Quality of life and factors predictive of burden among primary caregivers of chronic liver disease patients

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Abstract

Background Chronic liver disease increases the socioeconomic and emotional burden on the patient’s caregiver. This is important because a patient's adherence to therapy and transplant eligibility is dependent on the caregiver's ability to handle these challenges.

Methods This was a prospective, cross-sectional study of 50 primary caregivers of patients with advanced liver disease. Caregivers completed the RAND 36-item (Short Form [SF-36]) Health Survey and the Zarit Burden Scale survey. Caregiver quality of life, based on the SF-36, was compared using t-tests with the scores of the National reference population as controls.

Results In our cohort, the mean age of caregivers was 56.9±11.4 years, 40 (83.3%) were female, and 34 (70.8%) were spouses/significant others of the patient. Compared with the adjusted National norm data, caregivers scored substantially lower in categories of role limitations due to emotional problems (P<0.001), vitality (P=0.025), mental health (P=0.005), and social functioning (P=0.002). While the adjusted physical component score of the caregivers was comparable to the National mean, the mental component score (MCS) was lower than the National average (42.4±13.3 vs. 50.0±10, P<0.001). Though only 8 of 50 (16.0%) subjects reported a formal diagnosis of depression or anxiety, 23 (46.0%) had MCS <42, a strong predictor of clinical depression, based on previous studies.

Conclusions Primary caregivers of patients with advanced liver disease have significantly lower SF-36 mental health scores compared with the general population. Comparison of SF-36 scores to caregiver history suggests under recognition of mental health problems in this population.

Keywords Chronic liver disease, caregiver burden, depression

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Introduction

Chronic liver disease (CLD) and cirrhosis are leading causes of morbidity and mortality in the United States. The impact of liver disease and cirrhosis on the health care system has been previously studied [1-4]. However, the burden of cirrhosis on the family unit, consisting of patients and their caregivers, is relatively unknown. Bajaj et al reported that variables predictive of increased caregiver burden included model for end-stage liver disease (MELD) score, previous hepatic encephalopathy, alcoholic etiology, depression, anxiety, and years of relationship [5]. However, the study did not evaluate caregiver characteristics and other patient characteristics that may be predictive of increased provider burden. In addition, the study by Bajaj et al did not clearly define the quality of life of caregivers of patients with CLD. Further investigation is necessary to understand the burden of CLD on the family unit because patient’s adherence to medical therapy and transplant eligibility is dependent on the ability of the family to absorb these challenges.

By determining the most common physical and mental manifestations of caregiver burden, it may be possible to develop screening protocols and have ancillary resources available for caregivers to help relieve stressors and potentially improve patient outcomes. The liver disease-related factors that contribute the most to caregiver burden, such as those explored by previous studies, may help providers identify caregivers at high risk for burden-related problems. The diagnoses and specific complications that result from caregiver burden,
including depression, anxiety, other mental illness, financial loss, and difficulties with personal relationships, also requires further study.

This study’s objective is to evaluate the quality of life of primary caregivers of patients with advanced liver disease using the Medical Outcomes Study Short Form 36 (SF-36) and caregiver burden using the revised Zarit Burden Interview (ZBI). A review of the patients’ medical records was then conducted to determine the characteristics of advanced liver disease that are predictors of increased caregiver burden.

Patients and methods

Subject recruitment

Starting in March 2013, we recruited 50 consecutive caregivers who accompanied patients to their visit in the Liver Clinic at the VA Long Beach Healthcare System. Inclusion criteria included: 1) caregiver age >18 years; 2) the patient must have clinical or laboratory evidence of advanced liver disease; and 3) the patient must have identified the caregiver as his primary caregiver at the time of recruitment. Advanced liver disease was defined as having an etiology of liver disease (i.e., chronic hepatitis C, a history of alcohol abuse) and meeting one or more of the following clinical or laboratory parameters: 1) platelet count <150 x 10^9/L; 2) albumin <3.5 g/dL; 3) bilirubin >2.0 mg/dL; and 4) a liver biopsy showing Ishak fibrosis score of 4 or greater out of 6. The study protocol was approved by the VA Long Beach Healthcare System Institutional Review Board.

Surveys included

Caregivers were asked to complete the data on demographic variables, relationship to patient, geographic location to patient, Medical Outcomes Study SF-36 and the ZBI. The SF-36 Health Survey consists of 36 questions measuring 8 different quality-of-life domains of limitation in role functioning due to physical health, role limitations due to emotional health, social functioning, energy/fatigue, emotional well-being, and general health perceptions [6-10]. The Zarit Burden Scale consists of 22 questions, rating 0-9 (9 - highest level of burden) and measures physical, emotional, and financial toll of providing care [11-13].

