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Knowledge about the Management of Anti-Epileptic Drug Treatment among General Practitioners in Brazzaville, Congo

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Abstract

Background: Epilepsy is a chronic brain disorder. It often leads to disabilities and handicaps. In Africa, epilepsy is almost exclusively treated by general practitioners (GPs) because of a shortage of epilepsy specialists. It is therefore important to know the level of knowledge about epilepsy among GPs in order to improve their skills. **Objectives:** To assess the level of knowledge about the management of anti-epileptic drug treatment among GPs in Brazzaville; to investigate the relationship between demographic factors and GPs' knowledge. **Methods:** This was a cross-sectional analytical study. It was conducted from 20 July to 1 September 2021. It focused on GPs working in public hospitals and private care centers in Brazzaville. Information on treatment aspects was collected through a standardized 11-item questionnaire. **Results:** Among the 137 participants, there were 84 (61.3%) men and 53 (38.7%) women. Of these participants, 36 (26.3%) were trained in Congo *versus* 101 (73.7%) in other countries. Only 21 (15.3%) GPs had good knowledge about the management of anti-epileptic drug treatment. The overall average knowledge score among GPs was low (31.4%). No significant associations were found between low and good levels of knowledge and gender (OR = 1.03; 95% CI = 0.40 - 2.68; p = 1.000), age groups (OR < 1; 95% CI = 0.08 - 1.02; p > 0.05), training country (OR = 0.62; 95% CI = 0.19 - 1.98; p = 0.591), practice hospital (OR = 0.40; 95% CI = 0.05 - 3.20; p = 0.695) and duration of professional experience (OR < 1; 95% CI = 0.04 - 2.82; p > 0.05). **Conclusion:** The study population has insufficient knowledge about the management of anti-epileptic drug treatment. Demographic factors have no impact on GPs' knowledge. Epilepsy education programs are needed to improve GPs' know-

ledge and skills.

Keywords

Epilepsy, Drug Treatment, General Practitioners, Knowledge, Brazzaville

1. Introduction

Epilepsy is a chronic brain disorder characterized by the occurrence of at least one spontaneous epileptic seizure [1]. Epileptic seizures result from the initial electrical hyperactivity of a network of cortical or cortico-subcortical neurons, which may later spread to part or all of the brain [2].

Epilepsy often leads to communication, learning, locomotor, situational and other visible or invisible disabilities, and orientation and social integration handicaps [1] [3] [4] [5].

The causes of epilepsy are multifactorial. These causes include immune, genetic and metabolic factors, brain tumor, fetal brain injury during pregnancy, traumatic brain injury, birth trauma, stroke, degenerative brain disorder, central nervous system infections, alcohol or drug abuse, and unknown factors [6]-[11].

Epilepsy affects all people, whatever the gender [12] [13] [14] [15]. It occurs in all ages; however, it affects children and the elderly more [13] [16] [17] [18] [19] [20]. It is common throughout the world. Its incidence and frequency are higher in low- and middle-income countries than in developed countries [21] [22] [23].

The management of patients with epilepsy is an important problem for general practitioners (GPs) working in low- and middle-income countries. Indeed, in their clinical practice, they are often confronted with: psychosocial and environmental factors; limited material resources for diagnosis (video-electroencephalography, magnetic resonance imaging, CT scan, positron emission tomography, single photon emission computed tomography), sometimes leading to an erroneous initial diagnosis or the administration of inappropriate treatment; problem of therapeutic deficit due to high cost of treatment, limited choice and supply of anti-epileptic drugs, erratic supply of anti-epileptic drugs [24] [25] [26] [27] [28].

If in developed countries with a high number of neurologists and epilepsy specialists, good clinical practice guidelines have been developed to increase the number of physicians to effectively manage patients with epilepsy [4] [29] [30], and specialized epilepsy institutions have been built to provide comprehensive care for patients with epileptic seizures that are difficult to control and unresponsive to conventional drug treatment [4] [31] [32] [33], this is not the case in almost all low-income countries.

In low-income countries, patients with epilepsy are usually managed by GPs because there is a shortage of neurologists and epilepsy specialists [24] [25] [27].

