

## Specific Nursing Care Rendered In Hepatic Encephalopathy: Contemporary Review and New Clinical Insights

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Rec Date: May 06, 2015; Acc Date: Jun 08, 2015 ; Pub Date: Jun 16, 2015

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### Abstract

**Introduction:** Hepatic Encephalopathy (HE) is neuropsychiatric deterioration syndrome due to hepatic insufficiency. HE symptoms appear gradually ranging from altered mental status to deep coma and manifest as disorders of orientation, memory, perception, reasoning, focusing, rigor, and generalized convulsions. Four levels of HE exist with different symptoms.

**Aim of the paper:** To observe Specific Nursing Care rendered to hepatic encephalopathy patients and determining the significance of nurse education and employment length in HE patient healthcare.

**Methodology:** This is a cross-sectional study of 70 nurses in (Clinical Center of Serbia, Clinic for Gastroenterology and Hepatology) Between May1 to December15, 2011. The questionnaire was divided into two parts with 18 questions in total. The first part consisted of general questions (sex, professional education, working experience, working hours), while the second part had 13 questions assessing knowledge of nurses about the specificities of HE healthcare

**Results:** The most common cause of hepatic encephalopathy is ethylic cirrhosis with 69.2%, while 30.8% of patients with cirrhosis and HE died in period from 1.5.-15.12.2011. Nurses (N=70) declared that 91.4% of them had no adequate conditions to provide necessary HE patient healthcare. Out of N=70, 78.6% knew how to recognize first symptoms of HE while 64.3% nurses made no difference between HE and other diseases.

**Conclusion:** Specificity of HE patient healthcare encompasses nursing interventions and diagnosis. Through continuous education, respecting previous knowledge, it is necessary to focus on specific diseases such as hepatic encephalopathy with the aim of providing healthcare excellence.

**Keywords:** Healthcare; Hepatic encephalopathy; Nurse

### Abbreviation

HE: Hepatic Encephalopathy; CVC: Central Venous Catheter; HCC: Hepatocellular Carcinoma; SDD: Selective Digestive Decontamination; HRS: Hepatorenal Syndrome; DALY: The Disability-Adjusted Life Year; C: College; U: University

### Introduction

Hepatic encephalopathy (HE) [1] represents potentially reversible reduction of neuropsychiatric functions due to acute and/or chronic liver disease. It occurs most often inpatients with portal hypertension. The beginning is usually insidious, and is characterized by subtle and sometimes periodical changes in memory, cognition, associative higher intellectual functions, as well as altered personality. The liver plays a central role in the regulation of other organ systems through the spectrum of its functions related to energetic metabolism, hormonal and electrolyte balance, immunologic and immunomodulatory status. As a consequence, chronic liver disease causes a number of systemic manifestations that can dominate the clinical course. Some of these complications stem from the reduction

in number of functional hepatocytes and the resulting loss of synthetic and metabolic functional capacity. Others consequences are from portal pressure, leading to portal vascular collaterals opening and shunting with bypassing the liver lobules. These manifestations of cirrhosis –reduced synthetic reserve and disrupted perfusion are functionally connected and can change over time depending on various pathophysiological demands. Subtle signs of hepatic encephalopathy can be observed in almost 70% of patients with liver cirrhosis and they are called the subclinical form of hepatic encephalopathy [2]. Hepatic encephalopathy can be provoked by dehydration, excessive protein intake through food and certain beverages, constipation, hypo and hyperkalemia, digestive tract haemorrhages, infections, renal failure, hypoxia, use of barbiturates and benzodiazepine, as well as changes in physical factors (climate and atmospheric disturbances). Hepatic encephalopathy is progressive in terms of its clinical prognostic character. A nurse needs to know well the symptoms of encephalopathy thus being able to react promptly and adequately in taking care of such a patient. Hepatic encephalopathy can manifest itself acutely with a rapid deterioration of mental functions leading to coma, with no previous symptomatology [3]. Being chronic reversible in patients with pronounced portal hypertension, it is caused by certain precipitating factors (constipation, bleeding, and diuretics) which can be identified

