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Authors

Dong, Ning
Chen, Wei-Ti
Bao, Meijuan
et al.

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Self-Management Behaviors Among Patients With Liver Cirrhosis in Shanghai, China: A Cross-Sectional Study

Ning Dong, MSN, RN[1], Wei-Ti Chen, PhD, CNM, RN, FAAN[2], Meijuan Bao, BSN, RN[1], Yan Lu, BSN, RN[1], Yuqian Qian, BSN, RN[1], and Hongzhou Lu, PhD, MD[1]

Abstract

Effective self-management of liver cirrhosis requires medication adherence and lifestyle modifications. The purpose of this study was to investigate the self-management behaviors of liver cirrhosis patients and how their knowledge of cirrhosis, psychological status, and self-efficacy contributes to self-management practices in Shanghai, China. Subjects were recruited from the hepatology units in an infectious hospital in Shanghai, China. Self-administered questionnaires were collected and medical charts were reviewed by the research staff. A total of 134 subjects were enrolled from November 2016 to March 2017. The results indicate that the self-management behaviors mean score was 2.51 out of 4 and that depression, severity of cirrhosis, and self-efficacy significantly affected self-management

[1]Shanghai Public Health Clinical Center, Fudan University, Shanghai, China
[2]University of California, Los Angeles, USA

Corresponding Author:
Meijuan Bao, Nursing Director, Department of Nursing, Shanghai Public Health Clinical Center, Fudan University, 2901 Cao Lang Road, Jinshan District, Shanghai, China.
Email: baomeijuan123@126.com

behaviors and explained 22.9% of the total variance. The findings also indicate that psychological stress, disease severity, and self-efficacy affected self-management behaviors in liver cirrhosis patients. Interventions focusing on decreasing depression and enhancing self-efficacy according to disease severity should improve self-management behaviors in this population.

Keywords
liver cirrhosis, self-management, depression, anxiety, self-efficacy

Introduction

Liver cirrhosis (LC) is a serious disease associated with high morbidity and mortality (Bosetti et al., 2007; Lim & Kim, 2008). In 2010, it was the 12th leading cause of mortality worldwide (Muir, 2015), and it was the 10th leading cause of death in lower-middle income countries (World Health Organization, 2012). In China, chronic liver diseases, including hepatitis B virus (HBV) and hepatitis C virus (HCV) infections, alcoholic liver disease (ALD), nonalcoholic fatty liver disease (NAFLD) and associated cirrhosis, liver failure, and hepatocellular carcinoma affect approximately 300 million people (F. S. Wang, Fan, Zhang, Gao, & Wang, 2014). Chronic HBV and HCV infection and alcoholism are the most important causes of LC in China, and the incidence of LC has increased during recent years (Wang, Fan, et al., 2014). In a study reported in China, viral hepatitis ranks first among the various infectious diseases of the liver. In addition, approximately 4,000 new LC cases related to HBV and HCV were reported in a single hospital in Shanghai, China (H. Q. Wu et al., 2015).

Background

LC is a complication of many liver diseases. It is characterized by fibrosis and the conversion of normal liver architecture into structurally abnormal nodules (Anthony et al., 1978). Intervention in LC includes avoiding further damage to the liver, treating the complications of LC, preventing liver cancer and/or detecting liver cancer early, and, in the later stages of the disease, liver transplantation (Abbas, Makker, Abbas, & Balar, 2017; J. James & I.W. Liou, 2015).

Creer, Renne, and Christian (1976) first used the term self-management in the context of rehabilitation of chronically ill children and indicated that the patient should be an active participant in treatment. Self-management is described as a collaborative activity between patient and health care providers (Lorig, 1993). Activities involve managing symptoms, coping

with physical and psychosocial impacts of the disease, and changing one's lifestyle to adapt to the chronic disease and to keep the illness under control (Glasgow, Davis, Funnell, & Beck, 2003).

In China, the prevalence of HBsAg positivity is greater than 70% in LC patients (Y. Zhang, Zhang, Elizabeth, & Liu, 2012). Because LC is a slowly progressing disease, self-management is needed. After a confirmed diagnosis, patients usually start taking LC medicine and practising life modification, which includes eating healthy foods and regular exercise. Regardless of etiology, all cirrhotic patients are considered infectious, which causes them to experience social isolation from their friends, relatives, and colleagues (Ren, Shi, Li, Meng, & Hu, 2016; Shabanloei, Ebrahimi, Ahmadi, Mohammadi, & Dolatkhah, 2016). All these changes can be overwhelming initially, and they may ultimately lead to mental distress (Abdi, Daryani, Khorvas, & Yousef, 2015). Furthermore, as the disease progresses to portal hypertension, patients may experience more unpleasant signs and symptoms, including fatigue, decreased appetite, pain, jaundice, internal bleeding, encephalopathy, and abdomen distension (Bianchi et al., 2005; Fagerstrom & Frisman, 2017; Fritz & Hammer, 2009; Kim, Oh, & Lee, 2006; Tsai et al., 2014; L. J. Wu, Wu, Lien, Chen, & Tsai, 2012). These exacerbated symptoms can make patients feel powerless and discouraged in response to the disease. These stressors might also cause a vicious circle that increases nonadherence to medication and renders patients unable to keep to the required special diet; therefore, self-management can enhance LC patients' self-efficacy, which can in turn improve their quality of life and help them control disease progression (M. G. Zhang & Wang, 2014). To effectively manage their disease, LC patients should equip themselves with knowledge on how to live with the disease and how to address the simple but unpleasant symptoms. This knowledge is typically included in self-management strategies. Specific skills taught might include routine follow-up, adherence to prescribed regimens, and communication with health professionals regarding complications (Fowler, 2013).

