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# Implementation of the High-Risk Alcoholism Relapse Scale in a Liver Transplant Clinic

## ABSTRACT

Because of the high prevalence of alcohol relapse after liver transplantation, transplant programs are challenged to evaluate alcoholism among liver transplant patients. Relapse after liver transplantation can have detrimental outcomes such as organ rejection, medical and social resource exhaustion, financial burden to the family and society, and negative public perception of organ transplantation. The purpose of this project was to improve post-liver transplant assessment for the risk of relapse to heavy alcohol use by implementing a protocol using the High-Risk Alcoholism Relapse (HRAR) scale (DiMartini et al., 2000; Yates et al., 1993). The project was conducted in an urban organ transplant center's outpatient post liver transplant clinic. Chart reviews assessed the process of patients identified as being at high risk and the transplant providers' completion of the HRAR scale. Eleven percent of patients assessed were identified as being at high risk for relapse of heavy alcohol use and 85% of providers used the HRAR scale in their clinic interviews. This project demonstrates that further refinements in techniques of predicting the risks of relapse are necessary, and nurses are in ideal positions to screen patients for alcohol use.

**A**lcoholism is one of the major causes of liver disease worldwide. Alcoholic liver disease (ALD) is a disease that results from alcohol ingestion and is manifest in a broad spectrum of liver injury ranging from fatty liver to end-stage liver disease and cirrhosis (O'Shea, Dasarthy, McCullough, & the Practice

Guideline Committee of the American Association for the Study of Liver Diseases and the Practice Parameters Committee of the American College of Gastroenterology, 2010). According to the United States (U.S.) Department of Health and Human Services, the Organ Procurement and Transplant Network/Scientific Registry of Transplant Recipients 2011 Annual Data Report (2012), ALD accounted for approximately 17.6%–20.4% of all liver transplants in the United States between 2001 and 2011, and ranks as the second most common reason for orthotopic liver transplantation (OLT) after hepatitis C. Without transplantation, the 5-year survival in patients with ALD is 23% (Pfitzmann et al., 2007), but with OLT, survival is improved up to 80% (Iruzubieta, Crespo, & Fábrega, 2013; Pfitzmann et al., 2007).

There is ample evidence that alcoholic patients selected for OLT have similar or better survival rates than those who underwent transplant for other indications (Hartl et al., 2011). However, liver transplant for alcoholism remains controversial because of the chronic and worsening shortage of donor organs and the inadequate rate of organ donation. This is reinforced by concerns that alcoholic patients might relapse into drinking, thereby damaging the transplanted liver (Varma, Webb, & Mirza, 2010).

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## Significance of Relapse

In transplant studies, *relapse* is defined as resuming alcohol use. It can vary from occasional lapse or slips to harmful drinking or addictive drinking (Lucey, 2011). Alcoholism is recognized as an addiction to alcohol with a pattern of tolerance, dependence (*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*), relapse, and remission that can persist even after liver transplant (Shawcross & O'Grady, 2010). Of those who receive a liver transplant due to ALD, either as a primary diagnosis or in combination with hepatitis C virus infection, 30%–50% of patients acknowledge some alcohol use in the first 5 years after liver transplant (DiMartini et al., 2006; Weinrieb et al., 2001). Among these, 10%–15% return to harmful drinking, some damaging their liver allografts or experiencing the many life-threatening consequences of excessive drinking such as gastrointestinal bleeding, recurrent cirrhosis, or death (Tome & Lucey, 2003; Weinrieb et al., 2001; Weinrieb, Van Horn, Lynch, & Lucey, 2011).

Relapse into patterns of harmful or addictive drinking influences transplant patient survival rates and organ allocation. The histological changes in the liver after the resumption of harmful drinking in transplant patients are similar to those of ALD in the native liver (Lee, 1997). Return to moderate or heavy alcohol consumption after liver transplant is associated with rapid development of histological liver injury including fibrosis (Tang, Boulton, Guson, Hubscher, & Neuberger, 1998), which means that the progression of disease is faster in transplanted organs. Excessive alcohol consumption has a negative impact on long-term survival after liver transplant, whether or not ALD was the primary indication for transplant, and death is caused mainly by recurrence of liver disease or nonhepatic cancer (Faure et al., 2012). Furthermore, relapse may lead to reduced adherence to medication regimens, which is associated with an increased graft rejection rate (Cuadrado, Fabrega, Casfont, & Fons-Romero, 2005).

