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Telemedicine in Developing Countries: Knowledge, Attitudes, and Practices of Caregivers of Children with Epilepsy Regarding Telemedicine at the Philippine Children's Medical Center

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Purpose: The coronavirus disease 2019 pandemic has prompted the use of telemedicine as an alternative method for providing continuous epilepsy care. This study was conducted to validate and administer a web-based questionnaire to assess the knowledge, attitudes, and practices (KAP) regarding telemedicine among caregivers of children with epilepsy at the Philippine Children's Medical Center (PCMC).

Methods: This cross-sectional study was conducted by a primary investigator from the child neurology section of PCMC between July 2022 and October 2022 and consisted of two phases. In phase 1, content validation and pre-testing of the Filipino version of the questionnaire were conducted with 29 caregivers. Phase 2 involved the web-based administration of the final version of the questionnaire to 89 caregivers.

Results: The resulting questionnaire comprised four main sections: demographics, KAP. Regarding caregivers' knowledge, 70.8% had not heard of telemedicine before participating in teleconsultations at PCMC. However, most participants were able to correctly identify its purposes (86.4%), benefits (87.6%), and barriers (78.7%). All aspects of the caregivers' attitudes demonstrated positive agreement with the Likert scale of attitudes, with *P* values of <0.01, which indicated statistical significance. The most common device used was a cellular phone, and most caregivers identified Facebook Messenger, Viber, and Zoom as the most useful platforms.

Conclusion: Our study revealed low awareness of the availability of telemedicine services but good knowledge of its purposes, benefits, and barriers. Caregivers exhibited positive attitudes toward telemedicine, with Facebook Messenger identified as the most useful platform.

Keywords: Telemedicine; Epilepsy; Knowledge; Attitude; Remote consultation

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has wreaked havoc on the global healthcare system, shifting focus to prioritizing the management of patients with COVID-19 [1]. Epilepsy, a challenging disease, has become even more difficult to manage during the pandemic. The suspension of outpatient clinics, due to the cessation of public transportation and lockdown

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procedures, puts people with epilepsy (PWE) at risk of having their necessary follow-up appointments canceled. These appointments are crucial for ensuring adequate seizure control, addressing adverse drug reactions, and handling other patient and family concerns [2]. To bridge this gap, a novel solution was needed, leading us to implement telemedicine.

Telemedicine serves as an alternative for providing epilepsy care during the pandemic, with the potential to improve the quality of epilepsy management [3]. Although telemedicine was available prior to the COVID-19 pandemic, it was not fully embraced or utilized due to physicians' and patients' unfamiliarity with the technology and processes required for implementation [4,5]. Despite its widespread adoption in many countries, numerous challenges persist in implementing telemedicine [6]. Several studies have been conducted to investigate the knowledge, attitudes, and practices (KAP) of healthcare workers and medical students regarding telemedicine in countries such as India, Pakistan, West Ethiopia, Dubai, and Uganda. However, we have not encountered a study examining the KAP of caregivers for patients with epilepsy in relation to telemedicine [7-11].

Telemedicine is relatively new to our institution, the Philippine Children's Medical Center (PCMC). Therefore, this study was conducted to explore the KAP related to telemedicine among caregivers of PWE who participated in teleconsultations at this institution between May 2020 and April 2022. Investigating the KAP of caregivers is essential for enhancing our telemedicine services and establishing a long-term, successful epilepsy telehealth clinic that will assist in the provision of uninterrupted epilepsy care during and even after the COVID-19 pandemic. A structured telemedicine program can reduce the number of patients seen during face-to-face consultations at outpatient clinics. It offers more cost-effective services to PWE, particularly those with comorbidities that make transportation difficult [4,12]. This research will help ensure that an established, structured telemedicine platform will be readily available and efficiently delivered should another pandemic inevitably occur in the future. The data generated from this study can also be utilized to develop hospital programs and policies related to the implementation of telemedicine.

Materials and Methods

The study employed a cross-sectional descriptive design. A web-based self-administered questionnaire was validated and used to assess the KAP regarding telemedicine among caregivers of children with epilepsy who participated in teleconsultations at PCMC between May 2020 and April 2022. We employed a purposive sampling design, and the questionnaire was administered between July 2022 and October 2022. The inclusion criteria were as follows: (1) A caregiver (aged 18 years or older) for a patient with epilepsy, regardless of place of residence; (2) The caregiver had been involved in the patient's care for at least 6 months and resided with the patient during the pandemic; (3) Between May 2020 and April 2022, the caregiver participated in at least one teleconsultation with the PCMC Child Neurology department. New patients referred to PCMC Child Neurology for teleconsultation were excluded from the study.

A total of 89 caregivers who met the inclusion criteria participated in the final version of the questionnaire, which was designed to determine their KAP regarding telemedicine. The questionnaire had a margin of error of no more than 0.05 and a 95% confidence level, assuming that 7.5% of caregivers would be aware of telemedicine [1]. The study was carried out in two phases.

