

# Are Physician-Derived Disease Severity Indices Associated with Health-Related Quality of Life in Patients with End-Stage Liver Disease?

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- OBJECTIVES:** Model for end-stage liver disease (MELD) score is now often used as an overall indicator of health status for patients with end-stage liver disease. However, there are no data evaluating the associations between MELD scores and patient reports of health-related quality of life (HRQOL).
- METHODS:** Two hundred-three patients with end-stage liver disease completed a disease-targeted HRQOL instrument (the LDQOL 1.0). Patients also rated the severity of their liver disease and reported number of disability days attributed to their liver disease in the preceding month. MELD and Child Turcotte Pugh (CTP) scores were calculated for all patients. Associations of MELD and CTP scores with patient-derived outcomes were estimated.
- RESULTS:** The mean MELD and CTP scores were 12 and 7, respectively, indicating mild severity of liver disease. HRQOL of patients was generally poor, with the mean SF-36 physical and mental component summary scores of 35 and 40. Seventy percent of patients rated their liver disease symptoms as moderate to severe. Similarly, 70% reported being disabled from their liver disease. MELD was associated with physical functioning scale and the physical component summary (PCS) score in patients with end-stage liver disease. In contrast, CTP score was significantly associated with physical functioning, role limitations due to physical health problems, PCS score, effects of liver disease, sexual functioning, and sexual problems. Both MELD and CTP scores correlated with self-rated severity of liver disease symptoms but not with self-reported disability days.
- CONCLUSIONS:** Despite objectively mild liver disease, the subjective HRQOL of this cohort was severely impaired. CTP score was more closely associated with patient-reported estimates of HRQOL than the MELD score. CTP or disease-specific HRQOL instruments may compliment MELD by providing insights into outcomes of importance to patients with low risk of mortality.

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## INTRODUCTION

Two liver disease severity indices are widely employed in routine clinical practice—the Child Turcotte Pugh (CTP) and the model for end-stage liver disease (MELD) score. CTP score has formed the basis on which liver disease severity is assessed since its formulation as a measure of risk stratification for shunt surgery, more than 30 yr ago. More recently, MELD has been proposed as an objective liver disease severity scoring index (1). The MELD score—calculated from total serum bilirubin, creatinine, and international normalized ratio (INR)—is a reliable and valid predictor of short-term mortality in patients with end-stage liver disease (1, 2).

Unlike the CTP score, the MELD score is not dependent on subjective provider assessments, such as the presence and degree of ascites and encephalopathy. As a result, MELD has recently replaced CTP as the primary basis for allocation of organs to patients with advanced, chronic liver disease awaiting orthotopic liver transplantation (OLT) (3).

Accurate estimates of the risk of mortality are of obvious importance in determining the appropriateness and timing of OLT. However, most patients on the liver transplant waiting list have a low risk of early death. In fact, a preliminary analysis of the United Network for Organ Sharing (UNOS) database revealed that 93% of adults listed for OLT had a MELD score of less than 20 (mean MELD score = 15) (4),

which corresponds to a 3-month mortality of only 6% (2). Thus, many patients on the OLT-waiting list may regard their functional status and sense of well being (*i.e.*, their health-related quality of life, HRQOL) as a more relevant outcome measure than their immediate risk of death.

Although the MELD score was originally proposed as a model to predict short-term mortality in patients with end-stage liver disease, in clinical practice it is commonly used as an overall indicator of a patient's functional health status. Individuals with high MELD scores are considered 'more sick' than those with low scores. Two prior studies have reported associations between the CTP score and HRQOL of patients with end-stage liver disease (5, 6). However, there are no data evaluating the associations of MELD scores with patient self-reports of HRQOL.

