



Brief Communication

Brief video enhances teacher trainees' knowledge of epilepsy

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ABSTRACT

Objective: Relative to the general population, children with epilepsy (CWE) demonstrate difficulties in aspects of cognition and mental health. Previous studies have found that teachers have poor knowledge about epilepsy, which may lead to inadequate management of CWE's comorbidities and seizures, potentially impacting CWE's school performance, social development, and safety. The current study aimed to evaluate whether a brief training program improves teachers' epilepsy knowledge.

Method: Participants included pre-service teachers enrolled in the Faculty of Education at Western University (London, Ontario, Canada). There were no exclusion criteria. Pre-service teachers completed a questionnaire evaluating their experiences and knowledge of epilepsy prior to, and two weeks following, the training program. The training program consisted of a 10.5-min video and booklet that described the characteristics of seizures, seizure first aid, and the cognitive, psychological, and social consequences of epilepsy.

Results: Pre-service teachers' knowledge about epilepsy, seizure safety, and common comorbidities associated with epilepsy significantly improved after participating in the training program. Furthermore, pre-service teachers indicated greater self-reported knowledge about epilepsy and greater preparedness to handle a seizure in the classroom.

Conclusion: The results of the current study demonstrated that a brief, cost-effective training program significantly enhances teachers' knowledge about epilepsy, seizure safety, and the comorbidities associated with epilepsy. Enhancing teachers' knowledge about epilepsy has the potential to improve children's academic and social success in school.

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1. Introduction

Children with epilepsy (CWE) demonstrate difficulties with aspects of cognition and mental health [1–4]. These comorbidities have a greater influence on quality of life relative to epilepsy-related factors [5,6]. Furthermore, cognitive/behavioral comorbidities may lead to poor academic performance [2] and social competence [7], which may further impact quality of life. Raising awareness of these comorbidities among those who work with

CWE and creating strategies to better accommodate these difficulties may improve CWE's academic success, peer relationships, and potentially improve quality of life.

Teachers' knowledge about epilepsy has been suggested to have a significant impact on CWE's school performance and social skill development [8]. A recent systematic review [9] of 47 studies found that across all studies, teachers had poor knowledge about epilepsy. Specific knowledge deficits pertain to the comorbidities related to epilepsy [10], the clinical symptoms of seizures [11,12], causes or triggers of seizures [11], side effects of anti-seizure medication [12], and appropriate seizure management [13]. Relatedly, teachers have reported low self-confidence in teaching students with epilepsy and in how to properly handle a seizure [10,13–15]. Poor teacher knowledge of epilepsy may lead to negative attitudes, and stigmatization toward CWE [16],

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decreased safety for students, and unnecessary usage of medical services [14].

Previous studies have found that educational interventions improve teachers' knowledge of epilepsy [9], reduce teachers' negative attitudes toward CWE [11], and increase confidence in managing seizures in emergency situations [17,18]. Critically, these interventions are time intensive, ranging from 40 min to 120 min, and involve an instructor-led presentation [11,17,19,20]. The present study aimed to evaluate whether a brief, cost-effective, and accessible training program improves teachers' knowledge about epilepsy. The first objective of this pilot study was to evaluate whether the brief video and booklet improved teacher's epilepsy knowledge and their understanding of how to support students with epilepsy within the school. The second objective was to assess whether greater improvements were observed with the combined video and booklet compared with the video alone.

2. Material and methods

2.1. Participants

Participants included pre-service teachers enrolled in the Faculty of Education at Western University (London, Ontario, Canada), attending a second-year mandatory course, *Safe and Accepting Schools* (EDUC 5019S). The course included two sections and students enrolled in both sections of the course were invited to participate in the study. There were no exclusion criteria. This study was approved by the research ethics board at Western University.

2.2. Toolkit training

The training program was part of an Educator Tool Kit for Epilepsy, which aims to inform teachers about epilepsy as a prevalent medical condition and increase knowledge of the various strategies that can be used to promote the well-being and academic success of CWE in school. The training included a 10.5-min video that outlined the definitions of epilepsy and seizures, the characteristics of different types of seizures, and content related to seizure first aid, rescue medication, as well as the cognitive, psychological, and social consequences of epilepsy. A booklet summarized the information from the video and contained a list of general strategies that teachers can use to assist students with epilepsy in the school (Booklet: *Relevant Issues for School and General Strategies for Children with Epilepsy*: <https://epilepsyswo.ca/teacher-toolkit/>). The video and booklet were developed by investigators (EK, MLS, MS) with recommendations on format, content, and length from 10 educators who attended a focus group and each of the study investigators.

