ORIGINAL RESEARCH

A Qualitative Study on Cryptogenic Hepatic Encephalopathy Screening Cognition Among Hepatology Medical Care Personnel

Xiao-Qin Li, Wen Cao, Tian-Tian Yin, Rui Lu, Yang Li, Ya-Yun Sha

Department of Infectious Disease, The Affiliated Taizhou People's Hospital of Nanjing Medical University, Taizhou, 225300, People's Republic of China

Correspondence: Yang Li; Ya-Yun Sha, Department of Infectious Disease, The Affiliated Taizhou People's Hospital of Nanjing Medical University, No. 399 of South Hailing Road, Hailing District, Taizhou, 225300, People's Republic of China, Tel +86052386606252, Email liyangll69@126.com; shayayuns7@126.com

Objective: In this study, we focused on gaining an in-depth understanding on the attitudes and perceptions of hepatology healthcare professionals toward screening for cryptogenic hepatic encephalopathy (CHE), with the goal of providing references for the scientific and standardized implementation of CHE screening.

Study Methods: Based on the phenomenological research method, semi-structured in-depth interviews with nine medical professionals were conducted in March 2023 at the department of hepatology of a tertiary hospital in Taizhou city. The collected data was then integrated and analyzed using the Colaizzi seven-step method.

Results: Three main themes and seven sub-themes were identified: Inadequate knowledge of relevant information (inadequate knowledge of CHE, inadequate knowledge of neuropsychological test tools for CHE); positive attitudes toward screening for cirrhosis CHE; and screening factors (limited human resources, lack of stringent rules from the management, inability to properly use neuropsychological test tools, lack of cooperation from patients and their families, and lack of auxiliary means of screening).

Conclusion: Hepatology medical care personnel had a favorable outlook on CHE screening, however there is room for improvement in both their level of knowledge and clinical work. As a result the administrative departments of hospitals should focus on the factors affecting the clinical work of hepatology medical care personnel and formulate corresponding countermeasures. Emphasis should be placed on the screening and management of CHE for early recognition, early intervention, improvement of quality of life, and effective prevention of hepatic encephalopathy.

Keywords: cryptogenic hepatic encephalopathy, cognition, phenomenological research

Introduction

Hepatic encephalopathy (HE) is a syndrome of cerebral dysfunction caused by hepatic insufficiency and/or portosystemic shunt.[1] HE is classified into two types based on clinical symptoms: mild hepatic encephalopathy (MHE) and overt hepatic encephalopathy (OHE).[2] The "2014 Practice Guideline for Hepatic Encephalopathy in Chronic Liver Disease",[3] published in collaboration by the American Association for the Study of Liver Diseases (AASLD) and the European Association for the Study of the Liver (EASL), uses the West-Haven grading scale to categorize HE into grades 0 to 4, with grade 0 being minimal hepatic encephalopathy (MHE). Due to the strong subjectivity of West-Haven in distinguishing between grade 0 and grade 1 hEs, the International Society for Hepatic Encephalopathy and Nitrogen Metabolism has proposed that MHE, grade 0 hE and grade 1 hE be referred to as covert hepatic encephalopathy (CHE), and HE with grades 2 to 4 be defined as overt hepatic encephalopathy (OHE).[4] Patients with CHE may exhibit neuropsychological and/or neurophysiological abnormalities without any overt clinical manifestations, or they may present with only mild cognitive impairment, euphoria or anxiety, and decreased attention and computational ability, but without disorientation or asterixis (flapping tremor).[4] The prevalence of CHE in patients with cirrhosis is 39.1%.[5] Despite representing the earliest and mildest form of HE, CHE is prone to develop into OHE, leading to hospitalization and a poor prognosis, and