In Congo, there are currently 16 neurologists working in public hospitals and private care centers for a population of about 5 million inhabitants, *i.e.* 1 neu-

rologist for 312,500 inhabitants. This number shows that GPs play an important role in the management of patients with epilepsy. It is therefore important to know the level of knowledge of GPs because new anti-epileptic drugs are constantly being discovered, and they may not have information about new therapeutic strategies [34]-[41]. This study was undertaken to develop education programs to enhance GPs' knowledge and skills in the management of anti-epileptic drug treatment. The objectives of our study are: to assess the level of knowledge about the management of anti-epileptic drug treatment among GPs in Brazzaville; to investigate the relationship between demographic factors and GPs' knowledge.

2. Methods

This was an analytical cross-sectional study. It was carried out from 20 July to 1 September 2021. It focused on GPs working in public hospitals (n = 9) and private care centers (n = 10) in Brazzaville. Only private care centers registered by the Ministry of Health were taken into account.

Inclusion criteria were GPs: of any age; who gave consent to participate in the study; with the general medical diploma.

Non-inclusion criteria were GPs: working in neurology, psychiatry, neurosurgery and pediatrics; in training, regardless of specialty; who had not finished the interview.

The recruitment of GPs was exhaustive. Out of a total of 202 GPs, 22 (10.9%) had not consented to participate in the study. Of the 180 GPs who agreed to take part in the study, 137 (75.7%) fulfilled inclusion criteria.

The information was collected through a standardized questionnaire (See: appendix), which was developed on the basis of literature data [30] [42] [43] [44] [45]. The content of the questionnaire was validated by a research team at the Faculty of Health Sciences in Brazzaville. The questionnaire was first tested on a sample of 7 GPs to verify whether it was accurate and easy to understand. The study protocol was approved by the Ethics Committee of the Health Sciences Research.

Each GP was interviewed in an office allocated for the survey within his or her practice hospital in order to avoid any influence on the answers to the questions asked. He or she answered the questions without the help of the investigator. GPs working in several hospitals were interviewed only once.

The study questionnaire consisted of 2 parts. The first part dealt with the demographic factors, including gender, age, training country, duration of professional experience; type of practice hospital.

The second part dealt with the treatment aspects, including 11 questions corresponding to 11 items. These focused on referral of a patient with epilepsy to an epilepsy specialist for anti-epileptic drug treatment, initiation of antiepileptic treatment, criteria for choosing an antiepileptic drug, number of generations of antiepileptic drugs, indications for dual therapy, indications for triple therapy,

anti-epileptic drugs commonly used in low-income countries, clinical and para-clinical monitoring data for antiepileptic treatment, times for monitoring the effectiveness of anti-epileptic treatment, cessation of anti-epileptic treatment, and post-graduate epilepsy education programs.

The knowledge score of an item, expressed as a percentage and determined as described by Diatewa *et al.* [46], was presented as follows: score < 50% = low knowledge; score ranging from 50% to 69% = moderate knowledge; score ≥ 70% = good knowledge.

The data collected was analyzed using CS Pro 7.2 software. Statistical analyses were performed using SPSS 25 software. Qualitative and quantitative variables were expressed as percentages and mean ± standard deviation, respectively. The relationship between two factors was investigated by determining the Odds Ratio (OR) and the 95% confidence interval (CI). The significance level was set at $p < 0.05$.

3. Results

3.1. Demographic Aspects of the Study Population

Table 1 presents the demographic characteristics of the study population. Of the participants, 61.3% were males, 73.7% were trained in countries other than Congo, and 89.8% were employed in public hospitals. The average duration of professional experience was 5.3 ± 3.3 years (Range: 1 - 35 years). The average age of the study population was 30 ± 6 years (Range: 25 - 75 years).

3.2. Treatment Aspects

Of the 137 participants, 21 (15.3%) had good knowledge about the management of anti-epileptic drug treatment. One hundred and sixteen (84.7%) participants had insufficient knowledge.

Table 2 shows that of the 137 GPs, 34 (24.8%) mentioned referring the patient with epilepsy to the specialist after treatment. One hundred and three (75.2%) GPs reported referring the patient to the specialist before treatment.

Concerning item "Initiation of anti-epileptic treatment", Table 3 shows that the knowledge score, calculated on the basis of the average number of GPs who gave correct answers (n = 33), was 24.1%, corresponding to low knowledge. All the components of the item were poorly identified by GPs (knowledge score range = 11% - 36%).

