Self-reports on symptoms of alcohol abuse: liver transplant patients versus rehabilitation therapy patients

Context—Self-report measures often underestimate the severity of symptoms of alcohol abuse. It is generally supposed that patients who abuse alcohol tend to minimize their drinking behavior. However, the validity of self-reports also can be influenced by external factors such as the setting.

Objective—To investigate how the setting influences self-reporting on symptoms of alcohol abuse in patients with alcoholic liver disease.

Design, Setting and Participants—Cross-sectional study in patients before liver transplant (n=40) and patients in rehabilitation therapy (n=44).

Main Outcome Measure—Scores on the Munich Alcoholism Test, which consists of a self-report-scale and an expert-rating scale.

Results—The discrepancy in scores on the self-report scale and the expert-rating scale differed significantly between patients before liver transplant and patients in rehabilitation therapy. Furthermore, patients in the rehabilitation therapy group reported higher alcoholism scores on the self-report questionnaire than did patients before liver transplant, but the groups did not differ in the expert evaluation value.

Conclusion—The transplant setting seems to evoke minimizing in self-reports in patients with alcohol abuse. Minimizing or denying symptoms of alcohol abuse does not seem to be a specific characteristic of persons with alcohol abuse, as it is also caused by the circumstances. In the transplant setting, more attention should be given to the psychologically difficult situation for patients with potential alcohol abuse. Implementation of psychoeducational interventions in the treatment process before transplant could be a first step toward reaching this goal. (*Progress in Transplantation*. 2015;25[3]:203-209)

©2015 NATCO, The Organization for Transplant Professionals
doi: <http://dx.doi.org/10.7182/pit2015618>

**Katharina Schieber, MSc,
Marion Lindner, MSc,
Jan-Peter Sowa, PhD,
Guido Gerken, MD, Norbert
Scherbaum, MD, Alisan
Kahraman, MD, Ali Canbay,
MD, Yesim Erim, MD**

University Hospital of Erlangen (KS, YE),
University Hospital, University Duisburg-
Essen (ML, J-PS, GG, NS, AK, AC),
Germany

Corresponding author: Yesim Erim, MD,
Department of Psychosomatic Medicine
and Psychotherapy, University Hospital
of Erlangen, Schwabachanlage 6,
91054 Erlangen, Germany
(e-mail: yesim.erim@uk-erlangen.de)

To purchase electronic or print reprints,
contact:
American Association of Critical-Care Nurses
101 Columbia, Aliso Viejo, CA 92656
Phone (800) 899-1712 (ext 532) or
(949) 448-7370 (ext 532)
Fax (949) 362-2049
E-mail reprints@aacn.org

A range of measurement techniques have been developed to diagnose alcoholism, especially to measure the amount of alcohol consumption accurately.¹⁻⁷ These measures, which include biochemical markers as well as self-report questionnaires, can assist health care professionals in identifying persons who are chronic heavy drinkers or at risk for alcohol abuse and dependence.

Although self-report-questionnaires are common in clinical practice, as they are a convenient and efficient measure, their predictive validity is weakened by numerous factors.⁸ Del Boca and colleagues^{9,10} established a model of 3 factors that influence the response accuracy of alcohol self-reports: social context, respondent characteristics, and task attributes. These factors

seem to be the main ones influencing the validity of the questionnaires.^{9,10} The social context factors include cultural proscriptions and norms, the assessment setting, and the interpersonal situation (eg, degree of anonymity). Thus, the participant's perception of the response contingencies can be affected, leading to a social desirability bias.¹⁰ Response accuracy can also be influenced by the personal characteristics of the participants such as demographic features, personality traits, intelligence, as well as their physical and psychological condition. Furthermore, task attributes such as the administration form, design, complexity, and duration can affect participants' response accuracy.

