Analysis of the Economic Efficiency of the Medical Treatment of Children with Encephalitis

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Abstract

Encephalitis represents a major risk factor through its virulent outcome and the probability of great complications which can generate encephalopathy and whose clinical picture can lead to psychiatric complications and consequently to a socio-financial impact on society and the family. The costs of the treatment of encephalitis are of two types: one immediate in the acute onset, consisting of the medical treatment for the fight against the viral process and the second type consisting of the treatment for the support of the vital functions and also for the patient's maintenance in the stabilisation period. The latter has the role to prevent the complications, to strengthen the immune response of the organism, to improve treatment outcomes and to maintain the function of the nervous system in the best parameters. The aim of the research is to highlight, in terms of economic and medical efficiency, the medical treatments used for the improvement of the symptoms of encephalitis in children, depending on the type of the disease, viruses and comorbidities associated. So the impact of the options widely applicable with good results was simulated for the creation of a model of economic-medical efficiency.

Keywords: Encephalitis; Viruses; Encephalopathy; Treatment.

Introduction

Encephalitis is defined as an inflammatory process of the brain in association with the demonstration of clinic neurological malfunction and in most of the cases associated with raised intracranial pressure (Jennische et. al., 2008). Most of the pathologic agents causing encephalitis are viruses. However, a great number of cases of encephalitis (70%) remain underdiagnosed and with unknown causes (Oechslin et. al. 2018). Another major cause for patients with encephalitis is the determination of the relevant infectious agent, which acts outside the nervous system; these agents can play a role in developing neurological signs but not through direct invasion of the Central Nervous System (CNS) (Said & Kang, 2018). It is important to identify the infectious encephalitis as also the post infectious encephalitis or the encephalitis after immunisations or the encephalomyelitis (for example, ADEM) which can be mediated by an immunologic response to an antigenic stimuli form an infectious agent of through immunisation (Chen et. al., 2018, Lupu et. al., 2017). The CNS of non-infectious cause must be mentioned (vasculitis, collagen diseases or the paraneoplastic syndrome) because they can present with similar symptoms of the infectious encephalitis and they are taken into account for differential diagnosis. The mechanism is shown in Figure 1.

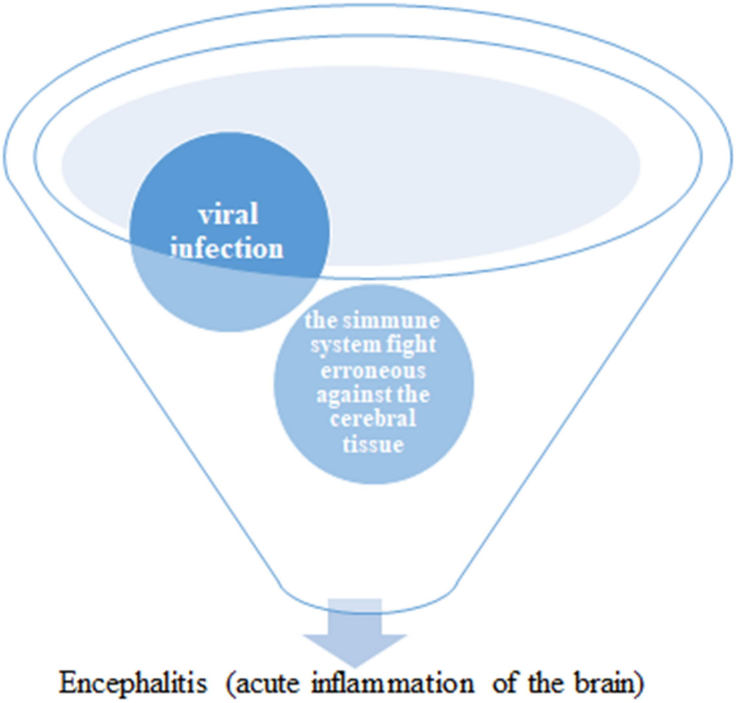


Figure 1. Mechanism of encephalitis

Viral encephalitis are a group of diseases which are hard to diagnose and recognize. Together with encephalitis, they require prompt interventions and are great emergencies (Beaman, 2018). There are two main types of encephalitis: primary and secondary (Straticiuc et. Al, 2016). Primary encephalitis first affects the brain and the spinal cord while secondary encephalitis (post infectious) occurs after the spread of the infection from the body to the brain (Jayaraman, Rangasami, & Chandrasekharan, 2018).

Epidemiology: The incidence of encephalitis varies with region and season. In addition, it occurs in persons with low socioeconomic status and in societies with poor sanitation (Madakshira, Bhardwaj, Gupta, Chander, & Bhalla, 2018) . In USA, the incidence of West Nile virus infection has a national rate of 0.44 cases per 100,000 population, manifesting as a neuro invasive disease. West Nile infection manifests as encephalitis in 50% of cases, as meningitis in 37% and in 6% it appears as acute flaccid paralysis (Emily et. al., 2017).

For the parechovirus a study was conducted in Denmark on 4808 children for a 4 year period when a enteral viral disease was taken into account as cause of meningoencephalitis. In these cases, (3%) of children were positive for HPeV and the medicine age of the infected children was 39 days (Kadambari et. al., 2018).

Encephalitis with herpes simplex virus is 2 cases/million/per year and 95% of the cases are caused by (HSV)–1 (Jayaraman, Rangasami, & Chandrasekharan, 2018).

In the case of Japanese encephalitis virus there are 30,000-50,000 global cases/year, from which approximately 20-30% of the patients will die. 30-50% of survivors can develop important neurological squeal. The clinical disease is developed in less than 1% of people infected with the virus. In medium-incidence countries, for example, the incidence is 1.7 per 100,000 persons, and in low-incidence countries it has a rate of 1.0 per 100,000 persons (Amicizia et. al., 2018).

Causes: In figure 2, the most frequent causes of encephalitis are presented.