Regarding item "Criteria for choosing an anti-epileptic drug", Table 4 shows that the knowledge score, determined on the basis of the average number of GPs who gave appropriate answers (n = 53), was 38.7%, corresponding to low knowledge. Of the two types of criteria, only the criteria related to the anti-epileptic drug were moderately identified by GPs (average number of GPs = 72; knowledge score = 52.5%). Patient-related criteria were lowly identified by GPs (average number of GPs = 40; knowledge score = 29.2%). Of the 12 components of the item, only 5 were moderately identified by GPs, namely age (n = 76; knowledge

Table 1. Data related to the demographic characteristics of general practitioners.

Variables	n	%
Gender		
Male	84	61.3
Female	53	38.7
Age groups		
< 30 years	82	59.9
30 - 39 years	47	34.3
≥ 40 years	8	5.8
Training country		
Congo	36	26.3
Other countries		
Cuba	64	46.7
African countries (Algeria, Cameroon, Ghana, Guinea Conakry, Morocco, Central African Republic, Democratic Republic of the Congo, Togo)	27	19.7
European countries (Romania, Russia, Ukraine)	7	5.1
China	3	2.2
Duration of professional experience		
≤1 year	81	59.1
2 - 3 years	27	19.7
4 - 5 years	13	9.5
≥6 years	16	11.7
Practice hospital		
Public	123	89.8
Private	14	10.2

Table 2. Data related to the referral of a patient with epilepsy to an epilepsy specialist for anti-epileptic drug treatment.

Item	Responses, n (%)
Question 1. When should the GP refer the patient to the epilepsy specialist for treatment?	
As soon as epilepsy is suspected	86 (62.8)
After confirmation of the diagnosis of epilepsy	48 (35)
After administration of anti-epileptic drug	34 (24.8)
After the occurrence of more than 2 epileptic seizures	1 (0.7)

Table 3. Data related to the initiation of anti-epileptic treatment.

Item	Correct answers, n (%)	Knowledge score (%)
Question 2. When should anti-epileptic treatment be started?		
In case of status epilepticus	49 (35.8%)	
After a second epileptic seizure, if the symptoms are disabling for the patient	43 (31.4%)	
After a first epileptic seizure, if the patient has EEG-confirmed epileptic activity	40 (29.2%)	
After a first epileptic seizure, if the patient has a neurological deficit and/or a neurodevelopmental disorder	36 (26.3%)	24.1
After a first epileptic seizure, if there are structural abnormalities on brain imaging consistent with the seizure presented by the patient	29 (21.2%)	
After a second epileptic seizure, if the symptoms have a psychosocial impact on the patient's daily life	24 (17.5%)	
In case of epileptic seizures which are a real danger in the immediate aftermath of a surgical operation	24 (17.5%)	
After a first epileptic seizure, if the patient has nocturnal seizures	21 (15.3%)	

Table 4. Data related to the criteria for choosing an anti-epileptic drug.

Item	Correct answers, n (%)	Knowledge score (%)
Question 3. What are the criteria for choosing an anti-epileptic drug?		38.7
Q3.1. Patient-related criteria		
Age	76 (55.5)	
Existence of comorbidity	71 (51.8)	
Patient's income	34 (24.8)	
Occupation	25 (18.2)	
Gender	25 (18.2)	
Agreement of the patient and/or relatives	25 (18.2)	
Type of epileptic seizure	21 (15.3)	
Q3.2. Criteria related to the anti-epileptic drug		
Drug availability	88 (64.2)	
Mechanism of action of the drug	74 (54)	
Reduced side effects of the treatment	73 (53.3)	
Cost of the drug	64 (46.7)	
Half-life of the drug	61 (44.5)	

score = 55.5%), existence of comorbidity (n = 71; knowledge score = 51.8%), drug availability (n = 88; knowledge score = 64.2%), mechanism of action of the drug (n = 74; knowledge score = 54%) and reduced side effects of the treatment (n = 73; knowledge score = 53.3%).

About the following items: "Number of generations of anti-epileptic drugs",

"Indications for dual therapy", "Indications for triple therapy" and "Anti-epileptic drugs commonly used in low-income countries", Table 5 shows that their knowledge scores, calculated on the basis of the average numbers of GPs who gave correct answers (n = 29, n = 62, n = 29 and n = 35, respectively), were 21.2%, 45.2%, 21.2% and 25.5%, respectively, corresponding to low knowledge. Of all the components of the item "Indications for dual therapy", only the component "When monotherapy is not sufficiently effective at maximum dose or is poorly tolerated" was moderately identified by GPs (n = 80; knowledge score = 58.4%).