This study examines the associations of the MELD and CTP scores with the HRQOL in patients with end-stage liver disease. In addition, the relationships between these scores, self-rated severity of liver disease symptoms, and the number of disability days attributed to their liver disease in the preceding month are evaluated. We hypothesized that CTP would have stronger associations with HRQOL than the MELD score, but that neither the MELD nor the CTP score, would be substantially related to the HRQOL. This hypothesis is based upon data demonstrating worse HRQOL in cirrhotic patients with signs of subclinical hepatic encephalopathy as compared to those without hepatic encephalopathy (7). Similarly, the presence of ascites has been shown to have negative effects on HRQOL (5). These two clinical variables are included in the CTP score calculation, therefore, the aggregate CTP score may be more sensitive to impaired HRQOL than the MELD score, which is based solely on biochemical/laboratory variables and therefore, may not correlate with patient HRQOL and other patient-centered outcomes.

## METHODS

### *Study Population*

HRQOL data were collected in 203 consecutive, ambulatory adults (aged  $\geq 18$  yr) with end-stage liver disease referred for primary OLT at the Dumont-UCLA Liver Transplant Center, Los Angeles, CA. Individuals excluded from participation were those unable to read and understand English, those with previous liver transplant, those with frank hepatic encephalopathy, and those refusing to participate or provide written informed consent. The initial data were collected between September 1997 and May 1998, as a part of cross-sectional, multicenter field study during the development and psychometric evaluation of the Liver Disease Quality of Life instrument, LDQOL 1.0 (8).

### *HRQOL Data Collection*

The HRQOL data were collected using the LDQOL 1.0, as described elsewhere (8). The LDQOL 1.0 is a self-report, disease-targeted HRQOL measure for patients with advanced, chronic liver disease. It contains the SF-36 Health

Survey version 2.0 as the generic core, supplemented by disease-targeted scales. The SF-36 taps eight aspects of HRQOL—referred to as domains or scales: physical functioning (10 items), role limitation-physical (4 items), bodily pain (2 items), general health (5 items), role limitation-emotional (3 items), vitality, emotional well-being (5 items), and social functioning (2 items). Physical component summary (PCS) and mental component summary (MCS) scores can also be computed. An additional single item assesses change in the respondent's health over the past 1 yr (9, 10). The SF-36 has been tested in numerous patient populations and medical conditions (11, 12). The disease-targeted supplement of the LDQOL 1.0 includes 12 multiitem scales that evaluate: liver disease-related symptoms (17 items), liver disease-related effects on activities of daily living (10 items), concentration (7 items), memory (6 items), sexual functioning (3 items), sexual problems (3 items), sleep (5 items), loneliness (5 items), hopelessness (4 items), quality of social interaction (5 items), health distress (4 items), and self-perceived stigma of liver disease (6 items). Scores of all the scales range from 0–100, with higher values indicating better HRQOL.

In addition to completing the LDQOL 1.0, patients were asked to report their self-rated severity of liver disease symptoms on a five-point Likert response scale: no symptoms = 1, mild symptoms = 2, moderate symptoms = 3, severe symptoms = 4, and extremely severe symptoms = 5. Patients also reported the number of disability days attributed to their liver disease in the preceding month, as 0 days, 1–10 days, 11–20 days, and 21–30 days.

### *Clinical Data Collection*

Clinical data including underlying etiology of liver disease, presence and degree of ascites, hepatic encephalopathy, presence or absence of renal failure requiring dialysis, prothrombin time and INR, serum albumin, total serum bilirubin, and serum creatinine level were collected using a separate standardized data collection form during the cross-sectional study. These data were used to calculate a CTP score at the time of the initial study. We computed the MELD score for all patients according to UNOS modification of the MELD model (13).

### *Statistical Analysis*

Continuous variables were summarized using means, and categorical variables as proportions. Items in the LDQOL 1.0 were grouped and placed into hypothesized scales based on content. For example, all items hypothesized to measure physical functioning ( $n = 10$ ) were placed under one scale. Scores were calculated for each scale by summing the scores of their component items and converting the sum to a scale ranging from 0 to 100, with 100 corresponding to the best possible quality of life.

Using the equation,

$$\frac{\text{Raw score} - \text{Minimum score}}{\text{Maximum score} - \text{Minimum score}} \times 100$$

mean score, standard deviation (SD), and ranges were estimated to evaluate scale score distribution.

