

Calculation of the Need of Multidisciplinary Units of Epilepsy in America

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Introduction

In the year 2011, I published an article related with the Multidisciplinary Epilepsy Units (MEU) [1]. However, in the time passed since this publication have done evident other needs in the treatment of patients, needs that only could cover through the association of different specialists; likewise, have appeared new advances in the treatment as well as in the epidemiological knowledge of different epileptogenic entities that force to a general review of this topic.

Epilepsy is a chronic disorder of the brain that affects people worldwide, representing in some countries the main causes of death and of morbidity. This illness, many times complex, requires immediate attention, modifying his prognosis if it is handled by a skilled assistance [2,3]. The intervention of Neurologists with specificity in epilepsy significantly reduces the morbidity, the in-hospitality complications, increases the percentage of independent patients, diminishes the probability to suffer recurrences and reduces the costs of the process [4].

The new organizational model of a MEU should emphasize the characteristics of the different levels care referral hospital, establish new criteria of attention of the patients, leave seated the therapeutic possibilities and the possible resulted both at the patient, their relatives and health administration. However, it remains us the doubt that in reality we do not know how many units of these are necessary in America.

To the light of the scientific evidence exposed previously, it is understood that the ideal goal in the care of complex epileptic patients is to get all they can be attended precociously by a specialist and that those that require it can benefit of an admission to an MEU. However, at present still the majority of complex patients are treated in hospitals that do not have of specialists and therefore are deprived of the best medical practical of their diseases.

In some European countries it is estimated that every year about 500 children are candidates to surgical treatment of the epilepsy. However, only 50% of them will be operated; this leads to important clinical implications for patients, socials for the families, and economic for the public health systems. In this sense, the direct and indirect costs along the life of every 100 non operated patients become about 40 million euros [5].

Hence the need to treat the epilepsy in his real clinical and epidemiological context arises. All this several questions arise:

1. How it should be made a MEU?
2. Where it should be installed a MEU?
3. How many MEUs require America?
4. How efficient, activity and performance of a MEU could be assessed?

How it Should be Made a Multidisciplinary Epilepsy Unit?

Depending on the hospital, the human talent, and of the country, a MEU could be constituted with more or less elements, but in all place, the ideal requirements would be:

Staff requirement

In the unit:

1. Specialist coordinator, with training, qualification official or sub-specialty in epilepsy.
2. An on call specialist 24H/7D.
3. Nursing (ratio 1 nurse/4 beds; 8H by shift).

At the hospital:

1. At least a neuroradiologist with special dedication to the epilepsy.
2. At least a neurosurgeon with training, official qualification or sub-specialty in epilepsy.
3. Intensivists.
4. Department of rehabilitation.
5. Social workers.
6. Possibility of having telemedicine equipment.

Infrastructure

1. Emergency department.
2. Specific beds for the handle of the patient under noninvasive multiparameter monitoring (ECG, EEG, oximetry, blood pressure).
3. Optimal surgical instruments.
4. Intraoperative neurophysiological monitoring.
5. Intensive care unit.
6. Neurointerventionism team-Wada Test.

Protocols

1. Work Programs coordinated with other specialists.
2. Clinical guidelines and diagnostics and therapeutic protocols.
3. Nursing protocols.
4. Very specific Protocols of fast and preferential access to hospitals for the application of diagnostic techniques and/or therapeutic.

Diagnostic techniques

1. Computed tomography 24H/7D.
2. Magnetic resonance imaging of 1,5 T or of 3,0 T, available at least in working hours.

3. High technology for planning and navigation of acquired images (optional).
4. Laboratory emergency department 24H/7D.

Therapeutic techniques

1. Specific intravenous therapy (Acid valproic, levetiracetam) 24H/7D.
2. Ventricular drainage 24H/7D.
3. Surgery of intracranial hypertension 24H/7D.
4. Physiotherapy.

Where Should be Installed a Multidisciplinary Epilepsy Unit?

A MEU should be located in a department of neurosciences conformed by the departments of neurology and neurosurgery at an university hospital that allow the assistance of the patient in conventional rooms, operating theatres and rooms of post-surgical reanimation; to have a multidisciplinary team constituted by neurologists, neurosurgeons, neurophysiologist, neuropsychologist, technicians, language physiotherapist, experts in neuroimaging, nursing, social workers and others assistants according to the available beds.

