

ORIGINAL ARTICLE

The international league against epilepsy primary healthcare educational curriculum: Assessment of educational needs

Gagandeep Singh¹  | Patricia Braga²  | Jaime Carrizosa³  |
 Marielle Prevos-Morgant⁴ | Man Mohan Mehndiratta⁵  | Priscilla Shisler⁶ |
 Chahnez Triki⁷  | Samuel Wiebe⁸  | Jo Wilmshurst⁹  | Ingmar Blümcke¹⁰ 

¹Department of Neurology, Dayanand Medical College & Hospital, Ludhiana, India

²Institute of Neurology, Facultad de Medicina, Universidad de la República, Montevideo, Uruguay

³Medical School, University of Antioquia, Medellín, Colombia

⁴Établissement médical de La Teppe, Tain-l'Hermitage, France

⁵Department of Neurology, BL Kapoor Hospital, New Delhi, India

⁶ILAE Academy, Washington, District of Columbia, USA

⁷Department of Child Neurology, LR19ES15 Neuropédiatrie, Sfax Medical School, University of Sfax, Sfax, Tunisia

⁸Department of Clinical Neurosciences, University of Calgary, Calgary, Alberta, Canada

⁹Department of Paediatric Neurology, Red Cross War Memorial Children's Hospital, Neuroscience Institute, University of Cape Town, Cape Town, South Africa

¹⁰Institute of Neuropathology, Universitätsklinikum Erlangen, Erlangen, Germany

Correspondence

Ingmar Blümcke, Institute of Neuropathology, University Hospitals Erlangen, Erlangen, Germany.
 Email: ingmar.bluemcke@uk-erlangen.de

Abstract

Objective: To assess the need for an epilepsy educational curriculum for primary healthcare providers formulated by the International League Against Epilepsy (ILAE) and the importance attributed to its competencies by epilepsy specialists and primary care providers and across country-income settings.

Methods: The ILAE primary care epilepsy curriculum was translated to five languages. A structured questionnaire assessing the importance of its 26 curricular competencies was posted online and publicized widely to an international community. Respondents included epilepsy specialists, primary care providers, and others from three World Bank country-income categories. Responses from different groups were compared with univariate and ordinal logistic regression analyses.

Results: Of 785 respondents, 60% noted that a primary care epilepsy curriculum did not exist or they were unaware of one in their country. Median ranks of importance for all competencies were high (very important to extremely important) in the entire sample and across different groups. Fewer primary care providers than specialists rated the following competencies as extremely important: definition of epilepsy ($p = .03$), recognition of seizure mimics ($p = .02$), interpretation of test results for epilepsy care ($p = .001$), identification of drug-resistant epilepsy (0.005) and management of psychiatric comorbidities (0.05). Likewise, fewer respondents from LMICs in comparison to UMICs rated 15 competencies as extremely important.

Significance: The survey underscores the unmet need for an epilepsy curriculum in primary care and the relevance of its competencies across different vocational and socioeconomic settings. Differences across vocational and country income

Patricia Braga, Jaime Carrizosa, Marielle Prevos-Morgant, Man Mohan Mehndiratta, Priscilla Shisler, Chahnez Triki, Samuel Wiebe, Jo Wilmshurst are listed in alphabetic order and contributed equally to the development of the curriculum.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2024 The Author(s). *Epileptic Disorders* published by Wiley Periodicals LLC on behalf of International League Against Epilepsy.

groups indicate that educational packages should be developed and adapted to needs in different settings.

KEYWORDS

competencies, education, epilepsy, learning objectives, seizures

1 | INTRODUCTION

Worldwide, there are more than 50 million people with epilepsy, of whom 80% live in low- and low-middle-income countries (LMICs).¹ Nearly one-half of those living in LMICs remain undiagnosed and only one in five of those diagnosed with epilepsy receive appropriate treatment.^{2–4} The proportion of people with epilepsy that remains undiagnosed constitutes the epilepsy diagnostic gap and the proportion that does not receive appropriate treatment constitutes the treatment gap.^{5,6} Despite recent progress, much remains to be done to reduce the epilepsy diagnostic and treatment gaps particularly in LMICs.^{5,7}

As one of the measures to reduce the diagnostic and treatment gaps, the World Health Organization's (WHO's) Resolution WHA 66.8, in 2015, advocated the integration of epilepsy management into primary health care by training non-specialists in basic aspects of diagnosis and treatment of epilepsy.⁸ In 2022, the 75th World Health Assembly approved the Intersectoral Global Action Plan for Epilepsy and other Neurological Disorders (IGAP).⁹ This resolution identified epilepsy as an entry point for the implementation of the IGAP for several reasons, not least its high disease burden, its cost-effective diagnosis and treatment, and the requirement of only a basic level of expertise for effective implementation.

The International League Against Epilepsy (ILAE) is committed to making resources available to healthcare providers worldwide to diagnose and treat epilepsy. Accordingly, it developed an educational curriculum for specialist epilepsy care.¹⁰ In keeping with WHO calls^{7–9} for strengthening epilepsy diagnosis and care at the primary care level, the ILAE undertook to develop a primary care epilepsy educational curriculum. This would target primary healthcare providers, who are often (but not always) the initial healthcare contact for people with epilepsy and are able to follow up these people to provide integrated health care. Particularly in LMICs, such providers might include not only physicians but also physician assistants and nurse practitioners. The need for such a curriculum exists in countries across all income levels, as primary

Key points

- The ILAE developed an epilepsy curriculum to promote optimal diagnosis and treatment among primary healthcare providers.
- A globally acquired feedback on the curriculum indicated that a primary care epilepsy curriculum did not exist in most countries.
- There were differences in rating of some of the curricular competencies between primary care providers and specialists.
- Fewer primary care providers than specialists rated epilepsy definition, seizure mimics identification, and management of psychiatric comorbidities as extremely important.
- There were differences in rating of some of the curricular competencies according to country income status of respondents.

healthcare providers are the point of first contact for people with epilepsy, and in many LMICs, the only available option.¹¹

A task force was established to develop a set of competencies and learning objectives for a primary healthcare epilepsy educational curriculum. The full curriculum and its development are already reported.¹² During development, the curriculum was disseminated to a worldwide constituency to obtain structured assessments and feedback. The feedback informed refinement of the curriculum and provided insights regarding its relevance and applicability. Here, we report our analysis of the global survey to understand the need for the curriculum and rate the importance of its competencies. In recognition of the wide variations in epilepsy care and the corresponding educational needs, we compared the importance ratings of competencies in the curriculum between primary care providers and epilepsy specialists and across World Bank country-income groups.¹³ This would allow for more targeted educational interventions, and allocation of educational resources according to needs.