It is widely assumed that persons abusing alcohol generally tend to deny their symptoms of alcohol

abuse/dependence,^{11,12} but according to the model just described, this assumption focuses only on the respondent characteristics factor. The task attributes and social context factors are less considered. However, the social context factor in particular deserves closer attention because of its importance in the context of transplant surgery. In transplant patients, it is a major clinical challenge to distinguish between patients with alcoholic liver disease (ALD) who have achieved sobriety and patients with ALD who are at risk for relapses before transplant. Therefore, a comprehensive psychological evaluation to identify the correct status of the disorder and the severity of the symptoms is fundamental and recommended as one of the minimal requirements before deciding whether to put a patient on the waiting list for liver transplant.¹³

Transplant centers also demand a 6-month sobriety period for patients with ALD,¹⁴ as strict abstinence from alcohol can lead to an improvement in health and to a temporary delay in the need for transplant. Furthermore, alcohol abstinence before transplant influences the outcome of the procedure and is also predictive of the risk of alcohol relapse after transplant.¹⁵⁻¹⁸ In addition, alcohol relapse after transplant may lead to a reduced long-term survival rate.^{15,19,20} Adherence to the 6-month sobriety rule is crucial to continue the transplant process, but some patients may have difficulties meeting it. Prior studies have reported alcohol relapse for up to one-third of patients with ALD on a liver transplant waiting list.^{2,17,21,22} Thus, as patients are informed about the importance of the sobriety rule, they may minimize or deny their symptoms of alcohol abuse in self-reports.²³

For about 52% of patients with ALD who are on the waiting list for liver transplant, alcohol markers were detected to be positive, even though alcohol consumption was denied.²⁴ Such discrepancies between self-reported drinking behavior and current alcohol consumption, assessed with different biochemical markers, were found in several studies,^{1-3,5,6,24,25} but as there was no comparison with a control group, the impact of the transplant setting has not yet been analyzed.

In the present study, we investigated how the setting influences self-reporting on symptoms of alcohol abuse by ALD patients. We aimed to compare the self-report on symptoms of alcohol abuse of patients before liver transplant with that of patients in rehabilitation therapy. As in the transplant setting, patients in rehabilitation therapy are not supposed to consume alcohol. However, in contrast to the transplant setting, patients in alcohol rehabilitation do not have to fear disadvantage if they report a relapse. Another goal was to extend the current status of this research area by comparing the patients' self-reports on symptoms of alcohol abuse with an expert evaluation.

Methods

Design and Participants

In this cross-sectional study of patients with a history of alcohol abuse, we compared patients who were in preparation for transplant because of ALD with a control group of patients in rehabilitation therapy.

ALD was defined as liver injury ranging from simple steatosis to cirrhosis that was caused by alcohol consumption, following the practice guidelines of the American Association for the Study of Liver Diseases.^{26,27} The diagnosis of ALD was based on the patient's history (significant alcohol consumption), findings on physical examination, and standard measures of liver damage including levels of alanine aminotransferase, aspartate aminotransferase, and γ -glutamyl transpeptidase, as well as a complete blood count and parameters of liver synthesis functions.^{26,27}

In Germany, public health services are funded out of general taxation and are provided to all legal residents without additional costs. Treatment of individuals with alcohol abuse normally includes a medically assisted detoxification program during a hospital stay and subsequent rehabilitation therapy for a period of several weeks on an inpatient or outpatient basis. Reported relapses during the rehabilitation therapy are addressed in the therapeutic process. The final treatment option for persons with ALD in the terminal stage is liver transplant. Before transplant, patients must undergo a basic evaluation to be placed on the waiting list. Identification of the correct status of the disorder and the intensity of drinking behavior is an integral part of the psychiatric evaluation. Additionally, a 6-month period of sobriety is required to continue the transplant process.

All patients participated voluntarily in the study and provided written informed consent. Approval for the study was obtained from the ethics committee of the University Hospital of Essen. The present study was also part of a survey that investigated adipokine and cytokine profiles of the subgroups, as noninvasive separation measures of alcoholic and nonalcoholic liver disease.²⁷

A total of 51 patients with ALD in the terminal stage were recruited consecutively from 2010 to 2012 by the Department of Psychosomatic Medicine and Psychotherapy at the University Hospital Essen. Patients participated in the study while they were being evaluated for placement on the waiting list before liver transplant.

The control group was recruited from 2010 to 2012. It consisted of 45 consecutive inpatients from the addiction therapy unit of the Fliehdner Clinic, Düsseldorf. Rehabilitation therapy normally lasts up to 12 weeks. Inpatients participated in the study about 4 weeks after beginning the therapy.