Studies have shown that improving self-management of chronic disease means increasing patients' knowledge about their condition (Gray, 2004). Knowledge can be described as the facts about the disease and its management that patients need to understand to enable them to perform complex self-management activities. Health education should include, for example, information about the importance of eating a low-salt diet and avoiding nonsteroidal anti-inflammatory drugs (NSAIDs; James et al., 2015). In addition, giving patients information related to hepatitis transmission and treatment has been demonstrated to be associated with improved disease management and patient outcomes, which in turn leads to a better quality of life for people with LC (Shah & Abu-Amara, 2013). Thus, a certain level of knowledge and technical skills related to LC should be delivered to all LC patients to enhance

their self-efficacy. In contrast, studies have shown that LC patients with inadequate knowledge of LC presented with more complications compared with LC patients with a better knowledge level (Beg, Curtis, & Shariff, 2016; Volk, Fisher, & Fontana, 2013). Currently, in China, very few studies have been focused on self-management in LC patients, but one has shown that patients lack knowledge about risk factors, long-term complications, prognosis of LC, and potential strategies to prevent further damage to the liver (Mi, Wang, Lu, & Zheng, 2005).

Theoretical Framework

The concept of self-efficacy was originally proposed by Bandura (1986). Self-efficacy is defined as an individual's personal beliefs regarding their capability to carry out a specific task to achieve a desired outcome (Bandura, 1986). Patients with greater self-efficacy have been shown to practice more self-management behaviors, leading to better disease control, better physical function, and better quality of life (Tsay & Halstead, 2002; Weng, Dai, Huang, & Chiang, 2010).

Mental health distress, such as depression and anxiety, often co-exist with chronic physical conditions. Stanton, Revenson, and Tennen (2007) found that patients with LC presented with high psychological burden, especially those who presented with advanced disease. Studies have also shown that patients with LC had signs of psychological distress and depression (Bianchi et al., 2005). A recent study showed that the incidence of depressive disorders in nonalcoholic cirrhotic patients was 8.4 per 1,000 person-years and that the risk of depression in cirrhotic patients was higher than that for the non-cirrhotic control patients (Perng et al., 2014). In addition, a considerable proportion of patients with LC had mood disorders, and the depression rates in chronic HBV carriers were associated with the severity of the cirrhosis (Perng et al., 2014). Based on this, we conclude that distressed LC patients might not be able to perform self-management effectively (M. G. Zhang & Wang, 2014). Accordingly, health care providers should work with LC patients to alleviate their concerns and worries, a strategy that may improve self-management behaviors and medication adherence.

While research has shown the importance of knowledge, self-efficacy, and psychological status on an individual's self-management behaviors, there are limited studies focusing on LC in China. The purpose of this article was to investigate the potential factors influencing LC patients' self-management behaviors. This includes nutritional intake to stay healthy, medical management, symptom monitoring, and the relationships among self-management knowledge, self-efficacy, and psychological status. We hypothesized that

self-management knowledge, self-efficacy, and psychological status influence LC patients' self-management behaviors.

Method

Study site. This cross-sectional study was conducted at Shanghai Public Health Clinical Center (SPHCC) in Shanghai, China, from November 2016 to March 2017. SPHCC is a tertiary hospital, where the medical expertise includes multidisciplinary teamwork in managing severe and complicated liver diseases and managing various infectious diseases, including, but not limited to, viral hepatitis/LC, HIV/AIDS, tuberculosis (TB), typhoid, and emerging infectious diseases. All study procedures were reviewed and approved by the institutional review board at SPHCC.

Sample. Study participants were recruited from inpatient units with confirmed cases of LC. Inclusion criteria were as follows: (a) a confirmed diagnosis of LC by ultrasonography, (b) at least 1 year since LC diagnosis, and (c) aged above 18 years. Patients who were unable to complete questionnaires or to read and understand the survey were excluded. Patients with comorbid illness such as end-stage renal disease, debilitating hepatic encephalopathy, or severe cognitive impairment were also excluded.

Measure. *Self-management behaviors* were assessed using the self-management behavior scale for LC patients as the outcome measure, which was developed by Q. Wang, Wang, Gao, Han, and Li (2015). The reliability and validity of the scale was tested among 180 LC patients in Tianjin and Handan City, China, in 2013 (Q. Wang, Wang, Gao, Han, & Li, 2014). This 24-item scale has four dimensions: dietary management (seven items), daily life management (seven items), medication management (five items), and illness-monitoring management (five items). A 4-point Likert-type scale was used to report self-management behaviors: all the time (4 points), most of the time (3 points), some of the time (2 points), rarely (1 point). A score for overall self-management behaviors was obtained by calculating a mean of the individual's response to all 24 items; four subscale scores were obtained similarly by calculating a mean of the responses to subscale items. The content validity index (CVI) was 0.93, Cronbach's alpha value was .80 for the total scale, and test–retest correlation was .84 for the total scale. In the present study, Cronbach's alpha value for the total scale was .95; for the subscales, the values were as follows: dietary management ($\alpha = .91$), daily life management ($\alpha = .82$), medication management ($\alpha = .85$), and illness-monitoring management ($\alpha = .85$).