2 | MATERIALS AND METHODS

2.1 | Development of the educational curriculum

A task force comprised of nine epilepsy experts with experience in epilepsy education and management followed a similar methodology to the previously developed ILAE specialist educational curriculum.¹⁰ After reviewing the contents of the specialist curriculum, five of its seven domains were deemed relevant and were adapted to the primary care curriculum, i.e., diagnosis, counseling, pharmacological treatment, emergencies, and comorbidities. A sixth domain, dealing with referral of people with epilepsy, was deemed to be a key primary care responsibility and was added by consensus.

The task force members met monthly, from March 2020 to January 2021, and during these meetings, they revised and refined existing elements by discussion and consensus. The first draft of the curriculum comprised six domains, 26 competencies, and 80 learning objectives.

2.2 | Surveys to obtain feedback

To obtain structured and unstructured feedback, the draft curriculum was distributed to the ILAE Chairs of each of the six world regions (<https://www.ilae.org/regions-and-countries/regions>), representatives of all 120 ILAE member countries, representatives of its Young Epilepsy Section and representatives of the International Bureau for Epilepsy. The structured and unstructured responses guided further refinement of the competencies and learning objectives. The updated English version of the curriculum was then translated by bilingual epilepsy specialists to Spanish, French, Chinese, Arabic, and Russian. A separate set of bilingual epilepsy specialists reviewed the translated versions for accuracy, linguistic comprehensibility, and cultural acceptability.

In parallel, a structured questionnaire was developed to assess the importance of each of the 26 competencies on a five-point Likert scale (5 = extremely important, 4 = very important, 3 = somewhat important, 2 = slightly important, and 1 = not at all important). The questionnaire also enquired about the need for a primary healthcare epilepsy educational package, and an exam, based on the proposed competencies. Free text fields were included to receive feedback regarding missing competencies or changes to the proposed competencies and to capture unstructured comments. The questionnaire was translated to the same five languages as the curriculum and was produced online using Survey Monkey. The curriculum and the questionnaire in six languages were posted on the ILAE website

(<https://www.ilae.org>) and were publicized widely. The survey remained open from March 09, 2021 to July 14, 2021.

2.3 | Statistical analysis

Descriptive analysis of the respondent sample was first undertaken. Respondents were categorized according to their vocation, i.e., epilepsy specialists, primary healthcare providers, and others. Specialists were drawn from the ILAE constituency and comprised neurologists or epilepsy experts. 'Others' included a mixed group of allied health providers, researchers, and lay persons who chose to respond to the online survey. Responses were also categorized according to the income status of their country of residence, i.e., low- and low-middle income, upper-middle income, and high income, based on the 2020 World Bank classification of countries.¹³ The frequencies of the ratings of importance of each competency were calculated for the entire sample and for the individual groups of respondents described above, and were compared using the chi-square test. Given the skewed responses toward high importance, the median and interquartile range of the rankings were used as summary measures.¹⁴ The Kruskal–Wallis test was used to test the null hypothesis that the groups demonstrated identical medians and hence, were drawn from the same population.¹⁵ In addition, the Games–Howell test, a non-parametric test akin to the chi-square test, was used *post hoc* to compare the various groups.¹⁶ Stata ver. 15.0 (StataCorp, CA, USA) was used for the analyses. $p < .05$ was considered significant.

3 | RESULTS

A total of 785 responses were accrued in all six languages [English: 524 (66.8%), French: 93 (11.8%), Spanish: 94 (12.0%), Russian: 41 (5.2%), Chinese: 32 (4.1%) and Arabic – 1 (0.1%)]. Because only 17 responses were received from low-income countries, these were combined with responses from low-middle income countries.

This resulted in three income categories, i.e., low- and LMICs ($n = 390$; 49.7%), upper-middle income countries (UMICs) ($n = 203$; 25.8%), and high-income countries (HICs) ($n = 173$; 22%). Epilepsy specialists comprised 497 (63.3%) of the respondents, 105 (13.4%) were primary healthcare providers, and 183 (23.3%) were in the "other" category.

Of 768 respondents who answered this question, 457 (60%) either denied or were unaware of the existence of a primary care epilepsy educational curriculum in their country. Of 504 respondents, 481 (95%) would support

using the curriculum to guide the training of primary healthcare providers for the care of people with epilepsy in their country. In addition, 629 (87%) of 724 respondents supported setting up an exam to certify proficiency in epilepsy for primary care providers.

All 26 competencies were rated as “very important” or “extremely important” by nearly all and across different groups of respondents (Tables 1 and 2). Four competencies were ranked as extremely important by >60% of both epilepsy specialists and primary care providers, and only two were rated as extremely important by <40% of the respondents from both groups (Table 3). Likewise, 10 competencies (Table 3) were ranked as extremely important by >60% of the respondents from at least two country-income groups, and only two were ranked as extremely important by <40% of the respondents from at least two country-income groups.

On univariate analyses, differences in rankings of importance were found between various vocational groups for six competencies and between the three country income groups for 17 competencies (Tables S1 and S2).

In comparison to specialists, primary care providers were less likely to rank the following competencies as extremely important: the definition of epilepsy, seizures and status epilepticus [12% less likely ($p=.02$)]; the ability to recognize seizure mimics [16% less likely ($p=.02$)]; the ability to interpret test results in relation to epilepsy care [14% less likely ($p=.001$)]; the identification of drug-resistant epilepsy [14% less likely ($p=.005$)]; and the ability to diagnose and treat common psychiatric comorbidities [8% less likely ($p=.05$)] (Figure 1A–D; Table S1).

Significantly more respondents from UMICs in comparison to those from LMICs ranked the following 15 competencies as extremely important: the definition of epilepsy, seizures and status epilepticus [9% more likely ($p=.02$)]; knowledge about the causes of acute symptomatic seizures [9% more likely ($p=.03$)]; the ability to identify and describe seizure semiology [10% more likely ($p=.01$)]; the ability to recognize common seizure mimics [11% more likely ($p=.02$)]; the ability to perform relevant clinical examinations [15% more likely ($p=.0001$)]; the ability to order [11% less likely ($p=.006$)] and interpret [9% more likely ($p=.03$)] laboratory tests in patients with epilepsy; the ability to communicate a diagnosis of non-epileptic events [7% more likely ($p=.04$)]; the ability to adjust treatment according to patient needs [15% more likely ($p=.001$)]; the ability to identify drug-resistant epilepsy [11% more likely ($p=.01$)]; the ability to manage epilepsy in remission [10% more likely ($p=.006$)]; and the ability to recognize and provide initial treatment for common somatic [11% more likely ($p=.001$)] and psychiatric [6% less likely ($p=.01$)] comorbidities (Figure 2A–D; Table S2). Respondents from UMICs were also more likely