Inclusion Criteria

Enrollment criteria for the control group were a proven history of alcohol consumption, sonographically detected steatosis, and absence of any further chronic or acute liver disease (viral, autoimmune, toxicity, metabolic causes). None of the patients showed cognitive impairment in an expert interview conducted by an experienced liaison psychiatrist and psychosomatician (Y.E.). To have a clear biological demarcation between the groups, cirrhotic changes in the liver were examined via an ultrasonographic measurement of liver stiffness (transient elastography) with a FibroScan system.²⁸ A value of 13 kPa or more led to exclusion from the control group. Three participants had to be excluded from data analyses because of cirrhotic changes in the liver.

Patients with ALD awaiting liver transplant fulfilled the criteria for liver cirrhosis. During the recruiting process, we screened for previous and current signs of cognitive impairment due to hepatoencephalopathic changes. All liver transplant patients were routinely assessed with the Transplant Evaluation Rating Scale (TERS).^{29,30} The German version of TERS is a common measure with good interrater reliability.²⁹ The TERS subscale “mental status” assesses cognitive impairment, disorder of attention, normal sleep-wake cycle, activity level, and responsiveness. No participant showed significant cognitive impairment according to the subscale “mental status.”

Because of the high number of missing responses, 9 persons had to be excluded from the data analysis. In total, 84 patients were included in the study: 40 patients being evaluated before liver transplant and 44 patients attending rehabilitation therapy.

Measurements

All participants completed a sheet assessing socio-demographic data (sex, age, family status, and educational level). Furthermore, clinical parameters were assessed by using the following questionnaires.

Hospital Anxiety and Depression Scale (HADS). The HADS, developed by Zigmond and Snaith,³¹ is a screening instrument for anxiety disorders and depression in somatic and psychiatric patients.³² Each subscale, 1 for anxiety and 1 for depression, consists of 7 items, which are totaled to yield 2 scores. A score of 8 was the optimal cutoff for both subscales.³² In the present study, we used the German version HADS-D, validated by Herrmann et al.³³ The internal consistency of both subscales is high: in the present study, both subscales had a Cronbach α of 0.86.

The Munich Alcoholism Test (MALT). This is a screening test for alcoholism developed by Feuerlein et al.³⁴ It consists of a self-report questionnaire

(MALT-S) and a clinical assessment rated by a physician (MALT-E). In the present study, a high internal consistency of the self-report questionnaire was found with a Cronbach α of 0.91. A total MALT score can be computed by summing the MALT-S and MALT-E scores (thereby MALT-E is multiplied by 4). Cutoff values from 6 to 10 in the MALT score can be interpreted as suspected alcoholism, whereas a score of 11 or higher is an indicator for alcoholism.

MALT-S. This self-rating scale consists of 24 dichotomous items focused on symptoms of alcohol abuse: drinking behavior, attitudes toward alcohol consumption, psychological and social impairment due to alcohol consumption, and physical symptoms as a consequence of alcohol consumption (eg, “I have sometimes tried to get rid of my trembling and nausea with alcohol”).

MALT-E. The MALT-E scale consists of 7 items that are rated by a physician in a face-to-face interview, in conjunction with laboratory findings. The item contents cover objective clinical data as a consequence of alcoholism, specific alcohol consumption, and help-seeking behavior of relatives.

Data Analysis

For data analysis, we used the software IBM SPSS statistics 21. Differences in demographic features were assessed by using a Student *t* test and a χ^2 test. Furthermore, analyses of covariance were conducted to control for sex as a confounding variable. We also computed effect sizes by using the Cohen *d*. We accepted up to 3 missing items in the MALT-S and MALT-E questionnaires, replacing them with the mean value of the completed items.

Results

The mean age of the liver transplant group was 52.3 (SD, 8.0) years, which did not differ significantly from the rehabilitation therapy group’s mean age of 49.3 (SD, 7.6) years. The distribution of sexes differed significantly between the groups, ($\chi^2_1 = 4.8$, $P < .035$) owing to a higher percentage of men in the rehabilitation therapy group. The groups did not differ significantly in family status and educational level: about 60% reported living in a partnership and about half of the participants had graduated from secondary school. No significant difference was found between the groups for anxiety disorders or depression. However, both groups reported HADS scores higher than the cutoff, which may reflect concerns about the actual and future situation (Table 1).