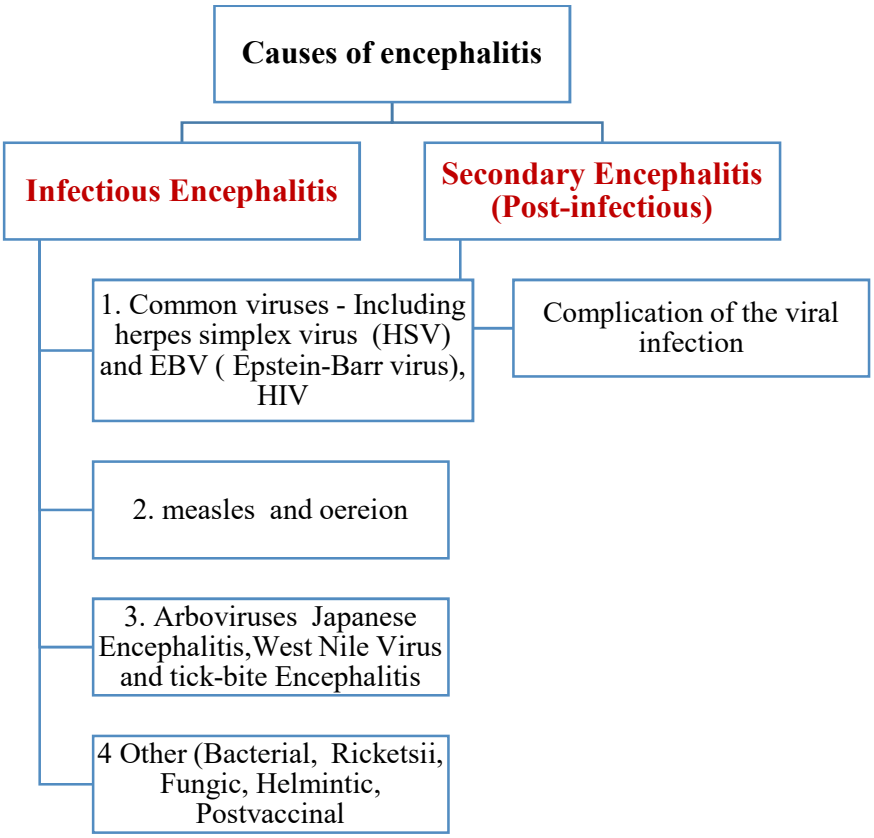


Figure 2. Causes of encephalitis

Causes: The viruses that can cause encephalitis in children can also be the enterovirus, adenovirus and cytomegalovirus (Madakshira et. al., & Bhalla, 2018). Varicella zoster, herpes viruses are other viruses involved. Arboviruses are also an important group called also important viruses transmitted through the bite of mosquitos. They include the West Nile viruses, which is the most important virus of this group. Other viruses from this category are generating another type of encephalitis called the Jamestown Canyon encephalitis, La Crosse encephalitis. The same mechanism is present for Powassan encephalitis and the St. Louis encephalitis, also as the eastern equine encephalitis (Curren et. al., 2018). Another virus is the parechovirus from the family of the picornaviridae and the most aggressive is the HPeV type 3 (Kadambari, 2018).

Another virus which can cause encephalitis is the varicella-zoster virus. This virus has a double-stranded DNA and its genome has under 125,000 base pairs. This kind of genome contains 68 unique open reading frames (ORF). Other viruses incrimined for encephalitis are rabies, dengue,

yellow fever (Beaman, 2018). A more rare cause is represented by Chandipura virus (CHPV) which manifests with fever and belongs to the genus of the Vesiculovirus and the Rhabdoviridae family (Gajanan, Sapkal, & Sawant, 2018). Another cause of encephalitis is the Japanese encephalitis virus (JEV).the virus has a single-stranded RNA and belongs to the genus Flavivirus, Flaviviridae family, (Amicizia, 2018). The meta-analysis of the phenomena in which viruses are involved is shown in table 1.

Table 1. Meta-analysis of the phenomena in which viruses are involved

AUTHOR	YEAR	VIRUS	STUDY	TRANS-MISION	SEASON	REGION
Chen J.	2018	Varicella zoster	33 patients (13 patients viral , ykl-40)	Post-infections	All seasons	All regions
Madakshira MG.	2018	Enterovirus B with subclass coxsackie B and echovirus	1 patient (15 year old girl died)	Faecal oral route	Summer,	Tempe-rate
Curren EJ.	2018	Arboviruses West Nile Jamestown Canyon La Crosse Powassan St. Louis encephalitis Eastern equine encephalitis	2,291 patients (2017)	Bites of infected mosquitos	April-September	Continenta l
Kadambari S.	2018	Parechovirus	Unspecified no. of patients (under the age of 90 days)	Faecal-oral	All seasons	All regions
Kennedy PG	2018	Varicella-zoster	Unspecified no. of patients - all ages	Respiratory	All seasons	All regions
Amicizia D.	2018	Japanese encephalitis virus	Unspecified no. of patients - all ages	Culex mosquitos transplants	All seasons	Asia, flooded rice fields
Sapkal GN.	2018	Chandipura virus	Unspecified no. of patients - under age of 15	Vectors	Sporadic forms	Sporadic forms

AUTHOR	YEAR	VIRUS	STUDY	TRANS-MISION	SEASON	REGION
Jayaramana K.	2018	Herpes virus	Unspecified no. of patients - all ages	Human to human secretions	All seasons	All regions

The different authors suggesting the viral involvement are mentioned in Figure 3.

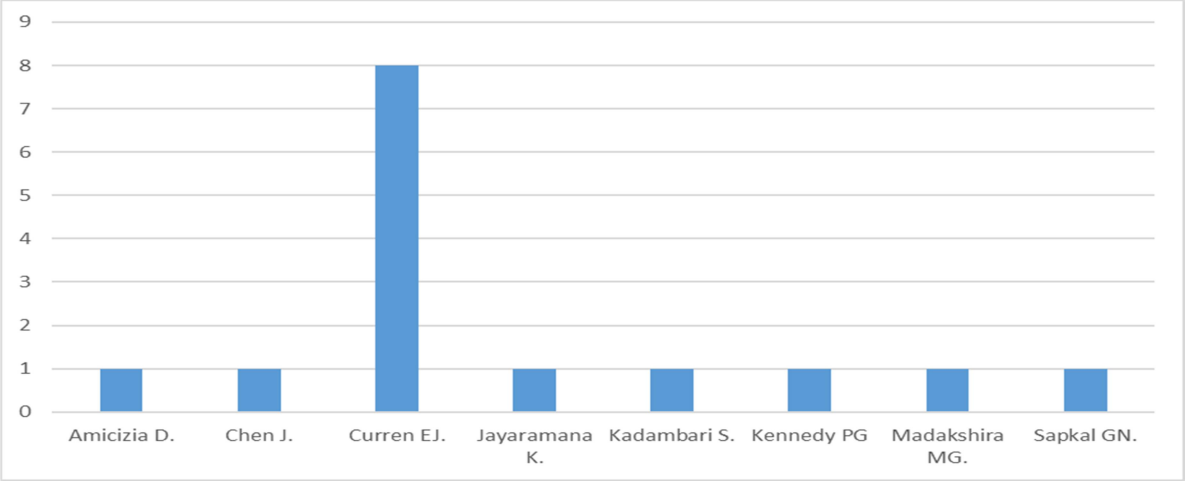


Figure 3. Authors showing viral involvement

The following viruses are involved after these authors and their distribution in different studies are shown in the following figure:

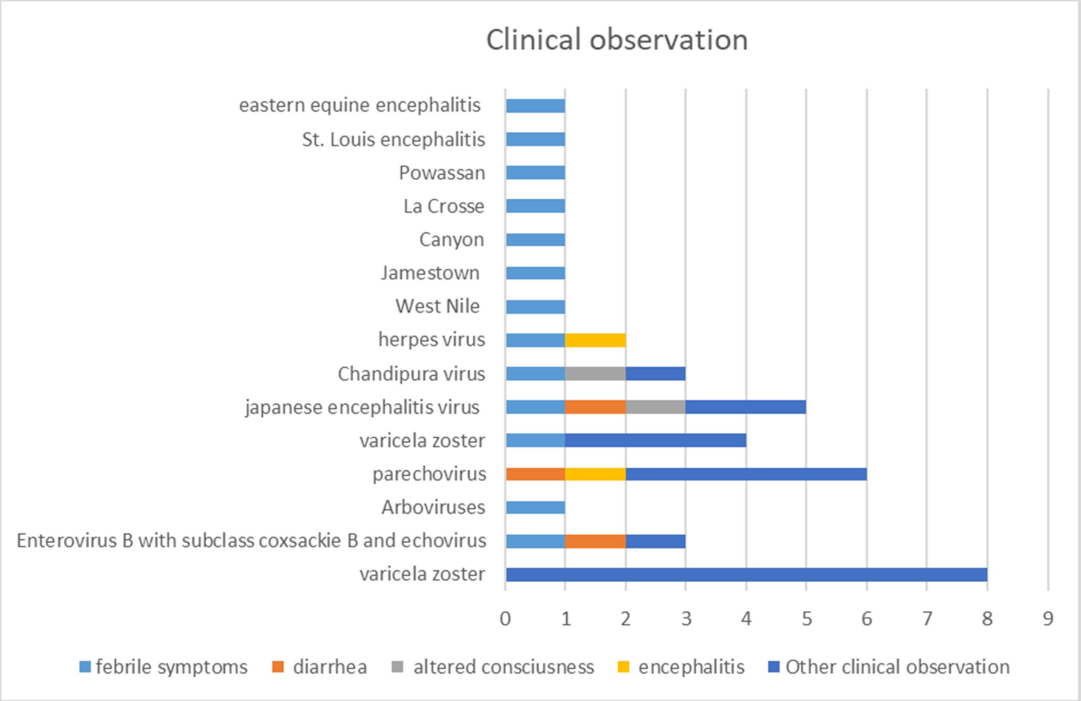


Figure 4. Viral involvement - different type of viruses shown in the clinical studies (meta-analysis)

Physiopathology: Anti NMDAR encephalitis is caused by antibodies, which are against the NR1 subunit of the receptor NMDAR.B, and the T type lymphocytes suffer transformation and play a role in the inflammatory process in this type of encephalitis (Chen D. Z., 2018).

Another mechanism is oedema and lymphohistiocytic infiltration, which occurs in the meninges and is a feature of aseptic meningitis caused by coxsackie viruses type B and echoviruses, which are subtypes of enterovirus B class. Hereby the encephalitic process involves gliosis but also implies microglial nodules. In the same time neurnophagia occurs as also neutrophilic infiltration and necrosis (Madakshira B. G., 2018). The parechovirus can cause in preterm infant white matter changes in the periventricular areas. The virus causes disruptions of the blood vessels through the mechanisms of haemorrhage and thrombosis (Kadambari H. S., 2018).

In the case of varicella zoster infection, this becomes evident when immunosuppression occurs because of drugs or because of a disease also due to trauma, X-ray irradiation. Infection or malignant status plays also a role (Kennedy, 2018).

In the Chandipura Viral Encephalitis model for mouse there is a reduction in CD4+, CD8 + and CD19 + cells (Gajanan, Sapkal, & Sawant, 2018). Symptoms are: fever, headache, vomiting, redness of the neck, lethargy. Severe symptoms of the disease: fever over 39.4 degrees, confusion, drowsiness, hallucinations, slow motion, coma, convulsions, irritability, photophobia.

Symptoms: Enteral viruses may cause a variety of symptoms which can include encephalitis, myocarditis as also lower respiratory tract infections (Madakshira B. G., 2018). When the infection is present, in most cases it manifests as a symptomatic febrile illness but in some cases the manifestations are as a neuroinvasive disease (Curren, et. al., 2018). The parechovirus cases in children determine appearance of a respiratory and gastrointestinal infection them. But these viruses can develop the symptoms of encephalitis. In these cases sometimes a macropapular rush is seen and this appears after 5 days of fever and its distribution is more distal. Meningitis as also myocarditis, and sepsis (Kadambari H. S., 2018). Chandipura Viral Encephalitis virus gives raise to symptoms of encephalitis in children with ages under 15. The onset is brutal and the complications are very severe and occur rapidly within 24-30 hours (Gajanan, Sapkal, & Sawant, 2018).

In the case of Japanese encephalitis, the symptoms are predominantly fever but also coryza diarrheal or rigor can occur. Other symptoms are altered mental status and associated convulsions, which are present in 75% of the paediatric population. Neurological symptoms consist of movement disorders, which can manifest like a parkinsonian syndrome including mask-like face and tremor and cog-wheel rigidity. Wakens and focal neurological deficits can complete the clinical picture in the course of the disease. Choreoathetoid movements might also occur (Amicizia Z. L., 2018).

Clinical symptoms observed in the meta-analysis of the different authors are shown in figure 5.

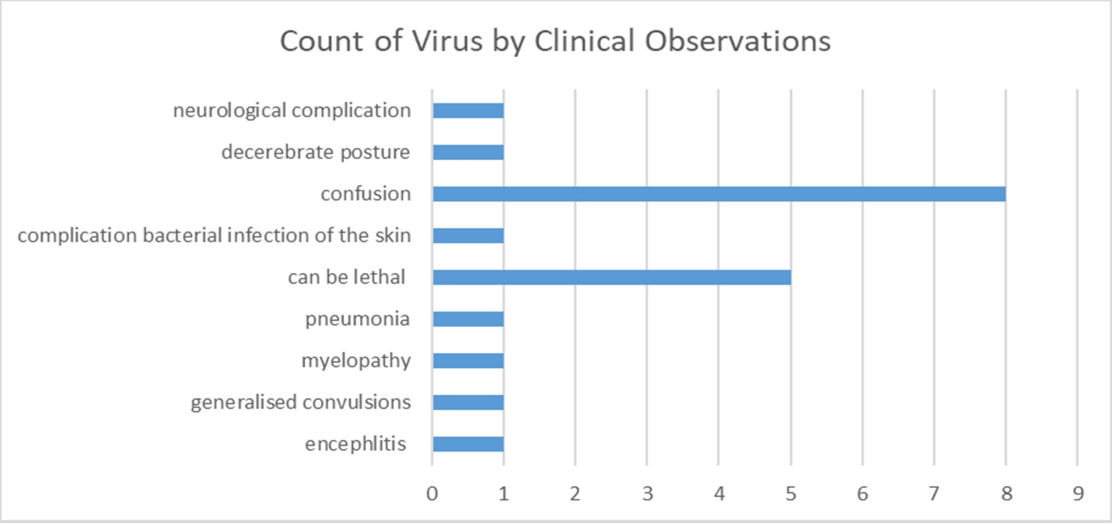


Figure 5. Clinical symptoms of encephalitis (meta-analysis)