than those from LMICs to rank working knowledge of epilepsy care in the elderly [11% more likely ($p=.007$)] and understanding of the pharmacology of common antiseizure medications [13% more likely ($p=.001$)]. By contrast, significantly more respondents from LMICs ranked the following 11 competencies as extremely important in comparison to those from HICs: working knowledge about the causes of acute symptomatic seizures [12% more likely ($p=.004$)], and epilepsy [12% more likely ($p=.008$)]; ability to identify and describe seizure semiology [10% more likely ($p=.01$)]; ability to present the diagnosis of epilepsy in the culturally-appropriate context [11% more likely ($p=.011$)]; ability to provide life-style guidance [8% more likely ($p=.047$)]; ability to provide counseling specific to children with epilepsy [9% more likely ($p=.0200$)]; understanding of the pharmacology of common anti-seizure medications [8% more likely ($p=.04$)]; ability to adjust treatment according to patient needs [10% more likely ($p=.004$)]; ability to treat the underlying causes of epilepsy [9% more likely ($p=.01$)], to recognize epilepsy in remission [14% more likely ($p=.0001$)]; and ability to provide initial management of uncontrolled seizures [14% more likely ($p=.001$)]. At the same time, respondents from UMICs were 13% less likely than those from HICs to rank as extremely important the recognition and provision of counseling to children with epilepsy and their parents ($p=.02$) (Figure 2A–D; Table S2).

4 | DISCUSSION

Feedback responses to the survey confirm the unmet need for a primary care epilepsy curriculum and support for its endorsement to guide training and eventually certify primary healthcare providers in epilepsy care. Median rankings were high across all items surveyed and this reflects the relevance of the competencies as perceived by respondents. The support cut across vocational divisions, national borders, and country-income rankings. However, five competencies were rated differently by specialists and primary care providers. Differences were also evident between countries divided according to income status (Table S2).

Intuitively, the support for the curriculum is driven by large numbers of people with epilepsy who are managed in primary care settings around the world.^{17–20} Despite this, shortcomings in standards of care for epilepsy are expressed by patient communities as well as primary care providers.^{21–24} The gaps are wide-ranging and diverse, depending on setting and context. In some LMICs, the gaps are underlined by a reluctance to use western-style epilepsy medicines and reliance on traditional healers.^{25,26} In HICs, however, the knowledge and skills gaps might relate

TABLE 1 Median rankings provided by various groups divided according to professional statuses.

Competency	Median rank (interquartile range)			p		
	Specialists	Primary care providers	Others	Specialists vs primary care providers	Specialists vs others	Primary care providers vs others
1.1. Epilepsy Definition	5 (5–5)	5 (4–5)	5 (4–5)	.018	.095	.737
1.2. Causes: Seizures	5 (4–5)	5 (4–5)	5 (4–5)	.744	.813	.981
1.3. Causes: Epilepsy	5 (4–5)	5 (4–5)	5 (4–5)	.976	.990	.998
1.4. Semiology	4 (4–5)	4 (4–5)	5 (4–5)	.351	.357	.219
1.5. Seizure mimics	5 (4–5)	4 (4–5)	5 (4–5)	.007	.054	.900
1.6. Clinical exam	4 (4–5)	4.5 (4–5)	5 (4–5)	.435	.595	.961
1.7. Laboratory tests	5 (4–5)	4 (4–5)	5 (4–5)	.179	.216	.336
1.8. Interpretation of tests	4 (4–5)	4 (3–5)	4 (4–5)	.000	.004	.002
2.1. Presenting diagnosis	5 (4–5)	5 (4–5)	5 (4–5)	.306	.246	.125
2.2. Life competencies, style guidance	5 (4–5)	5 (4–5)	5 (4–5)	.618	1.000	.704
2.3. Information on causes and consequences	5 (4–5)	4 (4–5)	5 (4–5)	.182	.552	.137
2.4. Women with epilepsy	5 (4–5)	5 (4–5)	5 (4–5)	.204	.998	.522
2.5. Epilepsy in elderly	4 (4–5)	4 (4–5)	4 (4–5)	.597	.925	.515
2.6. Counsel children & parents	5 (4–5)	5 (4–5)	5 (4–5)	.020	.457	.554
2.7. Recognize non-epileptic events	4 (4–5)	4 (4–5)	4.5 (4–5)	.145	.355	.092
3.1. Pharmacology of antiseizure medications	5 (4–5)	5 (4–5)	5 (4–5)	.069	.176	.715
3.2. Tailoring treatment	5 (4–5)	5 (4–5)	5 (4–5)	.262	.344	.316
3.3. Treat causes of epilepsies	4 (4–5)	4 (4–5)	5 (4–5)	.244	.307	.308
3.4. Identify drug-resistant epilepsy	5 (4–5)	4 (4–5)	4 (4–5)	.014	.016	.149
3.5. Manage epilepsy in remission	4 (4–5)	4 (4–5)	4 (4–5)	.116	.350	.114
3.6. Uncontrolled seizures: initial management	5 (4–5)	5 (4–5)	5 (4–5)	.549	.676	.923
4.1. Referral	5 (4–5)	5 (4–5)	5 (4–5)	.889	.979	.910
5.1. Epilepsy emergencies	5 (5–5)	5 (5–5)	5 (4–5)	.130	.512	.999
5.2. Status epilepticus	5 (4–5)	5 (4–5)	5 (4–5)	.440	.650	.830
6.1. Psychiatric comorbidities	4 (4–5)	4 (3–5)	4 (4–5)	.003	.117	.003
6.2. Somatic comorbidities	4 (4–5)	4 (3–5)	4 (4–5)	.020	.744	.045

TABLE 2 Median rankings provided by various groups divided according to country-income groups.