How Many Multidisciplinary Epilepsy Units are Requires in America?

The population or territorial distribution of these units is difficult to establish because different factors to consider:

1. Regional population (by countries).
2. Frequency of the epilepsy according to the countries.
3. Supply capacity of the center where the unit is located.
4. Characteristics of the geographic area.

Of all these factors, surely the frequency is the essential element in the calculation of the need of these units. The frequency of the epilepsy in Latin America and the Caribbean is greater that the existent in the developed countries, varying of a country to another and even in distinct areas of a same country. According to the Report on the Epilepsy in Latin America [2], at least 60% of the patients are not diagnosed or do not receive suitable treatment; making it difficult to know the exact reality of the epilepsy in terms of incidence and prevalence.

The incidence of the epilepsy (new cases at a time and defined space, usually presented as a rate per 100.000 inhabitants/year) is not an easy rate to obtain by which, until a few decades ago, this had been collected practically only in developed countries. The systematic review of Camfield and collaborators fixed incidence of epilepsy in ranks of 41 to 187/100.000, with greater incidence in developing countries, particularly in his rural areas [6].

The prevalence of the epilepsy is consistently higher than the incidence and his rank goes of 3,2-5,5/1.000 inhabitants in developed countries and of 3,6-4,4/1.000 inhabitants in developing countries [6]. Unlike incidence, the prevalence (together with the global magnitude) is the most important basis that should be used to plan secondary and tertiary prevention, that is to say the type and dimension of the services.

A timely manner, if we take into account exclusively the prevalence of the epilepsy of the American countries (Table 1), if we fixed the percentage of refractory epileptic patients in 30%, and if of these consider that 30% are surgical, could elaborate the following table, with a final numerator (Table 2a) [7].

COUNTRY	POPULATION	PREVALENCE
ARGENTINA	42.980.026	13
BOLIVIA	10.561.887	20
BRAZIL	206.077.898	13
CANADA	35.540.419	4
CHILE	17.762.647	15
COLOMBIA	47.791.393	17,3
ECUADOR	15.902.916	17,7
UNITED STATES	318.857.056	6
GUATEMALA	16.015.494	12,4
HONDURAS	7.961.680	17
MEXICO	125.385.833	18
PANAMA	3.867.535	22
URUGUAY	3.419.516	10,3
VENEZUELA	30.693.827	17,5

Table 1: Prevalence of epilepsy in America.

POPULATION	-	20000000
PREVALENCE	-	10
TOTAL EPILEPTICS	-	200000
REFRACTORY	30	60000
QUIRURGICOS	30	18000

Table 2a: Need of units of cirugia of epilepsy in a hypothetical country with 20 million inhabitants.

If, we considered as optimal, that each MEU reach to operate to 100 refractory patients per year, and that each country have an MEU by each millions of inhabitants, would obtain a denominator value (Table 2b).

OPERATED/YEARS	-	-	2000
UNITS×MILLON	1	##	20
#Operated patient per units	-	-	100

Table 2b: Each country has an MEU by each millions of inhabitants.

From these two tables would go out the computing years that each country would take to operate to their refractory epileptic patients.

In a country with 20 million inhabitants, and a hypothetical epilepsy prevalence of 10/1.000 inhabitants, would have:

1. 200.000 epileptic patients,
2. If the 30% are refractory, would have 60.000 refractory epileptic patients, and
3. If of these, 30% are potentially surgical, would have 1800 patients to operate.

If this country had a single MEU, and the capacity of surgical attention of this unit were 100 patients per year, it would take 180 years to operate to these patients; but if this same country had one unit per million of inhabitants, it would take nine years to operate the prevalent cases only (leaving aside the incidence of the disease (new cases)).

Attached to this document, a digital file in Excel format (annex 1) with a simple formula in which the readers can enter data (population, epilepsy prevalence, the estimated percentage of refractory cases and the potentially surgical) that will form a numerator, and the data (multidisciplinary units per million of inhabitants, and the number of surgeries by year) that will form the denominator of a formula with which will be able to calculate the time in which a determinate country would take to attend only to prevalent cases, without considering the new cases (incidents).