2.3. Questionnaire

Participants' experiences and knowledge of epilepsy were evaluated using pre- and 2 weeks post-training questionnaires that included three questions assessing prior experience with epilepsy, three questions evaluating self-reported expertise in epilepsy, and nineteen questions assessing the participants' understanding and knowledge across three categories: epilepsy/seizures, seizure safety, and comorbidities of epilepsy (supplementary Tables 1–3). In the post-survey, participants were also asked to rate their satisfaction with the training video, whether they had read any further information about epilepsy, and whether they were provided with the booklet and if so, had they read it. Each survey took approximately 15 min to complete.

2.4. Procedure

Students present in class were invited to participate by a study investigator (KB) at the beginning of class. All those attending class indicated an interest in participating in the study and reviewed and signed the consent form. Participants completed the pre-training questionnaire, then watched the training video. One section of the course also received the training booklet. Participants who completed the pre-training questionnaire and participated in the training were asked to complete a post-survey in class two weeks after the pre-survey. Only participants who watched the video were included in the study (i.e., class latecomers did not participate).

2.5. Statistical analyses

For each participant, the number of correct responses across the survey (total score) and for each of the question categories was calculated for the pre- and post-training questionnaires. Percent accuracy for each participant was calculated based on the total number of questions completed; unanswered items were considered to reflect accidental omissions. Seven questions asked participants to "select the options that apply"; points were given if participants selected the correct option or if incorrect options were not selected; when no options were selected, all options were scored as incorrect and were included in the total number of questions completed. Paired sample t-tests were used to delineate whether the proportion of correct responses for the total score and for each category improved after the training.

To evaluate whether pre-service teachers who read the booklet exhibited greater knowledge improvement relative to pre-service teachers who did not read the booklet, a 2 (time: pre vs. post) \times 2 (group: read the booklet vs. did not read the booklet) repeated measures ANOVA was conducted.

3. Results

3.1. Demographic

All participants who attended the class completed the pre-training questionnaire ($n = 90$). Attendance at the class in which the follow-up questionnaire was administered was lower than in the initial class, resulting in a lower number who completed both the pre- and post-training questionnaires ($n = 57$). Details of the participants are presented in Table 1. No differences were found in demographics or accuracy rates on the pre-training survey between those who did and did not complete the post-training survey (p values ranged from 0.3 to 1.0).

3.2. Effectiveness of training

Accuracy scores pre- and post-training are provided in Table 2. The total accuracy score increased from 59% to 75% ($t(56) = -8.0$, $p < 0.001$) after training, and scores increased significantly for all aspects of the content. 75% of participants rated the training video as *adequate* or *excellent*, 23% as *somewhat adequate*, and 2% as *not adequate*. Only 7% of pre-service teachers who viewed the training video read other information about epilepsy.

3.3. Self-reported improvement in epilepsy knowledge

Prior to training, 70% of participants reported having little or no knowledge about epilepsy. Following training, 63% of these individuals indicated they were now knowledgeable about epilepsy. Prior to training, 74% of pre-service teachers reported that they

Table 1
Demographic characteristics.

Age	
Mean (SD)	27.6 (5.0)
Range	24–48
Sex (N = 57)	
Female	68%
Male	32%
Ethnicity	
Caucasian	66.7%
Mixed (Two or more reported)	12.3%
Other*	21%
Program stream (N = 56)	
Primary/Junior	38.6%
Junior/Intermediate	14.0%
Intermediate/Senior	45.6%
Teaching speciality (N = 56)	
International Education	8.8%
Early Childhood Education	12.3%
Urban Education	19.3%
French (Elementary)	10.5%
French (Secondary)	1.8%
Advanced Studies in Psychology of Achievement, Inclusion & Mental Health	12.3%
Mathematics Through the Arts	10.5%
STEM Education**	22.8%
Prior experiences with epilepsy	
Support or taught a student with epilepsy	17.5%
Seen an epileptic seizure in real life	31.6%
A close friend or family has epilepsy	17.5%

* Includes the following ethnicities/cultural backgrounds: Chinese, South Asian, Latin America, Arab; SD = standard deviation.

** Science, Technology, Engineering, Math.

were not prepared to handle a seizure during class. After participating in the training, 79% of these same individuals indicated they felt prepared to handle a seizure. At the pre-test, when participants were asked to rate their training experience in first-aid management of seizures, 72% indicated they have not received sufficient training; post-intervention, 42% of these participants reported receiving sufficient training.

3.4. Effectiveness of tool kit booklet

Across the participants who completed the pre- and post-training questionnaires, 75% of participants were provided the

Table 2
Mean percent accuracy pre- and post-training.

