Original Article

Innovative Easy Google Form for Pediatric Seizure (EGFS) to Improve Knowledges of Pediatric Seizure Among General Practitioners and Medical Students at Maharat Nakhon Ratchasima Hospital

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Background: Seizure and epilepsy are common chronic diseases in children that lead to high morbidity and affect the quality of life. However, there is more than 50% treatment gap in epilepsy patients especially in limited-resource or poor income countries. One of the factors causing the treatment gaps is the lack of specialist. Previous studies created tools such as mobile applications to help healthcare worker and non-specialist to diagnose epilepsy to fill these gaps.

Objective: To create a tool using Google Form to improve the knowledges of intern and medical students and evaluate the benefit of this tool.

Materials and Methods: The authors created the Google Form named Easy Google Form for Pediatric Seizure (EGFS). It contains an easy diagram and framework of knowledge regarding diagnosis, investigation, and treatment of pediatric seizure and epilepsy validated by a pediatric neurologist. The authors recruited fifth- and sixth-year medical students, and interns rotating in the Pediatric ward at Maharat Nakhon Ratchasima Hospital between May 1, 2019 and May 30, 2020. The interns participated in the 30 items Multiple-Choice Questions (MCQ) and Key Feature Examination (KF examination). Each intern was assessed for 60 minutes, the first 30 minutes would be assessed without using EGFS (pretest), and then assessed for 30 minutes using EGFS (posttest). The comparison of the mean score between pretest and posttest was determined to identify the benefit of this EGFS. The feedback in-depth interview was recorded.

Results: One hundred twenty-three participants were recruited, 62 (50.41%) were intern with a mean age of 24.07±0.95 years and 51.22% were female. In the intern group, the mean score of every part as the diagnosis, investigation, and treatment were significant different between pretest and posttest. In medical students, the fifth-year medical students showed significant differences in the investigation part, and the sixth-year medical students showed significant differences in the investigation and treatment part. Ninety-two percent of the participants had positive feedback toward the benefit of this EGFS.

Conclusion: The EGFS can improve the knowledges of general practitioners and medical students toward pediatric seizure and epilepsy.

Keywords: Epilepsy; Seizure; Tool; Diagnosis; Investigation; Treatment

Epilepsy is one of the common chronic diseases in children lead to high morbidity and affect the quality of life. However, there is a more than 50% treatment gap in epilepsy patients especially in limited-resource or poor income countries. One of the factors causing the treatment gaps is the lack of specialist in epilepsy[1,2]. Previous studies identified that there was a lack of awareness and knowledge among general practitioners toward seizure and epilepsy field[3,4].

Previous studies in both developing and developed countries created tools such as video animation, educational program, and mobile application to help healthcare worker and non-specialist to understand and make the precise diagnosis and make prompt treatment in seizure and epilepsy[5-7].