Competency	LMICs	UMICs	HICs	<i>p</i>	LMICs vs UMICs	LMICs vs HICs	UMICs vs HICs
1.1. Epilepsy Definition	5 (4–5)	5 (5–5)	5 (4–5)	.033	0.016	1.000	0.066
1.2. Causes: Seizures	5 (4–5)	5 (4–5)	5 (4–5)	.000	0.036	0.018	0.000
1.3. Causes: Epilepsy	5 (4–5)	5 (4–5)	4 (4–5)	.002	0.175	0.042	0.001
1.4. Semiology	4 (4–5)	5 (4–5)	4 (4–5)	.000	0.004	0.076	0.000
1.5. Seizure mimics	5 (4–5)	5 (4–5)	5 (4–5)	.048	0.024	0.838	0.254
1.6. Clinical exam	4 (4–5)	5 (4–5)	4 (4–5)	.000	0.000	0.929	0.000
1.7. Laboratory tests	4 (4–5)	5 (4–5)	5 (4–5)	.010	0.003	0.904	0.013
1.8. Interpretation of tests	4 (4–5)	5 (4–5)	4 (4–5)	.006	0.015	0.441	0.003
2.1. Presenting diagnosis	5 (4–5)	5 (4–5)	5 (4–5)	.038	0.507	0.115	0.626
2.2. Life competencies, style guidance	5 (4–5)	4 (4–5)	4 (4–5)	.096	0.415	0.226	0.903
2.3. Information on causes and consequences	5 (4–5)	5 (4–5)	5 (4–5)	.321	0.140	0.878	0.483
2.4. Women with epilepsy	5 (4–5)	5 (4–5)	5 (4–5)	.221	0.651	0.403	0.149
2.5. Epilepsy in elderly	4 (4–5)	5 (4–5)	4 (4–5)	.020	0.013	0.696	0.209
2.6. Counsel children & parents	5 (4–5)	5 (4–5)	4 (4–5)	.015	0.213	0.083	0.003
2.7. Recognize non-epileptic events	4 (4–5)	5 (4–5)	4 (4–5)	.041	0.007	0.975	0.024
3.1. Pharmacology of antiseizure medications	5 (4–5)	5 (5–5)	5 (4–5)	.000	0.001	0.065	0.000
3.2. Tailoring treatment	5 (4–5)	5 (4.25–5)	5 (4–5)	.000	0.006	0.005	0.000
3.3. Treat causes of epilepsies	4 (4–5)	5 (4–5)	4 (4–5)	.001	0.119	0.033	0.001
3.4. Identify drug-resistant epilepsy	4 (4–5)	5 (4–5)	4 (4–5)	.005	0.005	0.499	0.002
3.5. Manage epilepsy in remission	4 (4–5)	4 (4–5)	4 (3–4.5)	.000	0.001	0.000	0.000
3.6. Uncontrolled seizures: initial management	5 (4–5)	5 (4–5)	4 (4–5)	.000	0.229	0.006	0.000
4.1. Referral	5 (4–5)	5 (4–5)	5 (4–5)	.145	0.725	0.309	0.791
5.1. Epilepsy emergencies	5 (5–5)	5 (5–5)	5 (4–5)	.051	0.253	0.146	0.011
5.2. Status epilepticus	5 (4–5)	5 (4–5)	5 (4–5)	.016	0.224	0.048	0.003
6.1. Psychiatric comorbidities	4 (4–5)	4 (4–5)	4 (4–5)	.017	0.002	0.235	0.316
6.2. Somatic comorbidities	4 (3–5)	4 (4–5)	4 (4–5)	.001	0.000	0.932	0.006

to the identification of drug-resistant epilepsy leading to prompt referral to specialist care.²³ In these countries, systems for epilepsy diagnosis and care are highly efficient across the primary-specialist care continuum, however, gaps have been identified in relation to patient counseling and education and referral to specialists.^{27,28}

In comparison to specialists, primary care providers accorded lesser importance to the definition of epilepsy, seizures and status epilepticus, the ability to recognize seizure mimics, the knowledge of interpretation of epilepsy investigations, identification of drug-resistant epilepsy, and the ability to diagnose and treat common psychiatric comorbidities of epilepsy (Figure 1A–D; Table S1). The lower level of importance accorded by primary care providers to the definition of seizures, epilepsy, and status epilepticus and the ability to recognize and address psychiatric

comorbidities might seem counterintuitive. However, this is likely related to insufficient awareness, among primary care providers, of the key aspects of epilepsy and is commensurate with the epilepsy diagnostic and treatment gaps in LMICs. Insufficient knowledge of the definition of epilepsy and its comorbidities prevents early diagnosis and timely treatment. Similarly, the lack of knowledge of the definition and recognition of status epilepticus may contribute to elevated morbidity and mortality from epilepsy. Other differences might have plausible explanations. For instance, the identification of seizure mimics can be complex, requiring substantial specialist inputs and hence, may account for a lack of awareness of mimics among primary care providers.^{29,30} Likewise, the interpretation of tests employed in the diagnostic workup of epilepsies is a specialist competency. On the other hand, the

TABLE 3 Primary care epilepsy competencies and their ratings by epilepsy specialists vs. primary healthcare providers and according to country-income groups.

S.No.	S.No.	Competency	Rankings by specialists and primary care providers		Rankings by country-income groups			Significant group differences ^a : Predicted probabilities with 95% CIs
			Specialists	Primary care providers	LMICs	UMICs	HICs	
1	1.1	Define what is a seizure and epilepsy	+	+	+	+	+	Primary care [0.68 (0.60, 0.77)] < Specialists [0.79 (0.75, 0.83)], $p = .02$ LMICs [0.74 (0.69, 0.78)] < UMICs [0.82 (0.77, 0.88)], $p = .02$
2	1.2	Demonstrate working knowledge of the main causes of acute symptomatic (provoked) seizures in children and adults	+	+	+	+	+	LMICs [0.64 (0.59, 0.69)] < UMICs [0.73 (0.67, 0.79)], $p = .03$ LMICs [0.64 (0.59, 0.69)] > HICs [0.51 (0.44, 0.59)], $p = .004$
3	1.3	Demonstrate working knowledge of the main causes of focal and generalized epilepsies in children and adults					+	LMICs [0.56 (0.51, 0.61)] > HICs [0.44 (0.37, 0.51)], $p = .008$
4	1.4	Identify and describe the semiology (clinical features) of epileptic seizures using standardized ILAE terminology and classification systems				–		LMICs [0.49 (0.44, 0.54)] < UMICs [0.60 (0.53, 0.66)], $p = .01$ LMICs [0.49 (0.44, 0.54)] > HICs [0.38 (0.31, 0.45)], $p = .01$
5	1.5	Recognize common seizure mimics	+		+	+	+	Primary care [0.51 (0.42, 0.60)] < Specialists [0.63 (0.59, 0.68)], $p = .02$ LMICs [0.56 (0.51, 0.61)] < UMICs [0.66 (0.60, 0.73)], $p = .015$
6	1.6	Demonstrate working knowledge of relevant aspects of the clinical examination in newly diagnosed seizures and epilepsy				+	+	LMICs [0.46 (0.41, 0.50)] < UMICs [0.63 (0.57, 0.70)], $p = .0001$
7	1.7	Decide which initial lab tests should be ordered in patients with epilepsy or recurrent seizures						LMICs [0.48 (0.43, 0.53)] < UMICs [0.60 (0.53, 0.66)], $p = .006$
8	1.8	Demonstrate working knowledge of implications of test results and pathways to care according to the regional setting		–		–		Primary care [0.29 (0.21, 0.36)] < Specialists [0.44 (0.40, 0.48)], $p = .001$ LMICs [0.42 (0.37, 0.47)] < UMICs [0.51 (0.45, 0.58)], $p = .028$
9	2.1	Understand and address the culturally appropriate aspects and consequences of the diagnosis of epilepsy, including stigma			+			LMICs [0.61 (0.56, 0.66)] > HICs [0.49 (0.42, 0.57)], $p = .011$
10	2.2	Provide guidance on specific issues related to epilepsy						LMICs [0.58 (0.53, 0.63)] > HICs [0.49 (0.42, 0.56)], $p = .047$