	Pre-Training	Post-Training	Test Statistics	CI
Total Score				
Mean (SD)	59.2 (16.1)	74.6 (13.5)	$t(56) = -8.0, p < 0.001$	-19.2, -11.5
Range	0–86.1	19.4–94.4		-
Percentage of participants scoring above 50%	71.9%	94.7%		-
Epilepsy and Seizures				
Mean (SD)	53.5 (21.8)	71.8 (16.2)	$t(56) = -7.6, p < 0.001$	-23.0, -13.4
Range	0–94.1	20.6–100.0		-
Percentage of participants scoring above 50%	59.6%	87.7%		-
Seizure Safety				
Mean (SD)	62.7 (17.5)	82.1 (15.9)	$t(56) = -6.7, p < 0.001$	-25.2, -13.6
Range	0–100.0	6.7–100.0		-
Percentage of participants scoring above 50%	89.5%	98.2%		-
Comorbidities				
Mean (SD)	65.2 (16.0)	73.7 (16.3)	$t(56) = -3.5, p = 0.001$	-13.5, -3.6
Range	0–91.3	17.4–95.7		-
Percentage of participants scoring above 50%	87.7%	93.0%		-

SD = standard deviation; CI = 95% confidence interval of the difference between pre- and post-training.

booklet; of these participants, 77% indicated that they had read the booklet. The 2 × 2 ANOVA indicated that improvement in the total score pre- to post-training was not significantly different between participants who read the tool kit booklet and participants who did not read the booklet [$F(1,55) = 0.3, p = 0.6$]. A significant main effect of time indicated that both groups showed improvements over time [$F(1, 55) = 62.3, p < 0.001$]. There was no main effect of group, indicating that the two groups did not differ on accuracy scores pre- or post-training [$F(1,55) = 2.0, p = 0.12$]. A similar pattern of results was found for each of the survey knowledge categories (Table 3).

4. Discussion

The current study aimed to determine whether a brief, cost-effective, and accessible training program enhances pre-service teachers' epilepsy knowledge. Specifically, a video and a paper-based booklet, components of the Educator Tool Kit for Epilepsy, were distributed to pre-service teachers; knowledge of epilepsy and seizure management was examined pre- and post-training. Pre-service teachers' knowledge about epilepsy, seizure management, and common comorbidities significantly improved following the intervention. These results support the utility of the brief training video from the Educator Tool Kit for Epilepsy to enhance epilepsy knowledge in teachers.

Poor epilepsy knowledge in teachers can lead to negative attitude and stigmatization toward students with epilepsy [16], unsupported cognitive and psychosocial issues [2] as well as unsafe management of seizure events [14]. Limited epilepsy knowledge may leave the student's academic and social-emotional needs unrecognized and unsupported at school, may impact the child's psychosocial functioning and social integration with peers, and may lead to unnecessary usage of medical services. These potential consequences highlight the critical need for teachers to be informed about epilepsy to support the academic, psychosocial functioning, and safety of CWE.

4.1. Knowledge of epilepsy pre-training

Our results showed that prior to the training program, pre-service teachers exhibited limited knowledge about epilepsy (in the total score and across categories), scoring on average 62% on the pre-questionnaire; total scores ranged from 0% to 86%, with nearly 30% of pre-service teachers scoring below 50%. These results

Table 3

Effectiveness of tool kit booklet. Comparison of performance for those who did and did not read the booklet after viewing the video.

	N	Mean accuracy (%)	SD
Total Score			
<i>Pre-training</i>			
Read*	33	61.7	13.0
Did not read	24	55.7	19.3
<i>Post-training</i>			
Read	33	76.2	11.2
Did not read	24	72.3	16.2
Epilepsy & Seizure			
<i>Pre-training</i>			
Read*	33	57.8	18.8
Did not read	24	47.7	24.6
<i>Post-training</i>			
Read	33	74.1	12.8
Did not read	24	68.6	19.8
Seizure Safety			
<i>Pre-training</i>			
Read*	33	61.6	14.1
Did not read	23	64.2	21.5
<i>Post-training</i>			
Read	33	82.0	14.1
Did not read	24	82.2	18.4
Comorbidities			
<i>Pre-training</i>			
Read*	33	67.5	12.3
Did not read	23	62.0	19.9
<i>Post-training</i>			
Read	33	75.5	15.3
Did not read	24	71.4	17.7

* Represents the cohort that reported reviewing the booklet post-training.