and removed in most cases. The development of hepatic encephalopathy is a poor prognostic sign and is related to less than 32% of survival rate during first year. The most significant cause of this disease in the developed countries is alcohol abuse [4,5]. In Asia and Africa the most common cause of liver cirrhosis is hepatitis B virus (with or without delta antigens) [6]. The cause of cirrhosis of the liver can also be hepatitis C virus, hepatocellular carcinoma with intraparenchymatous dissemination (the so-called HCC satellite induced HE), various intoxications with heavy metals and poisonous gases, Wilson's disease (hepatolenticular degeneration), metabolic diseases (alpha-1 antitrypsin deficiency, as well as so-called storage diseases, such as hemochromatosis), while other half comprises autoimmune liver disease such as autoimmune hepatitis and primary biliary cirrhosis. HE has four grades of classification, on the basis of West-Haven Classification System [7] (Table1). HE diagnosis is established on the basis of physical clinical examination and biochemical panel. As far as biochemical markers are concerned, blood is taken for a complete blood workup which can indicate the presence of hyperammonemia usually with levels above 50mmol/l, elevated serum transaminases and bilirubin, hypokalemia, hyponatremia and azotemia. Analyses such as metabolic tests of glycaemia, serum osmolality, liver function enzymes, can point out to disorders in metabolism which are indicative for liver cirrhosis. Also urea, creatinine, eGFR, and cystatin C give away the functional capacity of kidneys whose function is also specifically altered in liver cirrhosis. If positive, hemoculture indicates the presence of pathogenic organisms, and administration of adequate antibiotics is mandatory. Coagulation status points to the presence of coagulopathy and low levels of coagulation factors predominantly factor V (with plasma half-life of 3-6h) and factor VII (also referred to as proaccelerin or labile factor) [8]. The biochemical examination of abdominal fluid, ascites (Rivalta test), bacteriological and cytomorphological examination (presence of malignant hyperchromatic cells) can also help determine the etiologic factor of liver lesion. Chest X-ray, ECG, ultrasound with portal system doppler examination and EEG are all basic diagnostic procedures that can be supplemented according to the state of the patient. The assessment of psychological status is conducted using a standardized algorithm preferably number connection test as well as using Glasgow Coma Scale when having severe HE form. Also, we must underline West-Haven criterias which are diagnostic hallmarks. Treatment is conducted through reduction of serum ammonia levels (restriction of animal proteins), administration of oral lactulose, oral or IV antibiotics, giving parenteral solutions with branched-chain amino acids, enemas, transfusions of blood and its components, and general healthcare [9]. The final and ultimately complete treatment for liver cirrhosis with hepatic encephalopathy is liver transplantation. Transplantation is an incremental factor incurring patients with liver cirrhosis [10,11]. To accurately establish the diagnosis of hepatic encephalopathy it is necessary to determine the severity of liver disease, exclude cerebral trauma, intracranial vascular and expansive lesions, metabolic disorders, as well as systemic hemodynamic distortions (checking continuously if cardiovascular and renal function is intact) [12]. As stated above, the approach to care differs depending on the level of encephalopathy in patients. It is necessary to establish adequate nursing diagnosis, upon which the planning goals for patient healthcare are defined. How does a patient with second (II) or third (III) grade hepatic encephalopathy clinically present? They speak incomprehensibly, they are often two or three dimensionally disoriented, with clinically pronounced abdomen due to ascites, their skin is sticky, colored from yellow to orange. Their odor is sweet, as well as breath, obstipation to diarrhoea is present usually with bimodal

incontinence and oliguria. Nutrition in comatose patients is parenteral: using infusions, with nasogastric or nasojejunal tubes, or with PEG tube in most severe cases with coexisting disorders. Due to altered state of consciousness patients can be aggressive, agitated, and they can try to get out of bed and hurt themselves, therefore, they have to be placed in intensive care units under a 24-hour observation in beds with side rails.

<b>Grade 0 HE</b>	<b>HE represents the minimal hepatic encephalopathy, known as subclinical, with minimal changes in personality and concentration.</b>
<b>Grade I HE</b>	Is characterized by trivial lack of consciousness, shortened attention span, insomnia, sleep inversion, euphoria or depression, irritability, decreased intellectual function with altered short term memory which rarely manifests
<b>Grade II HE</b>	clinically features the occurrence of lethargy, apathy, temporal disorientation, incomprehensible speech, inappropriate behavior and somnolence.
<b>Grade III HE</b>	Is characterized by somnolence, disorientation both in time and space, confusion or amnesia.
<b>Grade IV</b>	Represents coma.