On item "Clinical and paraclinical monitoring data for anti-epileptic treatment", Table 6 shows that the knowledge score, determined on the basis of the average number of GPs who gave appropriate answers (n = 60), was 43.8%, corresponding to low knowledge. Of the 11 clinical monitoring data, 3 were best known by the participants, namely presence/persistence of seizures (n = 118; knowledge score = 86.1%), psychomotor development and learning of the child (n = 102; knowledge score = 74.4%), and adverse events related to epilepsy

Table 5. Data related to the anti-epileptic drugs.

Item	Correct answers, n (%)	Knowledge score (%)
Question 4. How many generations of anti-epileptic drugs are there?		21.2
3 generations	32 (23.4)	
2 generations	28 (20.4)	
1 generation	26 (19.7)	
Question 5. What are the conditions for initiating dual therapy?		45.2
When monotherapy is not sufficiently effective at maximum dose or is poorly tolerated	80 (58.4)	
In case of failure of two successive monotherapies adapted to the diagnosis of epileptic seizures and at optimal doses	64 (46.7)	
In case of drug-resistant epilepsy	42 (30.7)	
Question 6. What are the conditions for initiating triple therapy?		21.2
When dual therapy does not completely stop epileptic seizures or is poorly tolerated	30 (21.9)	
In case of drug-resistant epilepsy	29 (21.2)	
In case of failure of two successive dual therapies adapted to the diagnosis of epileptic seizures and at optimal doses	28 (20.4)	
Question 7. What major or conventional anti-epileptic drugs are commonly used in low-income countries?		25.5
Phenobarbital	53 (38.7)	
Sodium valproate	46 (33.6)	
Carbamazepine	30 (21.9)	
Phenytoin	23(16.8)	
Diazepam	21 (15.3)	

Table 6. Data related to the monitoring of anti-epileptic treatment.

Item	Correct answers, n (%)	Knowledge score (%)
Question 8. What data are included in the monitoring of anti-epileptic treatment?		43.8
Q8.1. Clinical monitoring data		
Presence/persistence of seizures	118 (86.1)	
Psychomotor development and learning of the child	102 (74.4)	
Adverse events related to the treatment of epilepsy	102 (74.4)	
Therapeutic compliance	68 (49.6)	
Cognitive disorders	67 (48.9)	
Impact of epilepsy on the patient's daily life	67 (48.9)	
Attention deficit disorders	52 (38)	
Depression	51 (37.2)	
Suicide risk	41 (29.9)	
Anxiety syndrome	31 (22.6)	
Nutritional status and measurements (weight; height)	29 (21.2)	
Q8.2. Paraclinical monitoring data		
EEG	93 (67.9)	
Serum transaminase activities	43 (31.4)	
Creatinemia	41 (29.9)	
Blood determination of drugs	26 (19)	
Blood count	21 (15.3)	
Question 9. What are the times for monitoring the effectiveness of anti-epileptic treatment?		24.1
At the third month after starting treatment	44 (32.1)	
Every six months after starting treatment	22 (16.1)	

treatment (n = 102; knowledge score = 74.4%). Of the 5 para-clinical monitoring data, only EEG was moderately identified by GPs (n = 93; knowledge score = 67.9%).

In addition, Table 6 shows that, for item "Times for monitoring the effectiveness of anti-epileptic treatment", the knowledge score, determined on the basis of the average number of GPs who gave correct answers (n = 33), was 24.1%, corresponding to low knowledge.

Concerning item "Cessation of anti-epileptic treatment", Table 7 shows that the knowledge score, calculated on the basis of the average number of GPs who gave appropriate answers (n = 53), was 38.7%, corresponding to low knowledge. Of the 2 components of the item, only the component "Epilepsy specialist" was moderately identified by GPs (n = 84; knowledge score = 61.3%).

Regarding item "Post-graduate epilepsy education programs", 117 (85.4%)

Table 7. Data related to the cessation of anti-epileptic treatment.

