hospital (n = 260)
Standard antiepileptic drugs		
Carbamazepine	100.00	91.54
Phenobarbital	88.24	78.85
Phenytoin	88.24	84.23
Sodium valproate	82.35	85.38
New antiepileptic drugs		
Gabapentin	100.00	35.38
Pregabalin	64.71	3.08
Levetiracetam	52.94	1.54
Lamotrigine	29.41	1.15
Topiramate	35.29	0.77
Intravenous antiepileptic drugs		
Phenytoin	82.35	58.08
Phenobarbital	58.82	22.69
Sodium valproate	76.47	9.23

Table 2. Percentage of the hospitals with equipment for epilepsy diagnostic in of the Northeast Thailand

Epilepsy diagnostic devices	General hospital (n = 17)	Community hospital (n = 260)
EEG	21.2	0
CT Scan	66.7	12.3
MRI	18.2	0

demonstrated that these hospitals had 100% of all of the 4 standard and key AEDs, while community hospitals had the drugs at 90.2, 60.8, 94.1, and 80.4%, respectively[7,9]. It can be seen that the availability of the standard AEDs in the Northeast hospitals correlates to the national survey and the survey of hospitals in the provinces under the responsibility of the NHSO Area 7. This present study, however, showed that sodium valproate was more available in the community hospitals than what was found in the national 2007 survey [8], which could result from the Northeast Medical Guidelines for epilepsy that necessitated availability of sodium valproate, especially for patients with absent and myoclonic seizures[11].

Additionally, this present study also indicated that the original standard AEDs-carbamazepine, phenytoin and sodium valproate were only available in a small quantity. The medical practice problem is the fact that most patients begin to receive treatment at the community hospitals with generic drugs, which are not able to control seizures wholly and the patients need to be transferred to specialists. The specialist then changes to an original AED, and after the seizures have been controlled, the patients are referred back to the community hospital where they can use their health coverage. Some patients may have seizures while receiving generic drugs and the doctor has to change back to the original drugs. This agrees with the study by Andermann et al[12] who showed the rate of return from generic drugs to original drugs in the patients who used to be prescribed the original drugs before. It was found that 20.9% of the patients receiving sodium valproate returned to use the original drugs while the rates of return from clobazam and lamotrigine were 20.6 and 12.9%, respectively. The high return rates could be caused by the nature of epilepsy and the properties of antiepileptic drugs as well as effects arising from status epilepticus. Therefore, before prescription of a generic AED instead of an original drug, the generic drug must be considered in terms of its bioequivalence with the original drug [13]. In addition, most of the AEDs have a narrow therapeutic index. Some show nonlinear pharmacokinetics with multiple patterns such as immediate release, extended release, etc[13].

Countries in Europe and America have set clear policies related to prescription of generic AEDs. In Germany and Italy, the policy states that patients are not prescribed another drug if their seizures can be controlled. In Poland, the policy states that pharmacists should not change AED without the doctor's consent[14]. In Thailand, AEDs and the prescription guidelines are yet to be made. Therefore, if a doctor wants to change from an original AED to generic AED owing to the cost and for economical reasons, the relevant medical personnel should consider the negative effects that could arise such as accidents that may happen, hospitalization, and effects on the quality of life of the patients that could lead to even higher costs, and have a psychological impact that cannot be assessed[14]. Nevertheless, Tiamkao has proposed guidelines for the selection of an original or generic drug; if the patient can control the symptoms, then the former drugs should be continued, no matter whether it is original or generic[15]. Specific groups of patients, namely children, the elderly, and pregnant women who are taking many types of medications, AEDs should not be changed because pharmacokinetics of the drugs in these patients may differ from normal people[15].

The problem of distribution of the original type of standard AEDs in the generic group necessitates development of a patient referral system. The patients whose seizures can be controlled but cannot obtain the drugs at the treating hospital must be transferred to a higher level hospital or the treating hospital has to buy the drugs from another hospital at the base cost[16].