Geographic area is a more complex variable to handle, since the prevalence of some complex pathologies is higher in zones less favored economically and where do not exist sanitary centers of reference.

It is important to highlight that the goal of surgery is the maximum resection of the epileptogenic tissue, preserving the maximum of functional brain tissue, that is to say, eliminate or achieve the lower frequency or intensity of the crises, with the lower possibility of neurological sequelae. The success of the surgery depends among others factors, of the years that carry the patient with the crises, the type of underlying injury, and the affected lobe. The total control of the post-surgery crises ranging from 50-80% [8-11].

How Could Evaluate the Activity and Efficiency of MEU?

Given the magnitude of the resources consumed by these units, justification is required no only to create but also to sustain and continue them. In this sense, would be convenient that after 2-5 years of work these units are subject to regulated audits to assess their effectiveness and fulfillment of aims in quantifiable terms as they are: Number of operated patients, rate of reduction of crisis after the surgery, proportion of complications and postsurgical sequels, time of hospital stay, improvements in the quality of life measured with validate scales (face-to-face or telephone follow-up), number of professionals formed at these units, papers and accumulated impact factors, training courses for professionals, training to the scientific community, information to the public community.

However, the achievement and maintenance of the excellence of an MEU required a minimum volume of activity which suggests the need to focus on few units the current demand, so that they reach the optimum performance figures and to ensure the maximum quality of the clinical procedures and surgical assessment. On the other hand, the need to form work teams and to have diagnostic equipment and complex therapeutic procedures does to consider the maximizing of the results and look for the greater efficiency of the resources devoted.

In Latin America, eight countries have structured epilepsy surgery programs of the and only Brazil has a comprehensive governmental program for all the country. In North America there are more than 100

centers with MEU. The surgical treatment of the epilepsy in children has to be implemented in all the countries, especially in those with higher prevalence, since the precocious recognition of the pharmacoresistance in children and his prompt intervention, allows not only the control of the crises, but, also a better neurological development [2].

Conclusion

Societies of Neurology and of Neurosurgery, by governmental or ministerial authorization, should become governing bodies and auditors of the MEU wishing to be developed, to evaluate these applications, the basic requirements of the same, his sustainability, and his continuity. It would be convenient to establish a procedure of accreditation of MEU, so that it ensures the sufficiency of resources. Accreditation should involve the follow-up of protocols of selection of patients, assessment and treatment established by professionals expert and professional associations, as well as the establishment of systems of register of activity and protocols of investigation that allow to advance in the knowledge of the efficiency and effectiveness of these units.

If governing bodies become one of the recommendations of Societies should be:

1. Each multidisciplinary unit/hospital must recognize their level of assistance in the management of the epilepsy, especially the one of difficult control.
2. The development and dissemination among health professionals of guidelines for the diagnosis, treatment and monitoring of epilepsy, given the continuing advances that have taken place in the clinical and surgical areas would be necessary.
3. Require the existence of circuits and protocols for referral of a patient to one or another level of complexity depending on the severity of the situation.
4. Once created a multidisciplinary unit, in response to an important problem of public health, it is necessary that health resources are organized efficiently in order to ensure the accessibility and the equity to the services that offer these units. In this sense, the hospitals with multidisciplinary units have to be qualified to assist to the patients having of a circuit of transfer previously defined and coordinated.

Recommendations

The present document could constitute in a regulatory document for the certification of the multidisciplinary units of epilepsy, with, at least two levels of accreditation:

Level 1, to show:

1. At least 25 epilepsy surgeries per year.
2. At least 50 video-electroencephalographic studies per year.
3. At least five indexed publications per year.

Level 2, to show:

1. At least 50 epilepsy surgeries per year.
2. At least 50 video-electroencephalographic studies per year.
3. At least five indexed publications per year.
4. Implantation of subdural and deep electrodes.
5. Participation in multicenter studies on epilepsy.

Certainly the establishment of the MEUs requires a big economic support, but especially the interest, the will of cooperation and motivation, with the commitment and the wish to improve what have inherited to perfect the sanitary assistance, the inter-professional relations, and the scientific knowledges, among others.

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