Item	Correct answers, n (%)	Knowledge score (%)
Question 10. Who should decide whether to stop anti-epileptic treatment? And when?		38.7
The neurologist/epilepsy specialist, in conjunction with the treating general practitioner	84 (61.3)	
After complete remission of epileptic seizures during a period of 3 to 5 years, in the absence of epileptogenic brain damage	21 (15.3)	

participants had requested education programs to improve their knowledge and skills. Twenty (14.6%) participants did not require further training.

Based on the overall average number of GPs who gave correct answers to the following 9 items (n = 43): initiation of antiepileptic treatment (Table 3; average number of GPs = 33), criteria for choosing an antiepileptic drug (Table 4; average number of GPs = 53), number of generations of antiepileptic drugs (Table 5; average number of GPs = 29), indications for dual therapy (Table 5; average number of GPs = 62), indications for triple therapy (Table 5; average number of GPs = 29), anti-epileptic drugs commonly used in low-income countries (Table 5; average number of GPs = 35), clinical and para-clinical monitoring data for antiepileptic treatment (Table 6; average number of GPs = 60), times for monitoring the effectiveness of anti-epileptic treatment (Table 6; average number of GPs = 33) and cessation of anti-epileptic treatment (Table 7; average number of GPs = 53), the overall average knowledge score was 31.4%, corresponding to low knowledge.

3.3. Factors Associated with GPs' Knowledge

Table 8 presents the data related to the association of low and good levels of knowledge with demographic factors. Based on the OR analysis, the result had shown that low and good levels of knowledge were not significantly associated with gender (OR = 1.03; p = 1.000), age groups (OR < 1; p > 0.05), training country (OR = 0.62; p = 0.591), practice hospital (OR = 0.40; p = 0.695) and duration of professional experience (OR < 1; p > 0.05).

4. Discussion

This study examines the level of knowledge about the management of anti-epileptic drug treatment among GPs and the relationship between demographic factors and GPs' knowledge.

In our study population, there are more men than women, with a sex ratio of 1.6. Male predominance has also been reported in other surveys [47] [48]. For a very long time, medicine has been considered a man's profession; this could explain the male predominance. However, today, there is a growing trend towards gender balance, or even a reversal of the trend [49].

In the present study, there are more GPs trained in Cuba (46.7%) than in Congo (26.3%) (Table 1). The predominance of GPs trained in Cuba is explained

Table 8. Data related to the relationship between demographic factors and GPs' knowledge.

Factors	Knowledge		OR [95% CI]	p-value
	Good, n (%)	Low, n (%)		
Gender				
Male	13 (15.5)	71 (84.5)	1.03 [0.40 - 2.68]	1.000
Female	8 (15.1)	45 (84.9)		
Age groups				
<30 years	16 (19.5)	66 (80.5)	1	0.067
30 - 39 years	3 (6.4)	44 (93.6)	0.28 [0.08 - 1.02]	0.068
≥40 years	2 (25.0)	6 (75.0)	1.38 [0.25 - 7.46]	0.658
Training Country				
Congo	4 (11.1)	32 (88.9)	0.62 [0.19 - 1.98]	0.591
Other countries	17 (16.8)	84 (83.2)		
Practice hospital				
Private	1 (7.1)	13 (92.9)	0.40 [0.05 - 3.20]	0.695
Public	20 (16.3)	103 (83.7)		
Duration of professional experience				
≤1 year	16 (19.8)	65 (80.2)	1	0.465
2 - 3 years	2 (7.4)	25 (92.6)	0.32 [0.07 - 1.52]	0.231
4 - 5 years	1 (7.7)	12 (92.3)	0.34 [0.04 - 2.80]	0.451
≥6 years	2 (12.5)	14 (87.5)	0.58 [0.12 - 2.82]	0.728

by the cooperation agreements in the health sector between the 2 countries. These agreements enable the Republic of the Congo to make up its deficit in health professionals, which is estimated at 40% [50] [51].

A large proportion of participants (75.2%) had mentioned referring patients with epilepsy to specialists before treatment (**Table 2**). This feature, which has also been reported by other investigators [48] [52] [53] [54], reflects a cooperative approach between GPs and epilepsy specialists. Cooperative approach leads to better management of patients with epilepsy [35] [55]. However, in our study, the good behavior of GPs in referring the patient to the specialist before treatment masks their gaps in the therapeutic management of epilepsy. Indeed, the overall average knowledge score among GPs was low (31.4%), and only 21 (15.3%) GPs have good knowledge. This characteristic is also seen in previous studies [35] [56] [57].