is a major cause of poor patient reported outcomes (PROs).[6,7] Patients with CHE are indistinguishable from healthy people, work and live normally, but have diminished emergency response and operation abilities—ability to work at altitude, operate machinery, or drive, and significantly higher risk of accidents. As CHE significantly affects the quality of life, driving skills, and socio-economic abilities of patients, timely diagnosis of CHE is essential for the improvement of quality of life, the reduction of accidents, and the improvement of prognosis.[8–10] The guideline from European Association for the Study of the Liver strongly recommended that patients with cirrhosis without a history of OHE be screened for CHE using empirical/instrumental procedures and local standards.[11] However, screening for CHE is challenging in clinical practice. First, CHE patients appear normal and exhibit only mild symptoms (such as decreased attention and reduced responsiveness), which are easily overlooked or misdiagnosed. Second, commonly used neuropsychological tests (such as the number connection test and Stroop test) require specialized training and patient cooperation, and their results may be influenced by factors such as the patient's educational level and cultural background. Additionally, the lack of awareness among healthcare professionals regarding CHE and its screening tools, as well as insufficient understanding of the necessity of screening among patients and their families, further increases the difficulty of screening. Early diagnosis and treatment can reduce hospitalizations and treatment costs associated with overt hepatic encephalopathy (OHE), lower healthcare expenses, and improve patients' quality of life and social functioning. In China, routine screening for covert hepatic encephalopathy (CHE) has not yet been implemented, and the awareness of CHE among the majority of healthcare professionals is insufficient.[4] Early diagnosis and treatment of CHE depend on medical professionals' awareness of the condition, their skill in making a diagnosis, and the effectiveness of screening tools. In this study, medical care personnel from the department of hepatology of a tertiary care hospital were selected as the study participants, and the descriptive phenomenological research method was used to investigate the attitudes and perceptions towards CHE screening, with the goal of providing a reference for the scientific and standardized implementation of CHE screening.

Objective and Study Methods
Objective
Medical care personnel in the department of hepatology of a tertiary hospital in Taizhou City were selected as study participants in March 2023 by using the purposive sampling method. To ensure that the study participants were diverse and representative, medical care personnel from different wards of the department of hepatology and with different professional titles were selected. Inclusion criteria: (1) be licensed to practice; (2) worked in the specialty for ≥ 3 years; (3) voluntarily participated in this study. The saturation of the data determined the size of the sample, and data collection was stopped when no new codes or themes emerged during data analysis.[12] Nine medical care personnel in the department of hepatology were finally enrolled, numbered N1 to N9, and the general information of the study sample is shown in Table 1.

Table 1 General Information of the Interviewed Medical Care Personnel in the Department of Hepatology

Serial Number	Gender	Age (years)	Education Background	Professional Experience (Years)	Professional Title
N1	Female	46	Undergraduate	18	Co-chief superintendent Nurse
N2	Female	32	Undergraduate	7	Nurse
N3	Female	47	Undergraduate	28	Co-chief superintendent Nurse
N4	Female	31	Undergraduate	3	Nurse
N5	Female	55	Undergraduate	29	Nurse-in-charge
N6	Female	37	Undergraduate	10	Nurse-in-charge
N7	Male	55	Undergraduate	32	Chief physician
N8	Female	35	Master's degree	10	Attending physician
N9	Female	44	Ph.D.	15	Associate chief physician

Research Methods
Data Collection
We utilized the phenomenological research method in this study for qualitative research, and the interview outline was created by consulting with relevant experts prior to the interview. We conducted pre-interviews with two medical care personnel who met the inclusion criteria, to ensure the comprehensiveness of the interview outline and to verify whether the interview outline could achieve the expected interview effect. Based on the results of the pre-interviews, the interview outline was further improved, and the finalized interview outline was as follows: (1) Please tell us about your views on covert hepatic encephalopathy. (2) Do you think it is necessary to screen for covert hepatic encephalopathy? Why? (3) Which neuropsychological test instruments used for screening covert hepatic encephalopathy are you aware of? From which source? (4) Who do you think should do the screening? (5) Do you routinely screen patients with cirrhosis? (6) Which factors do you think result in the paucity of screening?

To collect data, face-to-face and individualized in-depth interviews were conducted, and the interviews were synchronously audio-recorded. Before the interview, the researchers introduced themselves, explained the purpose, significance, and duration of the interview to a respondent, and obtained his/her consent for the audio recording. Codes were used instead of names to protect the privacy of the respondents. The researcher made an appointment with the respondent ahead of time, and the interview was scheduled in the afternoon to avoid the peak hours of the ward rounds and treatments and was conducted in a quiet and peaceful reception room. Each interview lasted for about 15 to 20 minutes. The researcher respected the respondents' answers, did not intervene or judge, did not use inducing words, and used interview techniques such as repeating, clarifying, questioning, and supplementing to elicit the details, while also observing and recording the respondents' facial expression and emotional changes.

Data Analysis
For timely data analysis, recorded data were organized and transcribed within 24 hours after each interview. Nonverbal cues such as expressions, emotions, and body language were also added. The Colaizzi seven-step analysis method for data analysis included data organization, identification of meaningful statements, coding, clustering themes, in-depth theme description, creating theme prototypes, and returning for validation.[13]

Results
The following three themes and seven sub-themes were developed from the compilation and analysis of the interview data.