Statistical analysis

The caregiver characteristics and demographics were summarized using descriptive statistics. The SF-36 Health Survey was scored using the previously established National norms across all domains [14-16]. The ZBI scores were recorded for each caregiver. A total ZBI score <21 was defined as no to little level of burden [17,18]. A multivariate logistic regression analysis was performed to identify patient and caregiver characteristics predictive of increased caregiver burden.

Results

Baseline caregiver characteristics

The baseline characteristics of primary caregivers of patients with CLD are summarized in Table 1. In our cohort, there was predominance in female caregivers (82.0%) and the majority of the caregivers (66.4%) identified as either spouse or unmarried significant other to the liver patient. The mean age of the caregivers was 56.9±11.6 years, and the mean age of the patients was 62.2±7.6 years. Of the 50 caregivers, only 14 (28.0%) were older in age than the patients. The median MELD score of patients at the time of study recruitment was 12. The median length serving as the patient’s primary caregiver was 6 years. The reported median length of time spent caregiving per week was 40 hours.

As many as 48.0% of the caregivers were actively working either part-time or full-time. Only 11 of the 50 caregivers (22.0%) reported having to stop working because of caregiving for the patients. In addition, 22.0% of the caregivers also reported having a dependent <18 years of age within their household.

A total of 40.0% of caregivers reported having at least one chronic medical condition such as diabetes, osteoarthritis, CLD, chronic kidney disease, or heart disease. In contrast, only 8 of the 50 caregivers (16.0%) reported being formally diagnosed with a psychiatric condition such as schizoaffective disorder, depression, bipolar disorder, adjustment disorder, dysthymia, and anxiety disorder.

Quality of life of caregivers

Fig. 1 summarizes the component scores to the SF-36 for the caregivers. Compared with the established National norms, primary caregivers of liver patients scored lower on quality-of-life domains of limitation in role functioning due to emotional health (43.3±13.5 vs. 50.0±10.0, P<0.001), vitality (46.8±11.1 vs. 50.0±10, P=0.025); mental health (44.5±12.8 vs. 50.0±10.0, P=0.005); and social functioning (44.2±12.8 vs. 50.0±10.0, P=0.002). There were no statistical differences in the mean component scores of physical functioning (P=0.34), role limitation due to physical health (P=0.12), bodily pain (P=0.37), and general health (P=0.11) in the caregiver group compared with the established National norms.

Overall, caregivers of patients with CLD have a significantly lower mental component score (MCS) compared to the national norms (42.4±13.3 vs. 50.0±10.0, P<0.001), while the physical component score (PCS) was similar between the two groups (51.9±9.1 vs. 50.0±10.0, P=0.16). Though only 8 of 48 (16.7%) subjects reported a formal clinical diagnosis for depression or anxiety, 23 subjects (47.9%) had MCS <42, a strong predictor of clinical depression [7,8].
Factors predictive of increased caregiver burden

Among the surveyed respondents, 23 of the 50 caregivers (46%) reported little to no level of burden based on the Zarit Burden Scale [19,20]. The mean ZBI score among our caregivers was 22.4±12.6. Caregiver with a ZBI score >21 was defined as having an increased level of burden. Factors predictive of increased care provider burden on the multivariate analysis were: more than 1 dependent in the household (odds ratio [OR]: 3.83, 95% confidence interval [CI]: 1.91 - 15.98); more than 2 hospitalizations as a complication of liver disease in the last 12 months (OR: 7.67, 95% CI: 2.05 - 10.07); a history of hepatic encephalopathy (OR: 4.25, 95% CI: 2.04 - 15.53); active alcohol use at home (OR: 2.98, 95% CI: 1.58 - 8.82); and household income $30,000 or less (OR: 1.98, 95% CI: 1.67 - 12.82). Caregiver’s age, relationship or proximity to the patient, and total time spent caregiving were not predictive of increased caregiver burden (Table 2).

Discussion

CLD and cirrhosis are currently the 12th leading cause of death in the United States [20]. The leading cause of CLD and need for liver transplantation is chronic hepatitis C virus infection, with an affected population between 3 and 5 million [21]. Due to ongoing cost-containment efforts, there is an increased need for family-based care of chronically ill individuals. Debilitating symptoms of fatigue, pruritus, ascites, malnutrition, and encephalopathy are common manifestations of patients with CLD. The presence of CLD at home has a