Self-management knowledge was assessed using a questionnaire developed by the study investigators from a review of the relevant research literature. The questionnaire consisted of 15 closed-ended questions about diet, medication use, and self-monitoring activities. Content validity was established by having three medical and two nursing experts (all of whom have been working with liver diseases for more than 15 years) rate each question for appropriateness and relevance using a 5-point Likert-type scale (1 = *do not agree at all* to 5 = *strongly agree*). The item-level CVI (I-CVI) of two questions was 0.60. The I-CVI of the other 13 questions was 1.00. The research panel discussed the matter with the five liver disease experts and decided to delete the two questions with an I-CVI level of 0.60. The final 13 questions can be seen in Table 2. All of them had a requirement of one answer only. One point was given for a correct answer and 0 for incorrect or "don't know." The highest possible total score was 13. Cronbach's alpha coefficient was .72 in the present study.

Self-efficacy was assessed using the Self-Efficacy for Managing Chronic Disease 6-item (SEMCD 6-item) scale (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001). Each item was scored from 1 (*not at all confident*) to 10 (*totally confident*). The score for the scale was the mean of the six items, with higher scores indicating greater self-efficacy. The Chinese version validity and reliability of SEMCD 6-item was tested and previously assured and described in the literature (Guo, 2009); the internal consistency reliability has been shown to be high (.889), and a panel of six experts confirmed the content validity of the questionnaire. Cronbach's alpha coefficient was .91 in the present study.

Psychological status was assessed using the Hospital Anxiety and Depression Scale (HADS). HADS was originally developed by Zigmond and Snaith (1983) to determine the risk of anxiety and depression in patients with physical illness and to measure the level and severity change in those conditions. The 14-item HADS comprises two subscales designed to assess feelings of anxiety (HADS-A) and depression (HADS-D) during the previous week on a 4-point scale from 1 (*not at all*) to 4 (*most of the time*). Higher scores reflect higher levels of anxiety and depressive symptomatology. The Chinese version of HADS is reported to be valid and reliable for Chinese (Ye & Xu, 1993). The 1-week test–retest reliability reported high, and the criterion-related validity between HADS-A and the Self-rating Anxiety Scale (SAS) was 0.92 ($p \leq .01$). The criterion-related validity of HADS-D compared with the Self-rating Depression Scale (SDS) was 0.84 ($p \leq .01$). Cronbach's alpha coefficients for anxiety and depression were .86 and .80, respectively, in the present study.

Disease severity was assessed by the Child-Pugh classification, based on serum bilirubin, albumin, prothrombin time, and the degree of ascites and hepatic encephalopathy. The Child-Pugh score ranges from 5 to 15 and is categorized into three groups: A (5-6, mild), B (7-9, moderate), and C (10-15, worst; Pugh, Murray-Lyon, Dawson, Pietroni, & Williams, 1973).

Demographic data were collected on gender, age, education level, current employment status, marital status, past and current alcohol usage, potential underlying etiology of LC, and duration of disease.

Pilot study. We conducted a pilot study to ensure the interpretation of the study questions was clear and easy to understand. A pilot study was conducted with 20 patients with the same inclusion criteria. The pilot participants found the language and questions understandable and thus had no further revisions to the questionnaires. Data from the pilot study were not included in the final analysis.

Data collection. Three research nurses recruited potential participants from the inpatient wards during the patients' first week of hospitalization. Each patient was informed of the study purpose and told that his or her consent to participate was voluntary. All participants provided a copy of the signed informed consent for this study. Child-Pugh classification was obtained and calculated from medical records.

Data analysis. Data analysis was performed using Statistical Package for Social Sciences (SPSS), version 17.0. Means and standard deviations (*SD*s) were presented for continuous variables (e.g., age, the total scores of self-management knowledge, self-management behaviors, self-efficacy, HADS). Frequency and percentage were presented for categorical variables (e.g., gender, etiology of LC, Child-Pugh classification). Differences between major study variables and demographic variables were analyzed through independent *t* test and analysis of variance (ANOVA). Pearson's correlation coefficient tests were used in the analysis of the correlation between self-management behaviors and self-management knowledge, self-efficacy, and HADS. Multiple regression analysis was used to determine the self-management behaviors predicting factors of patients with LC by analyzing the significant independent variables (Child-Pugh classification, self-management knowledge, self-efficacy, HADS) with self-management behaviors dependent variables. An initial investigation was conducted to ensure the non-violation of the regression assumptions of multicollinearity, normality, linearity, and homoscedasticity. Statistical significance was set at $p \geq .05$.

Results

Characteristics of Participants

A total of 180 eligible participants were contacted, and 134 of them were recruited and completed the study for an acceptance rate of 74.4%. The mean age was 52.69 years (*SD* = 11.45 years). Ages ranged from 25 to 77 years. Most of the participants were males (75.4%), and 88.1% were married. Some of them completed middle school education (32.1%), and 29.1% had a high school education. Most of them (74.6%) were unemployed, and 11.2% were still drinking alcohol at the time of the study. The majority of LC (66.4%) was caused by hepatitis B or C. The average duration of LC was 4.72 years (*SD* = 4.23 years, range = 1-20 years; see Table 1).

Self-Management Knowledge and Self-Efficacy

Mean score for self-management knowledge was 7.69 (*SD* = 2.47) out of a total possible score of 13, with actual scores ranging from 2 to 12. Table 2 displays the percentage of participants who answered each individual question correctly. Most of them (84.3%) knew LC patients should adhere to a low-salt diet and abstain from alcohol after being diagnosed (82.8%). Similarly, most of them (76.9%) knew to pay attention to their stool color and that if it turned black they should contact their health care providers immediately (74.6%). However, only 11.2% of participants knew that they should reduce intake of animal protein when hepatic encephalopathy presented (e.g., trembling and hand "flapping"), and few of them (18.7%) were aware that lactulose should be titrated to induce two to three soft bowel movements daily. Mean score was 6.91 (*SD* = 1.72) for self-efficacy out of a maximum score of 10, with a range from 2.83 to 10.00. Other demographic factors did not correlate with a statistically significant difference for self-management knowledge and self-efficacy (See Table 4).