The low level of knowledge about the management of anti-epileptic drug treatment, found among our participants, has also been reported in previous studies [52] [53] [58] [59]. This could be explained by the low number of hours devoted to epilepsy in the neurology program and its content, thus causing a

deficit in initial knowledge [52] [60]; in Congo, 4 hours are devoted to epilepsy. The deficit in knowledge among our participants could be also explained by other factors, such as: the lack of internships for some students in the neurology department; the learning environment; learning styles and teaching modes that do not help to reduce uncertainty about what students need to learn; the long duration of medical school, which can lead to a loss of the initial knowledge acquired; stress [60]-[67].

The poor knowledge about anti-epileptic drugs, observed in our participants (**Table 5**), is also seen in the Cambodia study [68]. The anti-epileptic drugs most identified by our participants, namely phenobarbital and sodium valproate, are commonly used in other low-income countries [69] [70] [71] [72].

The high rate of participants (85.4%) who requested further training in epilepsy reflects the desire to fill their gaps in the management of patients with epilepsy. The need for further training in epilepsy expressed by our GPs has also been reported in previous studies [54] [55] [73].

In the present study, gender, age groups, training country, practice hospital and duration of professional experience do not influence the level of knowledge of GPs. A study at the level of the general population of GPs is needed to confirm these preliminary findings.

Our study has some strengths. The exhaustive recruitment of GPs in all public hospitals and private care centers in Brazzaville enabled us to get a representative sample. Although the results of this study cannot be transposed to the general population of GPs, they provide robust data that could be used by policy makers to revise the epilepsy program for the training of GPs at the Faculty of Health Sciences in Brazzaville, and to develop epilepsy education programs for GPs in order to strengthen their knowledge and skills. Researchers have demonstrated that epilepsy education programs improve GPs' knowledge [48] [56].

The small numbers of GPs trained in China, other African countries and European countries (**Table 1**) are the limitation of this study. These numbers did not allow us to assess the level of knowledge of GPs by country of training.

5. Conclusion

This study highlights gaps in the management of anti-epileptic drug treatment among GPs. Demographic factors do not affect the level of knowledge of GPs. Epilepsy training strategies should be developed to improve GPs' knowledge and skills.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix: Questionnaire

Surname and first names of the general practitioner (GP) surveyed: ……

Registration number: /___ /___/ ___/

Date: /___/___//__ __//__ __/

I. Demographic Aspects

I.1. Age: …… years

I.2. Gender: Male ☐ Female ☐

I.3. Training country: ……

I.4. Diploma of general medicine: Yes ☐ No ☐

I.5. GP currently training in a medical/surgical specialty: Yes ☐ No ☐

I.6. Practice hospital:

i. Private: ☐

- Registered at the Ministry of Health: ☐
- Not registered at the Ministry of Health: ☐
- Name of hospital: ……..

ii. Public: ☐

- Name of hospital: ……..

I.7. GP working in:

- Department of Neurology ☐
- Department of Psychiatry ☐
- Department of Neurosurgery ☐
- Department of Pediatrics ☐
- Department of general medicine ☐
- Other Department ……

I.8. Duration of professional experience: ……. years

II. Treatment Aspects [30] [42] [43] [44] [45]

II.1. When should the GP refer the patient to the epilepsy specialist for treatment?

Please mark [*x*] *the appropriate answer*(*s*)

1. After administration of anti-epileptic drug ☐
2. After the occurrence of more than 2 epileptic seizures ☐
3. As soon as epilepsy is suspected ☐
4. After confirmation of the diagnosis of epilepsy ☐
5. Other conditions (*To list*): ……..
6. I do not know ☐

II.2. When should anti-epileptic treatment be started?

Please mark [*x*] *the appropriate answer*(*s*)

1. After a first epileptic seizure, if the patient has a neurological deficit and/or a neurodevelopmental disorder ☐
2. After a first epileptic seizure, if the patient has EEG-confirmed epileptic activity ☐
3. After a first epileptic seizure, if the patient has nocturnal seizures ☐
4. After a first epileptic seizure, if there are structural abnormalities on brain imaging consistent with the seizure

presented by the patient ☐

5. After a second epileptic seizure, if the symptoms are disabling for the patient ☐
6. After a second epileptic seizure, if the symptoms have a psychosocial impact on the patient's daily life ☐
7. In case of epileptic seizures which are a real danger in the immediate aftermath of a surgical operation ☐
8. In case of status epilepticus ☐
9. Other indications (*To list*):…..……
10. I do not know ☐

II.3. What are the criteria for choosing an anti-epileptic drug?