1. Phase 1

The first phase involved translating the preliminary questionnaire, which was derived from a review of the relevant literature, into Filipino. The research instrument included items consistently found in questionnaires administered to healthcare professionals in previous studies [8-11]. The questionnaire consisted of four domains. The first domain included the demographic profiles of both the caregiver and the PWE. The caregiver's demographic profile included age, sex, address, educational attainment, employment status, and the duration of time spent caring for the patient. The demographic data of the PWE consisted of age and sex. Additionally, information regarding the first consultation, the frequency of outpatient department (OPD) visits per year, the frequency and duration of seizures per day, and the number of prescribed medications was recorded.

The second domain assessed caregivers' knowledge regarding the purpose, benefits, and barriers of telemedicine, as well as the platforms available for teleconsultation. This section included caregivers' previous experiences with or exposure to telemedicine as well as when and how they became aware that PCMC Child Neurology offered telemedicine services. The items related to telemedicine awareness were based on a 2021 study by Alajwari et al. [3], which examined the knowledge and attitudes of Saudi Arabian citizens towards telemedicine during the COVID-19 pandemic. The information on purpose, benefits, and barriers was derived from 2019 research from Kissani et al. [13], which focused on improving care, teaching, and awareness of telemedicine in epilepsy, and from a 2013 study by Wechsler et al. [14], which discussed the benefits and barriers to telemedicine implementation.

The third domain assessed the caregiver's attitudes towards the implementation of telemedicine. This encompassed perceived

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feelings and opinions, including confidence in data privacy, the appropriateness of time allocation, and the ease of communication during teleconsultations. The study also explored perceptions of cost-effectiveness, convenience, impact on seizure control, and willingness to utilize telemedicine during and after the pandemic. These items were derived from a 2019 study by Constanzo et al. [15] on the validation of a patient satisfaction survey for a teleneurology program in Chile, as well as the 2017 work of Bahrani et al. [16] on telephonic reviews for outpatients with epilepsy. Perceived feelings regarding acceptability and willingness to continue telemedicine were incorporated based on a 2008 pilot study conducted by Ahmed et al. [17].

The fourth domain assessed caregivers' practices in using telemedicine. The multiple-choice questions examined the devices owned and the type of internet connection utilized. Two additional questions, answerable on a 5-point Likert scale, investigated the perceived usefulness of messaging applications and online video consultations. The examination of the practical application of telemedicine was based on a 2017 study by Russo et al. [18], which explored the technological profiles of parents and their attitudes towards telemedicine among families with pediatric patients.

After the preliminary questionnaire was constructed, it underwent content validation by an expert panel, followed by a pilot survey. The questionnaire was translated into Filipino by a linguistic expert and then analyzed for content validity by a panel of seven experts, consisting of child neurologists who practiced telemedicine during the pandemic. Each expert was asked to assess the clarity of each question using a 5-point Likert scale, where 1 represented "unclear," 2 represented "slightly unclear," 3 represented "moderately unclear," 4 represented "very clear," and 5 represented "perfectly clear." Additionally, they were asked to evaluate the practical relevance of the items using a 5-point Likert scale, where 1 represented "not very relevant," 2 represented "slightly relevant," 3 represented "moderately relevant," 4 represented "very relevant," and 5 represented "extremely relevant." The theoretical relevance was also assessed by determining whether the items pertained to knowledge, attitudes, or practices. The experts provided their opinions and suggestions for each item, and these suggestions were incorporated into the refinement of the content, language, and interpretation of each item, resulting in the second version of the questionnaire.

This second version underwent pre-testing with 29 caregivers. An invitation to participate in the pre-testing of the web-based questionnaire was sent to 128 patients, randomly selected from 7,092 patients in our OPD database, via Facebook Messenger. These participants were asked to provide informed consent, and assent was also obtained from each PWE as follows: 7 to 12 years old, verbal assent script; 12 to 15 years old, verbal assent simplified; 15 to <18 years old, co-signed assent; and 18 years old, informed consent. The PWE did not participate in answering the questionnaire. For children aged 7 to 12 years, verbal assent was obtained through a Facebook Messenger video call with the caregiver present.

Respondents were given 20 to 30 minutes to complete the questionnaire and were reminded to answer all items to ensure completeness. Time extensions were granted to participants who requested additional time to complete the questionnaire. If assistance was requested, the researcher provided support via video call. Participants were informed of the study objectives, asked to analyze each item, and encouraged to report any items they found difficult to understand. They were also asked to provide brief justification for any unclear items and to make recommendations for changes. Their suggestions were taken into consideration to improve the questionnaire and produce the final version for the study.

2. Phase 2

The second phase involved administering the final version of the web-based KAP questionnaire on telemedicine to a representative sample of caregivers (Fig. 1). Informed consent forms were given to 744 randomly chosen potential participants from our OPD database until 89 respondents were obtained. The primary investigator engaged in discussions with caregivers regarding their responses to each item. Confidentiality of information was maintained throughout the process. All valid data were incorporated into the analysis.