DIAGNOSTIC based on etiology. Lab test: blood count. CT scan and MRI are important, also an EEG exam is performed. CSf puncture is obligatory. Screening is made also for YKL-40chitinase 3-like 1 or HCgp39) when a disease with inflammatory or neurodegenerative component is suspected; so far it is used in the NMDAR encephalitis as a biological marker. Other markers are IL-6 and TNFα (Chen D. Z., 2018).

Other tests are: malaria card test and identification of subpopulation of lymphocytes like CD3 and for CD68 immunostaining demonstrating macrophages. For lymph nodes, section and histological analyses are made. From various types of tissues and CSF and plasma, can done PCR reactions (Madakshira B. G., 2018). In other situations, such as in varicella zoster infection, DNA can be identified in the skin lesions of the disease with PCR (Kennedy, 2018). Tests for the Chandipura Viral Encephalitis are CHPV specific IgM capture ELISA with specific polyclonal antibodies and the Plaque reduction neutralization test (PRNT) is considered as 'gold standard' (Gajanan, Sapkal, & Sawant, 2018).

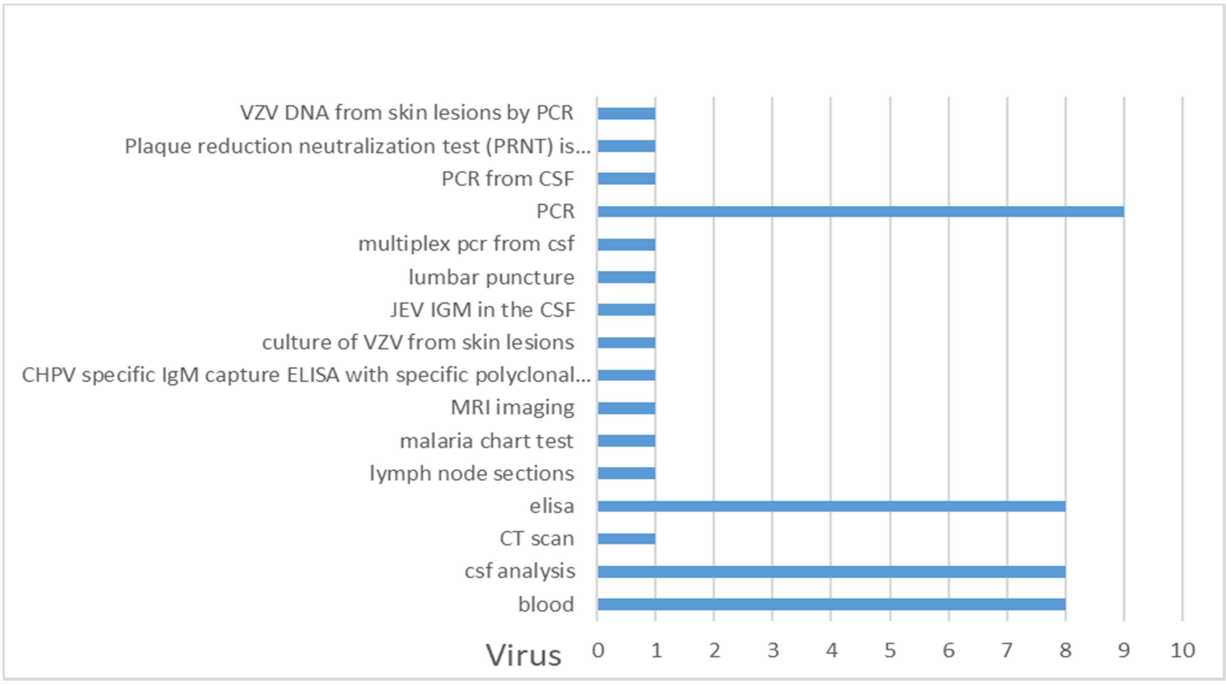


Figure 6. Meta-analysis of the analysis shown in the cited studies

There are more types of treatment, as following: Antiviral; Anti-inflammatory; Anticonvulsant; Supportive medication; Therapy of complications; Physical therapy for improvement of resistance, flexibility and motor coordination and balance; Occupational therapy for the daily activities; Vocal therapy for muscle control and to produce verbalization; Psychotherapy for coping strategies and new abilities.

The first are supportive measures, such as hydroelectrolytic balancing, anti-cerebral edema treatment, neurotropic, and other specific treatments such as cardiac support, respiratory support and kidney function support. Immunoglobulin is used in more severe cases (Madakshira B. G., 2018, Trandafir L et. al. 2018). Treatment of the par echovirus infection should not be focused on antibiotherapy so the earlier the diagnosis, the more unnecessary antibiotherapy might be avoided and the patient would stay a shorter period in hospital. Pleconaril is an antiviral agent used in this type of patients to inhibit the replication of the viruses, the mechanism being the inhibition of the uncarting of the viral RNA. Another therapeutic strategy was elaborated by a Finish group and consists of two monoclonal antibodies that have a target HPeV1.9 (Kadambari H. S., 2018). Varicella zoster can manifest as a severe form and then requires intravenous Acyclovir especially in immunocompromised patients and must be administrated at the start of treatment. The adverse effects of this type of treatment are gastrointestinal, neurological and also renal toxicity (Kennedy, 2018).

The treatment also includes symptomatic and blind treatment administered before the diagnostic is established and include therapy for different agents involved like herpes simplex virus type 1 (for example, acyclovir intravenous). Another therapeutic approach is through vaccines for the most common childhood infections like measles, mumps rubella and the poliovirus and for the varicella virus (Beaman, 2018). For Japanese encephalitis, the IC51 vaccine was obtained, a purified, inactivated vaccine, which can be administered to all ages. The vaccination occurs in 2 doses at four weeks distance (Amicizia, Zangrillo, Lai, Iovine, & Panatto, 2018). The research shows the economic-medical efficiency of the treatment used to improve the post encephalitic evolution in children. We analysed the costs of medication used for the treatment of encephalitis in the cases of 7 children hospitalised in the *Sf. Ioan* Emergency Hospital for children Galati.