The liver transplant group reported a mean score of 9.5 (SD, 6.2) on the MALT-S, whereas a mean score of 16.9 (SD, 4.6) was reported by the rehabilitation therapy group. According to the analyses of

Table 1 Sociodemographic data and clinical parameters of patients before transplant and patients during rehabilitation therapy^a

Variable	Before transplant (n = 40)	During rehabilitation (n = 44)	Statistics	P
Sex, No. (%) of patients			$\chi^2_1 = 4.8$	.035
Male	23 (58)	35 (80)		
Female	17 (42)	9 (20)		
Age, years			$t_{82} = 1.8$	.074
Mean (SD)	52.3 (8.0)	49.3 (7.6)		
Range	24-63	30-62		
Family status, No. (%) of patients			$\chi^2_1 = 0.01$	1.00
Single	14 (35)	18 (41)		
Living in partnership	21 (52)	26 (59)		
Educational level, No. (%) of patients			$\chi^2_2 = 0.2$	.829
Secondary school < 10 years	16 (40)	22 (50)		
Intermediate school < 12 years	12 (30)	13 (30)		
High school or higher	7 (18)	9 (20)		
HADS score, mean (SD)				
Anxiety subscale	11.5 (2.8)	11.7 (3.0)	$t_{77} = -0.3$	.761
Depression subscale	8.9 (1.6)	9.4 (1.9)	$t_{76} = -1.3$	.215

Abbreviation: HADS, Hospital Anxiety and Depression Scale.

^a Sample sizes vary because of missing data.

covariance, the difference between the groups was highly significant ($P < .001$), after controlling for sex as a covariate. There was also a large between-groups effect (Cohen $d = 1.4$). However, there was no significant difference between the groups for the MALT-E: The liver transplant group showed a mean score of 2.6 (SD, 1.6), which was similar to the mean score of 2.9 (SD, 1.2) in the rehabilitation therapy group.

We compared the discrepancy of the MALT-S and MALT-E by calculating the difference between the scores. Both groups differed significantly from each other ($P < .001$), with the liver transplant group showing a higher discrepancy between the MALT-S and MALT-E scores (mean discrepancy 14.0 in the liver transplant group vs 6.8 in the rehabilitation therapy group). The effect size also suggested a large effect, with a Cohen d of 1.4 (Table 2).

As a consequence of the significant difference in the MALT-S, both groups also differed significantly in the total MALT score ($P < .001$). Considering the cut-off values of the MALT score, it could be shown that each patient in the rehabilitation therapy group could be assigned to the category of alcoholism, whereas only about 75% of the liver transplant group could be classified within this category. In fact, approximately 10% of the liver transplant group did not reach the cutoff value for either alcohol abuse or alcoholism (Table 3).

Discussion

The aim of the study was to compare the self-report on symptoms of alcohol abuse between liver transplant patients and rehabilitation therapy patients. We focused on the impact of the different therapy settings

on self-reports by comparing the divergence of self-report and expert rating of symptoms of alcohol abuse in both settings. The rehabilitation therapy group reported higher alcoholism scores in the self-report questionnaire than the liver transplant group reported, but the groups did not differ in the external evaluation value. In addition, we found a significant difference in the MALT-S and MALT-E discrepancy between the liver transplant and rehabilitation therapy groups. This finding suggests that liver transplant patients reported a lower alcoholism score but were rated with a higher alcoholism score in the expert evaluation. Thus, the self-reported alcoholism score of the rehabilitation therapy group was closer to the expert evaluation than was the case in the liver transplant group. The results reported here are in line with results of previous studies^{1-3,5,6,24,25} where discrepancies between self-reports and measurements with biomarkers were reported in patients awaiting liver transplant.

Furthermore, our results show that the setting is an important factor influencing the validity of self-reports. Minimizing or denying symptoms of alcohol abuse does not seem to be a specific characteristic among individuals with a history of alcohol abuse, as it also seems to be caused by the circumstances. Liver transplant patients are in poor physical condition because of end-stage liver disease, which leads to extreme psychological stress.^{35,36}

Persons with alcohol abuse often use alcohol to reduce stress symptoms, but liver transplant patients are urged to refrain from alcohol in accordance with the sobriety rule. Doing so can potentially lead to an increase in stress levels, and hence liver transplant

Table 2 Comparison of patients' scores on the Munich Alcoholism Test (MALT) before transplant and during rehabilitation therapy^a

Scale	Score, mean (SD)		Statistics			
	Before transplant (n = 40)	During rehabilitation (n = 44)	df	F	P	Cohen d
MALT-S (self-rating)	9.5 (6.2)	16.9 (4.6)	1, 81	35.6	<.001	1.4
MALT-E (physician's rating)	2.6 (1.6)	2.9 (1.2)	1, 81	0.4	.558	0.2
MALT score, total	20.0 (10.4)	28.3 (7.6)	1, 81	15.5	<.001	0.9
Difference MALT-S – MALT-E	6.8 (5.7)	14.0 (4.4)	1, 81	38.4	<.001	1.4

^a Analysis of covariance with sex as covariate.