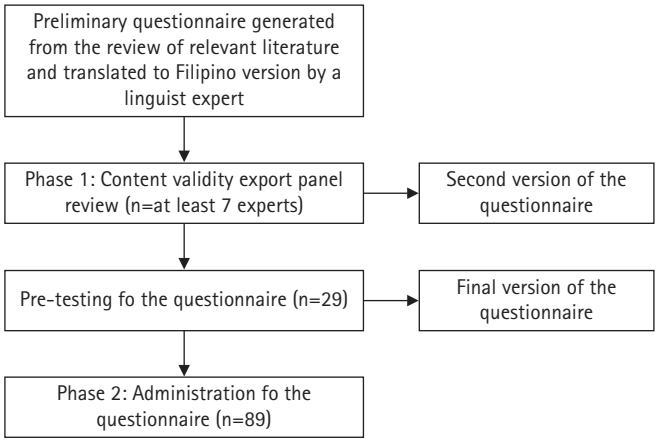

Fig. 1. The study was conducted in two phases. The first phase included the translation of the preliminary questionnaire gathered from the review of relevant literature to Filipino. This was followed by assessment by an expert panel, content validation and pilot.

3. Ethical considerations

The study was approved by the Institutional Review Board and Ethics Committee of PCMC with the approval number PCMC IR-EC 2022-015. Strict confidentiality was maintained in the handling of records, in accordance with the Data Privacy Act. Prior to participation in the study, informed consent was obtained from caregivers, and assent was received from each PWE.

4. Statistical analysis

Summary statistics were displayed in tables and graphs, reported as mean and standard deviation for continuous data with a normal distribution or as median and interquartile range for quantitative variables with a skewed distribution (e.g., age in years, duration of epilepsy in years, duration of seizures in minutes, and years spent caring for the patient) and discrete continuous data (e.g., number of seizures, number of medications, and frequency of visits). Additionally, count and percentage were used for qualitative measures (e.g., sex, education, and employment). The minimum and maximum values of continuous data were also reported.

The Shapiro-Wilk test was utilized to determine whether continuous variables deviated from a Gaussian or normal distribution. To evaluate the content validity, the content validation coefficient was employed to analyze inter-rater agreement concerning the clarity and relevance of items. Coefficient values above 0.70 were deemed to indicate adequacy. To assess the internal consistency reliability of the 5-point Likert scale, the Cronbach alpha was also used. A scale alpha of at least 0.7 was considered a sufficient result. The rankings of caregivers' perceived usefulness of messaging software, the method of online consultation, and the degree of preference for various platforms were summarized using the Kemeny-Young or maximum likelihood method. Furthermore, the Pearson chi-square test or exact test were conducted to compare proportions across caregiver characteristics. Significant pairwise comparisons were based on Bonferroni-adjusted *P* values.

Statistical significance was determined to be indicated by *P* values of at least 0.05. STATA version 16 (Stata Corp, College Station, TX, USA) was employed for data processing and analysis.

The Cronbach alpha was calculated to evaluate the reliability level of the multiple-question Likert scale (Table 1) [19].

Results

During phase 1 of the study, the second version of the questionnaire underwent content validity verification. The content validity coefficients for relevance and clarity in the knowledge domain were 1 and 0.92, respectively, while they were 1.0 and 0.96 for attitudes and 1.0 and 1.0 for practices (Table 2). Content validity analysis of all items in the scale demonstrated acceptable scores. The reliability analysis of the questionnaire scale for attitudes revealed high internal consistency (Cronbach alpha, 0.900), and all items exhibited acceptable item-total correlations (>0.5) (Table 3).

Among the 89 participants included in the survey using the final version of the questionnaire, the majority were female (93.3%), and nearly half were between the ages of 36 and 55 years (53.9%). Most participants had completed high school (44.9%) and were employed (78.7%). Regarding the duration of patient care, most participants had spent 2 to <6 years (37.1%) or 6 to <11 years (34.8%) caring for the patient (Table 4).

The demographic profile of the PWE showed that revealed that a slight majority were male (56.2%). The most prevalent age group was 6 to <13 years old (42.7%). Regarding the duration of epilepsy, the median was 5 years (range, 2 to 18). The highest number of seizures experienced in the past year was more than 10 (34.8%). Additionally, 52.8% of PWE were receiving polytherapy. The median number of OPD visits per year was 3 (range, 2 to 4). The majority of PWE experienced seizures infrequently (61.8%) and with a duration of 1 minute to <5 minutes (49.4%) (Table 5).

In terms of caregivers' knowledge about telemedicine, 70.8% had not heard of the term telemedicine/teleconsultation before accessing the telemedicine services at PCMC, while only 12.4% had previous experience from different hospitals. The majority learned about the PCMC Child Neurology telemedicine services through

Table 1. Cronbach alpha values and degrees of reliability

Value of Cronbach alpha (α)	Degree of reliability
α ≤0	Indicates a serious problem with the questionnaire design; the researcher should re-examine the format of the questionnaire intended for use in the survey.
0< α <0.5	Low internal consistency and hence poor inter-relatedness between items. Should be discarded or revised.
0.5< α <0.7	Moderate internal consistency and reliability of a given questionnaire. Can be revised.
α=0.7	Adequate internal consistency and reliability of a given questionnaire.
0.7< α <0.9	High internal consistency and reliability of a given questionnaire. Can be revised.
0.9< α <1.0	Some questionnaire items may be redundant; the researcher should consider removing some items that repeat questions in multiple ways.
α=1.0	Perfect internal consistency in the given questionnaire.