Inadequate Knowledge of Relevant Information
Inadequate Knowledge of CHE
Based on the interview results, two of the nine respondents answered directly that they did not know about CHE, while the remaining seven indicated that they knew about CHE, but only four were able to answer correctly about CHE. Although the corresponding training was conducted in the past, the training was not systematized, resulting in inadequate knowledge of CHE among medical care personnel.

N2 said:

Is there an incubation period for covert hepatic encephalopathy? I am not sure.

N7 said:

I am not sure, if covert means there are no symptoms? I haven't focused on it. Patients are admitted to the hospital because they have symptoms. If they do not have any symptoms, they won't come voluntarily.

N5 said:

I know to some extent that hepatic encephalopathy refers to cognitive problems in patients while everything else remains normal, right? There was training conducted in the department previously, but since it is not used frequently, we tend to forget over time.

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These findings highlight the need for more comprehensive and ongoing education on CHE.

Inadequate Knowledge of the Neuropsychological Test Tools for CHE

The HE neuropsychological test is the "gold standard" for the diagnosis of CHE,[3] but the interviews revealed that most of the medical care personnel had incomplete knowledge of the HE neuropsychological test instruments, and even relied on the presence of asterixis to determine CHE.

N2 said:

> I don't know what screening test instruments are available, and usually judge by relying on asterixis and computation ability.

N7 said:

> Asterixis, abnormal behavior, and blood ammonia monitoring can be used to screen.

N3 said:

> I just know that the neuropsychological scale is adequate, not much else.

N1 and N6 said:

> I am familiar with number connection, Stroop, animal naming, and other tests.

N4 said:

> There is an app for that, but I don't know its name.

N8 said:

> Number connection I think, not too sure about the rest.

These findings underscore the need for improved training on neuropsychological screening tools.

Positive Attitudes Towards Screening CHE

All respondents agreed that patients with cirrhosis should be screened for CHE. As CHE is associated with a high risk of patient-reported poor clinical outcomes, falls, motor vehicle accidents, financial burden and family care responsibilities, and the development of OHE, CHE screening is critical for early detection and intervention. Cirrhosis CHE screening can help to demonstrate the benefits of the specialty.

N1 said:

> Screening is extremely important since an objective basis is required to determine the disease, and screening can lead to early detection, treatment, and intervention, reduce the burden on patients' lives, improve quality of life, and demonstrate the value of care.

N2 said:

> If not taken seriously, CHE can lead to hepatic encephalopathy. Early detection, early treatment, and the use of specialized testing instruments can help to demonstrate the advantages of the specialty.

N9 said:

> Screening is critical because patients with CHE may have cognitive abnormalities but can communicate normally with others; only professional assessment can detect the abnormalities.

Such patients are unable to work in high-tech fields or at heights due to safety hazards. CHE has a negative influence on patients' employment and life, and early detection and treatment are beneficial for the recovery and prevention of

complications, preventing them from developing into severe complications. Despite these positive attitudes, respondents acknowledged the challenges in implementing screening due to knowledge gaps and resource limitations.

Factors Affecting Screening

Limited Human Resources

The medical care personnel are overburdened with daily diagnosis, treatment, and nursing care, and conducting CHE screening for cirrhosis requires significant amount of time and energy. Given the current human resources in the ward, it is extremely difficult to conduct CHE screening for cirrhosis.

N1 said:

> Clinical work is extremely demanding, and we nurses are burdened with an ever-growing list of tasks. Screening procedures require time, but where can we find it?

N6 said:

> Clinical work is tightly scheduled, and patients have to be trained prior to screening. There are unavoidable factors involved during the screening process, necessitating multiple screenings which are time consuming.

N7 said:

> There are detailed medical records to be written, due to which there is no time. We young doctors work overtime every day, so who has the time to conduct screenings?

These findings suggest that additional human resources and more efficient screening protocols are needed to facilitate CHE screening in clinical settings.

No Stringent Rules From the Hospital Administration

During the interviews, it was discovered that only two respondents had conducted CHE screening for cirrhosis earlier, but no record of it was kept. Due to the absence of strict regulations, most of the medical staff only complete the essential tasks that needed to be completed on a daily basis. There are also no clear guidelines on who should conduct the screening.

N2 said:

> Without stringent rules, if various scoring tools are integrated into the medical record system and it is clearly specified that assessment must be conducted, the results will be significantly improved.

N5 said:

> There are no clear guidelines for screening processes. With our work schedule being so hectic, we prefer to do less if we can.