TABLE 3 (Continued)

S.No.	S.No.	Competency	Rankings by specialists and primary care providers		Rankings by country-income groups			Significant group differences ^a : Predicted probabilities with 95% CIs
			Specialists	Primary care providers	LMICs	UMICs	HICs	
11	2.3	Communicate information about the causes and consequences of the specific type of epilepsy						
12	2.4	Counsel women with epilepsy of childbearing age about the implications and management of epilepsy	+	+	+	+	+	
13	2.5	Demonstrate working knowledge regarding issues related to elderly with epilepsy (e.g., comorbidities and drug interactions)						LMICs [0.41 (0.36, 0.45)] < UMICs [0.52 (0.45, 0.59)], <i>p</i> = .007
14	2.6	Provide counseling specific to children with epilepsy and their parents (e.g., lifestyle, cognitive function, parenting)					+	LMICs [0.56 (0.51, 0.61)] > HICs [0.46 (0.38, 0.53)], <i>p</i> = .017
15	2.7	Communicate to patients and carers the diagnosis of non-epileptic events and the need for different treatments						LMICs [0.46 (0.41, 0.51)] < UMICs [0.55 (0.48, 0.61)], <i>p</i> = .042
16	3.1	Demonstrate working knowledge about common antiseizure medications			+		+	LMICs [0.63 (0.58, 0.68)] < UMICs [0.76 (0.70, 0.82)], <i>p</i> = .001 LMICs [0.63 (0.58, 0.68)] > HICs [0.54 (0.47, 0.61)], <i>p</i> = .043
17	3.2	Recommend appropriate therapy based on epilepsy presentation			+		+	LMICs [0.61 (0.56, 0.66)] < UMICs [0.75 (0.69, 0.81)], <i>p</i> = .001 LMICs [0.61 (0.56, 0.66)] > HICs [0.48 (0.41, 0.56)], <i>p</i> = .004
18	3.3	Implement appropriate management strategies for the main causes of epilepsy according to local/regional setting (e.g., infective causes, metabolic, toxins, etc.)				–		LMICs [0.48 (0.43, 0.53)] > HICs [0.38 (0.11, 0.45)], <i>p</i> = .014
19	3.4	Identify patients who are drug-resistant according to the current ILAE definition	–					Primary care [0.39 (0.30, 0.48)] < Specialists [0.53 (0.48, 0.57)], <i>p</i> = .005 LMICs [0.48 (0.43, 0.53)] < UMICs [0.57 (0.50, 0.63)], <i>p</i> = .008
20	3.5	Demonstrate knowledge of when patients are in remission	–	–	–		–	LMICs [0.39 (0.34, 0.44)] < UMICs [0.50 (0.44, 0.57)], <i>p</i> = .006 LMICs [0.39 (0.34, 0.44)] > HICs [0.23 (0.18, 0.29)], <i>p</i> = .0001

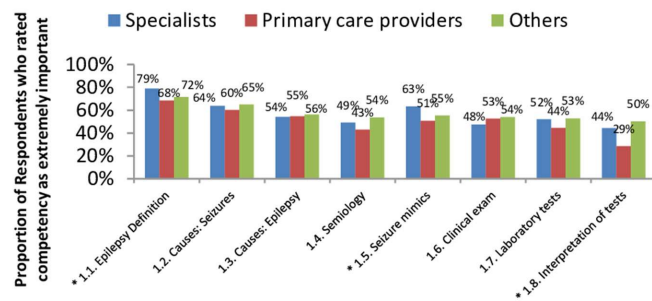
(Continues)

TABLE 3 (Continued)

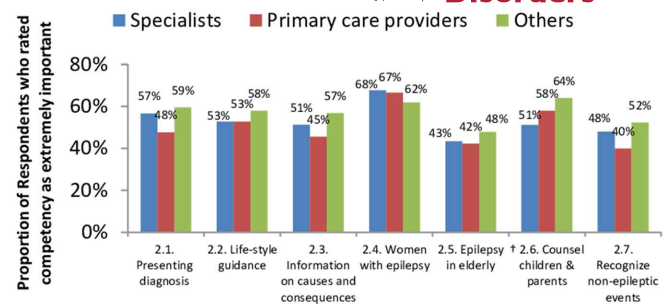
S.No.	S.No.	Competency	Rankings by specialists and primary care providers		Rankings by country-income groups			Significant group differences ^a : Predicted probabilities with 95% CIs
			Specialists	Primary care providers	LMICs	UMICs	HICs	
21	3.6	Demonstrate the ability to provide initial management of patients with uncontrolled seizures			+		+	LMICs [0.61 (0.56, 0.66)] > HICs [0.47 (0.39, 0.54)], $p = .01$
22	4.1	Demonstrate working knowledge about the management of patient referral to a higher level of care					+	
23	5.1	Demonstrate the ability to implement emergency treatment plans for children and adults in and outside the hospital setting			+	+	+	
24	5.2	Demonstrate the ability to manage focal and generalized convulsive status epilepticus in children and adults			+	+	+	
25	6.1	Demonstrate the ability to recognize and provide initial management of common psychiatric comorbidities	–	–	–		–	Primary care [0.29 (0.21, 0.37)] < Specialists [0.38 (0.34, 0.43)], $p = .045$ LMICs [0.36 (0.31, 0.40)] < UMICs [0.46 (0.39, 0.52)], $p = .011$
26	6.2	Demonstrate the ability to recognize and provide initial management of common somatic multi-morbidities	–	–	–		–	LMICs [0.32 (0.28, 0.37)] < UMICs [0.46 (0.39, 0.52)], $p = .001$

Note: The use of proportion cut-offs of 60% and 40% is arbitrary. + Ranked as extremely important by >60% of the respondents in the group. – Ranked as extremely important by <40% of the respondents in the group.