Please mark [*x*] *the appropriate answer*(*s*)

1. Patient-related criteria:
   - Age ☐
   - Agreement of the patient and/or relatives ☐
   - Existence of comorbidity ☐
   - Gender ☐
   - Occupation ☐
   - Patient's income ☐
   - Type of epileptic seizure ☐
   - Other variables (*To list*) ……
   - I do not know ☐
2. Criteria related to the anti-epileptic drug:
   - Cost of the drug ☐
   - Drug availability ☐
   - Half-life of the drug ☐
   - Mechanism of action of the drug ☐
   - Reduced side effects of the treatment ☐
   - Other variables (*To list*): ……
   - I do not know ☐

II.4. How many generations of anti-epileptic drugs are there?

Please mark [*x*] *the appropriate answer*(*s*)

1. One generation ☐
2. Two generations ☐
3. Three generations ☐
4. Other generations (*To list*): ……
5. I do not know ☐

II.5. What are the conditions for initiating dual therapy?

Please mark [*x*] *the appropriate answer*(*s*)

1. When monotherapy is not sufficiently effective at maximum dose or is poorly tolerated ☐
2. In case of failure of two successive monotherapies adapted to the diagnosis of epileptic seizures and at optimal doses ☐
3. In case of drug-resistant epilepsy ☐
4. Other conditions (*To list*): ……
5. I do not know ☐

II.6. What are the conditions for initiating triple therapy?

Please mark [*x*] *the appropriate answer*(*s*)

1. When dual therapy does not completely stop epileptic seizures or is poorly tolerated ☐
2. In case of failure of two successive dual therapies adapted to the diagnosis of epileptic seizures and at optimal doses ☐
3. In case of drug-resistant epilepsy ☐
4. Other conditions (*To list*): ……
5. I do not know ☐

II.7. What major or conventional anti-epileptic drugs are commonly used in low-resource countries?

Please mark [*x*] *the appropriate answer*(*s*)

1. Names of the drugs:
   - Carbamazepine ☐
   - Diazepam ☐
   - Phenobarbital ☐
   - Phenytoin ☐
   - Sodium valproate ☐
2. Other drugs (*To list*): ……..
3. I do not know ☐

II.8. What data are included in the monitoring of anti-epileptic treatment?

Please mark [*x*] *the appropriate answer*(*s*)

1. Clinical monitoring data:
   - Adverse events related to the treatment of epilepsy ☐
   - Anxiety syndrome ☐
   - Attention deficit disorders ☐
   - Cognitive disorders ☐
   - Depression ☐
   - Impact of epilepsy on the patient's daily life ☐
   - Nutritional status and measurements (weight; height) ☐
   - Presence/persistence of seizures ☐
   - Psychomotor development and learning of the child ☐
   - Suicide risk ☐
   - Therapeutic compliance ☐
   - Other monitoring variables (*To list*): ……
   - I do not know ☐
2. Paraclinical monitoring data:
   - Blood count ☐
   - Blood determination of drugs ☐
   - Creatinemia ☐
   - Serum transaminase activities ☐
   - Other monitoring variables (*To list*): ……
   - I do not know ☐

II.9. What are the times for monitoring the effectiveness of anti-epileptic treatment?

Please mark [*x*] *the appropriate answer*(*s*)

1. At the third month after starting treatment ☐

2. Every six months after starting treatment ☐
3. Other time limits (*To list*): ……
4. I do not know ☐

II.10. Who should decide whether to stop anti-epileptic treatment? And when?

Please mark [*x*] *the appropriate answer*(*s*)

1. The neurologist/epilepsy specialist, in conjunction with the treating general practitioner ☐
2. After complete remission of epileptic seizures during a period of 3 to 5 years, in the absence of epileptogenic brain damage ☐
3. Other health personnel involved in treatment cessation (*To list*): …….
4. Other conditions for cessation of treatment (*To list*): ……
5. I do not know ☐

II.11. Would you need post-graduate epilepsy education programs to improve your knowledge and skills?

Please mark [*x*] *the appropriate answer*

1. Yes ☐
2. No ☐