N6 said:

> We are accustomed to working by the regulations, and if there is no requirement, then we don't do it.

N8 said:

> Due to poor management, our clinicians are overwhelmed with work and can only prioritize tasks that are explicitly demanded. Although screening is crucial, there is no opportunity to address it. (sigh)

These findings indicate that hospital administrators should develop and enforce clear protocols for CHE screening.

Inability to Use Neuropsychological Test Tools Correctly

Only two respondents successfully applied the particular test tool with which they were familiar, while the remaining seven respondents had never used the tools and had no idea how to apply them. N1 said:

> I have used some of the tools regularly, like number connection, Stroop, and animal naming test, on my patients, however, some of the other tools can only be used by a psychologist, so I don't know much about them.

N6 said:

> I have just conducted the Stroop and animal naming tests for my patients, but I have not paid much attention to the others.

N8 said:

> I don't know much about it; HE neuropsychological tests require systematic training; you cannot just pick them up and use them.

These findings suggest that targeted training programs are essential to improve the ability of healthcare professionals to conduct CHE screening.

Non-Cooperation of Patients and Their Family Members

According to two respondents, several patients and their families questioned the necessity and accuracy of the screening, saying that it made no difference in their treatment.

N1 said:

> The level of cooperation of patients and their families is related to their level of education; some of them no matter how much you attempt to explain, do not listen to you and believe that screening is not reliable.

N6 said:

> The first person to detect that a patient has CHE may be their family members, however, some family members are uncooperative and do not think screening has much to do with the treatment.

These findings suggest that improving patient and family education on the importance of CHE screening is crucial for better compliance.

Lack of Auxiliary Means of Screening

Since animal naming and Stroop tests are suitable for bedside screening, the EncephalApp, a mobile app for Stroop testing, was created. According to the respondents, using personal cell phones for testing was not permitted.

N6 said:

> A cell phone is always necessary for screening, right? Since the Stroop App can only be installed on an iPhone, iPhones are required if the department regularly conducts screening.

N5 said:

> An iPad is required because some patients are old and the characters on phones are smaller.

These findings suggest that hospitals should provide necessary equipment and develop user-friendly screening tools to enhance the feasibility of CHE screening.

Discussion

Increase Awareness Among Medical Care Personnel to Promote Proactive CHE Screening for Cirrhosis

According to the results of this study, the medical care personnel in the hepatology department had a positive attitude toward screening for CHE but lacked knowledge of CHE and HE neuropsychological testing tools. Their knowledge level was not directly related to their professional title and the years of experience in the specialty, and only a small number of nursing staff had clinically performed CHE screening. According to a survey study conducted in Germany

more than half of the GPs (53.7% were unfamiliar with CHE and about one-third of both groups had never tried to diagnose CHEonly 46.3% to 93.6% of gastroenterologists were familiar with CHE, and 1/3 of gastroenterologists were unaware of CHE,[14] indicating that the medical care staff have a low level of understanding of CHE. According to Liu et al,[15] medical care staff have inadequate knowledge of CHE screening, and there are differences in the knowledge levels of medical care personnel with different specialties, education levels, and professional titles on CHE in patients with cirrhosis. This differs from the finding in this study that there was no significant difference in the perception of CHE among healthcare workers with different professional titles and years of experience in specialized fields, which may reflect differences among regions and medical institutions. Therefore, medical care personnel should be trained on CHE-related knowledge and the application of neuropsychological testing tools. Changes in attitudes and beliefs are caused by changes in knowledge, and changes in knowledge drive changes in conduct.[16] Only with adequate awareness is it possible to implement into practice. Some of the study participants acknowledged inadequate CHE-related knowledge and the application of neuropsychological testing tools, and were interested to receive training to improve CHE screening. Hospital administrative departments should create detailed training programs for medical care personnel at different levels on CHE-related content, the application of HE neuropsychological test tools, and screening exercises, and adhere to the combination of theory-practice approach to enhance the screening ability of medical care personnel.

