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Knowledge, attitudes and practice towards epilepsy among medical staff in Southern China: Does the level of hospitals make a difference?

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ABSTRACT

Purpose: To assess knowledge, attitudes, and practice (KAP) toward epilepsy among medical staff from different levels of hospitals in Southern China.

Method: An adapted and structured questionnaire was administered to medical personnel from tertiary (n = 451) and basic-level (n = 448) hospitals in Southern China. The questionnaire comprised of three domains which consisted of 6 items for awareness, 12 items for knowledge and a 14 item scale for attitudes.

Results: Almost 40% of medical staff in basic-level hospitals held that epilepsy could be caused by evil spirits/eyes, or transmitted from other patients, which was almost 6 times higher than that of tertiary hospitals. The mean score from general knowledge about epilepsy was higher among medical staff in tertiary hospitals than in basic-level hospitals. The mean scores in the general and personal domain of the Chinese Public Attitudes Toward Epilepsy (CPATE) scale were both significantly lower among medical staff in tertiary hospitals, when compared to those of basic-level hospitals.

Conclusions: The overall KAP from medical staff in response to seizures, was found to be better in tertiary hospitals than those of basic-level hospitals in Southern China, which was associated with the education level and impact of traditional culture. To date, there is a need for effective public intervention programs in China to improve the awareness of epilepsy and reduce discrimination among medical workers, especially for those working in basic-level hospitals in rural regions, to finally promote a better living environment for patients with epilepsy in China.

1. Introduction

People with epilepsy and their families suffer from severe stigma and discrimination in China, mostly because of traditional and superstitious views [1–3]. Such cultural misconceptions are considered to be a greater handicap to people with epilepsy than disability from repetitive seizures or antiepileptic drug side effects [4,5], contributing to tremendous psychological, economic, and social burdens [6–8]. Worse more, such stigmatizing attitudes are not just prevalent among the general population, but also exist in health-care personnel even though they have received medical education or training and are supposed to be relatively objective toward epilepsy [9–12].

As there are about 9 million people with epilepsy in China and 63% are untreated or not properly treated [13–15], the prevalent stigmatizing attitudes among medical staff may have more serious consequences in diagnostic overshadowing [16,17] and following long-term management for patients with epilepsy [17–22]. Some people hesitate to seek medical advice related to epilepsy because of such stigma [23], resulting in a decrease in the average life expectancy of patients with epilepsy [2,8,24]. Therefore, it is imperative to evaluate the current situation of stigmatization toward epilepsy among key stakeholder groups in order to deliver more specialized and effective medical care to people with epilepsy.

Previous studies have confirmed that residence, education level, individual monthly income, or other demographic characteristics would affect people's attitudes and knowledge toward chronic diseases [23,25–29]. Therefore, discrepancies in performance toward epilepsy may exist among medical workers from different level of hospitals according to regional and cultural differences, but only a few of these related studies were done in China [10].

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In this study, taking hospital hierarchy into consideration, we compared awareness and attitudes toward epilepsy among staff from different levels of hospitals in Southern China for the first time, with the aim to better establish and improve the design and focus of prospective stigma reduction interventions among health workers in the context of Chinese primary health care reform.

2. Materials and methods

2.1. Development of the questionnaire

The modified questionnaire, derived from international surveys to assess knowledge and attitudes toward epilepsy [10,30–32], was translated into Chinese and then back translated to make sure the translation was accurate by professional teams. A pilot study including 10 Chinese speaking adults was conducted in each center to minimize any misunderstanding or inappropriate wording of the items before the start of the study. Assessment of the inter-rater reliability of the resultant questionnaire was carried out and only minor modifications were needed, confirming the translated version was both content and construct validated and could be applied in Mainland China.

The questionnaire was composed of four blocks as follows: Demographic and clinical characteristics of medical staff, Awareness related to epilepsy, Knowledge related to epilepsy including general knowledge and first-aid measures for acute seizures, and Attitudes toward people with epilepsy.