The new AED with 100% availability in general hospitals is gabapentin. Other new AEDs available are pregabalin, levetiracetam, topiramate, and lamotrigine. The most available new AED in the community hospitals is also gabapentin, while other available new AEDs consist of pregabalin, levetiracetam, lamotrigine, and topiramate. Upon considering the results of antiepileptic drug survey in the public hospitals countrywide in 2007[8] and the survey of antiepileptic drugs in urban hospitals affiliated to the NHSO Area 7 in 2011[7,9], it was found that the new AEDs which are necessary for some patients are not all available in the general hospitals, preventing some patients to get the drugs at a hospital near home, and hence there is a problem related to control of seizures. Therefore, an efficient referral system has to be designed to solve the problem of drug distribution as the standard AEDs that are under the original group.

Status epilepticus can cause permanent brain damage or mortality if the patient is not treated by an intravenous AED. The survey of IV AEDs for treatment of status epilepticus, which are phenobarbital, phenytoin, and sodium valproate, showed that not all of the community hospitals had these drugs; the availability was only 22.69, 58.08, and 9.23%. This finding correlates to the survey of antiepileptic drugs

in the urban hospitals of the NHSO Area 7 in 2011, which demonstrated the drug availability of 7.8, 13.7, and 2.0%, in the same order as well as the 2007 survey of the antiepileptic drugs in the public hospitals countrywide, which showed the availability of 29.0, 47.8, and 5.8%, in that order. It can be seen that the availability of these drugs do not cover the treatment of patients with status epilepticus, leading to bad prognosis of this condition. Therefore, all community hospitals should possess at least one type of IV AED for status epilepticus cases besides diazepam[16].

In regard to epilepsy diagnostic facilities, the present study revealed that CT scan equipment was available at most general hospitals (66.7%), followed by EEG (21.2%), and MRI (18.2%), while 12.3% of the community hospitals have CT scan equipment, but no EEG or MRI equipment at all. The findings correlate to the 2011 survey of the antiepileptic drugs in the urban hospitals of the NHSO Area 7[7,9] and the 2007 survey of the antiepileptic drugs in the countrywide public hospitals[8], in which patients can be sent for CT scan in the community, general and/or center hospitals, but EEG and MRI facilities are not covered for all provincial and community hospitals. Thus, if the doctor is not confident in diagnosis of epilepsy, the patient must be referred for further investigation at a university, center or private hospital[5]. If there is any indication for MRI scan, then only the patients who are prescribed for by a physician or a neurologist should be selected. The patient may be decided to have brain CT - scan first, except only if the patient does not respond to treatment and it is certain that the reason is not poor compliance or low dosage of the prescribed AED. This is because there is a high chance of hippocampal sclerosis or cortical dysplasia. Referring a patient to receive EEG examination owing to uncertain preliminary diagnosis should only be done on consent of a physician or neurologist. Two approaches are recommended: firstly, making an appointment with many patients for EEG examination on the same day and providing transportation for the patients to a center or a tertiary-level hospital where EEG facility is available. Secondly, a nodal hospital can send a technician to perform EEG examination at the network hospital, where many patients are appointed to come on the same day[17]. These approaches will contribute to higher accessibility of patients to the treatment.

Conclusion

The study of the facilities of epilepsy services of the hospitals in the Northeast Thailand shows shortages of resources in the AEDs coverage and diagnostic facilities. The solution to these problems, which are the most appropriate and feasible, is development and creation of the Northeast epilepsy patients treatment network as such network will rapidly improve the quality of services that will also be efficient and covered for all hospitals. Building up the network, developing guidelines, and training doctors to have more knowledge, these will lead to providing appropriate treatment approaches under limited resources. The referral system for patients should be clarified. The guidelines should be used at all levels of hospitals for standardized treatment and patients' access to hospital and treatment.

Limitation

Only 51.52% of the data were from the general hospitals while 91.23% were from the community hospitals. Thus, the information may not be totally complete for the general hospitals.

What is already known on this topic?

Facilities of epilepsy services in the Northeast Thailand are limited.

What this study adds?

The present study provided the data on distribution of AEDs in all levels of hospitals and epilepsy diagnostic facilities and enables to understand the limitations of epilepsy services in the Northeast Thailand. The results of the present study could develop a service network that will benefit patient care in the future.

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Potential conflicts of interest

None.