With the current organ shortage, relapse has a negative impact on the organ donation system (Iruzubieta et al., 2013). Organ transplantation runs against the clock and patients waitlisted for organs die each day. There have been ethical concerns over the allocation of a liver to a patient with ALD that may cause reluctance of family members to give consent for organ donation (Donckier, Lucidi, Gustot, & Moreno, 2014; Tang et al., 1998).

Relapse after transplant places financial burdens not only on recipients and their families but also on the healthcare system and society. The liver transplant evaluation process is extensive and transplant surgery is expensive. According to UNOS 2008 data, the

average first-year costs for a liver transplant in the United States is \$523,400. In addition, the monthly costs for post-transplant immunosuppressive drugs average \$2,000–\$3,000 (United Network for Organ Sharing, 2011). Further costs include, but are not limited to, pretransplant consultations, evaluation testing, wait-time management while patients are on the waiting list, medical treatments and maintenance, social support services, and patient education resources.

## Challenges

All transplant programs face a challenge in selecting appropriate ALD candidates for transplantation and assessing the likelihood of alcohol relapse after liver transplantation (Dew et al., 2008). It is not well understood why some liver transplant recipients relapse after transplant whereas others do not (Newton, 2007). Because of the psychosocial factors of addiction that threaten the success of liver transplants in alcoholics, most ALD patients who are eligible for OLT are required to undergo a period of alcohol abstinence, a formal treatment and ongoing aftercare such as Alcoholics Anonymous. However, the typical 6-month abstinence period required before a patient can be listed for liver transplant, the “6-month rule” (Shawcross & O'Grady, 2010), does not reliably predict sustained patient abstinence during periods leading up to and following OLT (Friedman, 2012; Lucey, 2011).

It is difficult to achieve consensus among healthcare providers regarding candidates' eligibility based on their current and past alcohol histories. Provider debates on organ allocation are driven by diverse cultural values and belief systems, ethical concerns, different understandings of the biogenetic link between behaviors and alcohol consumption, and the availability of medical and surgical treatment options for ALD patients (Thompson, 2012; Tsoulfas & Agorastou, 2012).

Furthermore, alcoholics typically underreport their drinking histories (Bobiface & Shelton, 2013; Weinrieb et al., 2011) and their nonacceptance of having an alcohol problem (Hartl et al., 2011) complicates provider assessment. Nevertheless, with the presence of other comorbidities such as viral hepatitis or hemochromatosis, accurate diagnosis for primary alcoholic cirrhosis of liver in accordance to the *International Classification of Diseases, ninth revision (ICD-9 code) 571.2* is more difficult. Patients with alcoholism often underestimate the harmful consequences of drinking alcohol and are reluctant to attend relapse programs (Thompson, 2012). Failure to follow up on alcohol rehabilitation is exacerbated by insurance provider policies that deny or limit benefits covering outpatient individual relapse counseling.

It is crucial for transplant providers to identify patients at risk and implement actions to prevent alcohol relapse. Therefore, the purpose of this project was to improve assessment of recurrent alcohol use after liver transplantation by transplant providers using the High-Risk Alcoholism Relapse (HRAR) scale.

## Needs Assessment

The transplant center in this study has encountered the aforementioned challenges in managing patients with a diagnosis of ALD. At present, like many other liver transplant centers, each transplant candidate must undergo a thorough medical and psychosocial evaluation before transplant listing. The program adheres to the practice protocol adopted by many other liver transplant centers, which requires a minimum of 6 full months of abstinence from alcohol. This protocol also requires transplant candidates with histories of alcoholism to complete an alcohol relapse prevention program. However, recommendations and requirements of the accepted transplant protocol are not consistently followed. This might relate to the fact that some ALD patients are not referred to the transplant program until they are in an advanced state of physical deterioration or cognitively compromised by hepatic encephalopathy, interfering with their abilities to fully comply with the requirements of the evaluation process.