The first section collected demographic data including gender, age, residence, occupation, specialty, title (Resident: Under training, no qualified independent practice; Attending Physician: Completed training, independent practice; Professor: Completed training, independent practice for more than 10 years with high level), educational level, and whether they witnessed an epileptic seizure or not, which was proved to impact knowledge and attitudes toward epilepsy among the population.Awareness about epilepsy was assessed by 6 questions, consisting of 2 single choice and 4 multiple-choice questions. The first 5 questions were identical to those used in a previous Gallup Poll of public awareness toward epilepsy [31]. The last question was modified from a similar survey conducted in South Korea to explore the comparative ratings of epilepsy among 6 other chronic conditions [30]. In traditional Chinese medicine, people believe that a doctor of herbal medicine, acupuncture, or prayers could treat epilepsy. Therefore, we added these options to choices of 'How do you think epilepsy should be treated?' in Table 2. The frequencies and percentages of each selection were calculated. Odds Ratios (OR) were shown for comparisons between the medical staff of tertiary hospitals and of basic-level hospitals.

We used the following part to quantify the level of awareness related to epilepsy, which was modified from a similar survey that was previously used to assess hospital staff's knowledge of seizures in Henan, China [10]. General knowledge of epilepsy was assessed using 5 true or false items, each of which required a simple yes/no response. Participants scored one for each item which they answered correctly, and their overall score was the sum of their right responses, ranging from 0 to 5. Higher scores indicated a better knowledge of epilepsy. Also, we were particularly interested in whether medical staff were able to take correct measures when a seizure occurred. A total of 6 questions inquired whether first-aid measures were helpful or not, and were answered by 'Yes', 'No', or 'I don't know'. In traditional Chinese medicine, people believe that pressing the philtrum (the median sulcus between the upper lip and nose) and the 'Hukou' (between the thumb and index finger) could awaken patients from a coma. Therefore, we included 'pressing the philtrum and Hukou' as an option that 'should not be done'. Based on the medical staff's score percentiles, the results were categorized as very low for the 20 percentile or less, low 21–40, moderate 41–60 high 61–80, and very high for more than 81.

The Chinese Public Attitudes Toward Epilepsy (CPATE) scale was used to evaluate attitudes toward epilepsy [32], including general domain (Item 1–9) and personal domain (Item 10–14). On the basis of social aspects of life, the items were further subcategorized into education (items 1, 8, and 9), social connection (items 3, 4, 5, and 7), marital relations (items 6, 10, 11, and 13), and employment (items 12 and 14). Each item was scored using a five-point Likert's scale, with 1 being 'strongly disagree' and 5 being 'strongly agree'. The higher the score, the more negative the response reflected toward epilepsy.

Table 1
Demographic characterists of the study population.

c	Tertiary Hospital n (%)	Bascic-level Hosptial n (%)	p-value†
N	451 (50.2)	448 (49.8)	
Gender			
Male	150 (31.5)	157 (35.0)	0.575
Female	301 (68.5)	291 (65.0)	
Age (years old)			
18-25	154 (34.1)	144 (32.1)	0.550
26-35	212 (47.0)	206 (46.0)	
36-45	75 (16.6)	82 (18.3)	
≥46	10 (2.2)	16 (3.6)	
Residence			
Urban	311 (69.0)	228 (50.9)	**< 0.01**
Rural	140 (31.0)	220 (49.1)	
Occupation			
Doctor	228 (50.6)	252 (56.2)	0.095
Nurse	223 (49.4)	196 (43.8)	
Speciaty			
Neurological	170 (37.7)	184 (41.1)	0.307
Non-neurological	281 (62.3)	264 (58.9)	
Title			
Resident	354 (78.5)	378 (84.4)	0.074
Attending physician	79 (17.5)	56 (12.5)	
Professor	18 (4.0)	14 (3.1)	
Education level			
Technical secondary or below	1 (0.2)	77 (17.2)	**< 0.01**
Junior college	62 (13.7)	201 (44.9)	
Undergraduate or above	388 (86.1)	170 (37.9)	
Witness an epileptic seizure			
Yes	236 (52.3)	232 (51.8)	0.894
No	215 (47.7)	216 (48.2)	

† Statistical significance ($p < 0.05$) is indicated in bold.