We analysed the criteria of acute encephalitis by the multidirectional approach:

1. emergent problems,
2. epilepsy,
3. etiology (treatment with antibiotics).

The costs of the medical treatment of the children with encephalitis have several components:

- medication for amelioration of acute symptoms (medication for the viral invasion),
- treatment for the support of vital functions,
- maintenance treatment after the stabilisation of the patient.

The last component is related to the prevention of complications and the strengthening of the body for better results and the best possible functioning of the nervous system which a child can have.

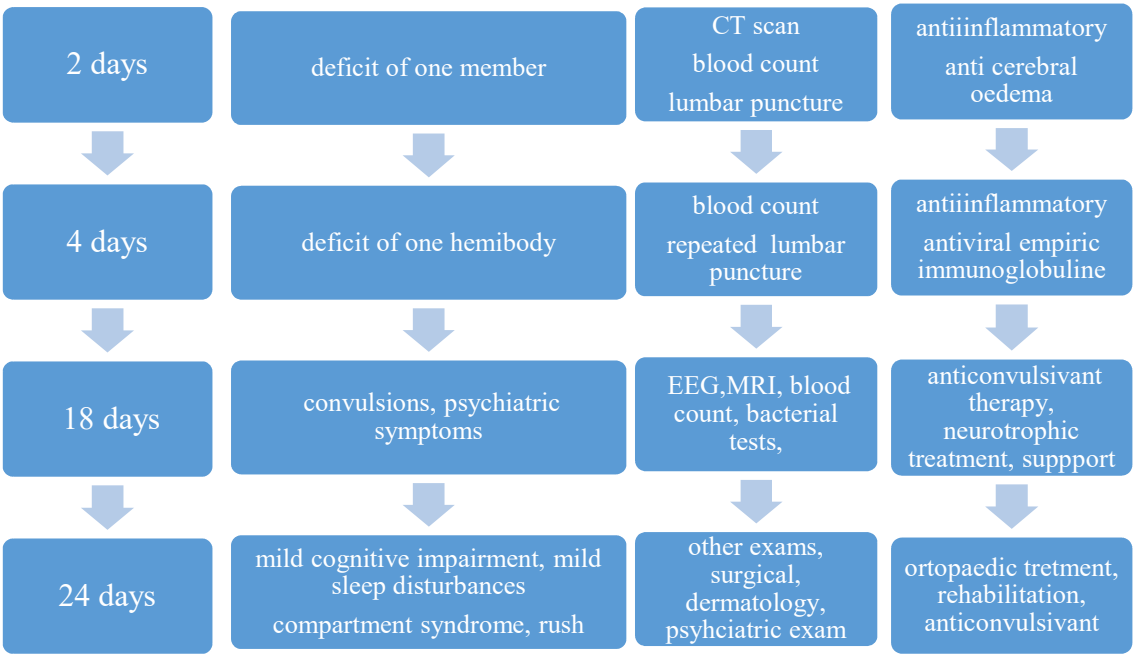


Figure 7. Presentation of cases depending on the duration of hospitalisation

Cost structure of the medical treatment of children with encephalitis by duration of hospitalisation

Public hospitals are public institutions integral funded by their proper incomes and functioning on the principles of financial autonomy. The sources of income of public hospitals are: sums received from the health insurance houses for performed medical services, other services performed by contract, as well as other sources from the state budget, according to the legislation.

Each year hospitals conclude contracts for health services with health insurance houses under the framework contract and methodological norms, for the following categories of services: hospital medical services, clinical medical services, preclinical medical services (laboratory medical

examinations, investigations medical imaging, etc.), dental health care services, family medicine medical services, pharmaceutical medical services (personal and non-personal medical supplies, medical devices), national health programs, emergency medical services and health care, medical care at home, health care services (Duceac et. al.l 2018).

In the framework of these services contracted with the health insurance houses, the hospital medical services, depending on the pathology, require long term hospitalization, or half day hospitalization under the conditions stipulated by the Framework Contract and the methodological norms.

The provision of hospital care is provided on the basis of the contracts concluded by the hospitals with the health insurance houses, taking into account the following hospital-specific indicators, as the case may be:

a) quantitative indicators: number of specialized medical personnel; number of beds established according to the organizational structure of the hospital; number of contract beds; the average national bedside index; number of days of hospitalization; length of hospitalization / effective hospitalization duration / average length of hospitalization at national level in acute wards, as appropriate; number of cases discharged to continuous hospitalization; case complexity index; number of hospital medical services granted under day hospitalization and number of resolved cases granted under day hospitalization; Diagnose Related Groups (DRG); average non-DRG case rate; the medical service tariff, respectively the case for solved for day hospitalization; rate per day of hospitalization for Chronic Department sections; the average hospitalization duration at the hospital level – DMS (average duration for hospitalization) spital for DRG-funded acute care hospitals and the average length of hospitalization at national level – DMS (average duration for hospitalization) nat for acute hospitals that are not funded under the DRG system, and

b) qualitative indicators: the degree of complexity of the hospital care provided according to the hospitalized morbidity; nosocomial infections in relation to the total number of discharges; the degree of operability recorded on surgical sections / compartments; mortality relative to total discharges; the number of emergency medical / surgical cases presented in the emergency structures (guard rooms), of which the number of hospitalized cases; the level of achievement of the annual management indicators.

The total amount contracted by hospitals with health insurance houses is made up of the amount for hospital medical services for acute diseases, which are paid on a case by case basis (DRG) for DRG-funded hospitals, case solved for non-DRG hospitals. In the case of hospitals payable on a case by case basis (DRG), the amount contracted (SC) by the hospital with the health insurance house, under the conditions provided by the Annual Methodological Norms for the application of the Framework Contract, for services of continuous hospitalization for acute conditions in the DRG system is calculated according to the following formula:

SC = P x (Nr_bed x IU_bed / DMS_hospital) x ICM x TCP, where:

- P - value of the reference percentage established in the hospital classification according to competencies;
- No_bed - number of beds approved and contractible after application of the provisions of the National Bed Plan, which does not include the beds for the departments and for ITU departments;
- IU_bed - index of bed use;
- DMS_hospital - the average length of hospitalization at hospital level;
- TCP - the weighted-rate tariff;
- ICM - the case-mix index.

For non-DRG-funded hospitals, the contracted amount is set according to the average rate per case solved, which is set as follows:

- number of contracted discharged cases x case-mix index last year x weighted-rate tariff for the last year, respectively,
- number of contracted discharged cases x average rate per case solved by specialties.

