Special Article

Tele-neurology during the COVID-19 Pandemic as a Solution for Bridging the Healthcare Gap

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Due to the COVID-19 outbreak in Thailand, patients were unable to be examined, to receive follow-up treatments, or to receive medication in the normal ways that they previously had. As a result, Srinagarind Hospital of the Faculty of Medicine at Khon Kaen University established a home delivery system for those patients, who needed to be continuously treated. Two types of services were made available: 1) Patients were able to make a request on the Facebook page of 'Drug delivery' or on the Line application: @Dr. Somsak, and 2) the physicians phoned the patients in order to assess symptoms and to provide treatment based on the symptoms and severity of the disease.

Regarding neurological patients in Thailand, most patients; such as people with epilepsy (PWE) are most often treated by general practitioners in community hospitals or by internist or pediatricians in provincial hospitals. Only a small percentage of PWE are actually treated by neurologists or pediatric neurologists.

The Epilepsy Clinic of Srinagarind Hospital has, therefore, developed a service system for the out-patient department in which the physicians call the patients in order to assess their symptoms and to provide continued treatment to those individuals with PWE so that status epilepticus, which arises from drug deficiency, can be prevented.

Consequently, the Integrated Epilepsy Research Group has developed a tele-medicine system for PWE, who are treated in the Epilepsy Clinic. Moreover, the newly developed service system will continue to be used to treat patients with neurological diseases in order to resolve the problem of gaining access to neurological doctors.

Keywords: Epilepsy clinic, Neurological disease, Tele-medicine

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Neurological disease is a major public health problem in Thailand. The most common of neurological disease include stroke and epilepsy. Especially in the case of epilepsy, most of patients are treated by general practitioners in community hospitals, by internists or pediatricians in general hospitals, or by neurologists or pediatric neurologists in some provincial hospitals and center hospitals[1]. A few patients are treated by epileptologists in the hospitals of medical schools or in some center hospitals. In addition, there is a lack of specialist doctors, who can interpret the results of the electroencephalography (EEG) test. As a consequence of this, only a few patients receive standardized treatment that is in accordance with the clinical practice guidelines. The main cause arises from the fact that the distribution of medical professionals and tools are not fully covered in all provinces[2].

Epilepsy is a common neurological disorder that occurs in about 7 per 1,000 people in the population. It is found in both sexes and in all age groups. Commonly, people with epilepsy (PWE) will begin to see a general practitioner at a nearby community hospital. If the doctor can provide a diagnosis, the patient will be treated with anti-epileptic drugs (AEDs). However, CT brain scanning and EEG will not be performed because community hospitals do not have such technologies. If needed, the patient must be referred to the center hospital where PWE will be examined with by neurological specialist[3].

After the PWE started receiving AEDs, approximately 65% of the patients responded to mono-therapy AED treatment. The rest of the patients, therefore, needed to receive a combination of two to three AEDs (polytherapy/add-on therapy), which require new AEDs[4] that are available only in provincial and center hospitals and medical school hospitals. This situation has caused the PWE to be unable to access appropriate treatments. The treatment of epilepsy in Thailand has a treatment gap of approximately 50%. According to the World Health Organization (WHO), it was found that the treatment gap is related to the economic conditions that exist in each country[5].

Due to the outbreak of COVID-19 in Thailand from March to June 2020, most of the patients were unable to continually visit and to receive regular follow-up

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treatments. Despite this fact, each hospital has attempted to remain in contact with the patients and their relatives so that the patients could be continuously treated and be minimally impacted.

Therefore, the Epilepsy Clinic and Neurological Clinic of Srinagarind Hospital at The Faculty of Medicine at Khon Kaen University has developed the Tele-neurology system[6] to provide patients with the most up-to-date form of on-going treatment, the Tele-neurology system, which is outlined below:

1) In order to assess whether a patient's symptoms are normal, whether the patient needs to see the doctor in person for further assessment, or whether the treatments should be adjusted, phone calls are made to those patients whose names are on the follow-up schedule. If the patient's condition is determined to be normal, the doctor will then prescribe treatments in the hospital system and will set up delivery of the prescribed drugs to the patient at his/her home via Thai post. The delivery fee will then be collected at the destination.

2) For the purpose of delivering drugs to a patient's home, a Facebook page was created in order that the patient or his/her relatives can coordinate with the service team at Srinagarind Hospital to receive home delivery of medicines or can inquire about initial abnormalities, for which there is a team of volunteer doctors, who can give advice on health problems.

3) To allow patients to inquire about their unusual symptoms and drug delivery, an official Line called @Dr. Somsak was created.