**Table 1:** West-Haven Classification System

## Research Material and Methods

Survey data was collected using the self-administration method to ensure the confidentiality and anonymity with a previous oral approval of nurses being questioned. The analysis of medical documentation and official protocols in the Clinic of Gastroenterology and Hepatology of the Clinical Centre of Serbia was also conducted for the time during the study period May 1. to December 15., 2011. Sample size is selected based on criteria that are nurses employed at the Clinic for Gastroenterology and Hepatology - Clinical Center of Serbia, as well as nurses who are working with patients of HE. Employed nurses that are included in the study - 70 of 98. Data processing The SPSS program for Windows, version 17.0, was used for data processing. The comparison of numerical markers between two groups (working experience and level of education) was made using the chi-square (X<sup>2</sup>) test. Values p<0.05 were taken as statistically significant. Ethical considerations This study was approved by the chief nursing educator, head-chief nurse, and department chief nurses of our clinic where the research was carried out, as well as by the head of the Department of Scientific and Research Work, Education Activity and Human Resources of the Clinic of Gastroenterology, the Director of the Clinic of Gastroenterology, and the Director of the Centre for Scientific Research Work, Education and Teaching Activities and Human Resources of the Clinical Centre of Serbia.

## General sample characteristics

Out of the total number of nurses (N=70), 62 of them (88.6%) had only secondary medical school completed, while 8 had college or university degrees (11.4%). According to the length of working experience, 30 respondents had less than 20 years of experience (42.9%), while 40 respondents had over 20 years of working experience (57.1%). The average working experience was 17.3 years. There were 6 male nurses (8.6%) and 64 female nurses (91.4%). 37 respondents worked in shifts (52.9%), while 33 of them worked only in the morning. In the hepatology ward within the Clinic of

Gastroenterohepatology, there were 30 grade I and II HE patients and 13 grade III and IV HE patients in the period between May 1 and December 15, 2011. The causes for grade III and IV patients were, results: The findings of this study revealed that the most common cause of hepatic encephalopathy is ethylic cirrhosis with 69.2%, toxic liver disease induced HE with 15.4%, autoimmune liver disease HE with 7.7%, and hepatitis C virus (HCV) HE with 7.7%. Four patients died, or 30.8% of the total number of patients with Grade III and IV HE. 38.5% suffered from portal vein thrombosis, while 66.7% had esophageal varices. Sex distribution consisted of 73.3% of male patients and 13.3% of female patients. Each one of the patients was diagnosed with hepatic encephalopathy (100%) using West-Haven criteria and adjunctive number connection test.

## Research results (Table 2)

Participants with 20 years of employment status knew that HE is disturbance of consciousness (96,7%), while those with more than 20 years of professional experience gave correct answer in 62,5%, (p=, 001), and there wasn't any statistical significance relating to the educational level between two groups. On question if they would know to recognise symptoms of HE, first group (one up to 20 years of employment) said that they would recognise (90%), and those over 20 years of experience gave positive answer in 70% (p=,044), while interpreting the educational status, there wasn't any significant statistical difference. Participants up to 20 years would know how to read blood tests (83%) and those over 20 years of employment status answered positively in 50% (p=,004).

Question	N	C%	W%	According to working experience					According to education				
				Less than 20 y. C%	More than 20 y. C%	Less than 20 y. W%	More than 20 y. W%	P	SS C%	C & U C %	SS W%	C & U W %	P
Hepatic encephalopathy is a disorder of consciousness	70	77.1	22.9	96.7	62.5	3.3	37.5	0.001	74.2	100	25.8	0	NS
I know how to recognize first signs and symptoms of HE	70	78.6	21.4	90	70	10	30	0.044	75.8	100	24	0	NS
Can you interpret blood results# of patients with HE	70	64.3	35.7	83.3	50	16.7	50	0.004	61.3	87.5	38.7	12.5	NS
HE is a chronic disease	70	31.4	68.6	26.7	35	73.3	65	NS	27.4	62.5	72.6	37.5	0.044
Do you work in adequate conditions for HE patients care	70	8.6	91.4	10	7.5	90	92.5	NS	4.8	37.5	95.2	62.5	0.002
Are there procedural standards for providing health care to HE patients	70	5.7	94.3	3.3	7.5	96.7	92.5	NS	3.2	25	96.8	75	0.013