In Thailand, especially in rural area such as northeastern area, there is a huge lack of pediatric neurologist as there are 2,500 to 3,000 pediatric seizure and epilepsy patients to one pediatric
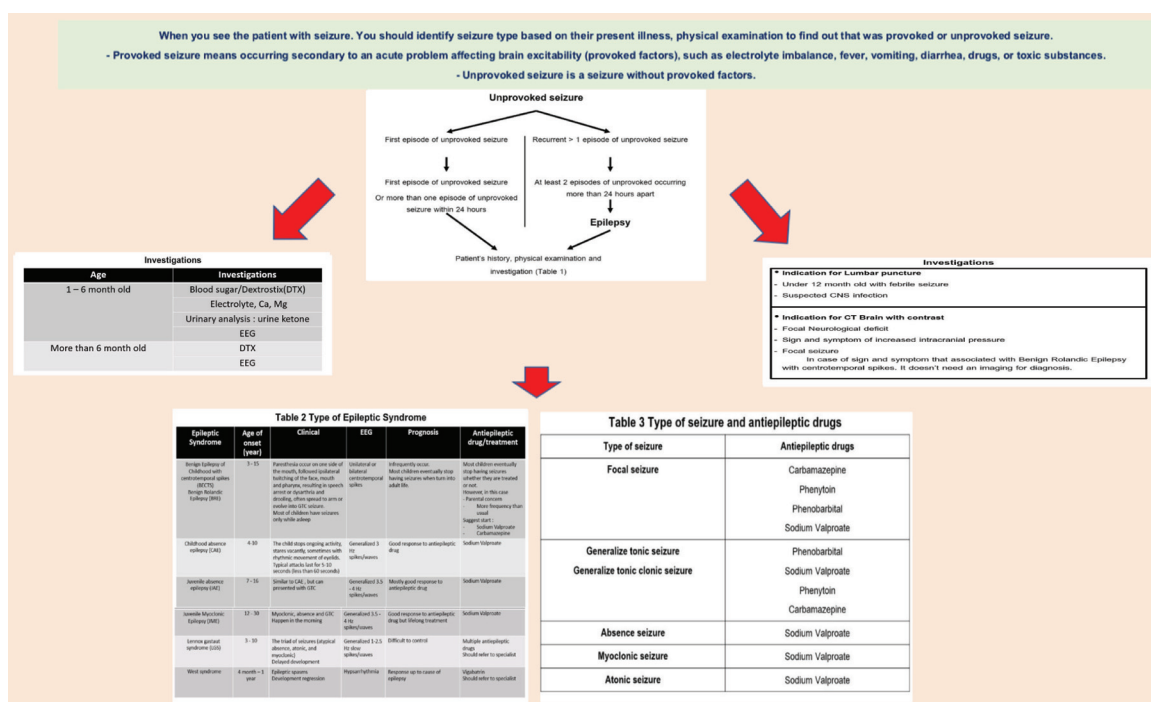
Figure 1. The Easy Google Form for Pediatric Seizure (EGFS).

neurologist. One of the main healthcare workers in rural area of Thailand is the primary care doctor who is a general practitioner or an intern. They may lack knowledge of pediatric epilepsy. For this reason, the authors were inspired to create an easy tool to improve the knowledges of intern and medical students toward pediatric seizure and epilepsy and evaluate the benefit of this tool.

Materials and Methods

After receiving the Maharat Nakhon Ratchasima Hospital IRB approval (IRB021/2019), the authors created a Google Form named Easy Google Form for Pediatric Seizure (EGFS). The Google Form is one of the innovative technologies using online software based on Google's web-based app suites. It helps user to create quiz or adding study guide and teaching method as video and URL inside. The EGFS was designed to be an easy online clinical practice guideline that contain an easy diagram and framework of knowledge regarding the diagnosis, investigation, and treatment of pediatric seizure/epilepsy as shown in Figure 1.

The EGFS could be accessed by using a mobile phone, tablet, or computer via scanning a QR code or entered via URL (https://forms.gle/SFa8iLenrgUjYuTBA). The knowledge inside this

google form was based on the Thai Clinical Practice Guideline of Epilepsy and validated by a pediatric neurologist. One pediatric neurologist did the validation of this tool.

The authors' recruited fifth- and sixth-year medical students and first-year interns rotating in the Pediatric ward at Maharat Nakhon Ratchasima Hospital between May 1, 2019 and May 30, 2020. Each participant had been informed about the study, medical students and interns who did not wish to participate in the present study were excluded.

The participants would do the 30 items examination. The examination was composed of Multi-Choice Questions (MCQ) and Key Feature Examination (KF examination). The examination was categorized into three parts. The diagnosis part had 10 items with a score of 10. The investigation had 10 items with a score of 16. The KF examination and Treatment part had 10 items with a score of 10.

The participants were assessed in two steps. In step one or the pretest, the participants had 30 minutes to do the examination without the EGFS guidance. In step two, the posttest, the participants had 30 minutes to do the same examination using the EGFS. There was a quick 5-minute break between pretest and posttest. Accessing EGFS was done on the participant's own electronic device because the

Table 1. Demographic data

Participant	n (%)
Intern group (n=62)	
Sex	
• Male	32 (51.61)
• Female	30 (48.39)
Age (year); mean±SD	24.65±0.75
GPA	
• <2.5	3 (4.84)
• 2.5 to 2.99	14 (22.58)
• 3.0 to 3.49	34 (54.84)
• >3.5	11 (17.74)
Medical student group (n=61)	
Sex	
• Male	31 (50.81)
• Female	30 (49.19)
Medical students	
• 5th year	17 (27.9)
• 6th year	44 (72.1)
Age (year); mean±SD	23.49±0.77
GPA	
• <2.5	3 (4.9)
• 2.5 to 2.99	13 (21.3)
• 3.0 to 3.49	32 (52.5)
• >3.5	11 (18.0)
• Unknown	2 (3.3)