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Table 2. Content validity coefficient of all questionnaire items

	Questionnaire	Relevance CVC	Clarity CVC
Knowledge			
Q1	Had you heard the term "telemedicine" prior to your teleconsultation at PCMC?	1.0	0.78
Q2	Had you encountered a telemedicine process or tried online consultations prior to your teleconsultation at PCMC?	1.0	0.78
Q3	How and when were you made aware of the teleconsultation services of the PCMC?	1.0	1.0
Q4	Purpose of telemedicine	1.0	0.89
Q5	Benefits of telemedicine	1.0	1.0
Q6	Perceived barriers to telemedicine implementation	1.0	1.0
Q7	Platforms that may be used for teleconsultation	1.0	1.0
Overall		1.0; acceptable	0.92; acceptable
Attitude			
Q1	I feel more comfortable communicating with my physician during teleconsultation than during face-to-face consultations.	1.0	1.0
Q2	The time allotted during an online consult is enough to address my concerns regarding the patient.	1.0	1.0
Q3	I feel that my personal information and privacy will be protected during an online teleconsultation.	1.0	1.0
Q4	I think online teleconsultation is more cost-effective than going to the hospital.	1.0	1.0
Q5	I prefer online teleconsultations to face-to-face consultations.	1.0	1.0
Q6	I am willing to continue using online consultations during this pandemic.	1.0	0.89
Q7	I am willing to continue using online consultations even after the resolution of the pandemic.	1.0	0.78
Q8	I feel that online consultations can replace face-to-face clinics.	1.0	1.0
Q9	I feel that my patient has the same or better seizure control after resorting to teleconsultation.	1.0	0.89
Q10	Teleconsultations are more convenient for our family and our patient.	1.0	1.0
Overall		1.0; acceptable	0.96; acceptable
Practices			
Q1	Internet connections used	1.0	1.0
Q2	Devices used to connect to the internet	1.0	1.0
Q3	Usefulness of the following applications for messaging (for sending pictures, videos, and files related to the teleconsult)	1.0	1.0
Q4	Usefulness of the following platforms for online video consultation	1.0	1.0
Overall		1.0; acceptable	1.0; acceptable

CVC, content validity coefficient; Q, question; PCMC, Philippine Children's Medical Center.

Table 3. Cronbach alpha for the attitude scale

	Corrected item-total correlation	Cronbach alpha if item deleted
Q1	0.530	0.897
Q2	0.596	0.893
Q3	0.531	0.897
Q4	0.685	0.888
Q5	0.684	0.888
Q6	0.613	0.894
Q7	0.766	0.882
Q8	0.757	0.883
Q9	0.633	0.891
Q10	0.739	0.884
Overall		0.900

Q, question.

Facebook announcements (66.3%). Overall, caregivers demonstrated good understanding of the purposes, benefits, and barriers of telemedicine. Specifically, 86.4% of caregivers correctly identified all three primary purposes of telemedicine, 87.6% identified all of its main benefits, and 78.7% identified all of its main barriers. Additionally, 62.9% of caregivers reported that telemedicine platforms could include SMS messaging, video calls (Viber, Zoom, Facebook Messenger, Telegram, WhatsApp, Discord), telephone/mobile phone calls, E-mail, and medical portals (Table 6).

All aspects of the caregiver's attitude received a median score of at least 4, indicating positive agreement. Two aspects had a median score of 5, signifying very positive agreement: "I feel that my personal information and privacy will be protected during an online teleconsultation" and "I think online teleconsultation is more cost-effective than going to the hospital" (Table 7). Regarding caregivers' practices, the most common internet connection used was Wi-Fi (57.9%), and the most frequently utilized device was a cellular phone (90.9%). In terms of platform usefulness in telemedicine, the highest-scoring platforms were Facebook Messenger, Viber, and Zoom (Table 8).

Table 4. Profile of caregivers of children with epilepsy

Characteristic	No. (%) (n=89)
Sex	
Male	6 (6.7)
Female	83 (93.3)
Age (yr)	
18–35	41 (46.1)
36–55	48 (53.9)
≥56	0
Education	
None	2 (2.2)
Elementary	0
High school	40 (44.9)
Vocational	11 (12.4)
College	29 (32.6)
Post-graduate	7 (7.9)
Employment	
Unemployed	16 (18.0)
Employed	70 (78.7)
Self-employed	3 (3.4)
Time spent caring for the patient	
6 mo to <2 yr	1 (1.1)
2 yr to <6 yr	33 (37.1)
6 to <11 yr	31 (34.8)
≥11 yr	24 (27.0)