2.2. The study design and the sample

The study was conducted from September 2017 to April 2018. Medical staff were classified into two groups on account of the level of hospitals they worked in based on the Hospital Classification Standards in China.

General hospitals in China are categorized into three levels: Level I hospitals have to provide the basic outpatient services in small or midsized towns, Level II hospitals should obtain hospital care with supra-regional supply in diagnostics and therapies, and Level III hospitals provide the maximum range of medical knowledge and technical infrastructure in diagnostics and treatment of almost all diseases. In this study, we consider Level I and II hospitals as basic-level hospitals and Level III hospitals as tertiary hospitals.

Group A: Medical staff in tertiary hospitals. These three hospitals selected by our study were regional medical centers, covering nearly half of the patients with epilepsy, which represented 3 large geographical and socioeconomical parts of the capital. Group B: In order to get a representative view of medical personnel from multitudinous parts, 3–4 hospitals were randomly selected in each of all four regions (Center, North, Southwest and Southeast) in basic-level areas. Of the 14 invited hospitals, 8 different basic-level hospitals agreed to participate, which were usually located in rural or remote mountainous areas. A total of 448 samples were obtained, using the same questionnaire.

In addition to the willingness to participate in the research, the

Table 2
Percentage of answers to questions compromising familiarity with epilepsy.

Question	Frequency of YES answer (%) Tertiary Hospital (451)	Basic-level Hospital (448)	OR[†]
Have you ever heard of a disease called epilepsy?			
Yes **	446 (98.9)	431 (96.2)	**3.52**
No **	5 (1.1)	17 (3.8)	**0.28**
Do you think that the cause of epilepsy is? [‡]			
Hereditary ***	245 (54.3)	161 (35.9)	2.13
Evil spirits/Evil eyes ***	26 (5.8)	122 (27.2)	**0.16**
Depression and anxiety	59 (13.1)	58 (12.9)	1.01
Fever ***	267 (59.2)	346 (77.2)	0.43
Infection from a person with epilepsy ***	38 (8.4)	212 (47.3)	**0.10**
Others *	63 (14.0)	40 (8.9)	1.66
I don't know ***	15 (3.3)	52 (11.6)	**0.26**
What are the symptoms of epilepsy? [‡]			
Convulsions of the body *	410 (90.9)	385 (85.9)	1.64
Loss of Consciousness ***	329 (72.9)	273 (60.9)	1.73
Twitching of facial muscles ***	176 (39.2)	78 (17.4)	**3.03**
Uncontrolled shouting (cry)	61 (13.5)	58 (12.9)	1.05
I don't know **	15 (3.3)	39 (8.7)	0.36
How do you think epilepsy should be treated? [‡]			
Ask for a medical doctor ***	423 (93.8)	381 (85.0)	2.66
Go to drugstore	7 (1.6)	10 (2.2)	0.69
Herbal medicine doctor/ Acupuncture ***	56 (12.4)	251 (56.0)	**0.11**
Surgery ***	180 (39.9)	124 (27.7)	1.74
Prayers ***	29 (6.4)	108 (24.1)	**0.22**
Don't know what to recommend ***	15 (3.3)	63 (14.1)	**0.21**
Do you consider epilepsy as a treatable illness?			
Yes ***	313 (69.4)	169 (37.7)	**3.74**
No ***	119 (26.4)	193 (43.1)	0.47
I have no idea ***	19 (4.2)	86 (19.2)	**0.19**
Do you think the severity of epilepsy like? [‡]			
AIDS ***	18 (4.0)	146 (32.6)	**0.09**
Cancer **	26 (5.8)	48 (10.7)	0.51
Mental disease ***	127 (28.2)	184 (41.1)	0.56
Stroke ***	145 (32.2)	229 (51.1)	0.45
Diabetes mellitus **	312 (69.2)	349 (77.9)	0.64
Hypertension ***	336 (75.0)	386 (86.2)	0.47