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ความพร้อมของการให้บริการโรคลมชักในภาคตะวันออกเฉียงเหนือของประเทศไทย

สุณี เลิศสินอุดม, นันทพรรณ์ ชัยนิรันดร์, สมศักดิ์ เทียมเก่า, สินีนาฏ พรานบุญ, ธนิดา นันทะแสน, สุภิญญา ตันตาปกุล, ศิริพร เทียมเก่า, คัชรินทร์ ภูนิคม

ภูมิหลัง: ความพร้อมด้านยากันชักและเครื่องมือวินิจฉัยโรคลมชักของโรงพยาบาลมีส่วนช่วยให้ผู้ป่วยโรคลมชัก ได้รับการรักษาที่มีประสิทธิภาพเข้าถึงการรักษาได้มากยิ่งขึ้นและมีคุณภาพชีวิตที่ดี

วัตถุประสงค์: สำรวจความพร้อมของการให้บริการผู้ป่วยโรคลมชักในภาคตะวันออกเฉียงเหนือ

วัสดุและวิธีการ: ส่งแบบสำรวจความพร้อมของการให้บริการโรคลมชัก ได้แก่ ความพร้อมด้านระบบยากันชัก และความพร้อมด้านเครื่องมือวินิจฉัยโรคลมชัก ไปยังโรงพยาบาลในภาคตะวันออกเฉียงเหนือ ซึ่งมีทั้งหมดจำนวน 318 โรงพยาบาล วิเคราะห์ข้อมูลด้วยสถิติ ร้อยละ

ผลการศึกษา: ส่งแบบสอบถามให้โรงพยาบาลในภาคตะวันออกเฉียงเหนือทั้งหมด 318 โรงพยาบาล ได้รับข้อมูล ตอบกลับจำนวน 277 โรงพยาบาล (ร้อยละ 87.1) โดยโรงพยาบาลทั่วไป ร้อยละ 51.52 และโรงพยาบาลชุมชน ร้อยละ 91.23 ที่ตอบแบบสอบถามกลับมา โรงพยาบาลทั่วไปมียากันชักกลุ่มมาตรฐาน 4 ตัวหลัก ได้แก่ carbamazepine, phenobarbital, phenytoin, และ sodium valproate ร้อยละ 100, 88.24, 88.24, 82.35 ตามลำดับ สำหรับโรงพยาบาลชุมชน มียากันชักดังกล่าว ร้อยละ 91.54, 78.85, 84.23 และ 85.38 ตามลำดับ มียากันชัก กลุ่มมาตรฐานที่เป็นยาต้นแบบ ได้แก่ carbamazepine, phenytoinและ sodium valproate ร้อยละ 3.61, 36.46 และ ร้อยละ 38.63 ตามลำดับ มียากันชักกลุ่มใหม่อย่างน้อย 1 ชนิดร้อยละ 40.07 ยาฉีดเข้าหลอดเลือดดำที่ใช้รักษา อาการชักต่อเนื่อง ที่มีใช้ในโรงพยาบาลทั่วไปมากที่สุด คือ phenytoin ร้อยละ 82.35 รองลงมาคือ sodium valproate และ phenobarbital ร้อยละ 76.47 และร้อยละ 58.82 ตามลำดับ ในโรงพยาบาลชุมชน คือ phenytoin, phenobarbital และ sodium valproate ร้อยละ 58.08, 22.69 และ 9.23 ตามลำดับ เครื่องมือที่ช่วยในการวินิจฉัยโรคลมชักในระดับโรงพยาบาลทั่วไปพบว่ามีเครื่องตรวจ CT scan มากที่สุด ร้อยละ 66.7 รองลงมาคือ เครื่องตรวจ EEG ร้อยละ 21.2 และเครื่องตรวจ MRI ร้อยละ 18.2 ส่วนในระดับโรงพยาบาลชุมชนพบว่ามีเครื่องตรวจ CT scan ร้อยละ 12.3 ไม่มีเครื่องตรวจ EEG และ MRI เลย

สรุป: โรงพยาบาลในภาคตะวันออกเฉียงเหนือมียากันชักไม่ครอบคลุมทุกโรงพยาบาลโดยเฉพาะยากันชักรุ่นใหม่และยากันชักมาตรฐานต้นแบบขาดแคลนเครื่องมือช่วยในการวินิจฉัยโรคลมชัก ดังนั้นแนวทางการแก้ไขปัญหาที่เหมาะสมคือ การสร้างเครือข่ายการให้บริการรักษาผู้ป่วยโรคลมชักในภาคตะวันออกเฉียงเหนือ เพื่อให้ผู้ป่วยเข้าถึงการให้บริการที่มีคุณภาพ