For the purpose of this analysis, the MELD and CTP scores were treated as continuous variables.

The associations between the MELD, the CTP, and the HRQOL scale scores, self-reported number of disability days within the prior 30 days, and self-rated severity of liver disease symptoms were estimated using multivariable linear regression models while adjusting for age and gender.

In an additional exploratory analysis, the entire cohort was divided into two groups: those with chronic hepatitis C ( $n = 94$ ) and those without chronic hepatitis C ( $n = 99$ ). Between group comparisons were made using analysis of variance and  $\chi^2$  tests for continuous and categorical variables, respectively. The between group HRQOL differences were adjusted for age, gender, and liver disease severity using multivariable linear regression. The Hochberg adjustment for multiple comparisons was used throughout. A  $p$ -value of  $<0.05$  was considered statistically significant. All analyses were performed using SAS (SAS, Cary, NC) software (14).

## RESULTS

### Sample Characteristics

Two hundred-three patients completed the LDQOL 1.0. One hundred ninety-one (94%) and 181 (89%) patients had complete CTP and MELD data, respectively, at the time of liver transplant evaluation. The mean age (SD) of the patients was 51.3 (10) yr, with 58% of the sample being men (Table 1). The majority of the patients were white (58%). The most common primary diagnosis for end-stage liver disease was hepatitis C (46%), followed by alcoholic liver disease (16%), primary biliary cirrhosis/primary sclerosing cholangitis (11.6%), and cryptogenic cirrhosis (11%). There were no differences in the mean age (51.3 vs 51.0 yr,  $p = 0.87$ ) or gender (men, 64%

**Table 1.** Sample characteristics

Number	203
Gender (male), N (%)	118 (58)
Age (yr), mean (SD)	51.1 (10)
Race, N (%)	173 (100)
White	101 (58)
African American	8 (5)
Asian	11 (7)
Latino	47 (27)
Others	6 (3)
Underlying liver disease, N (%)	193 (100)
Hepatitis C <sup>a</sup>	94 (46)
Alcohol	33 (16)
Cryptogenic	22 (11)
PBC/PSC <sup>b</sup>	23 (11)
Hepatitis B	11 (5)
Others	20 (10)
Physician-rated liver disease severity	
MELD score, mean (SD)	12 (4.8)
CTP score, mean (SD)	7 (2)

<sup>a</sup>There were no differences in age, gender, MELD, and CTP score distribution between those with *versus* those without chronic hepatitis C.

<sup>b</sup>Primary biliary cirrhosis/primary sclerosing cholangitis.

vs 53%,  $p = 0.09$ ) distributions between those with *versus* those without chronic hepatitis C.

### Physician-Rated Liver Disease Severity

As shown in Table 1, the mean (SD) CTP and MELD scores were 7 (2) and 12 (4.8), respectively. Thirty percent of our sample had CTP scores of 5–6 (Child-Pugh class A), 52% had scores of 7–9 (Child-Pugh class B), and 17% had scores  $\geq 10$  (Child-Pugh class C). Similarly, MELD score was  $\leq 9$  in 32%, 10–19 in 60%, and  $\geq 20$  in the remaining 8% of the patients. None of the patients had a MELD score  $\geq 30$ . There was no difference in the physician-rated liver disease severity between those with *versus* those without chronic hepatitis C, regardless of whether estimated by CTP (mean score 7.6 vs 7.5,  $p = 0.66$ ) or MELD score (mean score 12.4 vs 11.3,  $p = 0.12$ ).