Psychological Status

Mean scores for HADS-A and HADS-D were 1.82 (*SD* = 0.60, range = 1.00-3.14) and 1.79 (*SD* = 0.58, range = 1.00-3.57), respectively, out of the total score of 4. Significant differences for HADS-A, HADS-D scores were found by gender ($t = -3.447$, $p = .001$; $t = -2.306$, $p = .023$) and Child-Pugh classification ($F = 5.926$, $p = .003$; $F = 5.429$, $p = .005$). Females had higher levels of anxiety and depressive symptoms than males; post hoc tests revealed that Child-Pugh C class patients had higher levels of anxious and depressive

Table 1. Participant Characteristics (n = 134).

Characteristics	Classification	*n*	%
Age (years)	25-40	23	17.2
	41-50	37	27.6
	51-60	32	23.9
	61-77	42	31.3
Gender	Male	101	75.4
	Female	33	24.6
Marital status	Married	118	88.1
	Other (single, divorced, unknown)	16	11.9
Educational level	Elementary school	35	26.1
	Middle school	43	32.1
	High school	39	29.1
	College or above	17	12.7
Current employment status	Yes	34	25.4
	No	100	74.6
Alcohol drinking habits	Still drinking	15	11.2
	Used to drink	73	54.5
	Never drank	46	34.3
Etiology of LC	Hepatitis (B & C)	89	66.4
	Alcohol	21	15.7
	Others (autoimmune, primary biliary, NAFLD, unknown)	24	17.9
Child-Pugh classification	A	51	38.1
	B	44	32.8
	C	39	29.1
Duration of disease (years)	1-3	75	56.0
	4-10	49	36.6
	11-20	10	7.5

Note. LC = liver cirrhosis; NAFLD: nonalcoholic fatty liver disease.

symptoms than those in Child-Pugh A class (F = 0.406, p = .001; F = 0.384, p = .002) and those in Child-Pugh B class (F = 0.325, p = .011; F = 0.303, p = .016; Table 4).

Self-Management Behaviors

The mean score of total self-management behaviors was 2.51 (SD = 0.77), and mean scores for the four subscales ranged from 2.41 to 2.61.

Table 2. Percentage of Participants (n = 134) Who Answered Each Question Correctly in the Survey.

Item	Question	Correct (%)
1	What diet should patients with liver cirrhosis adhere to? **(a) low salt** (b) high salt (c) don't know	84.3
2	The recommended weekly allowance for alcohol intake in patients with cirrhosis is? **(a) abstinence from alcohol** (b) there is no restriction (c) don't know	82.8
3	Patients with cirrhosis (not caused by viral hepatitis B) should be vaccinated against viral hepatitis A and hepatitis B? **(a) true** (b) false (c) don't know	28.4
4	Which medicine may not be restricted with liver cirrhosis patients? (a) morphine **(b) omeprazole** (c) ibuprofen (d) don't know	39.6
5	Liver cirrhosis patients may have esophagogastric varices bleeding, thus you should pay attention to your stool color? **(a) true** (b) false (c) don't know	76.9
6	How should liver cirrhosis caused by viral hepatitis B or hepatitis C be treated? **(a) using anti-viral medications after consulting a doctor** (b) there is no need to use any anti-viral medication (c) don't know	72.4
7	If your stool turns black and tarry, what should you do? **(a) you may be bleeding from the gut, see a doctor immediately** (b) there's too much meat in the diet, adjust diet (c) this is normal (d) don't know	74.6
8	What type of diet should liver cirrhosis patients with esophagogastric varices (especially those that have red wale signs) choose? (a) normal diet **(b) healthy food, but avoid roughage and dense items** (c) a diet high in fiber (d) don't know	55.2
9	Liver cirrhosis patients should produce stools every day to prevent **(a) hepatic encephalopathy (confusion related to cirrhosis)** (b) ascites (c) hemorrhoids (d) don't know	50.0
10	Lactulose should be taken (a) at a fixed dose every day **(b) at a daily adjusted to produce 2 to 3 soft stools per day** (c) don't know	18.7
11	Liver cirrhosis patients should self-monitor if they have an abnormal sleep cycle, impaired thinking, odd behavior, etc. **(a) true** (b) false (c) don't know	73.1
12	Patients with hepatic encephalopathy (confusion related to cirrhosis) should reduce their intake of **(a) animal protein** (b) plant protein (c) don't know	11.2
13	Patients with cirrhosis should get an ultrasound every 6 months to **(a) look for liver cancer** (b) look for gallstone (c) determine liver function (d) don't know	38.1

Note. Correct answers are shown in bold.

Table 3. Five Highest and Lowest Scored Self-Management Behaviors Practiced by Study Participants (n = 134).