The current practice pattern in this liver transplant clinic does not include routine relapse risk assessment as part of post liver transplant care, and there is no practice protocol with a standardized instrument to screen the risk of relapse. Similar to other transplant centers, the nurses and physicians mainly focus on medical evaluation and they rely on social workers or psychiatrists to provide psychosocial assessment during the preliver transplant evaluation. The desired short-term goals of the project, developed following a needs assessment, were as follows:

1. Implement a protocol using the HRAR scale by educating transplant providers and applying the HRAR in a post liver transplant clinic.
2. Evaluate providers' completion of the HRAR scale through chart review.
3. Document the percentage of post liver transplant patients identified at risk for alcohol relapse and monitor the follow-up or referrals.

## Methods

### Relapse Risk Assessment Tools

A number of predictive tools were considered as part of the assessment including random blood alcohol level screening (Carbonneau et al., 2010) and the University of Michigan Alcoholism Prognosis Scale (McCallum & Masterton, 2006). Using blood alcohol level

screening to detect alcohol consumption has some disadvantages because it detects only acute intoxication and recent consumption, affecting its validity in measuring relapse as a pattern of alcohol use. The Michigan Alcoholism Prognosis Scale is an alcoholism prognostic scale that examines some psychosocial domains for relapse (Lucey, 2011). Data from other studies show that the effectiveness of the Michigan Alcoholism Prognosis Scale tool is ambiguous (DiMartini et al., 2000) and not a significant predictor of post-transplant abstinence (Coffman, Hoffman, & Sher, 1997) or relapse (Lucey, 1999).

One risk assessment tool is HRAR scale (De Gottardi et al., 2007; DiMartini et al., 2000; Yates, Booth, Reed, Brown, & Masterton, 1993). The predictive validity of the HRAR identified by Yates et al. (1993) was replicated in a study of relapse following inpatient alcoholism treatment in a cohort of male U.S. veterans (DiMartini et al., 2000) and in a cohort of post-transplant recipients (De Gottardi et al., 2007). Adding confidence to the utilization of the HRAR, a sensitivity of 69% and a specificity of 65% were reported for predictive validity by Yates et al. (DiMartini et al., 2000).

Compared with other screening instruments, the HRAR scale has been examined in several studies focusing on alcohol relapse in the postrehabilitation groups or the post liver transplant population. Most importantly, the HRAR scale concentrates more on the risk of heavy drinking rather than slips in drinking (De Gottardi et al., 2007). Given the relative strengths and weaknesses of all of these scales, it appeared that the HRAR was the most appropriate for use in this study.

### High-Risk Alcoholism Relapse Scale

The HRAR scale consists of three items reflecting risk factors of relapse: (1) the duration of heavy drinking, (2) the daily number of drinks, and (3) the number of admissions for inpatient treatment of alcoholism (DiMartini et al., 2000). A 0–2 ordinal score was ranked for each item. The total HRAR scale scores range from 0 to 6. Low risk scores range from 0 to 3 and high risk scores from 4 to 6 (DiMartini et al., 2000; Yates et al., 1993). For further details of the scale, please see Table 1.

### Design

The implementation of the use of the HRAR scale contained two phases—Phase 1: Educate transplant providers on use of the HRAR scale and Phase 2: Implement the HRAR scale in clinical interviews, which were conducted in the outpatient post liver transplant clinic Mondays and Wednesdays for a total of 12 weeks. An advanced practice registered nurse (M.Z.) trained transplant providers to implement the HRAR scale. The project was approved by a

**TABLE 1.** High-Risk Alcoholism Relapse Scale

Items	Score
Duration of heavy drinking (years)	
<11	0
11–25	1
>25	2
Daily drink number (1 drink = 12 g of ethanol)	
<9	0
9–17	1
>17	2
Previous alcohol in-patient treatments number	
0	0
1	1
>1	2

university-affiliated medical center's institutional review board.

### Sample Selection

The project included providers and patients. The inclusion criteria for transplant providers were nurses or physicians who routinely care for liver transplant patients. The providers evaluated each patient for the following criteria through chart review: adult, 18 years of age or older, and a post liver transplant patient with a pretransplant primary or concurrent diagnosis of alcoholic cirrhosis of liver (ICD-9 code 571.2).

### Data Collection

Beginning after week 1 of the intervention period, the data collection procedure was conducted by a weekly review of the medical records of patients, including electronic and paper charts. This was done after business hours, so as not to influence the intervention. Information collected consisted of two parts: providers' data (e.g., frequency of using the HRAR, completion of the HRAR) and patients' data (e.g., age, marital status, time since transplant, HRAR score, and diagnosis). Data analysis and descriptive statistics were used to summarize the data.