[†] OR: odds ratio [(Tertiary Hospital confirmed/Tertiary Hospital not confirmed)/(Basic-level Hospital confirmed/Basic-level Hospital not confirmed)] OR > 3 or OR < 1/3 is indicated in bold.
[‡] Multiple responses possible.
* p-value is < 0.05 /.
** p-value is < 0.01 /.
*** p-value is < 0.001.

inclusion criteria for doctors and nurses with different specialties in hospitals was to be actively practicing at least a 6-month work experience. Known cases of epilepsy and members of their families were excluded. The interviewers were either one of the current authors or a limited number of professional investigators. We illustrated the aim of the study and guaranteed anonymity before distributing the questionnaire. Respondents were asked to fill in the questionnaire independently. Interviewers were instructed to ensure that each item was filled in and to go through the whole omnibus after an interview was finished.

2.3. Statistical analysis

Data were expressed as the means and SDs in the case of normally distributed data. Pearson's or Spearman's correlation tests were conducted to determine the correlations between variables. Multivariate analysis was performed in order to identify whether the level of hospitals was independently related to attitudes toward epilepsy. The dependent variables were the scores on the general and personal domains of CPATE. The independent variables were the categorical variables for the medical groups, including tertiary and basic-level hospitals. Confounding variables included in the analyses were demographic characteristics and scores in knowledge of epilepsy of medical staff. Data were analyzed using Statistical Package for Social Sciences version 19 (SPSS 19.0).

2.4. Ethics

All participants signed an informed consent document as required by the institutional ethics committee. This study was approved by the ethics committees of the Xiangya Hospital of Central South University.

3. Results

3.1. Demographic data of samples

A total of 484 medical staff in Group A were approached and 33 (6.8%) refused to be interviewed, with 451 (93.2%) agreeing to participate in the survey. A total of 478 individuals in Group B were approached. Out of these, 30 (6.3%) refused and 448 (93.7%) agreed to be interviewed. A lack of time was most frequently mentioned as a reason for refusal in both of the two groups. There were some significant differences on several characteristics; more medical staff in tertiary hospitals lived in an urban area and held a higher education level, as compared to that of staff in basic-level hospitals. Other socio-demographic characteristics among the two groups are presented in Table 1.

3.2. Awareness about epilepsy

Regarding the etiology of epilepsy, a total of 27.2% and 47.3% of medical staff in basic-level hospitals related the disease to evil spirits/eyes (OR: 0.16, $p < 0.001$) and transmission from other patients with epilepsy (OR: 0.10, $p < 0.001$), respectively, which was much higher than that of the tertiary hospitals (5.8% and 8.4%, respectively). The view that epilepsy can be treated was held by 69.4% in Group A and 37.7% in Group B. As for treatment of epilepsy, licensed medical facilities were recommended by 89.9% of the whole medical groups (93.8% of Group A and 85% of Group B). However, asking for help from prayers as a treatment option was selected by only 29 (6.4%) of Group A and by quadruple the number (24.1%) of Group B (OR: 0.22, $p < 0.001$). Going to a drugstore directly was the last choice for both of the two groups. We also studied the comparative ratings of epilepsy among 6 other chronic conditions, which showed that epilepsy was thought to be more severe by medical staff in basic-level hospitals than in tertiary hospitals. Particularly, epilepsy was rated as a disease like AIDS in 32.6% of Group B, while only 4.0% of Group A agreed with it (OR: 0.09, $p < 0.001$) (Table 2).