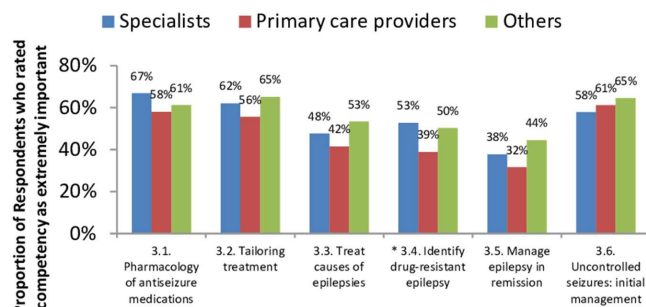
^aValues represent predicted probabilities (with 95% Confidence intervals) of rating the competency as “extremely important” for each group. p Values based on chi-square test are also shown.



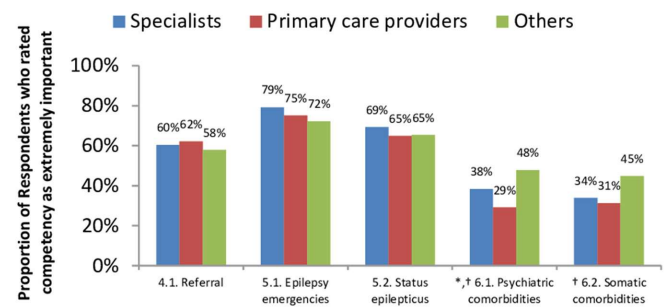
(A) Domain: Diagnosis



(B) Domain: Counselling

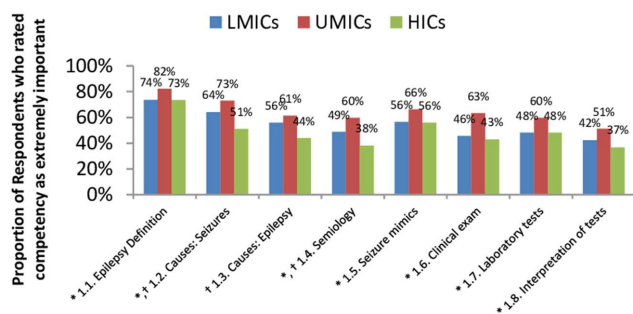


(C) Domain: Pharmacological treatment

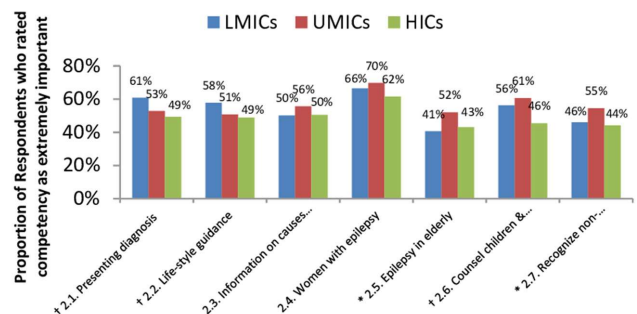


(D) Domains: Referral, Emergencies and Comorbidities

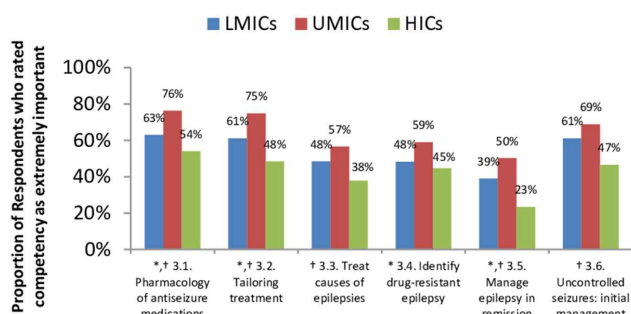
FIGURE 1 (A–D) Proportions of respondents from among specialists, primary care providers, and others who rated various competencies divided into four groups according to domains (A – Diagnosis; B – Counseling; C – Pharmacological treatment; and D – Referral, Emergencies, and Comorbidities) as “extremely important”. *Specialists vs primary care providers; †Specialists vs others.



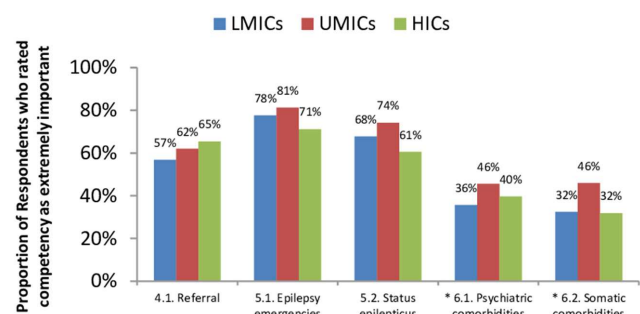
(A) Domain: Diagnosis



(B) Domain: Counselling



(C) Domain: Pharmacological treatment



(D) Domains: Referral, Emergencies and Comorbidities

FIGURE 2 (A–D) Proportions of respondents from three country income groups who rated various competencies divided into four groups according to domains (A – Diagnosis; B – Counseling; C – Pharmacological treatment; and D – Referral, Emergencies, and Comorbidities) as “extremely important.” *LMICs vs UMICs; †LMICs vs HICs.

identification of drug-resistant epilepsy might constitute a useful primary care competency as this might prompt referral to specialist care where available.²³ Similarly, the recent roll-out of packages integrating epilepsy with mental healthcare delivery in primary care settings in LMICs calls for scaling up the capacity of care providers to diagnose and provide initial care for comorbid psychiatric and mental health conditions.^{31,32} The relatively lower priority given to psychiatric comorbidities of epilepsy by primary care providers in our survey could be one of the challenges in implementation of such packages.

An important element to consider in educational interventions is the need to increase awareness and understanding of the importance of some of the crucial competencies, of which learners may not be aware. For example, the low priority accorded across all subgroups to some competencies, e.g., care for epilepsy in remission and recognition and initial treatment of common psychiatric and somatic comorbidities, suggests that many respondents may not be aware of the importance of these aspects and of their direct impact on seizures, self-management, and well-being in epilepsy. We must, therefore, gear our efforts toward improving this awareness.

Respondents from UMICs more often rated several competencies as “extremely important” in comparison to those from LMICs (Tables 1 and S2; Figure 2A–D). These findings suggest that by and large, the curriculum resonates well with respondents from UMICs and might be explained by differences in levels of development of primary health care in the two country-income groups.³² Curiously, however, respondents from LMICs provided higher rankings than HICs for many competencies (Figure 2A–D; Table S2). This might be attributed to a greater reliance on specialist care in HICs.