### HRQOL

Descriptive statistics for the HRQOL scales are provided in Table 2. The self-reported HRQOL of study patients was generally poor. The mean (SD) PCS and MCS scores in the study population were 35 (10.8) and 40 (9.8), and were consistent with the scores reported in the literature for end-stage liver disease patients (5). Patients with a diagnosis of chronic hepatitis C scored lower (*i.e.*, self-reported worse HRQOL) on all scales (Table 2). After adjusting for multiple comparisons,

**Table 2.** Descriptive statistics of LDQOL 1.0

HRQOL scale	N	Mean score	SD <sup>a</sup>	Range
SF-36 scales				
Physical functioning <sup>b</sup>	187	49.5	29.3	0–100
Role limitations—physical <sup>b</sup>	184	38.5	32.5	0–100
Role limitations—emotional <sup>b</sup>	187	49.7	32.4	0–100
Social functioning <sup>b</sup>	187	52.5	26.9	0–100
Bodily pain <sup>b</sup>	187	53.4	29.5	0–100
Energy/fatigue <sup>b</sup>	187	32.7	21.3	0–100
Emotional well-being	187	56.6	20.1	5–100
General health perceptions	187	33.8	21.2	0–95
Physical summary score <sup>b,c</sup>	183	35.1	10.8	11.5–63.9
Mental summary score	183	40.3	9.8	20–62.3
Liver disease-targeted scales				
Symptoms of liver disease <sup>b,c</sup>	187	55.3	21.1	11.2–100
Effects of liver disease <sup>b</sup>	187	59.1	23.9	0–100
Concentration <sup>b</sup>	187	61.2	27.3	0–100
Memory <sup>b</sup>	187	58.1	28.4	0–100
Quality of social interaction <sup>b</sup>	186	66.7	17.1	0–100
Health distress <sup>b</sup>	187	42.5	27.8	0–100
Sleep	184	44.1	20.8	0–95
Loneliness	185	75.2	20.7	0–100
Hopelessness	186	66.2	25.4	0–100
Stigma of liver disease	186	70.1	26.0	0–100
Sexual functioning	176	53.1	39.1	0–100
Sexual problems	94	60.7	36.3	0–100

<sup>a</sup>Standard deviation.

<sup>b</sup>Patients with chronic hepatitis C diagnosis scored lower than those without chronic hepatitis C on all scales. However, the difference was significant at  $p < 0.05$  for these scales only (without Hochberg adjustment).

<sup>c</sup> $p < 0.05$  based on Hochberg adjustment for multiple comparisons.

two differences persisted. The mean PCS score of those with chronic hepatitis C was significantly lower (0.4 SD difference,  $p = 0.0005$ ) than those without chronic hepatitis C. In addition, patients with chronic hepatitis C reported significantly worse symptoms of liver disease (0.5 SD difference,  $p = 0.0005$ ) than those without chronic hepatitis C.

#### **Self-Rated Liver Disease Symptom Severity and Disability Days**

Seventy percent of patients rated their liver disease symptoms as *moderate* to *severe*, while the remaining reported mild (22%) or no symptoms (8%) related to their liver disease. Patients with chronic hepatitis C rated their liver disease symptom severity worse than those without chronic hepatitis C ( $p = 0.02$ ). However, this difference was not significant after adjusting for multiple comparisons. The majority of patients (70%) reported being disabled from their liver disease. Almost half (46%) of the patients were unable to work for  $\geq 21$  days in the preceding month. There was no difference in the disability days between those with *versus* those without chronic hepatitis C ( $p = 0.33$ ).