3.3. Knowledge of epilepsy

The mean (SD) score for general knowledge about epilepsy was 3.99 ± 0.55 among medical staff in tertiary hospitals, which was significantly higher than the 3.00 ± 0.77 of basic-level hospitals. Around 45% of Group B believed that epilepsy was a kind of mental disorder, whereas 75.8% of medical staff in tertiary hospitals disagreed with this statement. The correct answer regarding the manifestation of seizures was given by almost 400 respondents (90%) in tertiary hospitals, in contrast to 84% of basic-level hospitals. The biggest difference among the two groups (88.9% vs. 49.3%) was whether epilepsy could be transmitted. Regarding reasonable treatment, 53.9% and 26.3% of the two groups, respectively, responded correctly that seizures could be

Table 3
Items of general knowledge related to epilepsy in different levels of hospitals.

General Knowledge of epilepsy section items	Correct Answer (%)	
	Tertiary Hospital (451)	Basic-level Hospital (448)
Epilepsy is a kind of mental disorder (F).	342 (75.8)	248 (55.4)
Seizures include several types, that is shaking, stiffening and staring (T).	420 (93.8)	379 (84.6)
Duration of seizures last about 2-3 min (T).	395 (87.6)	376 (83.9)
Epilepsy can be transmitted (F).	401 (88.9)	221 (49.3)
Taking medications regularly would make some people with epilepsy free from seizures (T).	243 (53.9)	118 (26.3)

well controlled by standardized drug treatment (Table 3).

Items regarding first-aid knowledge about seizures and correct answer rate are shown in Fig. 1. The overall mean for this was 49.6% and 37.5% in the two groups, respectively. Almost 95% of medical staff knew how to avoid injury and accidents to the patients at the time of a seizure. In addition, almost three-fourths of the medical staff in basic-level hospitals chose to open the patients' mouth to put something between their jaws, and press philtrum and "Hukou" to waken them. Half of the medical staff in Group B insisted on restraining the patient at the onset of a seizure, while only 22.4% in Group A would take the same measure.

3.4. Attitudes toward epilepsy

The attitudes toward epilepsy of Group A were much more positive than those of Group B, in both general (2.09 ± 0.71 vs. 2.83 ± 0.77, respectively, $p < 0.001$) and personal (2.81 ± 0.84 vs. 3.23 ± 0.79, respectively, $p < 0.01$) domains. We also compared responses to each item of the CPATE scale among the two groups (Table 4). Interestingly, there were significant differences between the two groups with regard to item 9 and item 11. Further sub-analysis about social aspects of life showed that the attitudes of medical staff in tertiary hospitals were significantly better than those in basic-level hospitals toward marriage, employment, education, and social life **(Figure S1)**.

3.5. Factors related to parental knowledge and attitudes

Knowledge of epilepsy and levels of hospitals were identified as independent factors in both the general and personal domains of the CPATE scale, while lower age and non-neurological occupation were independently associated with only the general domain of the scale. These models for general and personal domains of the CPATE scale explained 84.6% and 60.4% of the total variance, respectively.

Additionally, we focused specifically on the items with the biggest differences between the different levels of hospitals. Results of correlation analysis showed medical staff who considered 'Epilepsy is caused by Evil spirits/Evil eyes' (Pearson correlation coefficient $r = 0.942$, $p < 0.01$) possessed more negative attitudes than those who answered correctly, along with 'Epilepsy is a kind of mental disorder' (Pearson correlation coefficient $r = 0.976$, $p < 0.01$) and 'Epilepsy can be