Table 1 Baseline characteristics of primary caregivers of patients with chronic liver disease

| Characteristics                          | No. (%)     |
|------------------------------------------|-------------|
| Gender                                   |             |
| Male                                     | 9 (18.0)    |
| Female                                   | 41 (82.0)   |
| Mean age (years)                         | 56.9±11.6   |
| Relationship with patient                |             |
| Spouse or significant other              | 33 (66.0)   |
| Child                                    | 7 (14.0)    |
| Friend                                   | 5 (10.0)    |
| Other                                    | 5 (10.0)    |
| Total household income level             |             |
| $10,000-$30,000                          | 27 (52.0)   |
| $40,000-$60,000                          | 14 (28.0)   |
| $70,000-$90,000                          | 7 (14)      |
| $100,000 or more                         | 2 (4.0)     |
| Current employment status                |             |
| Full time                                 | 14 (28.0)   |
| Part time                                 | 10 (20.0)   |
| Retired                                   | 13 (26.0)   |
| Quit working because of caregiving       | 11 (22.0)   |
| Unemployed                                | 2 (4.0)     |
| Median duration as caregiver (years, range)| 6 (1-32)   |
| Median time serving as caregiver weekly (h, range)| 40 (2-160) |
| Proximity to patient                     |             |
| Lives in the same house                  | 37 (74.0)   |
| Lives within close proximity (within 1 h drive)| 7 (14.0) |
| Lives>1 h away                           | 6 (12.0)    |
| Personal history of mental health illness| 8 (16.0)    |
| Personal history of at least one chronic illness| 20 (40) |
| More than 1 dependent (other than patient) at home| 11 (22.0) |
| Patient's median MELD score              | 18 (6, 34)  |
| Patient's mean age (years)               | 62.2±7.6    |
| Etiology for patient's liver disease     |             |
| Viral hepatitis                           | 32 (64.0)   |
| Alcoholic hepatitis                      | 7 (14.0)    |
| Non-alcoholic fatty liver disease        | 5 (10.0)    |
| Other                                    | 6 (12.0)    |

Table 2 Multivariate of factors predictive of increased caregiver burden of patients with chronic liver disease

| Factors                                              | OR  | 95% CI     |
|------------------------------------------------------|-----|------------|
| Caregiver’s age>50                                  | 1.01| 0.72-3.58  |
| Caregiver older than patient                         | 1.12| 0.60-3.69  |
| Relationship to patient                             |    |            |
| Spouse/significant other                             | 0.89| 0.49-2.47  |
| Non-spouse                                           | 1.00|            |
| Caregiver with history of psychiatric illness or chronic illness | 1.49| 0.76-2.90  |
| More than 1 dependent (other than patient) at home   | 3.83| 1.91-15.98 |
| Proximity to patient                                 |    |            |
| Within 1 h away                                      | 0.93| 0.76-3.14  |
| More than 1 h away                                   | 1.00|            |
| Greater than 40 h/week                               | 1.62| 0.91-3.69  |
| MELD score>15                                        | 1.48| 0.58-6.81  |
| More than 2 patient hospitalizations in the last 12 months| 7.67| 2.05-10.07|
| Patient with history of hepatic encephalopathy       | 4.25| 2.04-15.53 |
| Patient with active alcohol use                       | 2.98| 1.58-8.82  |
| Household income ≤$30,000                            | 1.98| 1.67-12.82 |

MELD, model for end-stage liver disease

OR, odds ratio; CI, confidence interval; MELD, model for end-stage liver disease
significant impact on the primary caregivers and affects their overall quality of life. Similar to previous studies [22,23], we have demonstrated that caregivers in our cohort experienced a significantly lower mental health score with nearly one standard deviation below the reported National norm (MCS 42.4 vs. 50.0, P<0.05). Furthermore, though only a minority (16.7%) of caregivers reported a formal clinical diagnosis for depression or anxiety, nearly half of the caregivers had an MCS <42, a strong predictor of underlying depression based on previous studies [7-10]. This discrepancy underscores the fact that nearly 30% of caregivers in our study may have undiagnosed clinical depression. Chronic depression and stress in the presence of inadequate resources and increasing patient dependency has been linked to decline in both physical and mental health status of patients and caregivers of other chronic disease conditions [24-33].

Despite the fact that nearly half of our caregivers reported having a personal history of chronic medical condition, our study is the first to highlight that caregivers of CLD patients are less likely to experience limited quality-of-life from a physical health standpoint. In this cohort, PCS was similar between the caregiver group and the established US norm (51.9±9.1 vs. 50.0±10.0, P=0.16). This is in contrast to other studies among caregivers of patients with advanced disease such as cancer and dementia [34-36]. The difference between caregivers of CLD patients and other chronic illnesses could be due to the fact that CLD patients are more likely to have an indolent course of illness compared to patients with advanced cancer who are more likely to have a more progressive disease course. Therefore, caring for liver patients may be less physically demanding than caring for patients with more rapid deterioration in physical health such as cancer and dementia.