Table 3 Comparison of patients' total scores and categories on the Munich Alcoholism Test (MALT) before transplant and during rehabilitation therapy

MALT	Before transplant (n = 40)	During rehabilitation (n = 44)	Statistics	P
Score, mean (SD)	20.0 (10.4)	28.3 (7.6)	$F_{1,81} = 15.5$	<.001
Category, No. (%) of patients			$\chi^2_2 = 12.8$	<.001
No alcoholism	4 (10)	0 (0)		
Alcohol abuse	6 (15)	0 (0)		
Alcoholism	30 (75)	44 (100)		

patients find themselves in a vicious circle of a life-threatening physical condition, psychological stress, and a craving for alcohol. Withstanding this enormous pressure is very difficult, and many patients may not be able to handle it. Patients who cannot cope with this sort of pressure relapse into alcohol abuse and take the risk of being excluded from the transplant waiting list. The alcohol abuse would consequently worsen their physical condition and increase their risk of death. By denying and minimizing their actual symptoms of alcohol abuse, they avoid recognizing their own incapacity and bearing the consequences.

In contrast, rehabilitation therapy patients are in better physical condition than are liver transplant patients and do not have to fear for their lives. Furthermore, conducting a rehabilitation therapy may trigger an open report of their actual symptoms of alcohol abuse, as it is encouraged and supported in this setting. In accordance with the data reported in this study, we suggest that for patients with alcohol abuse, the transplant setting seems to evoke minimizing in self-reports. Minimizing symptoms of alcohol abuse allows access to further treatment on the one hand, but on the other it eliminates the chance of getting professional support for alcohol-related problems.

The results also raise some ethical issues. Asking for information about symptoms of alcohol abuse, especially about alcohol consumption, can put patients with ongoing alcohol abuse before transplant into a difficult situation. They have to decide whether to tell the truth and risk exclusion from the transplant waiting list or to deny symptoms of alcohol abuse. However,

people have a right not to incriminate themselves, therefore it may be ethically incorrect to require such a decision from them, especially in cases of advanced disease and deterioration of health as in patients with acute liver failure. The use of biochemical markers could be helpful in avoiding this dilemma and may relieve patients from additional distress. This topic therefore requires further research and discussion.

To our knowledge, this is the first study to explore the influence of different settings (before transplant and during rehabilitation therapy) on self-reported symptoms of alcohol abuse. Inclusion of a control group was therefore an important feature of the study. Furthermore, a comparison of self-report and expert evaluation was conducted for the first time in this research area by using the MALT. It has proven to be a prompt and efficient screening instrument that can be used as a decision-making aid. However, the study has some limitations that must be addressed. The different status of ALD in the groups may result in differences in quality of health. Researchers in future studies should measure quality of health and consider it in the data analysis. Although we screened for cognitive impairment with a validated standardized interview, we have to acknowledge that the conduction of a neuropsychological test series would have been the reference standard to detect cognitive impairment. To confirm the present findings, further studies are needed with a prospective design and a higher sample size. An external assessment of alcohol consumption, such as physiological biological markers, should also be added to the measurements.

Conclusions

The results of the present study indicate that future research should be focused on developing reliable measures of symptoms of alcohol abuse, as well as psychological interventions for patients with alcohol abuse who are awaiting liver transplant. Reliable methods for measuring symptoms of alcohol abuse in liver transplant patients are needed because the use of self-report measurement alone seems to be insufficient. Measurements combining biomarkers and self-report should be considered, as they show more accurate values of alcohol consumption and at the same time individual needs and stress factors can be identified.

The results give some important indications concerning the care of patients with ALD being evaluated for liver transplant candidacy. In clinical practice, more attention should be given to the circumstances of the transplant setting and the psychologically difficult situation of liver transplant patients. Liver transplant patients should be given more support by professionals to learn how to deal with the symptoms and circumstances. Implementation of psychoeducational interventions^{37,38} in the treatment process before transplant could be a first step toward reaching this aim. A continuous therapeutic assistance according to individual needs of the patients may ensure effective treatment with lasting success.