Table 5. Profile of children with epilepsy

Characteristic	No. (%) (n=89)
Sex	
Male	50 (56.2)
Female	39 (43.8)
Age (yr)	
Infant (<1)	0
Toddler (1–<3)	7 (7.9)
Preschooler (3–<6)	26 (29.2)
School age (6–<13)	38 (42.7)
Adolescent (13–<19)	18 (20.2)
Duration of epilepsy in years	5 (2-18)
No. of seizures in the past year	
None	28 (31.5)
≤5	25 (28.1)
6–10	5 (5.6)
>10	31 (34.8)
No. of current antiseizure medications	
Monotherapy	42 (47.2)
Polytherapy	47 (52.8)
Frequency of OPD visits per year	3 (2-4)
Frequency of seizures	
Daily or almost daily	19 (21.3)
Weekly	7 (7.9)
Monthly	8 (9.0)
Seldom	55 (61.8)
Duration of seizures (min)	
<1	35 (39.3)
1–<5	44 (49.4)
5–10	8 (9.0)
10–15	1 (1.1)
>15	1 (1.1)

Values are presented as number (%) or median (range).
OPD, outpatient department.

Discussion

The COVID-19 pandemic has raised health concerns for patients with chronic conditions, including epilepsy. For PWE, regular follow-up is essential for optimizing antiseizure medications, managing concurrent comorbidities, and addressing adverse events related to antiseizure medications [6]. However, the closure of outpatient clinics and limited hospital access have hindered the delivery of effective epilepsy care [20]. Lockdown measures have resulted in canceled follow-up appointments, reduced access to neurodiagnostic tests, changes in the management of infantile spasms, increased financial burden related to antiseizure medications, unintentional non-adherence, and discontinuation of antiseizure medications, leading to worsening seizures [1,21]. In addition to these challenges in epilepsy care, caregivers of PWE have demonstrated a lack of knowledge about alternative ways to access healthcare and facilities during the pandemic [1].

One potential solution to address the aforementioned issues is telemedicine. As early as 1999, telemedicine had been formally incorporated into neurology, specifically stroke care [22]. However, despite its effectiveness, it has remained underutilized [5,7,20,22]. With the widespread availability of smartphones and high-speed internet connectivity, patients and their caregivers can engage in video calls and exchange information regarding the progression of the disease, medication usage, and any adverse effects [3]. They can also send files such as electroencephalograms, magnetic resonance images, and videos of seizures. Additionally, they can utilize blogs, Facebook, and various other social media platforms to share data [13].

Telemedicine offers benefits to both patients and the healthcare system [4]. By reducing the need for public transportation and limiting exposure in emergency room waiting areas, telemedicine can decrease the risk of COVID-19 virus exposure [23]. A dedicated telemedicine platform enables PWE to undergo examinations by their physician and receive e-prescriptions for antiseizure medications without incurring additional travel costs and inconvenience [4,12]. Ahmed et al. [17] investigated the feasibility of epilepsy follow-up through telemedicine and discovered that the majority (90%) of patients required a companion during travel, resulting in higher overall costs for conventional healthcare visits [19]. Both the conventional and telemedicine groups expressed satisfaction

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Table 6. Caregiver knowledge regarding telemedicine

Item	Caregivers of children with epilepsy
Heard the term "telemedicine"/"teleconsult" prior to teleconsultation at PCMC	
Yes	26 (29.2)
No	63 (70.8)
Encountered or tried a telemedicine process prior to teleconsultation in PCMC	
Yes	11 (12.4)
No	78 (87.6)
Source and time of awareness that PCMC Child Neurology had started having online consultations	
Facebook announcement by PCMC	59 (66.3)
Parents of PCMC patients	8 (9.0)
PCMC staff (doctors, nurses, etc.)	22 (24.7)
Other	0
Purpose(s) of telemedicine	
It is intended to overcome geographical barriers, connecting a patient and physician who are not in the same physical location using telecommunication (e.g., Wi-Fi, phones, computers).	8 (9.0)
Through telemedicine, patients are able to consult a physician for diagnostic tests so that initial management can be given.	3 (3.4)
Its goal is to improve health outcomes.	1 (1.1)
All of the above are purposes of telemedicine.	77 (86.5)
Benefits of telemedicine	
Decreases travel time and expenses for patients	9 (10.1)
Provides individual and group education for patients and their caregivers about epilepsy	2 (2.2)
Improves access to neurologic expertise for remote or underserviced areas	0
All of the above are benefits of telemedicine.	78 (87.6)
Barriers to telemedicine implementation	
Difficulty finding a doctor who does teleconsults	10 (11.2)
Additional costs of technology and lack of device to use for teleconsultations	6 (6.7)
Difficulty obtaining neurodiagnostic tests such as EEG, EMG, and neuroimaging	1 (1.1)
Difficulty performing physical and neurologic examination	2 (2.2)
All of the above are barriers to telemedicine implementation.	70 (78.7)
Platforms that may be used for teleconsultation	
SMS messaging	2 (2.2)
Video calls (Viber, Zoom, Facebook Messenger, Telegram, Whatsapp, Discord)	29 (32.6)
Telephone/Mobile phone call	0
E-mail	0
Medical portal	2 (2.2)
All of the above	56 (62.9)

Values are presented as number (%).
PCMC, Philippine Children's Medical Center; EEG, electroencephalography; EMG, electromyography.