By making adjustments to the services received from the doctors, who examine the patients in person at the examination room, and by utilizing communication systems over the phone, via Facebook pages, and via the official Line, a large number of patients have been able to receive this type of treatment. In addition, this Tele-neurology system is also being expanded for use with other patients. From March to June of 2020, a total of 7,915 patients received their treatments through the system described above.

Providing services according to the 'new normal' requires reducing congestion and practicing social distancing[7]. It has, therefore, been necessary to develop this Tele-neurology service system so that it can be utilized to serve patients with neurological problems in the future. The Tele-neurology service system contributes to minimizing the treatment gap for patients with neurological diseases, as well as for patients with other diseases[8].

The Tele-neurology system, which will be implemented as a part of the 'new normal service' in the Epilepsy Clinic beginning in October of 2020, will consists of the following: The PWE have been divided into the 3 following groups:

Group 1 PWE has normal symptoms and has been seizure-free for at least 6 consecutive months.

Group 2 PWE has infrequent seizures or has been unable to control seizures for 6 consecutive months.

Group 3 PWE has frequent seizures every month, drug complications, or has other unusual symptoms.

1) Group 1 uses the Tele-neurology system. After the patients have received the treatment, they will then have to be continually treated according to their appointments. Instead of seeing the physicians, the pharmacist at the Epilepsy Clinic will arrange the drugs and deliver them to the patients about 1 week prior to the appointment date. Then the clinical pharmacist and nurse will call or use the Line application to make VDO calls to all the patients (or the patients' relatives) to carry out the following procedures: 1) to provide clinical assessment; 2) to ask if the drugs had been received; 3) to assess the side-effects of the drugs; 4) to explain how to take the drugs, as well as to inquire about the patients' compliance of consistency in taking the drugs; and 5) to answer any questions that the patients and their relatives may have.

2) Group 2 uses the Tele-neurology system. By the time they have received treatment, the patients will have to be continually treated according to the appointment. The physicians will use the phone or the Line application to make VDO calls to all the patients (or to their relatives) so that clinical assessments can be provided and treatments can be adjusted in accordance with the patient's symptoms. In addition, the nurses and pharmacists will perform the same assessments and services that they provide for the patients in Group 1 as noted above.

3) The third group of the patients is required to see the physician on the appointment. However, if they are unable, they will receive the same treatment as the second group.

Note: All patient prescriptions, regardless of home delivery or drug store delivery, will utilize the refill drug list in order to confirm that the condition of each patient is stable and that no clinical changes have been noted.

After careful consideration, it was determined that this Tele-neurology system can likely be used in the treatment of all diseases that are related to neurological disease. Furthermore, it also can reduce the treatment gap of seeing professional physicians[8] as shown below in Figure 1.

Conclusion

In order to reduce congestion in the hospital during the COVID-19 outbreak in Thailand and across the world, a system of tele-health, tele-medicine, tele-pharmacy, and tele-neurology has been implemented. As a result, patients have been able to effectively access the medical service system. This will increase the opportunity to gain access to the medical service system and to reduce the treatment gaps for people in remote communities by helping them to gain better access and to receive suitable treatments.

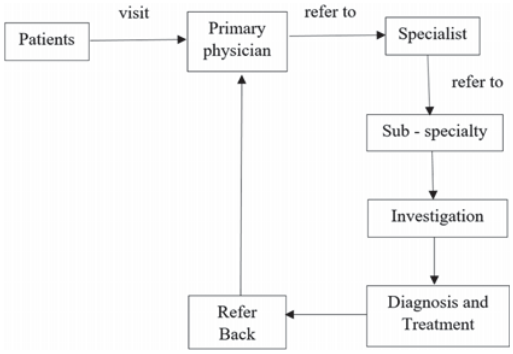
What is already known in this topic?

Telemedicine can reduce congestion in hospital during the COVID-19 pandemic across the world.

What this study adds?

Tele-neurology will increase the opportunity to

A) Flow of present service



B) Flow of new normal service

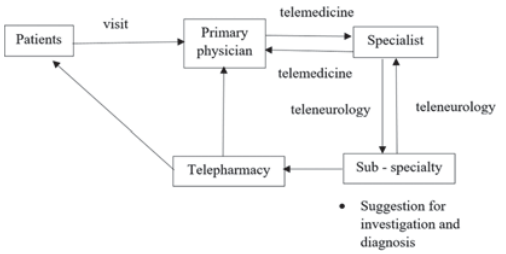


Figure 1. Flow of present and new normal service.

gain access the neurological service system and bridging the healthcare gap.

Conflicts of interest

The authors declare no conflict of interest.

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