Acknowledgment

The authors thank Dr O. Lask, head of the Department of Addiction Disturbances, Theodor Fliedner Hospital Ratingen Düsseldorf, for assistance in recruiting patients in rehabilitation therapy.

Financial Disclosures

None reported.

References

- Allen JP, Wurst FM, Thon N, Litten RZ. Assessing the drinking status of liver transplant patients with alcoholic liver disease. *Liver Transpl*. 2013;19(4):369-376. doi:10.1002/lt.23596.
- Hempel JM, Greif-Higer G, Kaufmann T, Beutel ME. Detection of alcohol consumption in patients with alcoholic liver cirrhosis during the evaluation process for liver transplantation. *Liver Transpl*. 2012;18(11):1310-1315. doi:10.1002/lt.23468.
- Erim Y, Bottcher M, Dahmen U, Beck O, Broelsch CE, Helander A. Urinary ethyl glucuronide testing detects alcohol consumption in alcoholic liver disease patients awaiting liver transplantation. *Liver Transpl*. 2007;13(5):757-761.
- DiMartini A, Day N, Dew MA, et al. Alcohol use following liver transplantation: a comparison of follow-up methods. *Psychosomatics*. 2001;42(1):55-62.
- Bholah H, Bate J, Rothwell K, Aldersley M. Random blood alcohol level testing detects concealed alcohol ingestion in patients with alcoholic liver disease awaiting liver transplantation. *Liver Transpl*. 2013;19(7):782-783. doi:10.1002/lt.23664.
- Carbonneau M, Jensen LA, Bain VG, Kelly K, Meeberg G, Tandon P. Alcohol use while on the liver transplant waiting list: a single-center experience. *Liver Transpl*. 2010;16(1):91-97. doi:10.1002/lt.21957.
- Litten RZ, Fertig J. Self-report and biochemical measures of alcohol consumption. *Addiction*. 2003;98(suppl 2):iii-iv.
- Schwarz N. Self-reports: how the questions shape the answers. *Am Psychol*. 1999;54(2):93-105. doi:10.1037/0003-066X.54.2.93.
- Del Boca FK, Dalkes J. The validity of self-reports of alcohol consumption: state of the science and challenges for research. *Addiction*. 2003;98(suppl 2):1-12.
- Del Boca FK, Noll JA. Truth or consequences: the validity of self-report data in health services research on addictions. *Addiction*. 2000;95(suppl 3):S347-S360.
- Orrego H, Blake JE, Blendis LM, Kapur BM, Israel Y. Reliability of assessment of alcohol intake based on personal interviews in a liver clinic. *Lancet*. 1979;2(8156-8157):1354-1356.
- Hesselbrock M, Babor TF, Hesselbrock V, Meyer RE, Workman K. "Never believe an alcoholic"? On the validity of self-report measures of alcohol dependence and related constructs. *Int J Addict*. 1983;18(5):593-609.
- Lucey MR, Brown KA, Everson GT, et al. Minimal criteria for placement of adults on the liver transplant waiting list: a report of a national conference organized by the American Society of Transplant Physicians and the American Association for the Study of Liver Diseases. *Liver Transpl Surg*. 1997;3(6):628-637.
- Rice JP, Lucey MR. Should length of sobriety be a major determinant in liver transplant selection? *Curr Opin Organ Transplant*. 2013;18(3):259-264.
- Pfizzmann R, Schwenzer J, Rayes N, Seehofer D, Neuhaus R, Nussler NC. Long-term survival and predictors of relapse after orthotopic liver transplantation for alcoholic liver disease. *Liver Transpl*. 2007;13(2):197-205.
- Karim Z, Intaraprasong P, Scudamore CH, et al. Predictors of relapse to significant alcohol drinking after liver transplantation. *Can J Gastroenterol*. 2010;24(4):245-250.
- DiMartini A, Dew MA, Day N, et al. Trajectories of alcohol consumption following liver transplantation. *Am J Transplant*. 2010;10(10):2305-2312. doi:10.1111/j.1600-6143.2010.03232.x.
- Dew MA, DiMartini AF, Steel J, et al. Meta-analysis of risk for relapse to substance use after transplantation of the liver or other solid organs. *Liver Transpl*. 2008;14(2):159-172. doi:10.1002/lt.21278.
- Faure S, Herrero A, Jung B, et al. Excessive alcohol consumption after liver transplantation impacts on long-term survival, whatever the primary indication. *J Hepatol*. 2012; 57(2):306-312. doi:10.1016/j.jhep.2012.03.014.
- Cuadrado A, Fabrega E, Casafont F, Pons-Romero F. Alcohol recidivism impairs long-term patient survival after orthotopic liver transplantation for alcoholic liver disease. *Liver Transpl*. 2005;11(4):420-426.
- Iasi MS, Vieira A, Anez CI, et al. Recurrence of alcohol ingestion in liver transplantation candidates. *Transplant Proc*. 2003; 35(3):1123-1124.
- Webzell I, Ball D, Bell J, et al. Substance use by liver transplant candidates: an anonymous urinalysis study. *Liver Transpl*. 2011;17(10):1200-1204. doi:10.1002/lt.22370.
- Weinrieb RM, Van Horn DH, McLellan AT, Lucey MR. Interpreting the significance of drinking by alcohol-dependent liver transplant patients: fostering candor is the key to recovery. *Liver Transpl*. 2000;6(6):769-776.
- Sterneck M, Yegles M, von Rothkirch G, et al. Determination of ethyl glucuronide in hair improves evaluation of long-term alcohol abstinence in liver transplant candidates. *Liver Int*. 2014;34(3):469-476. doi:10.1111/liv.12243.
- Dimartini AF, Dew MA. Monitoring alcohol use on the liver transplant wait list: therapeutic and practical issues. *Liver Transpl*. 2012;18(11):1267-1269. doi:10.1002/lt.23529.
- O'Shea RS, Dasarthy S, McCullough AJ. Alcoholic liver disease. *Am J Gastroenterol*. 2010;105(1):14-32; quiz 33. doi:10.1038/ajg.2009.593.
- Sowa JP, Atmaca O, Kahraman A, et al. Non-invasive separation of alcoholic and non-alcoholic liver disease with predictive modeling. *PLoS One*. 2014;9(7):e101444. doi:10.1371/journal.pone.0101444.
- Dechene A, Sowa JP, Gieseler RK, et al. Acute liver failure is associated with elevated liver stiffness and hepatic stellate cell activation. *Hepatology*. 2010;52(3):1008-1016. doi:10.1002/hep.23754.