Increased caregiver burden has also been linked to increased mortality among the caregivers [37]. Over half of the caregivers in this study reported experiencing an increased level of burden (mean ZBI of 22.4±12.6). Though difficult to compare across studies, the caregivers in our cohort demonstrated a similar or perhaps even greater level of burden reported among caregivers of patients with acute brain injury (ZBI 21.7±10.1), Alzheimer’s disease (ZBI 15.0±10.0), and advanced cancer (12.0±8.5) [38]. However, less than a fourth of our caregivers required quitting their current job because of caregiving. Interestingly, our cohort showed that factors that were independent of the caregiver burden was the caregiver’s age, patient's MELD score, total time caring for the patient, caregiver's personal relationship to the patient, and proximity to the patient.

Previous studies have also used ZBI to look for factors predictive of caregiver burden; two of the studies coincided with the results from this study showing that – history of hepatic encephalopathy in the patient, lower household income, and having one or more dependents at home other than the patient are important predictive factors [4,5]. While previous studies have demonstrated that alcoholic cirrhosis led to increased caregiver burden compared to other causes of cirrhosis, we found that, in fact, active alcohol use in the patient was strongly associated with an increased burden. Interestingly, MELD score, previously found to have a direct relationship with caregiver burden, was not a significant predictor in this study, although our study used a threshold of 18, which may not have been high enough to detect a difference [5,22]. Our study did demonstrate that frequent hospitalizations for any cause were the strongest predictor of caregiver burden. Increased rates of hospitalization due to severely decompensated liver disease and comorbidities can increase the challenge of caregiving. It may suggest that there may be a MELD threshold past which caregiver burden increases, but further studies will need to elucidate this relationship. This also underscores the need to optimize management in patients with advanced liver disease to prevent complications for both the patient and caregiver’s well-being. Previous studies have demonstrated that in other chronic diseases, social support groups for caregivers may also
reduce caregiver burden and burnout [39,40]. Furthermore, a specialized multidisciplinary care management to manage complications related to CLD such as depression, ascites, malnutrition, and variceal bleeding in the outpatient setting may reduce caregiver burden and reduction in hospitalization. Morando et al [41] demonstrated that an outpatient, multidisciplinary approach for outpatient management of cirrhotics can reduce 12-month mortality and potentially caregiver burden.

There are several limitations in this study. Firstly, the present study has a cross-sectional design which only allows for the assessment of quality of life and burden at a single point in time. To fully study caregiver burden as a process, a longitudinal study is required as patterns of quality of life and burden likely fluctuate with the patient’s disease activity. Secondly, given that this is a survey-based study, a recall bias is possible, thereby selecting a subset of caregivers with higher level burden and lower quality of life. Thirdly, the definitions utilized in our study, such as mental health, may not be specific enough, leaving room for personal interpretation.

In conclusion, this study demonstrated that primary caregivers of patients with advanced liver disease have significantly lower scores measuring mental well-being, compared with the general population. Depression among primary caregivers is also a significant problem with high prevalence and is most likely underdiagnosed. Health care providers need to be diligent in assessing caregivers regularly for signs and symptoms of depression, anxiety, and mental stress. Predictors of increased caregiver burden seem to include multiple factors that affect a patient’s ability to comply with treatment and function mentally, and complications that require hospitalization are a significant, previously undiscovered factor that increased caregiver burden. Larger studies may help clarify predictors more accurately.

Unanswered questions include whether increased caregiver burden leads to decreased quality in the care provided to the patient by the caregiver, and whether this leads to an increase in patient non-compliance, hospitalization, complications of liver disease, and poorer outcomes. Conversely, the question of whether reducing caregiver burden can lead to improved care and subsequent positive outcomes for the patient is important. Finally, an effective protocol for screening caregivers for depression and an effective treatment protocol need to be established. Should all caregivers be screened at baseline, and what interval should follow-up visits be conducted? Will effective treatment of caregiver depression lead to a rebound in the quality of care provided, reduce caregiver burden and have a positive impact on caregiver and patient outcomes? While physicians are coached to "treat the whole patient", the future of longitudinal care for chronic diseases, including advanced liver disease, may require treating the person seated next to the patient as well.

**Summary Box**

**What is already known:**
- Chronic liver disease increases the socioeconomic and emotional burden on the patient’s caregiver
- Patient’s adherence to therapy and transplant eligibility is dependent on the caregiver’s ability to handle these challenges

**What the new findings are:**
- We have demonstrated that caregivers in our cohort experienced a significantly lower mental health score with nearly one standard deviation below the reported National norm while the physical component score was similar to the National norm
- Factors predictive of increased care provider burden on the multivariate analysis were: more than 1 dependent in the household; more than 2 hospitalizations as a complication of liver disease in the last 12 months; history of hepatic encephalopathy; active alcohol use at home; and household income ≤ $30,000
- The future of longitudinal care for chronic diseases, including advanced liver disease, may require treating the person seated next to the patient as well

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