Items	$M \pm SD$
15. You rarely use acetanilide, sleeping, or sedative drugs.	3.02 ± 1.14
16. You follow the doctor's advice to take medicine on time and in the correct amount.	3.00 ± 1.11
8. You keep underwear and bedding clean and sanitized, changing them often.	2.73 ± 1.02
2. You avoid overeating every day, such as eating a lot of animal protein or drinking a lot of soybean milk in a short time.	2.66 ± 1.08
7. You eat smaller, more frequent meals, 4~6 times/day and diet regularly.	2.66 ± 1.16
3. You can control high-fat food intake, such as fat, butter, ice cream, or fried food.	2.16 ± 0.93
18. You do not use medicines that cause liver damage.	2.13 ± 0.93
23. You weigh yourself regularly (every day) and measure abdominal girth.	2.13 ± 0.90
1. You keep to a high-protein diet every day (1.0 g/kg~1.5 g/kg body weight), but when you have hepatic encephalopathy signs, you limit the intake of protein.	2.13 ± 0.95
6. You can control the intake of sodium, <2 g/day, and do not eat pickles, preserved eggs, ham, sausage, bacon, etc.	1.99 ± 0.92

Note. 4 = *all the time*, 3 = *most of the time*, 2 = *some of the time*, 1 = *rarely*.

Participants rated their level of dietary management (mean score = 2.41, SD = 0.89), daily life management (mean score = 2.58, SD = 0.75), medication management (mean score = 2.61, SD = 0.98), and illness-monitoring management (mean score = 2.45, SD = 0.87). In general, the top-scoring items were "following doctor's advice to take medication on time" and "rarely using acetanilide or sedative medicine without asking doctor's permission." However, participants rarely kept to a high-protein diet of 1.0 g/kg to 1.5 g/kg body weight each day, seldom controlled high-fat food intake, rarely kept the intake of sodium to less than 2 g/day, were less likely to weigh themselves regularly or measure abdominal girth, and sometimes would use medicines that cause liver damage (see Table 3). Analyzing the correlates of self-management behaviors for the participants, Child-Pugh classification (F = 6.772, p = .002) showed a significant relationship with self-management behaviors. Post hoc tests revealed that Child-Pugh A-class patients (n = 51) had higher self-management

behaviors than those in Child-Pugh B class ($n = 44$, $F = 0.388$, $p = .012$) and then those in Child-Pugh C class ($n = 39$, $F = 0.554$, $p = .001$; see Table 4). Self-efficacy ($r = .282$, $p < .01$), HADS-A ($r = -.374$, $p < .01$), and HADS-D ($r = -.402$, $p < .01$) were determined to be significantly associated with self-management behaviors (see Table 5).

Predictors of Self-Management Behaviors

The combination of the variables showed that Child-Pugh classification and the total score of HADS-D, self-efficacy were significant predictors of overall self-management behaviors of patients with LC and explained 22.9% of the total variance ($F = 12.86$, $p < .001$). HADS-D was the most significant predictor, which separately accounted for 16.2% of variance among self-management behaviors, followed by Child-Pugh classification (4.0%) and self-efficacy (2.7%). Beta weights showed that lower depression (HADS-D), lower disease severity (Child-Pugh classification), and higher self-efficacy predicted better self-management behaviors (see Table 6).

Discussion

This article presents the factors influencing self-management behaviors in people living with LC in one hospital in Shanghai, China. Study participants showed moderate self-management behaviors (2.51 out of 4), with the highest score in medication management. However, the study demonstrated a deficit in several areas in self-management behaviors in the study population; for example, participants had poor dietary management and poor illness-monitoring management. Also they reported increased levels of depression and disease severity. Self-efficacy was affected by self-management behaviors for this group, while self-management knowledge had no effect.

The current study indicates that most of the time, LC patients do follow doctor's advice to take medicine on time. Medication management was reported as commonly performed in similar studies conducted in China (D. Wang et al., 2016; Zhu, Dong, Zhou, Fan, & Wang, 2016). However, these results differ from those of Polis and colleagues (2016) and L. P. Chen et al. (2017), all of whom reported that patients might adjust their medications if symptoms improved or worsened, even without consulting their doctor. Patients were more likely to present with worsened symptoms (e.g., swollen legs and dyspnea as a result of ascites) when they went back to their LC health care providers (Polis et al., 2016). In addition, we also found patients sometimes would use medicines that cause liver damage. Accordingly, only 39.6% patients knew the correct medicine that may not be restricted with LC

Table 4. Participant Characteristics and Self-Management Knowledge, Self-Efficacy, Psychological Status, and Self-Management Behaviors in Participants (n = 134).

		Self-management knowledge		Self-efficacy		HADS-A		HADS-D		Self-management behaviors	
Variables	n	M (SD)	t or F (p)	M (SD)	t or F (p)	M (SD)	t or F (p)	M (SD)	t or F (p)	M (SD)	t or F (p)
Age (years)											
25-40	23	7.83 (2.57)	0.579	7.14 (1.64)	0.838	1.74 (0.57)	0.464	1.59 (0.42)	1.180	2.42 (0.80)	0.186
41-50	37	7.38 (2.41)	(.630)	7.01 (1.51)	(.476)	1.86 (0.58)	(.708)	1.85 (0.62)	(.320)	2.55 (0.85)	(.906)
51-60	32	8.13 (2.04)		7.08 (1.90)		1.76 (0.59)		1.79 (0.60)		2.47 (0.70)	
61-77	42	7.57 (2.77)		6.57 (1.79)		1.88 (0.64)		1.85 (0.61)		2.55 (0.76)	
Gender											
Male	101	7.90 (2.44)	1.712	6.91 (1.68)	−0.014	1.73 (0.58)	−3.447	1.73 (0.56)	−2.306	2.51 (0.81)	0.066
Female	33	7.06 (2.46)	(.089)	6.91 (1.84)	(.989)	2.12 (0.55)	(.001)*	1.99 (0.62)	(.023)*	2.50 (0.67)	(.947)
Marital status											
Married	118	7.77 (2.39)	0.984	6.91 (1.74)	0.036	1.85 (0.60)	1.423	1.82 (0.60)	1.814	2.49 (0.77)	−0.804
Others	16	7.13 (2.99)	(.327)	6.90 (1.60)	(.971)	1.63 (0.55)	(.157)	1.54 (0.43)	(.072)	2.66 (0.79)	(.423)
Education level											
Elementary school	35	6.91 (2.86)	1.900	6.88 (1.76)	0.243	1.81 (0.60)	0.151	1.79 (0.63)	0.138	2.60 (0.78)	1.163
Middle school	43	8.09 (2.54)	(.133)	6.86 (1.68)	(.866)	1.85 (0.56)	(.929)	1.82 (0.55)	(.937)	2.52 (0.76)	(.327)
High school	39	8.05 (2.00)		7.09 (1.76)		1.78 (0.66)		1.74 (0.63)		2.56 (0.80)	
College or above	17	7.47 (2.12)		6.70 (1.75)		1.87 (0.54)		1.82 (0.47)		2.19 (0.70)	