Table 7. Caregiver attitudes regarding telemedicine

Item	Median (range)
I feel more comfortable communicating with my physician during teleconsultation than during face-to-face consultations.	4 (18-50)
The time allotted during an online consult is enough to address my concerns regarding my patient.	4 (18-50)
I feel that my personal information and privacy will be protected during an online teleconsultation.	5 (18-50)
I think online teleconsultation is more cost-effective than going to the hospital.	5 (18-50)
I prefer online teleconsultations to face-to-face consultations.	4 (18-50)
I am willing to continue with online consultations during this pandemic.	4 (18-50)
I am willing to continue online consultations even after the resolution of the pandemic.	4 (18-50)
I feel that online consultations can replace face-to-face clinics.	4 (18-50)
I feel that my patient has the same or better seizure control after resorting to teleconsultation.	4 (18-50)
Teleconsultations are more convenient for our family and our patient.	4 (18-50)

Table 8. Caregiver practices regarding telemedicine

Item	Value
Internet connection used	
Cellular data	
Prepaid	35 (36.8)
Postpaid	1 (1.1)
Wi-Fi	55 (57.9)
Dial-up	0
Broadband	2 (2.1)
DSL (digital subscriber line)	1 (1.1)
Cable internet connection	1 (1.1)
Other	0
Device used during teleconsultations	
Cell phone	89 (90.9)
Personal computer	1 (1.0)
Laptop	7 (7.1)
Tablet	1 (1.0)
Computer shop rental	0
Other	0
Usefulness of messaging software	
Facebook Messenger	5 (1-5)
Viber	3 (1-5)
E-mail	4 (1-5)
Text messaging	5 (1-5)
Telegram	1 (1-5)
WhatsApp	1 (1-5)
Discord	1 (1-5)
Usefulness of software for video online consultation	
Facebook Messenger	5 (1-5)
Zoom	5 (1-5)
Viber	4 (1-5)
Google Meet	4 (1-5)
Telegram	1 (1-5)
Phone call	4 (1-5)
Discord	1 (1-5)
FaceTime	2 (1-5)

Values are presented as number (%) or median (range).

with the quality of service and indicated a preference for future telemedicine appointments [21]. Bahrani et al. [18] also reported no significant difference in the frequency of breakthrough seizures between patients seen via telephonic review and those attending face-to-face consultations, with greater satisfaction observed in the group experiencing telephonic reviews. Regarding the healthcare system, telemedicine facilitates the provision of care to underserved and remote areas of the community, reducing the number of patients in outpatient clinics. This approach allows for the expansion of clinical services without the need for physical expansion of healthcare facilities [4].

Despite the aforementioned benefits of telemedicine, challenges persist. Telemedicine relies on information technology services, yet older patients and caregivers often struggle to adapt to these innovations. Additionally, concerns exist regarding patient vulnerability and hospital data privacy [24]. In 2020, Casares et al. [25] reported various issues encountered in telemedicine, such as difficulty hearing the provider, delays in visual or audio feedback, and failure to receive the E-mail link for teleconsultation. A minority of patients reported poor cell phone connections and a lack of video applications [25].

Our child neurology section serves a large PWE population. In 2019, a total of 5,215 patients were seen at our outpatient clinics, accounting for 72% of all patients seen that year. Our patients were not immune to the unprecedented disruption caused by the pandemic, as we observed a decline in consultations from 1,208 patients between January and March 2020 to 813 patients between May and December of the same year, following the implementation of community lockdowns. To address our patients' needs, we began issuing electronic prescriptions via Facebook Messenger in May 2020 and subsequently launched our first online consultation services through the same platform, utilizing Messenger chats and video calls. However, in June 2021, our online services were temporarily suspended due to internet connectivity issues. We resumed online teleconsultations using the same platform and have continued to do so ever since. In 2020, we conducted 813 teleconsultations via this platform, and this number increased greatly to 1,653 teleconsultations in 2021. We provided these services free of charge through the end of February 2022.

To the best of our knowledge, this is the first study to develop a validated questionnaire with satisfactory content validity and reliability, examining the KAP of caregivers of children with epilepsy. Numerous studies have explored KAP regarding telemedicine; however, these were primarily administered to physicians, other allied healthcare workers, and medical students, and not to caregivers of PWE [8-11]. As our institution is in the early stages of implementing telemedicine, we aimed to determine the KAP of caregivers of PWE regarding telemedicine to enhance our telemedicine platform.

In our study of 89 caregivers of children with epilepsy, we found a low level of awareness regarding the availability of telemedicine services. The majority (70.8%) had not heard the term "telemedicine" or "teleconsult" prior to their teleconsultation at our institution. Only 12.4% had previous experience with teleconsultations, and those were primarily conducted at other hospitals. The caregivers in our study learned about the availability of telemedicine services through various channels: 66.3% discovered this via Facebook announcements from our child neurology section, 24.7% were informed by hospital staff at our institution, and 9% heard about it from fellow caregivers. The primary source of awareness regarding telemedicine availability came from our institution, with

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only 24.7% learning about it from other institutions. This finding is consistent with previous reports by Saleem et al. [1].