### Procedures

Every Friday, the project leader received the clinic schedule for the following week. She reviewed medical records and identified candidates who met the inclusion criteria. A paper copy of the HRAR scale was subsequently placed in each identified patient's chart.

Since some patients visit more frequently than others, and their alcohol use is not likely to change dramatically from week to week, patients were assessed only once during the project period, regardless of how many times they were seen during the 12-week period.

## Results

**Outcome 1:** Implement a protocol using the HRAR Scale by educating transplant providers and applying the risk assessment tool in a post-transplant clinic.

The intervention officially began in the outpatient post liver transplant clinic in the second week of November 2011. Providers (e.g., three RNs, six NPs, and four MDs) were taught how to complete the HRAR scale 1 week prior to the project kickoff. Thirty-five patients met inclusion criteria. Among them, three patients were within 1 month post liver transplant and they were seen in the clinic weekly. Two patients were within 5 months of their liver transplant and they were seen monthly. Twelve patients were more than 5 years after liver transplant and they were routinely seen once a year. The rest of the 18 patients in this sample visited the transplant clinic every 3–6 months. Table 2 shows the characteristics of the 35 patients who underwent liver transplant for ALD and were included in the study.

**Outcome 2:** Evaluate providers' completion of the HRAR tool.

A total of 41 HRAR forms were provided and 35 (85%) were actually used during patient interviews. In six cases, providers reported that they simply forgot to conduct risk assessment. Seventy-one percent ( $n = 25$ ) of the HRAR forms were fully completed.

During the 12 weeks of implementation, providers committed the following errors in using the HRAR tool: did not add up the total HRAR score ( $n = 5$ ); did not document whether social worker referral was called for ( $n = 3$ ); did not include the time spent on the patient interview ( $n = 2$ ); completed the HRAR through a chart review instead of from an interview ( $n = 1$ ); and completed the HRAR on a pretransplant alcoholic patient instead of a post-transplant patient ( $n = 1$ ). Strategies to address the aforementioned problems were to (1) re-educate providers or reinforce their knowledge of the tool; (2) mark the project candidates' names on the clinic sheet; (3) e-mail the list of identified candidates; and (4) verbally remind providers about the tool before beginning the clinical day. Strategy 4 worked effectively and immediately; from week 5 to week 11, 100% of the HRAR forms were used in the clinic after these daily verbal reminders. However, in week 12 (the last week of the project), one HRAR was not used because one NP who did not

**TABLE 2.** Characteristics of 35 Patients Who Underwent Liver Transplant With Alcoholic Liver Disease

Characteristics	Finding
Male gender (%)	29 (83%)
Female gender (%)	6 (17%)
Age at transplant (mean years)	54.2
Race (%)	
White	19 (54%)
Black/African American	2 (6%)
Hispanic origin	10 (29%)
Asian	4 (11%)
Marital status (%)	
Married/life partner	19 (54%)
Widowed	3 (8.5%)
Divorced/separated	3 (8.5%)
Never married	10 (29%)
Post-transplant time	
<1 year	11
1–3 years	7
3–5 years	5
>5 years	12
HRAR score	
0–3	31
4–6	4
Diagnosis	
ARLD	13
HCV/ARLD	12
ARLD/ HCC	4
HCV/ARLD/HCC	6

*Note.* ARLD = alcohol-related liver disease; HCC = hepatocellular carcinoma; HCV = hepatitis C; HRAR = High-Risk Alcoholism Relapse.

routinely see post liver patients was not familiar with the project. Most providers reported spending less than 5 minutes completing the form. The most frequent method of follow-up was social worker referral ( $n = 4$ ).