Since 2006, the Romanian Ministry of Health introduced, according to the legal framework, the cost statement, which is released to the patient for the received medical services, through which the public sanitary units were obliged to issue this reimbursement to the patients in order to highlight the value of the medical services provided by the health facility. The cost statement for hospitalized patients is calculated using a maximal cost/patient target within the approved income and expenditure budget, and takes into account the actual costs of hospital accounting, taking into account both the revenues from the contracted and received hospital payments from the contracts, for the supply of medical services health insurance houses for hospital care, health programs funded by the National Health Insurance House, which are run through the hospital, subsidies from the state budget, as well as any other incomes collected and used, under the law, for the provision of medical services. Public hospitals are public institutions financed entirely from their own revenues and operate on the principle of financial autonomy; the public hospitals' own revenues come from the sums received for the medical services performed, other contractually rendered services, as well as other sources, according to the legislation.

When it needs to determine the amount of the expenditure reimbursement for each discharged patient, the healthcare unit shall calculate:

a) rate per day of hospitalization per department / compartment of its own structure, excluding the value of the medication, sanitary materials or benefits that can be identified at the patient level and the distinct distinction on the account;

b) the number of days of hospitalization performed on an outpatient case;

c) the value of supplies - medications, sanitary materials or benefits that are not common and can be identified and quantified at the patient's level: medicines, including those in programs; sanitary materials, including those in programs; laboratory tests; other investigations; food allowance;

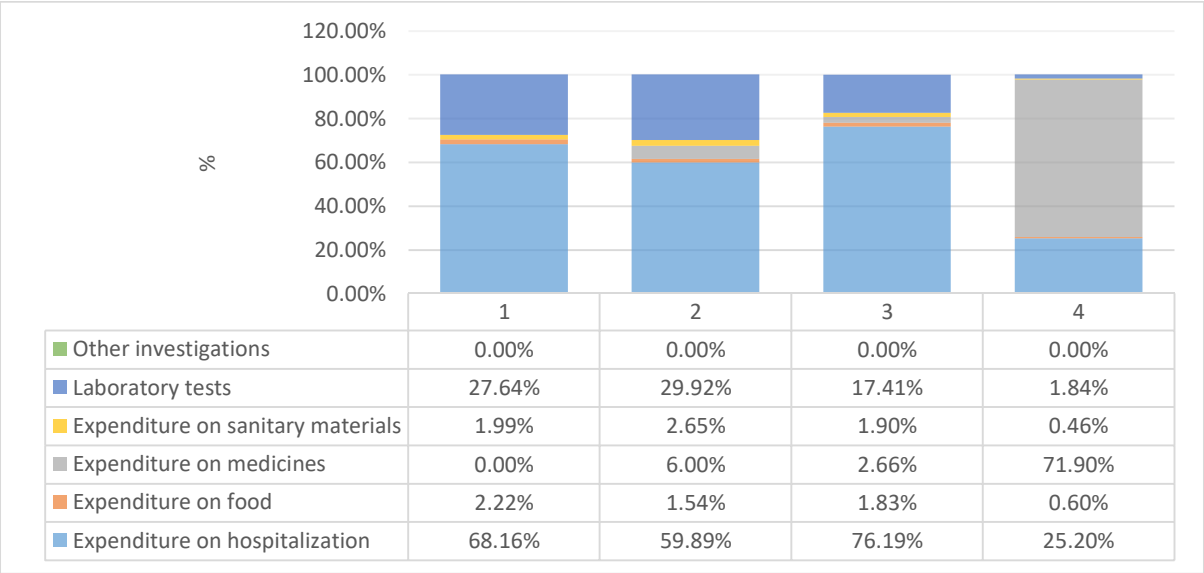
Within the daily hospital / departmental charge per hospital, all hospital expenditures made from all sources of income that are common to patients, except for the expenditures under (c) above, which can be distinct on each such as: - staff costs, - office supplies, - water, canal and sanitation costs, - expenditure on cleaning materials, - heating, lighting and driving force, - fuel and lubricant expenditure, expenditure on medical equipment, - expenditure on post, telecommunications, radio, television, internet, - expenditure on materials and services of a figurative character (maintenance, service, etc.) - expenditure on other goods and services for maintenance and operation ; - current repair costs on buildings; - disinfectant costs; -expenditure on goods in the nature of inventory objects, - travel expenses, postings, transfers, - consultancy and expertise expenses, - professional training expenses, - labor protection expenses, - insurance premiums, - other expenses, - construction expenditure, new and further investment, - expenditure on machinery, equipment and means of transport, including medical equipment, - expenditure on furniture, office equipment and other tangible assets, - capital repair related to fixed assets.

Table 2. Calculation of the relative weight of expenditures according to the duration of the hospitalization

Crt. No.	Duration of hospitalization days	2 days	4 days	18 days	24 days
	Expenditure on hospitalization	68.16%	59.89%	76.19%	25.20%
	Expenditure on food	2.22%	1.54%	1.83%	0.60%
	Expenditure on medicines	0.00%	6.00%	2.66%	71.90%
	Expenditure on sanitary materials	1.99%	2.65%	1.90%	0.46%
	Laboratory tests	27.64%	29.92%	17.41%	1.84%
	Other investigations	0.00%	0.00%	0.00%	0.00%
	Total	100.00%	100.00%	100.00%	100.00%

According to the table above, the structure of the medical treatment costs is represented predominantly for small and medium hospitalization periods, up to 18 days, on cost centres specific to continuous hospitalization. Another significant component of hospitalization costs is the cost of

para-clinical investigations. The analysis of the two significant expenditure categories reveals the inverse proportionality between the distribution of hospital expenditure and those for para-clinical investigations. In the sense that in the short term, the trend of hospitalization expenditures tends to increase directly in proportion to the duration of the hospitalization, while the trend of the share of costs with para-clinical investigations is inversely proportional once the increase in hospitalization duration.



	1	2	3	4
Other investigations	0.00%	0.00%	0.00%	0.00%
Laboratory tests	27.64%	29.92%	17.41%	1.84%
Expenditure on sanitary materials	1.99%	2.65%	1.90%	0.46%
Expenditure on medicines	0.00%	6.00%	2.66%	71.90%
Expenditure on food	2.22%	1.54%	1.83%	0.60%
Expenditure on hospitalization	68.16%	59.89%	76.19%	25.20%

Figure 8. Cost structure - relative weights

The relative weights of the expenditures according to the length of the hospitalization is modelled statistically, according to the median distribution intervals; the graphs of the costs by hospitalization are shown in the diagram below:

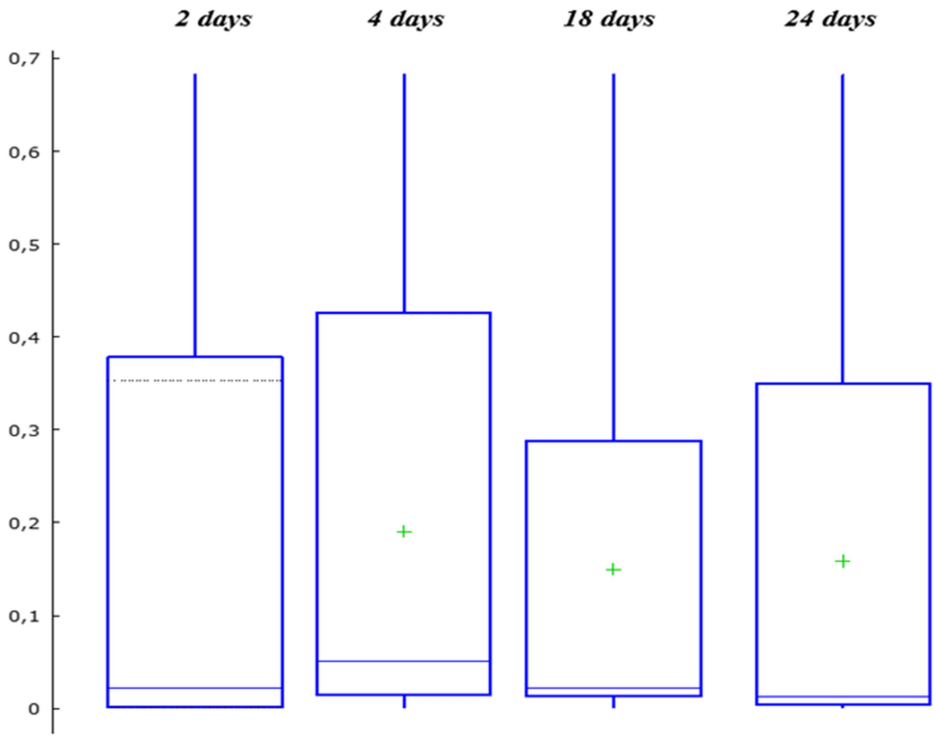


Figure 9. Distribution of costs during treatment - distribution intervals according to the diagram - boxplot diagram

Model 1: Tobit, using the observations 1-6
Dependent variable: 4 days hospitalization
Standard errors based on Hessian

Based on data on expenditure distribution by expenditure categories and duration of hospitalization, we have developed a statistical model, called Tobit, as a dependent variable, the 4-day hospital stay, provided in the Methodological Norms for the Application of the Annual Framework. The dependent variable was altered in relation to the repressors (the other hospitalization periods included in the study, respectively: short-term hospitalization, 2 days, 18-day medial hospitalization, and 24-day long-term hospitalization). The statistically correlated values have generated thresholds of high statistical significance, p-value <0.01, the residual normality test generating for the assumption that the error is normally distributed, p-value = 0.049. The convergence was reached after the 4th digit, the model being valid and significant for the studied model, regarding the financial distribution of expenditures according to durations of use.

			coefficient	Std. error	z	p-value	
18	days	hospitalization	−0.479214	0.0384232	−12.47	1.06e-035	***
24	days	hospitalization	0.101141	0.00679477	14.89	4.11e-050	***
2	days	hospitalization	137.704	0.0401596	34.29	1.14e-257	***

Log-likelihood 19.04636 Akaike criterion −30.09271
Schwarz criterion −30.92568 Hannan-Quinn −33.42713
sigma = 0.00466886 (0.00147642)
Test for residue normality -
Null hypothesis: The error is normally distributed
Statistical test: Hi square (2) = 6
with p-value = 0.0497871
Gradient in tolerance (1e-007)
Convergence achieved after 4 iterations

Depending on the type of treatment, the study reveals that the primary concern for financial allocation is 57% for relieving acute symptoms, while maintenance treatment after patient stabilization accounts for 23% of financial allocations, and treatment to support vital functions, a weight of 20% (Figure 10).

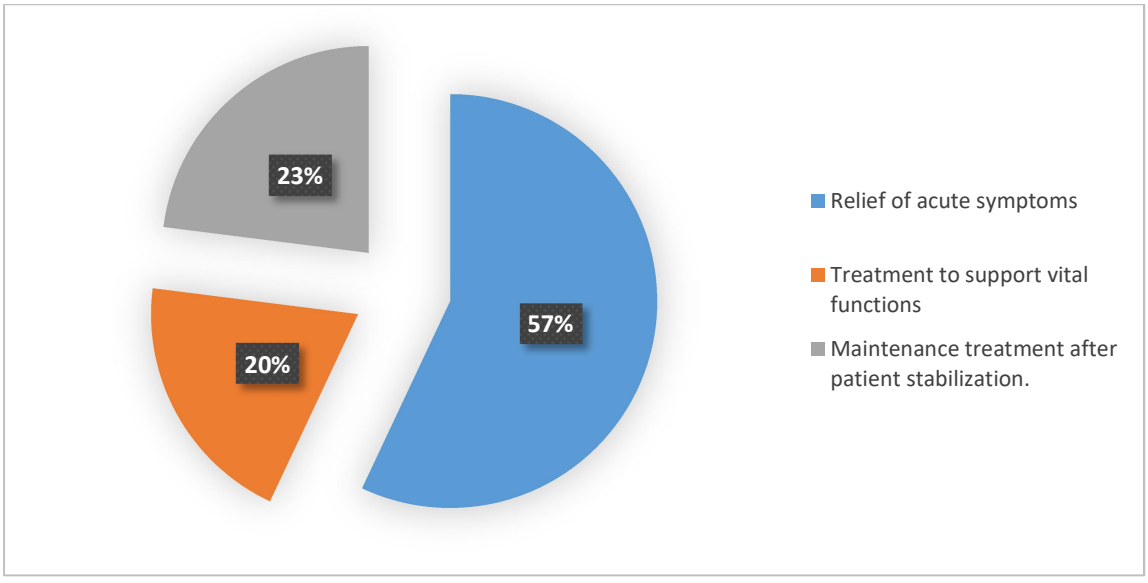


Figure 10. The average of the three treatments (according to the economic model)

According to the period of hospitalization, the improvement in acute symptoms tends to increase as a share in median treatment (up to 18 days), while maintenance treatment after patient stabilization is known to be inversely proportional to the evolution, the maximum weight as statistical significance being reached within the normed period according to the Methodological Norms for Application of the Annual Framework. Long-term treatment is an atypical case and knows changes in financial allocation in favor of 72% vital function support, a proportion that is maximum for all periods of hospitalization analysis.

Table 3. Treatment levels by length of hospitalization

Length of hospitalization days	2	4	18	24
Relief of acute symptoms	68.16%	59.89%	76.19%	25.20%
Treatment to support vital functions	0.00%	6.00%	2.66%	71.90%
Maintenance treatment after patient stabilization.	31.84%	34.11%	21.14%	2.90%

The figure below shows the distribution as a percentage of significance according to the length of hospitalization in ascending order, from 1 to 4, 1 - the minimum duration, 4 the maximum duration, the impact of the financial allocation for the types of treatment granted. The figure clearly shows that the distribution is a relatively symmetrical one and inversely proportional to the two types of acute treatment and stabilization.