In assessing caregivers' knowledge of telemedicine, most participants were able to correctly identify all of its main purposes, benefits, and barriers to implementation (Table 6). Despite low awareness of its availability, caregivers demonstrated good knowledge of telemedicine. Among the available platforms used for telemedicine, the majority of participants (62.9%) reported using video calls through Viber, Zoom, Facebook Messenger, Telegram, WhatsApp, and Discord. Other identified platforms included medical portals and SMS messaging. A significant number of respondents (32.6%) believed video calls to be the only available platform for teleconsultations. Since telemedicine is not well-established at our institution, awareness of available platforms is limited to those to which caregivers have been exposed. Disseminating information about telehealth availability through the Facebook platform or the hospital information system will address the identified low awareness of its availability.

All aspects of the caregiver's attitude scale had median scores of at least 4, indicating positive agreement. These aspects included positive agreement on comfort during teleconsultation, adequacy of time allotment for addressing patient concerns, preference for teleconsultation over face-to-face consultations, impact on seizure control, convenience, and intention to continue teleconsultations even after the pandemic. On this scale, two aspects demonstrated strong agreement with a median of 5: confidence in the privacy of data provided and the cost-effectiveness of telemedicine compared to conventional clinic visits (Table 4). Ashfaq et al. [7] reported that the majority of their respondents welcomed the introduction and implementation of telemedicine, but almost half of the participants believed that telemedicine disrupted the doctor-patient relationship and compromised patient privacy. This finding contrasts with the results of our study; however, favorable attitudes towards telemedicine are also evident in studies by Singh et al. [8], Datta et al. [10], and Zayapragassarazan and Kumar [11] in India, as well as by Biruk and Abetu [9] in Northwest Ethiopia. In these studies, the knowledge of doctors and healthcare professionals regarding telemedicine was average, but they demonstrated favorable attitudes towards telemedicine [8-11].

Regarding caregivers' practices, the most common type of internet connection utilized was Wi-Fi (57.9%), followed by cellular data (36.8%). Other types of internet connections included broadband, digital subscriber lines, and cable internet connections. The most frequently used devices were cellular phones (90.9%). Other devices employed were laptops, personal computers, and tablets, in decreasing order of usage. In terms of the usefulness of platforms for video calls in the context of telemedicine, those that scored the highest were Facebook Messenger, Viber, and Zoom, in decreasing order. Facebook Messenger and text messaging were deemed most useful for sending messages, including images, videos, and files. In a 2020 study on perceptions and satisfaction with telehealth among patients with intractable epilepsy, Casares et al. [25] reported that frequently used platforms included Zoom, telephone, and FaceTime [21]. One factor not addressed in our study is the caregivers' unfamiliarity with other platforms included in the questionnaire, as some caregivers may not have sufficient experience with every software listed, making it difficult for them to compare between the enumerated platforms. Our study demonstrated that telemedicine is well-accepted among caregivers of PWE, despite low awareness of its availability during the pandemic. Our study did not explore the relationships between demographic data, caregiver knowledge, its impact on attitudes and practices, and vice versa; hence, further studies with larger sample sizes are suggested. Investigating the KAP of caregivers of children with epilepsy will enable healthcare policymakers to identify key points to aid in strengthening the processes and structures of telemedicine programs, thereby better providing epilepsy care during and even beyond the present COVID-19 pandemic.

In conclusion, the COVID-19 pandemic has persisted for over 2 years, and its consequences, including the continued use of telemedicine, are likely to endure. The present study revealed that, prior to their teleconsultations at our institution, caregivers exhibited low awareness and utilization of telemedicine. However, they demonstrated a solid understanding of its purposes, benefits, and barriers. Most caregivers also held a positive attitude towards telemedicine. Wi-Fi was the most used internet connection, and cell phones were the most frequently employed devices for connectivity. Among various platforms, Facebook Messenger ranked first for sending messages and conducting video consultations.

Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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Author contribution

Conceptualization: GMD and LKFBB. Data curation: GMD. Formal analysis: GMD. Funding acquisition: GMD. Methodology: GMD and LKFBB. Project administration: GMD. Visualization:

GMD. Writing-original draft: GMD. Writing-review & editing: GMD and LKFBB.