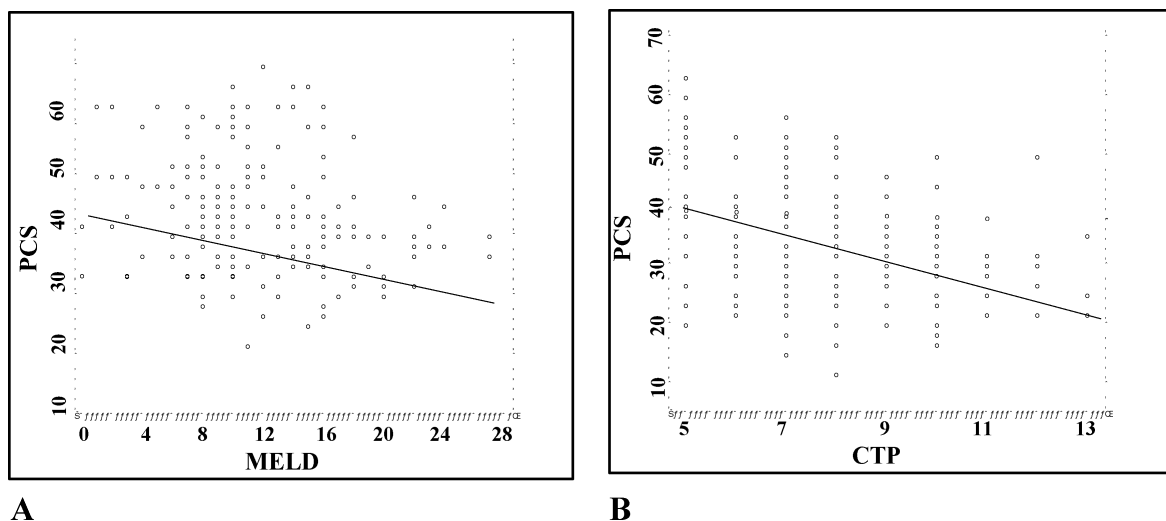
#### **Association Between MELD and CTP Scores with HRQOL Scales, Patients' Self-Rated Liver Disease Symptoms Severity and Disability Days**

The scatter plots of the PCS *versus* MELD and CTP are displayed in Figure 1. Both MELD and CTP had a negative correlation with the PCS. The magnitude of this correlation was larger for CTP (correlation coefficient ' $r$ ' =  $-0.31$ ,  $p = 0.0001$ ) than for MELD ( $r = -0.24$ ,  $p = 0.001$ ). Neither MELD nor CTP were significantly correlated with the MCS ( $r = -0.05$ ,  $p = 0.48$  and  $-0.04$ ,  $p = 0.54$ , respectively. Figures not displayed).

The results of regression analyses are as follows. We found that the presence and strength of association between MELD and HRQOL varied widely by domains. MELD had significant associations with physical functioning, role limitation—physical, general health perceptions, social functioning, energy and fatigue, the PCS, effects of liver disease, health distress, sexual functioning, and sexual problems (see Table 3). In other words, patients reported worsening HRQOL on all these scales as MELD scores worsened. There was a significant association of MELD with self-rated symptom severity. There was no significant association between MELD and self-reported disability days.

After adjusting for multiple comparisons, the following associations between MELD and HRQOL remained significant. First, there was a significant association of MELD with physical functioning and the PCS. Second, MELD was significantly associated with self-rated symptom severity (See Table 3).

As displayed in Table 3, CTP had significant associations with physical functioning, role limitations due to physical health problems, the PCS, energy/fatigue, role limitations due to emotional health problems, social functioning, symptoms of liver disease, effects of liver disease, stigma of liver disease, sexual functioning, and sexual problems. Therefore, as CTP score worsened, HRQOL scores worsened. Also as shown in Table 3, CTP had a significant association with self-rated liver symptom severity and self-reported disability days. After adjusting for multiple comparisons, significant associations of CTP with physical functioning, role limitations due to physical health, the PCS, effects of liver disease, sexual functioning, and sexual problems persisted. In addition, the association between MELD and self-rated symptom severity remained significant.



**Figure 1.** Scatter plots of the physical component summary score versus (A) MELD and (B) CTP. A displays a negative correlation between the physical component summary score (PCS) and the model for end-stage liver disease (MELD) score (correlation coefficient =  $-0.24$ ). The Child Turcott Pugh (CTP) score also has a negative and stronger correlation with the PCS (correlation coefficient =  $-0.31$ ) as shown in B.