Based on the data in Table 3, on which the stabilization costs were applied according to the Order of the Minister of Health, a trend equation of the evolution of costs was modeled on the two main categories, the evolutionary lines reflecting the fact that the inflection point from which the trend changes the evolution is that of the average hospital stay of up to 18 days. Until this moment, the improvement in acute symptoms has a lesser development than maintenance treatment, after which, starting with the average and long hospitalization times, the improvement in acute symptoms is significantly higher in terms of financial allocations.

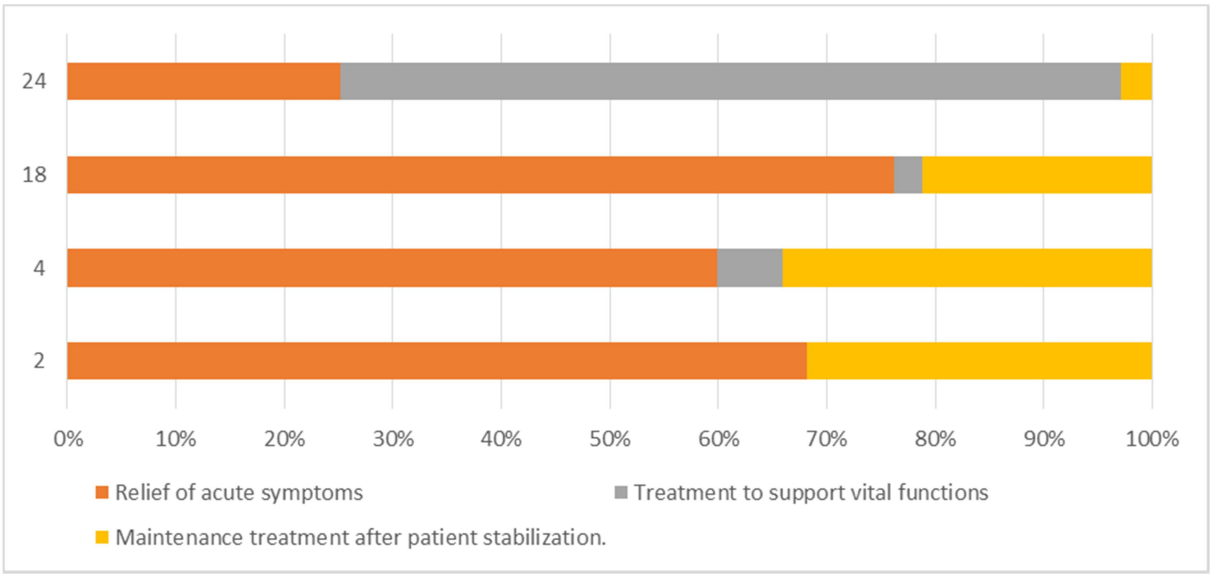


Figure 11. Treatment levels distribution

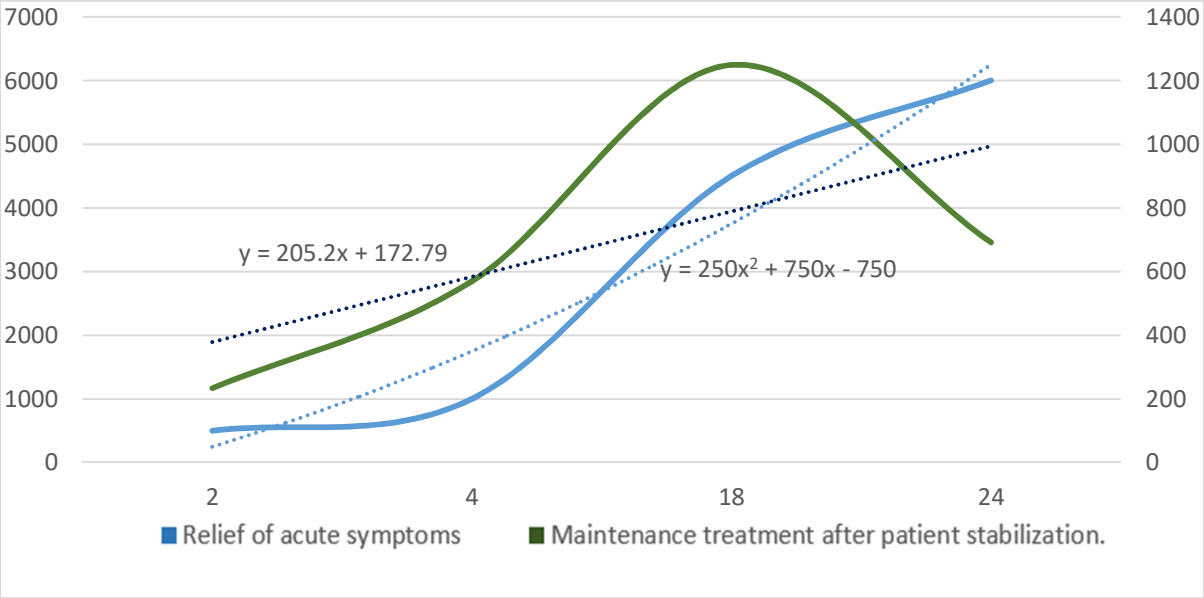


Figure 12. Transposition in real costs (at average cost of hospitalization / day = 250 lei)

The financial allocation process is of special significance and is directly related to the medical interest in ensuring the quality of the medical act and the achievement of the objectives of improving the patient's health and quality.

Conclusions

Encephalitis and the post encephalitic processes involved must motivate the workers in mental health to develop new protocols for the management of the complex cases in which viruses are involved which will lead to the development of brain injuries. The vast majority of encephalitis cases do not have a clear etiology. PCR reactions are undertaken so far in few medical health settings. Also intensive care units providing services for children with encephalitis are difficult to manage because the patient with encephalitis must stay isolated from other patients. Economic costs must be integrated with all facets of the medical and social intervention for the children affected by an encephalitis process. Laboratory tests are sometimes expensive but after a good diagnosis and treatment, they will reduce the duration of hospitalisation and the other costs implied. The costs of hospitalisation are interrelated and must be attentively managed. Acute symptoms amelioration costs for treatment represent 57%; consequently, to be effective these treatment must be triggered on a known physiopathological model and a known etiology of the disease. Even if not all costs are linear, the economic model can help the staff to anticipate unforeseen situations and to operate in a more efficient manner in the future knowing the impact of a group of diseases on hospital settings deserving an area of population.

This paper has created a model of economic and medical efficiency with future applicability for a better and easier understanding of the cost structure and effective treatment opportunities that can be implemented in terms of financial performance.

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