(continued)

Table 4. (continued)

Variables	*n*	Self-management knowledge		Self-efficacy		HADS-A		HADS-D		Self-management behaviors	
		M (*SD*)	*t* or *F* (*p*)	*M* (*SD*)	*t* or *F* (*p*)	*M* (*SD*)	*t* or *F* (*p*)	*M* (*SD*)	*t* or *F* (*p*)	*M* (*SD*)	*t* or *F* (*p*)
Current employment status											
Yes	34	7.44 (2.57)	−0.691	7.22 (1.75)	1.203	1.74 (0.64)	−0.899	1.72 (0.67)	−0.789	2.58 (0.78)	0.583
No	100	7.78 (2.44)	(.491)	6.81 (1.70)	(.231)	1.85 (0.58)	(.370)	1.81 (0.55)	(.432)	2.49 (0.77)	(.561)
Alcohol drinking habits											
Still drinking	15	6.93 (2.66)	1.117	7.29 (1.82)	0.408	1.85 (0.58)	2.518	1.70 (0.51)	0.544	2.55 (0.75)	0.024
Used to drink	73	7.93 (2.47)	(.330)	6.86 (1.70)	(.666)	1.72 (0.57)	(.085)	1.77 (0.58)	(.582)	2.51 (0.77)	(.977)
Never drank	46	7.57 (2.39)		6.87 (1.72)		1.97 (0.62)		1.86 (0.61)		2.50 (0.80)	
Potential etiology of LC											
Hepatitis	89	7.65 (2.59)	0.078	6.76 (1.68)	2.091	1.85 (0.61)	2.950	1.80 (0.59)	1.124	2.50 (0.78)	0.080
Alcohol	21	7.67 (2.33)	(.925)	7.60 (1.70)	(.128)	1.55 (0.47)	(.056)	1.64 (0.49)	(.328)	2.48 (0.80)	(.923)
Others	24	7.88 (2.15)		6.85 (1.78)		1.95 (0.60)		1.90 (0.65)		2.57 (0.73)	
Child-Pugh classification											
A①	51	7.61 (2.38)	0.310	7.15 (1.73)	2.038	1.68 (0.60)	5.926	1.65 (0.60)	5.429	2.80 (0.79)	6.772
B②	44	7.93 (2.64)	(.734)	7.04 (1.45)	(.134)	1.76 (0.53)	(.003)*	1.73 (0.53)	(.005)*	2.41 (0.74)	(.002)*
C③	39	7.54 (2.42)		6.45 (1.92)		2.08 (0.58)	①,②<③	2.04 (0.56)	①,②<③	2.24 (0.67)	①>②,③
Duration of disease (years)											
1-3	75	7.73 (2.55)	0.045	6.90 (1.85)	0.007	1.90 (0.56)	1.330	1.87 (0.56)	1.900	2.41 (0.78)	2.474
4-10	49	7.61 (2.46)	(.956)	6.93 (1.44)	(.993)	1.73 (0.64)	(.268)	1.66 (0.58)	(.154)	2.70 (0.76)	(.088)
11-20	10	7.80 (1.99)		6.92 (2.06)		1.74 (0.54)		1.80 (0.72)		2.34 (0.59)	

Note. HADS-A = Hospital Anxiety and Depression Scale-Anxiety; HADS-D = Hospital Anxiety and Depression Scale-Depression; LC = liver cirrhosis.
*$p < .05$.

Table 5. Correlations Among Self-Management Behaviors and Self-Management Knowledge, Self-Efficacy, and Psychological Status (n = 134).

Variable	Self-management behaviors	Self-management knowledge	Self-efficacy	HADS-A
Self-management knowledge	.048			
Self-efficacy	.282**	.018		
HADS-A	−.374**	−.168	−.208*	
HADS-D	−.402**	−.150	−.261**	.788**

Note. HADS-A = Hospital Anxiety and Depression Scale-Anxiety; HADS-D = Hospital Anxiety and Depression Scale-Depression.
*p < .05. **p < .01.

in this self-management knowledge survey. Similarly, Volk and colleagues (2013) found that more than half of patients thought that NSAIDs are safer than acetaminophen. Therefore, health care providers should include specific education about which medicine are suitable for LC and consult with doctors before using them.