**Table 2:** Knowledge and attitude of nurses toward hepatic encephalopathy Knowledge and attitude of nurses toward hepatic encephalopathy, N – total, C – correct answer, W – wrong answer, SS – Secondary medical school, C – College, U – University, NS-not significant, #Blood results: urea, creatinine, hepatic transaminases

The fact that HE is chronic disease nurses with higher education (C\* i U\*) knew in 62, 5%, while nurses that just graduated from high school didn't know that (72,6%) (p=,044). Up to 91, 4% of nurses said that they don't have adequate conditions for taking care of HE patients i.e. nurses with high school (95,2%) and those with higher education (62,5%) (p=,044). On question are there standards in healthcare procedures, 94,3% of all replied negatively, and influence of education for this question gave statistically significant result in those with high school in 96,8%, and in those with higher education in 75% ( p=,013).

## Discussion

Liver cirrhosis represents around 1% of overall global disease burden expressed in DALY (The disability-adjusted life year). The share of cirrhosis in global structure of dying is 1.4% [13]. In line with this non-negligible percentage, the prevention of this disease is of great importance. And if disease does appear, high-quality healthcare is

crucial in the clinical management process. Liver diseases comprised 1.0% of the total mortality rate in central Serbia and Vojvodina in 2000 [14]. Accessing the medical documentation, one can observe that share of cirrhosis in the structure of dying is correlating with prevailing alcohol intake as the primary etiological factor. Regardless of etiology, patients with hepatic encephalopathy have multiple specificities of health care. This paper aims to present the specificities of health care through nursing interventions in the purpose of providing better excellence in healthcare. Adequate care is of utmost importance in all phases of HE [12]. The specificity of health care for such patients would reflect in: Low-protein diet (meat and meat products), mushy and/or liquid food (due to accompanying esophagogastric varices). Diet regulates protein catabolism and allows the ammonia levels leveling in blood, simultaneously leading to adequate passage through intestines which prevents the occurrence of constipation. The limited intake of proteins is an important part of therapy, since it

enables the correction of nitrogenous substances balance in the organism [12]. The intake of probiotics regulates the gut flora and bowel movement, on the one hand, while it reduces the risk of bacterial translocation and subsequent septicemia as a common secondary complication in HE patients, on the other. The reduction in the possibility of sepsis development improves the prognosis of patients with hepatic dysfunction, thus the intake of yoghurt with added probiotics is recommended as an adjuvant nutritional therapy [15].

The intake of lactulose, a non-absorbable disaccharide which reduces the level of serum ammonia concentration, as well as its absorption, is the cornerstone therapy in the overall strategy of HE treatment [4,16,17]. A patient should not be administered any oral therapy two hours before and after the intake of lactulose to achieve full therapeutic effect of administered drug. The optimal intake of liquid is of great importance due to ascites, with special attention on avoiding the over diuresis syndrome. The effective diuresis larger than 600-800/24h must not be provoked because it leads to prerenal azotemia, which further deteriorates cerebral perfusion, increasing the severity of HE. Every infection can lead to or deteriorate the condition of patients into encephalopathy, thus, for the purpose of monitoring the transaminases in blood, bilirubin, proteins and other biochemical factors, a nurse has to perform venepuncture almost daily. Therefore, placing a CVC is recommended, naturally, only if the coagulation status of the patient allows such an intervention. Infections increase the mortality of HE cirrhotic patients, especially pneumonia, sometimes with the main cause of death in such patients [18]. Special attention should be focused on decubital ulcers which may appear due to prolonged bed lying. The risk of cellulitis also increases because of poor skin integrity and development of peripheral edema [8]. Inadequately treated cellulitis can lead to fasciitis and a potentially lethal phlegmon – *Vibrio vulnificus* cellulitis. Urinary catheter insertion. Everyday care of catheter should be overall clinical strategy hallmark. Continuous diuresis monitoring with the measurement of urine output should be an important parameter which pinpoints the beginning of hepatorenal syndrome (HRS). Time span development of low urine output is the differentiation stigmata between type I and type II of HRS. Type I HRS is the prognostic omen sign of the primary liver disease [19]. Rinsing the bladder and clearing or other undesirable contents is beneficial thus preventing post renal insufficiency or azotaemia [20]. Treatment of mouth cavity, where candida may appear due to overzealous antibiotic administration should also be considered as the mainstay of therapy. These patients have ascites and large abdominal girth, their skin should be treated with hydrating creams, especially in abdominal region, since there skin is stretched and the feeling of pain and tension is highly pronounced. Positive reciprocal correlation and associated with both hepatic encephalopathy and ascites as a risk factor for these complications and for death [21]. Abdominal therapeutic and diagnostic puncture and centesis should be performed rationally and moderately. The use of diuretics and abdominal centesis leads to positive response in 90% of patients, with the decrease in total body weight being the best indicator of diuretic, nutritional-dietetic and interventional therapy. However, the decrease in total bodyweight must not exceed 10% during a weekly period [22]. The hepatorenal syndrome (HRS) may insidiously overcome compensatory mechanisms and administered therapy and is characterized by acute renal failure with decrease in total urine output. It occurs in approximately 10% of patients with disease progression [23]. Using diuretics, nutrition and interventional techniques should be cautious respecting hemodynamically over-sensed nephrons. In