The survey has its limitations. Although globally representative, participation from primary healthcare providers and from low-income countries was limited. It can be hard for an organization rooted in specialist epilepsy care like the ILAE to reach primary healthcare respondents. Nevertheless, we were able to garner feedback from all low-income countries on the ILAE member country list except Rwanda and Guinea in Africa and Afghanistan, Yemen, and Syria in Eastern Mediterranean Region. The lower response rates from LMICs and primary care providers might render the proportion of various subgroups in the analyses out of balance. Nevertheless, the results of the analyses provide us with an important sense of direction. Although importance rankings could vary from extremely important to “not at all” important, the responses were skewed toward higher importance rankings, and most of the statistically significant differences among groups were seen within extremely important and very important rankings. A critical concern, raised in the

free text feedback accumulated in our survey, relates to the large number of skills and related learning objectives in the curriculum. Primary care providers have to deal with a wide range of health conditions and might face challenges in assimilating an educational package based on too many competencies. It must, however, be clarified that the breadth of the curriculum does not necessarily imply a greatly increased depth of knowledge and skills. In effect, the curriculum and its competencies represent core elements of a body of knowledge required for quality epilepsy care. In selecting the competencies and learning objectives thereof, the task force had to balance out the complexity of knowledge and skills generally available to a specialist, against the elements indispensable for quality primary health care for epilepsy. Furthermore, the breadth of curricular competencies does not imply a requirement of care providers to digest the body of knowledge for the curriculum in its entirety.

The platforms used to deliver epilepsy proficiency to primary care providers can be varied. There are good examples of currently available packages, and these include the WHO Mental Health Gap Action Program initiative, pediatric epilepsy training initiatives by the British Pediatric Neurology Association, the Latin American epilepsy primary care initiative, and epilepsy training initiative in the Extension for Community Health Outcomes program.^{33–38} We propose that future epilepsy educational initiatives for primary healthcare providers make use of the ILAE primary healthcare epilepsy curriculum in profile and content development. The widespread and sustained delivery of such educational interventions can be challenging.³⁹ Innovative methods and contents of the packages are likely to be key to successful implementation. Ultimately, their success will be determined not by participant experience but by their impact on epilepsy outcomes.

FUNDING INFORMATION

International League Against Epilepsy.

DISCLAIMER

This report was written by experts selected by the International League Against Epilepsy [ILAE] and was approved for publication by the ILAE. Opinions expressed by the authors, however, do not necessarily represent the policy or position of the ILAE.

ORCID

Gagandeep Singh  <https://orcid.org/0000-0001-6661-3553>

Patricia Braga  <https://orcid.org/0000-0001-7928-375X>

Jaime Carrizosa  <https://orcid.org/0000-0002-3651-7285>

Man Mohan Mehndiratta  <https://orcid.org/0000-0002-4428-9980>

Chahnez Triki  <https://orcid.org/0000-0003-2918-3819>

Samuel Wiebe  <https://orcid.org/0000-0002-1061-9099>

Jo Wilmshurst  <https://orcid.org/0000-0001-7328-1796>

Ingmar Blümcke  <https://orcid.org/0000-0001-8676-0788>

REFERENCES

- GBD 2016 Epilepsy Collaborators. Global, regional, and national burden of epilepsy, 1990–2016: a systematic analysis for the global burden of disease study 2016. *Lancet Neurol.* 2019;18:357–75. Erratum in: *Lancet Neurol.* 2019 May;18:e4.
- Mbuba CK, Ngugi AK, Fegan G, Ibinda F, Muchohi SN, Nyundo C, et al. Risk factors associated with the epilepsy treatment gap in Kilifi, Kenya: a cross-sectional study. *Lancet Neurol.* 2012;11:688–96.
- Meyer AC, Dua T, Ma J, Saxena S, Birbeck G. Global disparities in the epilepsy treatment gap: a systematic review. *Bull World Health Organ.* 2010;88:260–6.
- Singh B, Mahajan N, Singh G, Sander JW. Temporal trends in the epilepsy treatment gap in low- and low-middle-income countries: a meta-analysis. *J Neurol Sci.* 2022;434:120174.
- Kwon CS, Wagner RG, Carpio A, Jetté N, Newton CR, Thurman DJ. The worldwide epilepsy treatment gap: a systematic review and recommendations for revised definitions – a report from the ILAE epidemiology commission. *Epilepsia.* 2022;63:551–64.
- Kale R. Global campaign against epilepsy: the treatment gap. *Epilepsia.* 2002;43(Suppl 6):31–3.
- World Health Organisation. Epilepsy: a public health imperative. Geneva: WHO; 2019 https://www.who.int/mental_health/neurology/epilepsy/report_2019/en/Date [Accessed: December 4, 2020].
- World Health Organisation. Global burden of epilepsy and the need for coordinated action at the country level to address its health, social and public knowledge implications, WHA 68.20. Geneva: WHO; 2015 <https://www.ilae.org/files/dmfile/WHO-Epilepsy-2015.pdf> [Access: December 30, 2021].
- World Health Organisation. Global actions on epilepsy and other neurological disorders [WHA73.10]. Seventy-third world health assembly. Geneva: World Health Organization; 2020 https://apps.who.int/gb/ebwha/pdf_files/WHA73/A73_R10-en.pdfDate [Accessed: December 4, 2021].
- Blümcke I, Arzimanoglou A, Beniczky S, Wiebe S. Roadmap for a competency-based educational curriculum in epileptology: report of the epilepsy education task force of the international league against epilepsy. *Epileptic Disord.* 2019;21:129–40.
- Wilmshurst JM, Birbeck GL, Newton CR. Epilepsy is ubiquitous, but more devastating in the poorer regions of the world... Or is it? *Epilepsia.* 2014;55:1322–5.
- Singh G, Braga P, Carrizosa J, Prevos-Morgant M, Mehndiratta MM, Shisler P, et al. An epilepsy curriculum for primary health care providers: a report from the educational Council of the International League against Epilepsy. *Epileptic Disord.* 2022;24:983–93.
- <https://blogs.worldbank.org> [Accessed 01.01.2022].
- Sullivan GM, Artino AR Jr. Analyzing and interpreting data from likert-type scales. *J Grad Med Educ.* 2013;5:541–2.
- Šimkovic M, Träuble B. Robustness of statistical methods when measure is affected by ceiling and/or floor effect. *PLoS One.* 2019;14:e0220889.
- Wagner H, Orwat M, Hinz M, Pfusterschmied J, Bacharach DW, von Duvillard SP, et al. Testing game-based performance in team-handball. *J Strength Cond Res.* 2016;30:2794–801.
- MeerausWH PI, Chin RF, Knott F, Gilbert R. Childhood epilepsy recorded in primary care in the UK. *Arch Dis Child.* 2013;98:195–202.
- Rytter D, Vestergaard CH, Vestergaard M, Christensen J, Bech BH. Use of primary healthcare for persons with epilepsy. *Epilepsy Behav.* 2018;80:285–90.
- Fernández-Suárez E, Villa-Estébanez R, Garcia-Martinez A, Fidalgo-González JA, Zanabali Al-Sibbai AA, Salas-Puig J. Prevalencia, tipo de epilepsia y uso de farmacosantiepilepticosenatencionprimaria [Prevalence, type of epilepsy and use of antiepileptic drugs in primary care]. *Rev Neurol.* 2015;60:535–42.
- Coleman R, Loppy L, Walraven G. The treatment gap and primary health care for people with epilepsy in rural Gambia. *Bull World Health Organ.* 2002;80:378–83.
- Moran N, Poole K, Bell G, Solomon J, Kendall S, McCarthy M, et al. NHS services for epilepsy from the patient's perspective: a survey of primary, secondary and tertiary care access throughout the UK. *Seizure.* 2000;9:559–65.
- Keikelame MJ, Hills RM, Naidu C, de Sá A, Zweigenthal V. General practitioners' perceptions on management of epilepsy in primary care settings in Cape Town, South Africa: an exploratory pilot study. *Epilepsy Behav.* 2012;25:105–9.
- Hutchinson K, Herkes G, Shih P, Francis-Auton E, Bierbaum M, Ryder T, et al. Identification and referral of patients with refractory epilepsy from the primary to the tertiary care interface in New South Wales, Australia. *Epilepsy Behav.* 2020;111:107232.
- Catalao R, Eshetu T, Tsigebrhan R, Medhin G, Fekadu A, Hanlon C. Implementing integrated services for people with epilepsy in primary care in Ethiopia: a qualitative study. *BMC Health Serv Res.* 2018;18(1):372. <https://doi.org/10.1186/s12913-018-3190-y>
- Anand P, Othon GC, Sakadi F, Tassiou NR, Hamani ABD, Bah AK, et al. Guinea epilepsy project. Epilepsy and traditional healers in the Republic of Guinea: a mixed methods study. *Epilepsy Behav.* 2019;92:276–82.
- Mesraoua B, Kissani N, Deleu D, Elsheikh L, Ali M, Melikyan G, et al. Complementary and alternative medicine [CAM] for epilepsy treatment in the Middle East and North Africa [MENA] region. *Epilepsy Res.* 2021;170:106538.
- Altalib H, McMillan KK, Padilla S, Pugh MJ. Epilepsy quality performance in a national sample of neurologists and primary care providers: characterizing trends in acute and chronic care management. *Epilepsy Behav.* 2021;123:108218.
- Kobau R, Zack MM, Sapkota S, Sajatovic M, Kiriakopoulos E. When and why US primary care providers do and do not refer their patients with new-onset seizures or existing epilepsy or seizure disorders to neurologists-2018 DocStyles. *Epilepsy Behav.* 2021;125:108385.
- Shneker BF, Elliott JO. Primary care and emergency physician attitudes and beliefs related to patients with psychogenic nonepileptic spells. *Epilepsy Behav.* 2008;13(1):243–7.
- Shah S, Nagarajan L, Palumbo L, Walsh P, Silberstein J, Cannell P, et al. Paediatric new-onset seizure clinic in Australia: experience and lessons learnt. *J Paediatr Child Health.* 2019;55:789–94.
- Tsigebrhan R, Fekadu A, Medhin G, Newton CR, Prince MJ, Hanlon C. Performance of primary health care workers in detection of mental disorders comorbid with epilepsy in rural Ethiopia. *BMC Fam Pract.* 2021;22:204.