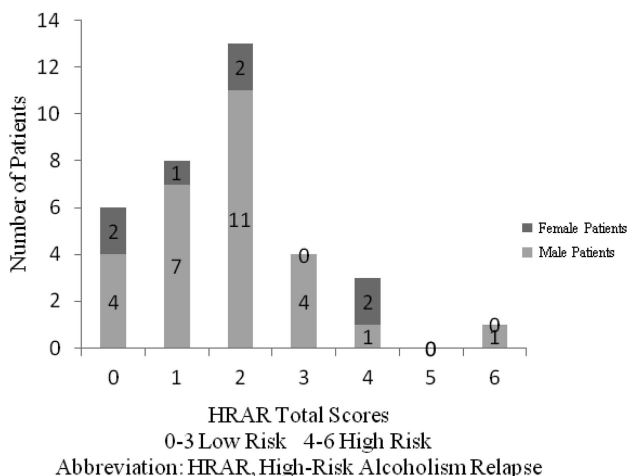
**Outcome 3:** Document the percentage of post-transplant patients identified for risk of relapse and monitor the follow-up or referrals.

Among the 35 patients assessed, the median HRAR score was 2, indicating a low risk for relapse to heavy drinking. Female patients had the same HRAR scores (median = 2) as male patients (median = 2). Eighty-nine percent of the group ( $n = 31$ ) were in the low-risk group (HRAR score 0–3). Four patients were in the high-risk group (HRAR score 4–6), three of whom scored 4 and one of whom scored 6. Therefore, 11% of the patients interviewed were identified as being at high risk for relapse to heavy drinking.

The distribution of HRAR total scores for the sample is shown in Figure 1. For the three components of the HRAR (duration of heavy drinking, the number of daily drinks, and the number of prior inpatient alcoholism treatments), 42% of patients reported 11–25 years of heavy drinking and 50% drank fewer than nine drinks daily. Most patients attended an outpatient alcohol relapse prevention program before being waitlisted for liver transplant.

**Post-transplant Alcohol Use**

Relapse was determined by self-reports or reported by a family member. As mentioned earlier, four patients (11%) were identified as being at high risk for relapse through the use of the HRAR scale (HRAR score  $\geq 4$ ). Out of four, only one admitted drinking, yielding the positive predictive value 25%. An additional five patients were identified as actively drinking or having episodes of relapse post liver transplant. All of their risk scores were low (0 and 2). For those who relapsed, their post-transplant periods varied from 3 months to 12 years. Based on the data collected, the sensitivity of the HRAR scale was 17%, the specificity was 90%, and the negative predictive value was 84%. This finding calls into question the predictive validity of the HRAR scale.



**FIGURE 1.** Distribution of the HRAR scores.

Three additional relapse cases were identified but excluded from the HRAR assessment during the project period, because two patients did not have ALD as a pretransplant diagnosis, and one patient was not identified in the clinic visit. Therefore, a total of nine patients were reported experiencing alcohol relapse after transplant.

## Social Work Referrals

The clinic interview also identified three patients who had been referred to a social worker for relapse counseling within the year prior to the project implementation. However, none of these patients were able to maintain abstinence. Four patients were referred to social workers within the project timeframe.

## Discussion

The results of this project suggest that transplant providers' utilization of the HRAR in the alcohol relapse risk assessment interviews was high (85%) and the completion rate for the HRAR scale was moderate (71%). Furthermore, 11% of the post-transplant recipients in this project were documented as being at high risk for alcohol relapse. A total of nine relapse cases were identified. Among them, six used the HRAR scale during the clinic interview. Therefore, relapse rate of this small sample ( $n = 35$ ) was 17%. Four patients were referred to social worker counseling within the project timeline.

These findings support the conclusion of DiMartini, Dew, Fitzgerald, and Fontes's (2008) prospective study that a structured clinical interview is the most successful method for identifying post-transplant alcohol abuse. The implementation of the protocol by using the HRAR scale in relapse assessment demonstrated the value of the structured interview in addition to training providers for improving reliability and adherence to interview directions. In this project, transplant providers easily identified patients' alcohol relapse by asking simple and direct questions about their alcohol use.

The project's clinical findings bear some similarity to findings by DiMartini et al. (2008) and De Gottardi et al. (2007), in that most transplant recipients were in the low-risk group for alcoholism relapse. Unlike most previous transplant studies, this project did not make the diagnosis of alcohol dependence or abuse in ALD patients according to the criteria detailed in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. Instead, the project based the diagnosis of alcoholism on consensus from the referring physician, transplant surgeon, transplant coordinator, and social worker. The fact that many of the relapse patients had gone through counseling with transplant social workers but still failed to maintain abstinence

highlights the challenges for developing strategies to motivate people to change harmful alcohol use.