some patients, progressive oliguria appears with rapid increase in serum concentration of creatinine, and this is type I of hepatorenal syndrome. Type II HRS appears more frequently and it is characterized by increase in serum concentration of creatinine and urea with chronic to moderate progression which usually takes place in the time period of six or over six weeks from the disease starting point (pathological black point). Care of IV cannulas. Every intravenous route is a potential place of infection entry [8]. Bacterial infections are present in about 15% -47% of patients with cirrhosis of the liver, especially in relation to gram-negative bacteria. The most common spontaneous bacterial peritonitis (SBP), urinary tract infection, pneumonia, pleural empyema and sepsis [24]. The patient receives infusions through one or preferably more IV routes, most often glucose or 0.9% NaCl with added potassium, magnesium sulfate or concentrated 3% NaCl [25]. Here the nurses role is pivotal giving the therapy strategy cornerstones of not only maintaining IV routes but also recognizing complications early e.g. thrombophlebitis, deep vein thrombosis or apparent hemorrhagic cutaneous or mucosal syndrome. Patients with acute liver failure, with grade III or more importantly grade IV HE, need to be intubated and put on mechanical ventilation following gas analyses every 8 hours. This should be standard of nursing monitoring care surveilling respiratory insufficiency (most frequently etiological factor is hepatopulmonary syndrome). Mechanical ventilation should be with sedating agents like fentanyl aiming the protection of respiratory system and/or phenobarbital which is a neurocerebral modulatory agent for early treatment of cerebral edema by decreasing intracranial pressure as well as maintaining sedation [3]. Central nursing fields of intensive treatment should encompass knowing all the principal pharmacodynamics and pharmacokinetics of neuromodulatory agents which have effect on respiratory function. Nurses should be able to recognize overdosing of these agents since they are pulmonary function depressants when used in higher doses. Bleeding in the digestive tract complicates further HE patients treatment since proteins from blood contribute to high levels of serum ammonia. Therefore, intestines should be decontaminated and cleared of its content. This maneuver is called selective digestive decontamination (SDD). Also bleeding induced infections can occur, so proper use of antibiotic prophylaxis should be given respecting pharmacokinetic profiles of given antibiotics. One old and good technique which is in use for decades SDD through deep enemas with or without lactulose. Therefore, nurses need to independently perform an intervention of giving deep enemas as an overall therapeutic modality. In the case of hematemesis doctor inserts the Sengstaken-Blakemoor tube with the necessity to provide drainage and skin care around the nostrils. A nurse has to prepare both the adequate material and the patient, and she or he has to assist actively in passing the tube. Blood vomiting usually occurs due to the varicosity in the upper portions of the digestive tract. Esophageal varices are present in 30% of patients with liver cirrhosis and 60% of patients with decompensated liver cirrhosis. Every episode of repeated bleeding carries 20% mortality rate [8,26]. The oxygen therapy is necessary in patients with altered consciousness. Oxygen should be administered through a nasal catheter, best using a mask. The continuous assessment of the respiratory status, including the respiratory rate, and oxygen saturation, should be performed through constant gas analyses. Passing an arterial cannula in Gr IV HE patients with acute liver failure should be particularly emphasized, since it allows for a continuous monitoring not only of blood oxygen saturation, but also of lactate and bicarbonate blood levels. The arterial cannulation gives as a clear-cut, always accessible arterial blood pH, without repeated