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References

1. Saleem T, Sheikh N, Abbasi MH, Javed I, Khawar MB. COVID-19 containment and its unrestrained impact on epilepsy management in resource-limited areas of Pakistan. Epilepsy Behav 2020;112:107476.
2. Rasmusson KA, Hartshorn JC. A comparison of epilepsy patients in a traditional ambulatory clinic and a telemedicine clinic. Epilepsia 2005;46:767-70.
3. Alajwari HA, Alfayez A, Alsalman D, Alanezi F, Alhodaib H, Al-Rayes S, et al. Knowledge and attitude of Saudi Arabian citizens towards telemedicine during the COVID-19 pandemic. Int Health 2022;14:604-9.
4. Seivert S, Badowski ME. The rise of telemedicine: lessons from a global pandemic. EMJ Innov 2021;5:64-9.
5. Domingues RB, Mantese CE, Aquino ED, Fantini FG, Prado GF, Nitrini R. Telemedicine in neurology: current evidence. Arq Neuropsiquiatr 2020;78:818-26.
6. Smith AC. Telemedicine: challenges and opportunities. Expert Rev Med Devices 2007;4:5-7.
7. Ashfaq A, Memon SF, Zehra A, Barry S, Jawed H, Akhtar M, et al. Knowledge and attitude regarding telemedicine among doctors in Karachi. Cureus 2020;12:e6927.
8. Singh A, Sahoo AK, Dhaneria S, Gupta D. The outlook of doctors toward telemedicine: a cross-sectional study of knowledge, awareness, and attitude in central India. J Family Med Prim Care 2021;10:3617-24.
9. Biruk K, Abetu E. Knowledge and attitude of health professionals toward telemedicine in resource-limited settings: a cross-sectional study in North West Ethiopia. J Healthc Eng 2018;2018:2389268.
10. Datta R, Singh A, Mishra P. A survey of awareness, knowledge, attitude, and skills of telemedicine among healthcare professionals in India. Med J Armed Forces India 2021 Oct 28 [Epub]. https://doi.org/10.1016/j.mjafi.2021.08.017.
11. Zayapragassarazan Z, Kumar S. Awareness, knowledge, attitude and skills of telemedicine among health professional faculty working in teaching hospitals. J Clin Diagn Res 2016;10:JC01-4.
12. Perrone G, Zerbo S, Bilotta C, Malta G, Argo A. Telemedicine during COVID-19 pandemic: advantage or critical issue? Med Leg J 2020;88:76-7.
13. Kissani N, Lengane YT, Patterson V, Mesraoua B, Dawn E, Ozkara C, et al. Telemedicine in epilepsy: how can we improve care, teaching, and awareness? Epilepsy Behav 2020;103(Pt A):106854.
14. Wechsler LR, Tsao JW, Levine SR, Swain-Eng RJ, Adams RJ, Demaerschalk BM, et al. Teleneurology applications: report of the Telemedicine Work Group of the American Academy of Neurology. Neurology 2013;80:670-6.
15. Constanzo F, Aracena-Sherck P, Hidalgo JP, Munoz M, Vergara G, Alvarado C. Validation of a patient satisfaction survey of the teleneurology program in Chile. BMC Res Notes 2019;12:359.
16. Bahrani K, Singh MB, Bhatia R, Prasad K, Vibha D, Shukla G, et al. Telephonic review for outpatients with epilepsy: a prospective randomized, parallel group study. Seizure 2017;53:55-61.
17. Ahmed SN, Mann C, Sinclair DB, Heino A, Iskiw B, Quigley D, et al. Feasibility of epilepsy follow-up care through telemedicine: a pilot study on the patient's perspective. Epilepsia 2008;49:573-85.
18. Russo L, Campagna I, Ferretti B, Agricola E, Pandolfi E, Carloni E, et al. What drives attitude towards telemedicine among families of pediatric patients?: a survey. BMC Pediatr 2017;17:21.
19. Aithal A, Aithal PS. Development and validation of survey questionnaire & experimental data: a systematical review-based statistical approach. Int J Manag Technol Soc Sci 2020;5:233-51.
20. Brigo F, Bonavita S, Leocani L, Tedeschi G, Lavorgna L; Digital Technologies, Web and Social Media Study Group of the Italian Society of Neurology. Telemedicine and the challenge of epilepsy management at the time of COVID-19 pandemic. Epilepsy Behav 2020;110:107164.
21. Wirrell EC, Grinspan ZM, Knupp KG, Jiang Y, Hammeed B, Mytinger JR, et al. Care delivery for children with epilepsy during the COVID-19 pandemic: an international survey of clinicians. J Child Neurol 2020;35:924-33.
22. Pagaling GT, Espiritu AI, Dellosa MA, Leochico CF, Pasco PM. The practice of teleneurology in the Philippines during the COVID-19 pandemic. Neurol Sci 2022;43:811-9.
23. von Wrede R, Moskau-Hartmann S, Baumgartner T, Helmstaedter C, Surges R. Counseling of people with epilepsy via telemedicine: experiences at a German tertiary epilepsy center

during the COVID-19 pandemic. Epilepsy Behav 2020;112:107298.
24. Chirra M, Marsili L, Wattley L, Sokol LL, Keeling E, Maule S, et al. Telemedicine in neurological disorders: opportunities and challenges. Telemed J E Health 2019;25:541-50.
25. Casares M, Wombles C, Skinner HJ, Westerveld M, Gireesh ED. Telehealth perceptions in patients with epilepsy and providers during the COVID-19 pandemic. Epilepsy Behav 2020;112:107394.