GPA=grade point average; SD=standard deviation

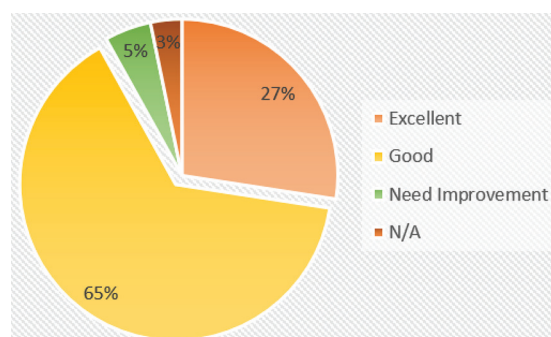**Figure 2.** The feedback from the user toward benefit of EGFS.

EGFS could be accessed on all mobile phone, tablet, or computer.

The results were determined as the comparison of the mean score between pretest and posttest to identify the benefit of the present EGFS. The feedback in-depth interview with each participant were recorded.

The descriptive data were analyzed using mean ± standard deviation (SD) and percent. The subgroup analysis was determined by univariate analysis, Fisher's exact test, and student pair t-test. The Stata, version 10 (StataCorp LP, College Station, TX, USA) was used and the significant p-value was less than 0.05.

Results

One hundred twenty-three participants were recruited and included 61 medical student and 62 intern. In the intern group, 51.61% were male with a mean age of 24.65±0.75 years. In medical student group, 50.81% were male with a mean age of 23.49±0.77 years. The mean age of all 123 participant was 24.07±0.95 years. Most of the participant's grade point average (GPA) was 3.00 to 3.49, as shown in Table 1. There was no significant difference in baseline characteristic data between intern and medical student group.

In the intern group, the mean score in the diagnostic part was 7.98±1.37 (pretest) compared to the posttest average of 8.53±0.97. The investigation part mean score was 8.53±2.11 for pretest compared to 10.63±2.25 for the posttest average. In the therapeutic part, the pretest mean score was 5.0±1.76 compared to the posttest average of 6.1±1.75. There were significant differences between pretest and posttest scores as shown in Table 2.

In the fifth-year medical students, the mean score showed significant differences in the mean score of the investigation part, while there were no differences in diagnosis and treatment part as shown in Table 3.

In the sixth-year medical students, the mean score showed significant differences in the investigation and the treatment part. There were no significant differences in the mean score of the diagnosis part as shown in Table 4.

In subgroup analysis, comparison of mean score among the three groups using Bonferroni method showed the significant difference of the mean score in fifth-year medical students and sixth-year medical students and intern group, while there was no significant difference of mean score between the sixth-year medical students and the intern group.

During the in-depth interview, 92% of the participants had a positive attitude of this EGFS as shown in Figure 2. As example of the in-depth interview, medical students mentioned that they liked how easy it is to access the EGFS, and this tool made him understand how to approach and manage children with unprovoked seizure.

Discussion

The treatment gap is the major problem in pediatric seizure/epilepsy and more than 50% of the

Table 2. The mean score of interns

	Pretest score; min-max [mean±SD]	Posttest score; min-max [mean±SD]	Difference of mean score	p-value
Diagnosis	3 to 10 [7.98±1.37]	4 to 10 [8.53±0.97]	0.55 (0.21 to 0.89)	0.002
Investigate	5 to 13 [8.53±2.11]	4 to 14 [10.63±2.25]	2.10 (1.44 to 2.76)	0.0001
Treatment	1 to 9 [5.0±1.76]	2 to 10 [6.1±1.75]	1.1 (0.59 to 1.61)	0.0001

SD=standard deviation

Table 3. The mean score of 5th year medical students

	Pretest score; min-max [mean±SD]	Posttest score; min-max [mean±SD]	Difference of mean score	p-value
Diagnosis	6 to 10 [8.29±1.10]	6 to 10 [7.68±2.13]	−0.65 (−1.67 to 0.38)	0.205
Investigate	4 to 14 [9.19±2.71]	5 to 14 [10.75±2.54]	1.56 (0.65 to 2.47)	0.0024
Treatment	4 to 10 [6.5±1.79]	3 to 10 [5.75±1.88]	−0.75 (−1.67 to 0.17)	0.1038