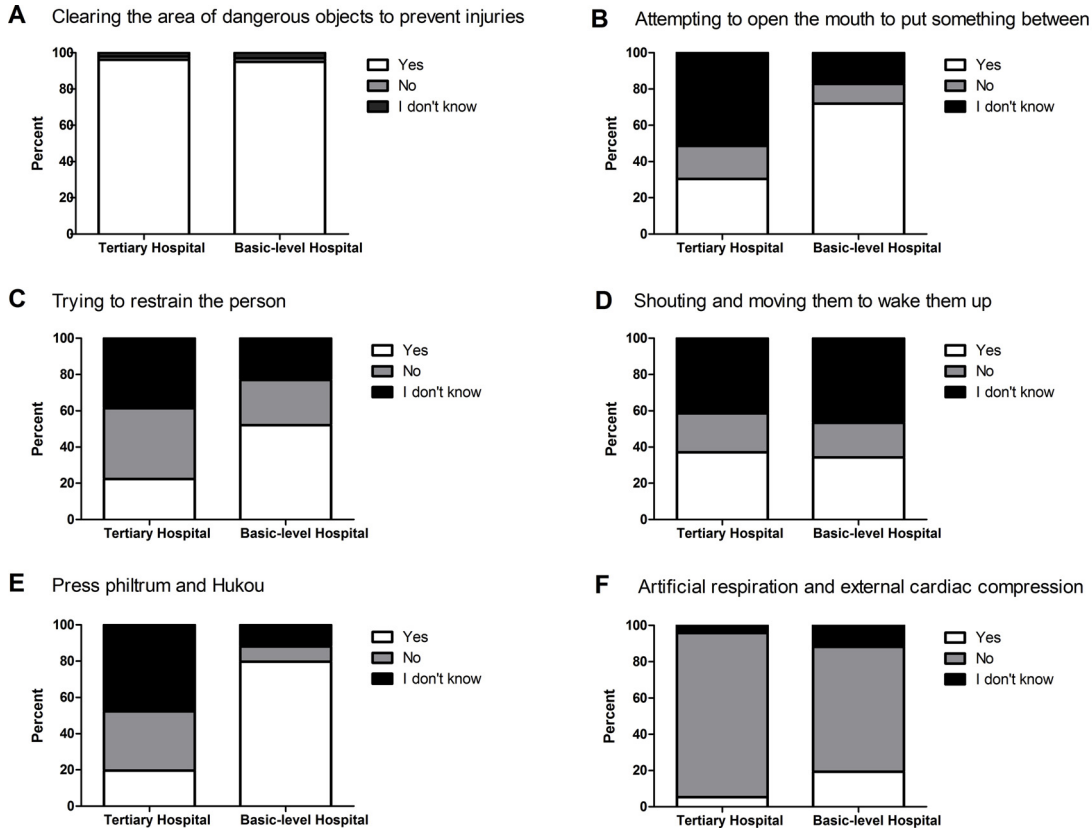

Fig. 1. First-aid measures that were considered possible to help in case of an epileptic seizure by medical staff.
(A) Clearing the area of dangerous objects to prevent injuries.
(B) Attempting to open the mouth to put something between jaws.
(C) Trying to restrain the person.
(D) Shouting and moving them to wake them up.
(E) Press philtrum and Hukou.
(F) Artificial respiration and external cardiac compression.

Table 4
The means and standard deviations of the scores in each domain and item, In different levels of hospitals.

ID	Item	Mean ± SD	
		Tertiary Hospital (451)	Basic-level Hospital (448)
	General Domain	2.09 ± 0.71	2.83 ± 0.77***
1	People with epilepsy should not study in college or university.	1.73 ± 0.73	2.84 ± 0.83***
2	People with epilepsy have the same rights as all people.[r]	1.67 ± 0.74	2.34 ± 0.62***
3	People with epilepsy should be isolated from others.	1.64 ± 0.69	2.62 ± 0.72***
4	People with epilepsy should notparticipate in social activities.	1.70 ± 0.66	2.53 ± 0.77***
5	I will not mind being seen in the company with someone known to have epilepsy.[r]	1.91 ± 0.87	2.85 ± 0.74***
6	People with epilepsy should not marry.	2.94 ± 0.80	3.48 ± 0.79**
7	I would stay away from a friend if I knew she/he had epilepsy.	1.70 ± 0.64	2.71 ± 0.64***
8	People with epilepsy should study in a special school.	2.67 ± 0.99	3.05 ± 0.58**
9	Schools should not place childrenwith epilepsy in regular classrooms.	2.81 ± 0.86	3.05 ± 0.61
Personal Domain		2.81 ± 0.84	3.23 ± 0.79**
10	I would date someone even thoughhe/she has epilepsy.[r]	2.85 ± 0.96	3.46 ± 0.71 ***
11	I would marry someone with epilepsy,even though he/she has epilepsy.[r]	3.62 ± 0.97	3.70 ± 0.78
12	I feel uncomfortable working with someone who has epilepsy.	1.93 ± 0.68	2.71 ± 0.65***
13	I will advise my family members against marrying someone with epilepsy.	3.08 ± 0.99	3.36 ± 0.62**
14	If I am an employe, I would give equal employment opportunities to someone with epilepsy.[r]	2.38 ± 0.92	2.94 ± 0.73***
General Average		2.35 ± 0.79	2.97 ± 0.80***