29. Johann B, Lorenzen J. *Psychosomatic Evaluation of Liver Transplantation Patients. Practical Use of the Transplant Evaluation Rating Scale*. Lengerich, Germany: Pabst Science Publishers; 1997:43.
30. Twillman RK, Manetto C, Wellisch DK, Wolcott DL. The Transplant Evaluation Rating Scale. A revision of the psychosocial levels system for evaluating organ transplant candidates. *Psychosomatics*. 1993;34(2):144-153.
31. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand*. 1983;67(6):361-370.
32. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale. An updated literature review. *J Psychosom Res*. 2002;52(2):69-77.
33. Herrmann C, Buss U, Snaith RP. *HADS-D Hospital Anxiety and Depression Scale: Deutsche Version*. Bern, Germany: Verlag Hans Huber; 1995.
34. Feuerlein W, Ringer C, Kufner H, Antons K. The diagnosis of alcoholism—the Munich Alcoholism Test (MALT). *Int J Rehabil Res*. 1979;2(4):533-534.
35. Stewart KE, Hart RP, Gibson DP, Fisher RA. Illness apprehension, depression, anxiety, and quality of life in liver transplant candidates: implications for psychosocial interventions. *Psychosomatics*. 2014;55(6):650-658.
36. Erim Y, Beckmann M, Klein C, Paul A, Beckebaum S. Psychosomatic aspects of organ transplantation. *Psychother Psychosom Med Psychol*. 2013;63(6):238-249. doi:10.1055/s-0033-1343191.
37. Erim Y, Beckmann M, Tagay S, et al. Stabilisation of abstinence by means of psychoeducation for patients with alcoholic liver disease awaiting liver transplantation [in German]. *Z Psychosom Med Psychother*. 2006;52(4):341-357.
38. Erim Y, Moller E, Beckebaum S, Gerken G, Broelsch CE, Senf WE. Manualised group therapy concept for patients with alcoholic cirrhosis awaiting liver transplantation [in German]. *Z Psychosom Med Psychother*. 2006;52(3):243-258.