SD=standard deviation

Table 4. The mean score of 6th year medical students

	Pretest score; min-max [mean±SD]	Posttest score; min-max [mean±SD]	Difference of mean score	p-value
Diagnosis	3 to 10 [7.27±1.74]	2 to 10 [7.68±2.13]	0.41 (−0.06 to 0.88)	0.0861
Investigate	5 to 12 [8.55±1.76]	2 to 14 [9.70±3.15]	1.15 (0.30 to 2.01)	0.0090
Treatment	1 to 8 [4.30±1.71]	0 to 8 [4.98±1.81]	0.67 (1.92 to 0.08)	0.0266

SD=standard deviation

patients with epilepsy in underdeveloped countries do not receive appropriate diagnosis and treatment. One of the reasons is the lack of specialists, especially in the rural area of underdeveloped countries[1,2].

Methods and different tools were created in previous studies to diminish the treatment gaps such as educational programs, video animation, and tools such as application to help and improve the diagnostic yield and improve quality of care in patients with epilepsy and seizure[5-7]. The authors created a tool with Google Form named Easy Google Form for Pediatric Seizure (EGFS) aimed to encourage the non-specialist such as medical students and intern or general practitioner to have corrected knowledge toward diagnosis, investigation, and treatment of pediatric seizure and epilepsy.

The EGFS tend to have the benefit of improving the mean score in every aspect of an intern group as the mean score is significantly different between pretest and posttest in every part as diagnosis, investigation, and treatment. In fifth-year medical student group, the EGFS has positive result toward score of investigation part, while the sixth-year medical students group showed improvement of both investigation and treatment parts. The improvement of score may be not significant in every part in the fifth-year medical students but from the subgroup

analysis, it showed that the mean score of fifth-year medical students was significant different from other groups. This may be explained by the basic knowledge of the fifth-year medical students about seizure/epilepsy, which may be inferior to the sixth-year medical students and intern group. Furthermore, the fifth-year medical students had the least experience in clinical skill compared to the sixth-year medical students and the interns. Comparing between the sixth-year medical students and the intern group, the data showed a correlation in mean score and no significant difference between the two groups from the subgroup analysis. The explanation may be that both groups had approximately the same basic knowledge and clinical skill.

From the study of Patterson et al in Pakistan[8-10], they created a mobile application for non-specialists such as non-medical volunteers, health workers, and inexperienced doctors. The mobile application was using 11 questions to answers and provided the score for diagnosing epilepsy. This compared with the gold standard that neurologist used in their diagnosis. This mobile application has 88% sensitivity and 100% specificity for helping the correct diagnosis in epilepsy.

From the study of Pina-Garza et al in USA[11], they created the refractory epilepsy screening tool for

Lennox-Gastaut syndrome (REST-LGS) as the case report to help the non-specialist diagnose intractable epilepsy as Lennox-Gastaut syndrome (LGS). It showed good reliability to help diagnosis of LGS patients.

The EGFS is not a mobile application because of the limitations in funding and information technology (IT) engineer to create an application. Therefore, the authors adapted the tool as a form in Google Form and contained step and keys knowledge for the non-specialist to make prompt diagnosis and treatment in pediatric seizure and epilepsy instead. Even though the present tool may be inferior to the previous studies, this EGFS showed positive results as improving the diagnosis, investigation, and treatment among intern and improving the investigation and treatment in the fifth- and sixth-year medical students. Furthermore, feedback from the users of EGFS was positive toward the usefulness of the tool.

One of the distinct aspects of the present study is that the authors conducted the study comparing the results of the mean score of the MCQ and KF examination in contrast with the previous studies that applied the tools in the clinical field and patients. The present study results showed the higher score after using the EGFS, suggesting the immediate application of knowledges but this may not guarantee the improvement in clinical practice. The EGFS should be studied in a next phase as a clinical trial or randomized clinical trial.

Conclusion

The Google Form, EGFS, has benefits for medical students and general practitioner to improve knowledge toward diagnosis, investigation, and treatment of pediatric seizure and epilepsy. Future trial using the EGFS in clinical field and pediatric patients with seizure/epilepsy should be done.

Conflicts of interest

The authors declare no conflict of interest.

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