*p-value is < 0.05 /, **p-value is < 0.01 /, ***p-value is < 0.001. (mark of statistical significance is indicated in higher score).
[r] These items were reversely scored.

Table 5
Linear regression analyses showing the association of medical staff with attitudes toward epilepsy.

Variable		PATE-G scale		PATE-P scale	
		β	p value	β	p value
Age		−0.038	0.004	0.002	0.931
Knowledge of epilepsy		−0.749	0.000	−0.837	0.000
Occupation	Neurological	Reference		——	
	Non-neurological	0.034	0.010		
Levels of hospital	Basic-level	Reference		Reference	
	Tertiary	−0.240	0.000	−0.107	0.000

PATE-G, general domain of the Public Attitudes Toward Epilepsy scale.
PATE-P, personal domain of the Public Attitudes Toward Epilepsy scale.

transmitted' (Pearson correlation coefficient $r = 0.869$, $p < 0.01$). However, there were no significant differences on attitudes between the staff who believed 'Herbal medicine doctor/Acupuncture' or not (Pearson correlation coefficient $r = 0.453$, $p > 0.05$). General knowledge was found to be correlated with age ($\beta = 0.010$, $p = 0.039$), title ($\beta = 0.411$, $p < 0.001$), education level ($\beta = 0.740$, $p < 0.001$), and whether the medical staff had been witness to an epileptic seizure or not ($\beta = 0.161$, $p = 0.002$). The results of the multiple linear regression explained 20.0% of the variance (Table 5).

4. Discussion

This was one of the first hospital-based attempts to obtain an initial estimate of Chinese public awareness and attitudes toward epilepsy. Especially, what has never been studied to our knowledge, was whether the level of hospitals exerted an impact on how the medical staff viewed patients with epilepsy or not, and our study tried to excavate internal and external influencing factors.

Hospital staff in tertiary hospitals were found to possess a much higher level of awareness and general knowledge regarding epilepsy than the ones in basic-level hospitals. The majority of medical practitioners, both in tertiary and basic-level hospitals, had a preliminary recognition of epilepsy and could recognize its clinical symptoms when a seizure occurred. However, misconceptions about the cause of epilepsy and corresponding treatment were still prevalent and were especially worse in basic-level hospitals. Almost 40% of the medical staff in basic-level hospitals held that epilepsy could be caused by evil spirits/evil eyes or transmitted from other patients, and only 37.7% of them considered epilepsy to be a treatable illness. Surprisingly, medical staff both in basic-level and tertiary hospitals were not aware of the importance of standard medication in epilepsy. Such defective knowledge toward epilepsy among health workers in China may drive the development of some non-standard therapies, as more than one fourth of the staff in basic-level hospitals believed that 'asking prayers for help' would be helpful for disease control, which was a common traditional view in rural China [33].

Our regression analysis indicated that respondents with a higher level of education presented a better knowledge of epilepsy, which was consistent with previous studies [34,35]. Urban–rural integration, which has been implemented for several decades in China, seems to take steps to promote the level of education in professional teams in the basic-level medical system, but this is still lagging behind when compared to high-ranking hospitals [36]. Interestingly, we noticed that medical staff with experience of witnessing a seizure were likely to have a better awareness of epilepsy, but the reasons for that are still unknown.