are consistent with prior work, showing poor epilepsy knowledge among teachers [9]. Similar to the current study's finding, Eze, Ebuehi, Brigo, Otte, and Igwe [11] reported that approximately one third of teachers did not correctly identify that seizures originate from the brain. Strikingly, Wodrich, Jarrar, Buchhalter, Levy, and Gay [10] found that less than 10% of teachers understood that CWE are at risk of attentional problems, depressive feelings, and learning difficulties. Similarly, in our cohort of pre-service teachers, prior to watching the video, 68% of participants indicated that there are no cognitive consequences associated with epilepsy. In terms of seizure management, Eze, Ebuehi, Brigo, Otte, and Igwe [11] and Dumeier, et al. [21] identified that approximately 40% of teachers reported that they would not know what to do if a student had a seizure, and 74% of our sample indicated on the pre-test that they did not know what to do if a student had a seizure. Collectively, these results exemplify that prior to educational interventions, teachers demonstrate limited understanding of epilepsy, including safe seizure management and the associated comorbidities.

4.2. Effectiveness of training

Two weeks after the administration of the training program, we found that pre-service teachers demonstrated improvements in knowledge, evidenced by higher accuracy total score in the post-questionnaire relative to the pre-questionnaire. Specifically, 95% of pre-service teachers ($n = 55$) scored above 50% in the post-questionnaire, relative to 72% in the pre-questionnaire. Improved knowledge was also evident for each of the knowledge categories. Furthermore, pre-service teachers reported greater self-reported knowledge about epilepsy and greater preparedness to handle a seizure in the classroom. These results are consistent with previous studies demonstrating that educational interventions improve teachers' attitude of CWE [19], general knowledge of epilepsy

[11,22], symptoms associated with seizures [17], and seizure management [11,18,22].

Past studies aiming to improve teachers' knowledge included interventions using an instructor-led presentation/workshops ranging from 40 min to 120 min [11,17,19,20]. In comparison, based on feedback from a working group of educators requesting brevity, the current study utilized a 10.5-min video and a paper-based booklet, offering a cost-effective, self-paced, and time-sensitive training program for teachers. In fact, the brief video was sufficient to increase knowledge significantly, as those who additionally read the booklet did not show advantages in knowledge acquisition. The goal of this brief intervention was to increase accessibility, willingness to participate in the training, and knowledge and support for the co-occurring cognitive and psychosocial issues associated with epilepsy. The results of the current study suggest that a brief training program can enhance teachers' knowledge of epilepsy/seizures, seizure safety, and the common comorbidities associated with epilepsy. It would be worthwhile to conduct further research to determine whether the increased knowledge translates into better classroom experiences for CWE.

4.3. Limitations

In considering the above findings, some limitations should be acknowledged. First, participants consisted of a cohort of pre-service teachers from a single university, and the findings may not be generalizable to other populations. However, the participants spanned a fairly large age range, and were studying different specialties within the education stream. Furthermore, the results are consistent with a recent systematic review reporting that teachers exhibit limited knowledge about epilepsy and seizure management, and that knowledge can be improved by educational interventions [9]. Second, the current study did not include a control group of participants who did not receive the training intervention, which will be an important addition in subsequent studies. Third, approximately thirty pre-service teachers did not attend class the day the post-questionnaire was administered, and thus were lost to follow-up. Notably, participants were unaware of when the post-questionnaires were going to be administered, and thus these participants are not considered to have withdrawn from the study. Those who completed both phases of the study did not differ from those who completed only the first phase with respect to demographic variables or pre-test accuracy, suggesting our final sample was not biased. Soon after the post-questionnaires were administered, the COVID-19 pandemic began, and in-person classes at the university were cancelled; thus, we were unable to re-visit the class and follow-up with these participants, and furthermore we were unable to evaluate longerterm effects of the intervention on epilepsy knowledge. Previous intervention studies have used a range of follow-up periods spanning from immediately after [20], to 12 months [17] after the intervention and have shown effectiveness in improving teachers' knowledge. Future studies should address the longer lasting effects of the video. Lastly, the pre- and post-training questionnaires predominantly examined knowledge of epilepsy/seizures with fewer questions focusing on teachers' knowledge of seizure safety or comorbidities of epilepsy. As a result, we were unable to compare teachers' knowledge across the different categories.

4.4. Conclusion

Comprehensive knowledge about epilepsy, seizure safety, co-occurring cognitive and psychosocial issues, as well as offering strategies to support students has the potential to improve children's academic and social success in school. Although prior and current research demonstrates that teachers exhibit limited

knowledge about epilepsy and seizure first aid, the importance of the current study is that improvements are found after only a very brief training intervention. This video provides a cost-effective and accessible training intervention that can enhance teachers' knowledge about epilepsy and its comorbidities and their preparedness to handle a seizure in the classroom.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.yebeh.2021.107963>.

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