Similar to Zhu and colleagues (2016), our study participants showed suboptimal dietary management. Most of our patients (84.3%) knew they should adhere to low-salt diets. However, as shown in our results (see Table 3), participants reported that they rarely control the intake of sodium below 2 g per day, and "couldn't resist" salty foods (e.g., bacon, ham, sausage, salted fish/eggs, and pickles) after being discharged from the hospital. This was to be expected because LC patients often have poor appetite, and salty foods are more appealing to them than the foods in the low-salt diet. Morando and colleagues (2015) studied 120 outpatients with cirrhosis and ascites and found that a moderately low-salt diet was followed by only 37 patients (31%), and that some of these patients followed the sodium-reduced diet by means of reducing the overall daily food intake. Previous research on nutritional status among patients of alcoholic cirrhosis and viral cirrhosis found that nutritional dysfunction exists in both the types of LC (Ban et al., 2017). Other studies reported symptoms such as low energy, pain, nausea/vomiting, and ascites impacted nutrition intake in LC patients (Ney et al., 2017). We speculate that patients have stronger adherence to medication schedule than to diet because medications can directly and discernibly control the symptoms of LC, while diet doesn't. It is also possible that medication management may present lower barriers compared with diet or daily self-management. Thus, the need to provide nutritional-intensive education in the LC population should be reinforced.

Table 6. Factors Associated With Self-Management Behaviors (n = 134).

Predicting variables	Unstandardized coefficient β	Standardized coefficient β	t test	p value	Collinearity statistics		R^2 change	F
					Tolerance	VIF		
(constant)	3.051		8.129	.000				12.86
HADS-D	−0.407	−0.308	−3.755	.000*	0.882	1.133	.162	
Child-Pugh classification	−0.180	−0.190	−2.374	.019*	0.922	1.084	.040	
Self-efficacy	0.077	0.171	2.133	.035*	0.923	1.084	.027	

Note. R = .478; R^2 = .229; Adjusted R^2 = .211; VIF = variance inflation factor; HADS-D = Hospital Anxiety and Depression Scale-Depression.
*p < .05.

To date, the literature has been inconclusive regarding how patients' self-management knowledge relates to their self-management behaviors. Formosa and Muscat (2016) have found that there is no significant relationship between knowledge and self-management practices, which is similar to this study. Moreover, this study found that patients were lower on knowledge of how to reduce intake of animal protein when hepatic encephalopathy presented (11.2%) and in knowledge of how to titrate lactulose daily (18.7%). In another study to assess the cognition of treatments on LC complications in decompensated hepatitis B LC patients in China, only 12.3% of participants knew that lactulose should be used for preventing hepatic encephalopathy (J. X. Zhang et al., 2015). Similar results have been reported in other countries (Goldsworthy et al., 2017; Volk et al., 2013).

Currently, lactulose remains the first-line treatment of hepatic encephalopathy based on extensive clinical experience (J. James & I.W. Liou, 2015). In a previous qualitative study (C. Fagerstrom & G.H. Frisman, 2017), LC patients reported they understood how to dose lactulose according to consistency and frequency of their stool because when they had been diagnosed with hepatic encephalopathy they were given special instructions. It is possible that our study participants had not experienced hepatic encephalopathy, thus they did not know how to titrate lactulose. The other possible reason is that doctors who are busy with treating patients often give less time to educating patients about dosing the prescribed medicines. Patients could ask pharmacists and nurses to educate them on how to use medicine but they seldom do because, in general, Chinese patients don't seek or trust advice from anyone other than their primary physician (W. T. Chen et al., 2010). Nevertheless, some researchers have argued that fulfillment of LC patients' educational needs related to their discomfort made these LC patients feel more relaxed and energized (Abdi et al., 2015). Therefore, educational materials should be well designed and tailored to the needs of LC patients. Since nurses spend more time with patients on the floor, they can provide information on how to use medicines and how to adhere to a low sodium diet.

In addition, this study shows that depression was a significant predictor of self-management behaviors. This finding is supported by Beg and colleagues (2016) and M. G. Zhang and Wang (2014). Depression can interfere with patients' ability to function in their daily activities and can limit their performance of self-management to reduce symptoms (Korpershoek, Vervoort, Trappenburg, & Schuurmans, 2016). In this study, we found that depressive LC patients seldom actively communicated with health care providers, that they had fewer questions, and that they were reluctant to take steps to take better care of themselves. Particularly, female participants had higher levels of anxiety and depressive symptoms than males. This aligns with Li (2007) and Lin's (2005) studies, which both reported that female gender was the

factor associated with poor quality of life in psychological domain of patients with LC in China. However, other studies have reported that there was no relationship between gender and psychological status of LC patients (Kim et al., 2006; Tsai et al., 2014). These differences might be because of gender role expectations in China, where females are expected to take care of the whole family, even while working full-time. In contemporary China, many women are facing a work–family conflict. Although women struggle with their modern role (breadwinner), society continues to reinforce a woman's traditional role (caregiver; Feng, 2004). Many (71%) men see it as intolerable if a female neglects her husband and children because of work (F. Wang, 2008). LC not only impacts a woman's family responsibilities but also changes family members' lifestyles because when the family caregiver becomes ill herself someone has to step in and take her role. This finding is supported by previous research showing that women—even women who are physically well—tend to be more concerned about other people's attitudes toward them than are men (Temple-Smith, Gifford, & Stoov, 2004). Therefore, providers should pay attention to patients who are experiencing maladjustment to LC and its symptoms. Providers can counsel patients and help them work on coping strategies (e.g., relaxation, anxiety reduction techniques) and finding emotional and peer support.