**Table 3.** Associations between the HRQOL and the MELD and CTP scores

HRQOL scales	MELD score			CTP score		
	N	t-score	p-value	N	t-score	p-value
Disability days, mean (SD)	158	1.89	0.06	174	2.21	0.03
Self-rated symptom severity	167	4.14	0.0001 <sup>a</sup>	183	5.09	0.0001 <sup>a</sup>
SF-36 scales						
Physical functioning	171	-3.78	0.0002 <sup>a</sup>	171	-4.82	0.00001 <sup>a</sup>
Role limitation—physical	169	-2.17	0.03	169	-3.09	0.0023 <sup>a</sup>
Bodily pain	171	-1.65	0.10	171	-1.90	0.06
General health perceptions	171	-2.50	0.01	171	-1.96	0.05
Emotional well being	171	-0.31	0.75	171	-0.29	0.77
Role limitation—emotional	168	-1.86	0.06	168	-2.64	0.009
Social functioning	171	-2.82	0.005	171	-2.57	0.01
Energy/fatigue	171	-2.05	0.04	171	-2.78	0.006
Physical summary score	167	-3.23	0.0015 <sup>a</sup>	181	-4.02	0.0001 <sup>a</sup>
Mental summary score	167	-0.84	0.40	181	-0.83	0.40
Liver disease targeted scales						
Symptoms of liver disease	171	-1.41	0.16	171	-2.81	0.005
Effects of liver disease	171	-2.62	0.009	171	-3.75	0.0002 <sup>a</sup>
Concentration	171	0.39	0.69	171	-0.09	0.93
Memory	171	0.43	0.66	171	0.18	0.85
Quality of social interaction	170	0.74	0.45	170	0.35	0.72
Health distress	170	-2.16	0.03	170	-1.42	0.15
Sleep	168	-1.73	0.56	168	-0.40	0.69
Loneliness	169	-0.59	0.55	169	-1.49	0.13
Hopelessness	170	-0.83	0.40	170	-1.38	0.17
Stigma of liver disease	170	-1.93	0.05	170	-2.36	0.02
Sexual functioning	160	-2.74	0.006	160	-3.65	0.0004 <sup>a</sup>
Sexual problems	88	-1.17	0.09	88	-3.43	0.0009 <sup>a</sup>

The *t*-scores and *p*-values are from the results of multivariable linear regression analyses. All analyses adjusted for age and gender.

<sup>a</sup>*p*-value significant at *p* < 0.05 after Hochberg adjustment for multiple comparisons.

N represents number of patients available for each analysis.

## DISCUSSION

A variety of disease severity indices have been designed and widely applied to quantify the biological activity of various diseases or the physician's assessment of disease activity. However, biological data and physician assessment may not adequately reflect patient-derived estimates of HRQOL. Studies examining the associations between indices of disease severity and HRQOL in other chronic diseases have yielded inconsistent results. Although several investigators have reported HRQOL scales to be significantly correlated with the disease-severity indices in individuals with inflammatory bowel disease (15), rheumatoid arthritis (16), and other chronic conditions (17–23), the magnitude of these associations were not large (18, 21). Other investigators have found no significant associations between disease severity indices and HRQOL (24). Two prior studies have reported correlations between the CTP score and HRQOL of patients with end-stage liver disease (5, 6). There are no data evaluating associations of the MELD scores with HRQOL.

In a large sample of patients with end-stage liver disease of diverse etiologies, we examined the associations between physician-derived indices of liver disease severity (MELD and CTP scores) and patient-derived HRQOL data. Several of our findings are worthy of further commentary. First, consistent with the preliminary analysis of UNOS data, a large

proportion of our patients (92%) had relatively low MELD scores (MELD ≤ 20). Despite the relatively mild degree of liver disease as judged by their MELD scores, patient self-reported HRQOL was profoundly impaired, and far below US population norms (e.g., the PCS and MCS score of 50) (25). These low HRQOL scores are consistent with other reports of HRQOL amongst individuals with cirrhosis (5, 6). In fact, our study sample reported worse social functioning and energy/fatigue than patients with depression in the Medical Outcome Study (25).

Second, we found that the CTP score appeared to be more strongly associated with HRQOL than the MELD score. The MELD score was linearly associated with physical functioning and the PCS—a reliable summary measure of physical HRQOL of the SF-36 (12, 26). Conversely, the CTP score was significantly associated with the physical functioning, the PCS, role limitations due to physical health problems, effects of liver disease, and sexual functioning and sexual problems domains. Both MELD and CTP scores were positively associated with patient self-rated liver disease symptom severity. Therefore, it appears that both MELD and CTP scores correlate with the physical health of patients with end-stage liver disease as well as the patients' perception of symptom severity. However, the CTP score may have a better role in comprehensively assessing the *physical health and sexual functioning* of these patients. Consistent with previous studies, the

magnitude of associations between the liver disease severity indices and HRQOL was low, with  $R^2$  ranging from 0.02 to 0.10. (Data not shown).