Occurrence of a seizure is unpredictable and lethal in some cases, thus the first-aid knowledge becomes more important among medical staff. Our results showed that medical workers from tertiary hospitals and basic-level hospitals demonstrated moderate and low levels of first-aid knowledge for seizures, respectively. This result was especially frustrating when compared to other medical staff's performance in some developed countries. We speculate the reason for the low awareness of first-aid knowledge among medical staff in China is the lack of specialized clinical training [37]. To avoid SUDEP (Sudden Unexpected Death in Epilepsy) or seizure-related injury and accident, seizure recognition and emergency treatments for epilepsy are particularly crucial in hospitals. More lectures and educational sessions should be launched to improve the first-aid knowledge of seizures in hospitals to avoid nonsense actions such as 'shout and moving epileptics' to 'wake them up'.

Our analysis demonstrated that medical staff in higher levels of hospitals had more positive attitudes toward epilepsy than those of lower level hospitals, even after controlling factors including age, occupation, and scores in knowledge of epilepsy. Moreover, some other factors such as hospital location should be included in the considerations when analyzed. In rural areas, staff in basic-level hospitals were more susceptible to being affected by the traditional misconceptions, as

epilepsy has long been treated as 'possession by evil spirits' or 'contagious disease', which is rooted in the traditional culture and severely misleads medical practice [38]. Considering cultural exposure or socioeconomic environment would have some effects on people's attitudes [39], it is well understood that medical staff in tertiary hospitals, settled in more diversified and international provincial capitals, may have a higher acceptance of the international norms of diagnosis and treatment of epilepsy, giving rise to a more positive attitude toward people with epilepsy. Medical staff from both tertiary and basic-level hospitals exhibited equally negative attitudes towards epilepsy in the marriage domain, which appeared to be deep rooted irrespective of the exposure to education and medical knowledge in Chinese society [40,41].

Being aware of the heavy burdens from discrimination to epilepsy, systematic managements and health education have been performed in China for years in patients, their families, and the public. This kind of health intervention by the government has greatly improved people's knowledge, attitudes, and practice (KAP) towards epilepsy [42], although it was still some way off meeting those in some Western or Asian countries [31,43–45]. For a better surrounding environment for patients with epilepsy, the stigma interventions should be expanded to medical staff that are considered the closest group with patients. Due to the direct role of medical staff in the long-term management of the disease and their feasible impact on the general populations' attitude, multi-faceted education programs or campaigns should be advanced among medical staff to improve their awareness towards epilepsy. Also, health-care administrative departments should enhance the training of first-aid measures for epilepsy in health workers to help assess disease risk and monitor emergency treatment. In addition, the stigma prevention programs should be carried out preferentially to residents with a lower education level in rural areas.

However, our study has some limitations. The associations between the variables described may not necessarily be causal in this cross-sectional study. Also, we only focused on Hunan Province in China, which is a good attempt but further research will need to be carried out to expand the region covering all ethnic groups. Despite these limitations, our work provides a basis for international comparisons of medical staff's awareness and attitudes toward epilepsy. Furthermore, it may have significant implications for key opinion leaders to implement educational interventions in medical fields to reduce the social stigma of epilepsy.

5. Conclusion

The overall awareness of epilepsy, attitudes toward epilepsy, and first-aid practice related to seizures among medical staff has been found to be better in tertiary hospitals than in basic-level hospitals in Southern China, which was associated with the education level and the impact of traditional culture. To date, there is a need for effective public intervention programs in China to improve the awareness of epilepsy and reduce discrimination among medical workers, especially those working in basic-level hospitals in rural regions to finally promote a better living environment for patients with epilepsy in China.

Conflicts of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethics approval

This study was approved by ethics committee of the Xiangya Hospital of Central South University. All data remained confidential, participants provided an informed consent before taking part in the study, and they were allowed to quit the study at any stage.

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Appendix A. Supplementary data

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