32. Tsigebrhan R, Fekadu A, Medhin G, Newton CR, Prince MJ, Hanlon C. Comorbid mental disorders and quality of life of people with epilepsy attending primary health care clinics in rural Ethiopia. *PLoS One*. 2021;16(1):e0238137.
33. World Health Organization. Review of 40 years of primary health care implementation at country level. Geneva: WHO; 2019.
34. Dos Santos PF, Cumbe V, Gouveia ML, de Fouchier C, Teuwen D, Dua T. Implementation of mhGAP in Mozambique: integrating epilepsy care into the primary health care system. *Int J Ment Heal Syst*. 2019;13:36.
35. Mutiso VN, Pike KM, Musyimi CW, Gitonga I, Tele A, Rebello TJ, et al. Feasibility and effectiveness of nurses and clinical officers in implementing the WHO mhGAP intervention guide: pilot study in Makueni County, Kenya. *Gen Hosp Psychiatry*. 2019;59:20–9.
36. Carrizosa J, Braga P, Albuquerque M, Bogacz A, Burneo J, Coan AC, et al. Epilepsy for primary health care: a cost-effective Latin American E-learning initiative. *Epileptic Disord*. 2018;20:386–95.
37. Patel AA, Wibecan L, Tembo O, Kalyelye P, Mathews M, Ciccone O. Improving paediatric epilepsy management at the first level of care: a pilot education intervention for clinical officers in Zambia. *BMJ Open*. 2019;9:e029322.
38. McDonald SB, Privitera M, Kakacek J, Owens S, Shafer P, Kobau R. Developing epilepsy training capacity for primary care providers using the project ECHO telementoring model. *Epilepsy Behav*. 2021;116:107789.
39. Hill E, Gurbutt D, Makuloluwa T, Gordon M, Georgiou R, Roddam H, et al. Collaborative healthcare education programmes for continuing professional education in low and middle-income countries: a best evidence medical education [BEME] systematic review. *BEME guide No. 65. Med Teach*. 2021;43:1228–41.

SUPPORTING INFORMATION Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Singh G, Braga P, Carrizosa J, Prevos-Morgant M, Mehndiratta MM, Shisler P, et al. The international league against epilepsy primary healthcare educational curriculum: Assessment of educational needs. *Epileptic Disord*. 2024;26:638–650. <https://doi.org/10.1002/epd2.20256>

Test yourself

1. Which of the following may not intuitively be considered as a primary care competency for good epilepsy care?
 - A. Referral
 - B. Diagnosis
 - C. Counselling
 - D. EEG interpretation
2. Which of the following competency is most underrated by health care providers?
 - A. Care of women with epilepsy
 - B. Recognition and treatment of comorbidities
 - C. Pharmacological treatment
 - D. Treatment of status epilepticus
3. Which of the following are appropriate roles for primary health care providers in the management of epilepsy?
 - A. Initial diagnosis and treatment
 - B. Initial treatment of convulsive status epilepticus
 - C. Interpretation of serum levels of antiseizure medications
 - D. Appropriate and timely referral of patients with drug-resistant epilepsy to specialists

Answers may be found in the [supporting information](#)