Last, patients with end-stage liver disease due to chronic hepatitis C reported significantly worse physical health (lower PCS score) and symptoms of liver disease than those without chronic hepatitis C. The difference in HRQOL can be anchored using the interpretation of effect size as provided by Cohen (27): 0.20 SD as a small-effect size, 0.50 as a medium-effect size, and 0.8 as a large-effect size. Therefore, the negative impact of chronic hepatitis C on the HRQOL of end-stage liver disease patients (0.4 SD difference for physical functioning and 0.5 SD difference for self-reported symptoms of liver disease) can be estimated as a medium effect. Our analysis further suggests that this effect is independent of age, gender, or degree of physician-rated liver disease severity. These results, although interesting, should be used for further hypotheses generation—to be tested formally with measurement and adjustment of potentially important confounders, that is, mode of acquisition of viral hepatitis (28), socio-economic status, and psychiatric as well as other comorbidities (29, 30).

Our results may have several implications. In our cohort of patients the severity of underlying liver disease, as estimated by the mean (SD) MELD score of 12 (4.8), was mild. These patients with low MELD scores are at low risk for early mortality (6% at 3 months) (2). Therefore, they may be considered ‘too healthy’ to be listed for transplantation. Once listed, they may stay on the waiting list for a long period of time. However, despite a low MELD score, these patients report poor HRQOL and therefore cannot be considered ‘less sick’. Moreover, in this cohort of patients HRQOL may be an especially important outcome to measure in the short or intermediate term. Consistent with other investigators (5, 6), we found that the physician-derived liver disease severity indices may have a role in assessing the physical health of patients with end-stage liver disease. However, a comprehensive assessment of patient centered outcomes requires use of reliable and valid HRQOL instruments. HRQOL indices are able to capture aspects of health status that extend beyond physiological measures. Although the literature enumerates the feasibility (31–34) and putative benefits of routine assessment of patients’ HRQOL in clinical practice (35–38) such assessments are not commonly undertaken (33). Such HRQOL measurements are not proposed to replace the physiological measures of disease severity, but rather to act as a compliment to accurately and comprehensively assess health. The present study adds further support for the contention that HRQOL assessments should be incorporated into clinical practice.

We are cognizant of the limitations of this study. First, it involved a cross-sectional design, and thus the results need to be confirmed in a prospective study. In addition, because our study was limited to patients in one tertiary care hospital, our ability to generalize the results may be limited. Moreover, the sample population studied consisted of ambulatory, chronic liver disease patients who were referred for liver transplant

evaluation. Therefore, this may be a somewhat unrepresentative sample because it consisted almost exclusively of persons with health insurance coverage and access to health care.

Despite these limitations, this study has several strengths. This is the first study to examine associations between MELD and patient-centered outcomes (*e.g.*, HRQOL). Our sample is fairly representative of those patients with end-stage liver disease who have successfully negotiated the health-care system and undergone evaluation for liver transplantation. Moreover, we tested our hypothesis in a relatively large sample of patients with different etiologies of liver disease, and a broad spectrum of liver disease severity.

In conclusion, despite relatively low MELD scores indicating mild liver disease with small risk of imminent mortality, the HRQOL of patients in our sample was profoundly impaired. Therefore, we believe that assessment of HRQOL is particularly important in patients who are otherwise at ‘low risk’ of dying in the short term. Disease-specific HRQOL instruments are necessary to reliably measure all domains of HRQOL. However, in the absence of routine assessments of HRQOL in clinical practice, the CTP score may provide insight into the outcomes of importance to patients with low risk of mortality—suggesting an ongoing role of CTP in the day-to-day management of patients with end-stage liver disease.

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