punctures of arteries [22]. When noticing that pH curve is shifting it should alarm the nursing staff that with it hemoglobin oxygen saturation curve shifts as well prompting doctors evaluation and therapeutic intervention. Regular monitoring of total body weight and abdominal girth. Receiving therapy and abdomen ascites centesis leads to change in abdominal girth and total body weight. Patient should loose from 0.3 to 0.5kg per day, however, if weight loss is greater it can lead to renal failure, since kidneys become more hypo perfused and sensitive to hemodynamic alterations [22]. Multimodality monitoring is tracking of multiple parameters of brain activity (monitoring intracranial pressure, EEG waves). This modern monitoring system has been used worldwide for over 20 years in neurointensive care units [27], facilitating the work of nurses and doctors, and influencing timely and accurately interventions with the improvement in patient's condition through its parameters and clinical status. Patient communication is hampered, i.e. they pronounce words with difficulty and speak incoherently, therefore it is necessary to spend enough time with them to show empathy and understanding. Communication with the patient's family is of utmost importance. Adequate communication with family members in relation to changes in the clinical status and condition offers the family an insight into the actual situation concerning prognosis and course of the disease [8,28]. In a healthcare institution, it is preferable to have a written document stating what kind of information concerning the patient's condition a nurse can convey to patient's family members. From the available medical literature, but above all from the experience of doctors with whom nurses work with, it is a well-known fact that a well educated and problem solving oriented nurse is crucial for the success of intensive care interventional procedures performed by doctors. A nurse offers psychological stability to the entire team led by a doctor, and helps the creation of positive atmosphere when highly complex procedures are performed such as insertion of a hemodialysis two lumen catheter through jugular venous system especially if low access point in the internal jugular vein is chosen or subclavian vein access point. Through their calmness and positive attitude, nurses often make the difference between success and failure of interventions performed by doctors in the intensive care units. This study examines the specificities of healthcare in patients, as well as the influence of knowledge and attitudes of nurses in providing best healthcare to patients with hepatic encephalopathy. Since knowledge is an socio-epidemiological determinant which is also related to informational level of the individual it can be concluded that respondents did not possess a substantial knowledge level of HE. Obtained research results show that correlation between the work quality factors (elaborated in more detail in the conclusion of this study) and ill-informed nurses, i.e. their lack of knowledge (44.3% stated that they did not receive any information at all), is statistically important and it carries a significant statistical relativerisk. Furthermore, the use of the Internet as an universal electronic tool for continuous medical education and self-evaluation is at a very low level, and it speaks of poor motivation of the staff for self-improvement and self-education, which is increasingly present both in contemporary literature and modern medical trends (personalized medical self-education –medline or medline plus networks and medscape internet community). Aspect of interpersonal relationships should also be mentioned, where the flow of information between doctors and head nurses, on the one hand, and ward nurses, on the other, is below the level necessary for further development and improvement of work quality (just 25.7% and 22.9%of staff personnel with secondary education received information from doctors and head nurses). Speaking of interpersonal relationships, it should be emphasized that they can have a beneficial or adverse influence on all