Develop a Screening System for Early Detection of Cirrhosis CHE

Despite the fact that Guideline for Cirrhosis and Hepatic Encephalopathy (2018 Edition)[4] suggest that medical care personnel should focus on CHE screening and management to improve the clinical outcomes of patients with cirrhosis, the results of the current study indicate that the current management system for screening and management of cirrhosis CHE is still imperfect. However, there are no specific rules on whether screening should be conducted clinically and who should conduct the screening. With hectic clinical workloads, few medical care personnel have the interest to actively pay attention to screening. Therefore, hospital administrators must prioritize the development of a management system for cirrhosis CHE screening. Based on the results of our study, medical care personnel must screen patients with cirrhosis for CHE. To ensure the effective implementation of screening, the time and frequency of screening should be specified, while human resources should be deployed rationally. Currently, quick and easy neuropsychological tests suitable for bedside screening include the Stroop[17] and the simplified version of the animal naming test,[18] which has high clinical sensitivity and specificity. The Chinese version of the Stroop test based on EncephalApp has been developed to automate the collection of test data, and hospitals need to provide devices for testing, such as iPhones or iPads. Furthermore, apps for simplified animal naming test should be developed and the test results should be synchronized with the nursing paperwork system to improve the ability of nursing staff to perform screening.

Increase Public Awareness to Improve Screening Compliance

CHE is a common complication of cirrhosis, and according to a survey involving 16 tertiary hospitals across 13 cities in China, the prevalence of CHE among hospitalized patients was as high as 39.9%.[19] CHE is the initial clinical manifestation of HE, which lacks recognizable early clinical manifestations, presents with mild characteristics and cognitive ability abnormalities, and is frequently overlooked in daily life. In patients with cirrhosis, CHE can increase the risk of traffic accidents,[20] hospital readmission, death,[21] and adverse emotions such as anxiety, depression, and sleep disorders.[22] Therefore, early screening, diagnosis, and appropriate treatment of CHE are important to improve the prognosis of such patients. Poor compliance was reported by some respondents in this study; this was analyzed as a result of a lack of understanding of CHE and its potential risks by patients and caregivers. Therefore, it is particularly important to improve the knowledge of patients and their families about CHE and its harmful effects. Nurses in charge should improve patient education and screening compliance. As an extension of nosocomial screening for CHE in patients with cirrhosis after discharge, family members should be mobilized and taught screening skills, as they are often the first to detect the mild characteristics and cognitive ability abnormalities; this allows for early detection and treatment, improving quality of life and preventing further disease progression.

Despite providing valuable insights into healthcare professionals' perceptions of CHE screening, this study has limitations. The single-center design and small sample size limit the generalizability of the findings. Future research

should adopt a multi-center approach to include a more diverse group of healthcare professionals. Additionally, combining qualitative interviews with quantitative surveys could offer a more comprehensive understanding of CHE screening practices and attitudes. The study also did not address patients' and caregivers' perceptions of CHE screening, which are crucial for improving screening compliance. Future work should focus on exploring these perspectives to develop targeted educational interventions. Furthermore, developing and integrating user-friendly screening tools into clinical practice could enhance the feasibility of CHE screening. Long-term intervention studies are needed to assess the impact of training programs and policy support on screening practices and patient outcomes.

Conclusion

It is challenging to diagnose CHE at an early stage because of the lack of typical clinical manifestations, and medical care personnel are the primary personnel to perform clinical screening for CHE. The study results indicate that healthcare workers generally have a positive attitude towards CHE screening; however, their level of knowledge is generally insufficient, with only a small proportion having conducted screening in actual clinical practice. The main factors influencing screening practice include strained human resources, lack of mandatory regulations from the management, improper use of screening tools, and low cooperation from patients and their families. To improve the current state of CHE screening, management should address the factors affecting clinical screening by formulating rational strategies and providing strong support. For example, they should enhance the training of healthcare workers on CHE and its screening tools, improve the screening management system, provide necessary screening auxiliary equipment, and increase the awareness of patients and their families regarding the importance of screening. Additionally, patients with cirrhosis often seek medical attention only after the onset of clinical symptoms. Therefore, future research could further investigate the awareness of CHE among caregivers of cirrhosis patients, providing a reference for the early identification of CHE and the comprehensive management of cirrhosis.

Abbreviations

HE, hepatic encephalopathy; MHE, minimal hepatic encephalopathy; OHE, overt hepatic encephalopathy; CHE, covert hepatic encephalopathy; OHE, overt hepatic encephalopathy; PROs, Patient reported outcomes.

Data Sharing Statement

The datasets used and analysed during the current study available from the corresponding author on reasonable request.

Ethics Approval

This study was conducted in accordance with the declaration of Helsinki.This study was conducted with approval from the Ethics Committee of The Affiliated Taizhou People's Hospital of Nanjing Medical University.

Consent for Publication

Informed Consent for publication was obtained from every individual whose data are included in this manuscript, including publication of anonymized responses/direct quotes.

Disclosure

The authors report no conflicts of interest in this work.

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