In this study, disease severity (Child-Pugh classification) also predicted self-management behaviors. This was contradictory to Zhu and colleagues' (2016) study, which concluded that Child-Pugh classification did not predict self-management behaviors of patients with LC. Previous research reports that half of the patients in the Child-Pugh B and C group had good appetites and could eat an entire meal, compared with Child-Pugh A patients (Ney et al., 2017). Moreover, similar to previous studies, Child-Pugh C class patients had higher anxiety and depressive symptoms than those in Child-Pugh A and B class (Fritz & Hammer, 2009; Kim et al., 2006). Health care providers can focus on improving patients' energy and appetite as well as increasing physical activity and nutrition intake, which may in turn improve depressive symptoms.

Finally, we found that self-efficacy also predicted self-management behaviors, which is in line with several publications (Curtin et al., 2008; Lei et al., 2015; S.L. Tsay & M. Halstead, 2002; Weng et al., 2010). Self-efficacy might be needed to initiate self-management behaviors, for example, helping patients maintain the confidence to actively communicate with health care providers and family members. Thus, patients' confidence in managing their LC condition should be routinely assessed. The information obtained from that assessment can then be used to formulate an individually tailored patient education plan (Lau-Walker, Presky, Webzell, Murrells, & Heaton, 2016).

Limitations

There are several limitations in this study. First, this is a cross-sectional study design, which could carry result bias. Longitudinal research is thus needed to determine causal relationships among the variables. Second, self-report questionnaires have limited reliability in relation to presenting the true facts about a patient's condition. Third, since the three research nurses have worked in these hepatology units for more than 5 years, they have established a good relationship with patients there. When they ask patients whether they would like to participate in the research, patients tend to accept the invitation, which can increase our response rate. For those who did not participate in the current project, we are not sure whether they were experiencing similar situation as our study participants do. Fourth, another study (Ney et al., 2017) has demonstrated that patients' dietary behaviors are related to LC symptoms, but in this study, we did not assess LC symptoms or experience of health education of diet of participants. These factors might be related to the level of self-management behaviors and knowledge. As such, future studies should include these factors and their possible influence on self-management behaviors. Fifth, this study was conducted in a metropolitan area in China, where patients have better access to health care services and where their economic status may be better compared with LC patients in more resourced-limited areas of the country. Accordingly, the results should not be generalized to other geographic areas. Finally, depression, disease severity, and self-efficacy explained only 22.9% of the total variance in self-management behaviors. The unexplained variance calls for future studies to go beyond the factors investigated in this study to better explain self-management behaviors. Future research should consider assessing other potential factors such as family support and patient–health care provider relationships.

Conclusion

Despite the limitations, this study presented several significant factors related to self-management behaviors of patients with LC. We found that psychological status (especially anxiety and depressive symptoms), disease severity, and self-efficacy were significant predictors of overall self-management behaviors. To enhance self-management behaviors, we speculate that future interventions are essential to decrease depression and enhance self-efficacy according to disease severity. The study findings highlighted that LC patients in Shanghai, China, had inadequate self-management knowledge. Therefore, it is necessary to increase LC self-management knowledge and help patients find strength to cope with stress to perform self-management behaviors. With

a better understanding of patients' self-management behaviors, providers can do a better job of designing tailored interventions for this population.

Relevance to Clinical Practice

Self-management is a simple process, but it can influence many internal and external factors. The results of our study suggest a multifaceted intervention to reduce potential barriers to self-management. First, clinicians should assess the psychological status of LC patients routinely (Tsai et al., 2014) and discuss the results with them to help them recognize things that impact their self-esteem negatively, including negative thoughts and feelings, avoidance behaviors, and physical consequences. Clinicians should then discuss problem-solving techniques and coping skills with their patients.

Second, disease severity should also be considered before planning to help patients meet their unique daily needs. For compensated LC patients, they may want to know how to keep a balance of work, rest, and exercise in life. As the disease progresses, patients may want to know how to adapt their daily activities. Some patients may have special dietary needs. For example, those who frequently experience severe hepatic encephalopathy may need to find the right balance between getting enough protein and getting enough calories, while still enjoying their meals.

Third, self-management knowledge should be included in learning strategies. Multisensory learning especially should be included to provide more effective self-management behaviors. Visual, auditory, taste, touch, and smell experiences can all be used as modes of knowledge building.

Finally, patients should be involved in the process of decision-making during the development of a care plan. For example, when planning exercise, health care providers need to ask what type of exercise patients like to perform (e.g., some like jogging with family members, some like jogging alone), then explore what obstacles might limit patients from doing those exercises, so those obstacles can be removed.

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ORCID iD


Ning Dong https://orcid.org/0000-0003-4687-3299

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Author Biographies

Ning Dong, MSN, RN, is a nursing educator assistant, Department of Nursing, Shanghai Public Health Clinical Center, Fudan University, Shanghai, China.

Wei-Ti Chen, PhD, CNM, RN, FAAN, is an associate professor, School of Nursing, University of California, Los Angeles, CA, U.S.A.

Meijuan Bao, BSN, RN, is the director of Nursing, Department of Nursing, Shanghai Public Health Clinical Center, Fudan University, Shanghai, China.

Yan Lu, BSN, RN, is a manager of Nursing, Obstetrics & Gynecology Unit, Shanghai Public Health Clinical Center, Fudan University, Shanghai, China.

Yuqian Qian, BSN, RN, is a staff nurse, Hepatology Unit, Shanghai Public Health Clinical Center, Fudan University, Shanghai, China.

Hongzhou Lu, PhD, MD, is a professor, the president, Shanghai Public Health Clinical Center, Fudan University, Shanghai, China.