three factors of work quality, defined and explained in more detail in the conclusion chapter of this study. Therefore, interpersonal relationships should be highlighted due to their prospective and universal importance, which makes the man inevitable part of any future epidemiological study dealing with the same or similar medical topic. It is precisely because of the fact that an integrated approach to HE patients is needed, statistically significant percent of nurses need (72.9% of respondents) continuous medical education. Moreover, it is believed that a better organization of continuous medical education would contribute at first hand to the increase in staff interest for further tertiary education, as well as the higher quality of secondary education. Secondly, the choice of topics of continuous medical education should be closely related to the specificities of HE patient care so as to have not only scientific and theoretical, but also practical significance. Thirdly, nurses need to participate actively in education, best in the format of panel discussion which needs to be implemented into continuous medical education, which will allow interactive approach making education clearer and more efficient. Therefore, it is not only sufficient to maintain continuous medical education, but to be modified as well. Since the staff personnel awareness is at respectable level (54.3% of nurses realized the importance of adequate and specific care of HE patients), it is also necessary to introduce the regulated improved official guidelines to nursing care, which would raise the existing awareness of the staff in the HE patient care. Healthcare is part of curative, restorative-healing, invigorating and rehabilitating process. The provided nursing care is of great importance in the treatment of HE patients [29]. Recognition and treatment of encephalopathy is critical for improving survival outcome with less complications in critically ill patients [29]. Managing complications in patients with cirrhosis in intensive care settings requires knowledge of various fields of medicine for doctors [10], which should also apply to nurses. Clinical guidelines already exist for doctors in this institution, but having in mind that the majority of staff recognizes their pivotal role in the complete medical therapy, it is necessary for such guidelines to exist for the nursing staff as well making the roles of doctors and nurses mutually complementary. Furthermore, this would ensure better interpersonal relationships, since it would define the position or place of every nurse in the medical team. Nursing guidelines would contribute to the standardization, as well as uniformity, of educational and interventional factors of work quality. Guidelines could also be modified on the basis of recognizing the importance of adequate and specific care of HE patients thus preparing nurses for addressing adequately any clinical problem and/or complication in HE patients. Clinical nursing guidelines would also allow better medical economics, i.e. pharmacoconomics, since they would avoid the problems of nursing polypragmasia or economic dispersion in interventional procedures. In addition, such guidelines would define when and which signs, symptoms, i.e. complications, in HE patients call for an alarming situation and establish the list of priorities that would eventually lead to great cost savings. In severe liver diseases, where there is no possibility of curative treatment, it is necessary to provide palliative care. Nurses and doctors are best aware of the symptoms which cause significant quality of patient's life impairment. Their task should be that as a team ensure a general sense of well-being of the patient and a dignified passing if it occurs. It is of great importance to alleviate the final moments of life when it is needed [8], which implies comprehensive engagement of health staff with the provision of organized palliative care. Based on the conducted research in our center, we believe that there are three principal factors that would improve the work of the medical staff with HE patients: economical,

educational, and interventional. Hospitals are not only institutions where medical help is provided, but also institutions of social and economic character.

### Economical factor

The lack of equipment and working conditions which hinder adequate treatment of HE patients, but also impair further education of the staff with secondary education.

### Educational factor

A statistically relevant number of questioned staff with secondary education knows how to recognize the manifestations of HE in patients with liver cirrhosis thus accurately establishing appropriate nursing diagnosis, leading to temporal optimization of therapy commencement. The continuous education and improvement of nurses is of significance when it comes to new medical apprehension and technologies being implemented into practice. Educational factor would ensure that quality of provided care is both effective and efficient. In our research, nurses expressed a good will for continuous education, which should be made possible for them.

### Interventional factor

The results show that majority of respondents don't know the difference between the nursing treatment of HE patients and other patients, which results in a poor interventional skills and therapeutic procedures during the course of the treatment.

### Conclusion

The specificity of health care in patients with hepatic encephalopathy is of multilevel nature clinically speaking and of great importance in the overall treatment process. Nurses should have the necessary work conditions and continuous education thus enabling effective and efficient care through nursing interventions. The above mentioned three principal factors (economic, educational, and interventional) lead to work improvement of the secondary staff education and better therapeutic modality of HE patient's treatment. These three factors are universal and can be applied as parameters of quality in every health care institution, i.e. at every intensive care unit regardless of the specific clinical pathology. Therefore, this paper has a universal meaning that should help the secondary staff education no matter in which medical institution or ward they are currently employed. The mentioned factors are in a direct correlation with each other and they can be only observed as a whole, where the failure to meet one of the factors is sufficient to make the algorithm of HE patient healthcare unsuccessful. It can be concluded that, apart from the substantial level of staff education, further education process has to improve the other two factors of quality of work, which are: the interventional - therapeutic skills of nursing staff and the upgrade of equipment and improvement of general working conditions.

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