The fact that transplant providers were able to identify relapse cases suggests that regardless of which tool was used, as long as the providers conducted the relapse risk assessment, the results would come out the same. Nevertheless, there are some indications that the HRAR scale has a few distinct advantages in assessing a patient's risk of relapse. First, it is a simple tool that elicits information about a person's drinking history. Simplicity of assessment can lead to easy acceptance by providers and easy application in various clinical settings. In this project, the majority of providers (95%) reported spending fewer than 5 minutes completing the HRAR, which clearly demonstrated the tool's ease of use in a busy liver transplant clinic. In addition, as with many other existing screening instruments, the collected data about duration of drinking, daily alcohol consumption, and treatment history provide useful information to healthcare providers, especially nurses in any practice settings where they frequently encounter alcoholic patients.

## Limitations

There are a few limitations to note. The HRAR instrument serves only as an assessment tool for heavy alcohol use. A more comprehensive assessment for risk of both alcohol and drug relapse should include questions about the quantity and frequency of drug use and the negative social and health consequences associated with the use of drugs (Naegle, 2008). Second, another limitation is that this project occurred in a single transplant center in a short time period. Replication of the project should include expanding the evaluation period and examining outcomes in pre- and post-transplant stage.

## Implications

### Nursing Practice

This project demonstrated that nurses are in ideal positions to screen patients for harmful alcohol use, because nurses encounter and communicate frequently with patients post-transplant. Nurses need to recognize that providing alcohol screening, counseling, and implementing actions are within their domain of practice. Any nursing interaction with transplant recipients could serve as an opportunity to assess for the presence of factors known to contribute to alcohol relapse such as lack of social support, depression, or life crises. Nurses can take an active role in teaching patients and their families about the potential effects of alcohol on the transplanted liver and post-transplant life.

### Nursing Education

The project also highlights the importance of expanding nursing curricula to foster competencies to deliver

services focused on substance abuse. Nurses should be familiar with the diagnostic criteria for alcohol dependence and alcohol abuse so that they can determine the appropriate treatment for patients and refer them for counseling if indicated. There is an urgent need for the implementation of educational models to develop nursing competencies in recognizing and responding to substance-misusing patients.

## Transplant Practice

All ALD candidates should receive a formal pretransplant substance misuse evaluation within a broader psychosocial assessment (Varma et al., 2010). In addition, all candidates with ALD on the waitlist should be assessed periodically for substance use (DiMartini et al., 2008; DiMartini, Crone, & Dew, 2011). Alcohol use in the non-ALD transplant candidate should also not be overlooked (Varma et al., 2010). The findings from this project highlight that two patients who did not have a diagnosis of ALD pretransplant engaged in harmful drinking afterward, highlighting the need for appropriate screening and assessment of all transplant recipients.

As the years pass after transplant, patients' visits to the transplant clinic become less frequent. Clinic follow-up for stable patients is subsequently based on medical necessity. Most patients receive regular follow-up with phone contact and monthly laboratory reports (i.e., liver function tests, immunosuppressant medication levels). Advanced practice registered nurses, nurses, and coordinators who work with liver transplant recipients should incorporate the alcohol relapse risk assessment screening into routine blood tests and telephone conversations with patients and their caregivers.

## Research

Future research should focus on designing and validating tools and improving sensitivity and specificity in predicting alcoholism relapse. A longitudinal study is suggested to collect data of relapse after the initial risk assessment with the HRAR scale to further assess the sensitivity, specificity, and positive and negative predictive value of the instrument. Studies are also needed to reach consensus on the appropriate definition of alcohol relapse (Gramenzi et al., 2011).

## Policy

The project underlines the importance of a particular clinical problem, the assessment for risk of relapse on liver transplant recipients with histories of alcoholism. In this project, the successful implementation of a new protocol using a risk assessment tool with a good clinical outcome indicates that transplant centers should develop an evidence-based practice guideline that recommends every healthcare provider screen patients for

the risk of alcohol relapse. Moreover, providers should include routine screening for alcohol use in their daily practice. This policy is applicable in various medical settings and populations.

## Conclusions

This project demonstrated the usefulness of a structured clinic interview for identifying the risk of alcoholism relapse. Education enabled transplant providers to use the protocol, integrate the HRAR scale into the clinic interview, and identify instances of relapse and risk of relapse for patients. The number of staff using the protocol and patient identification outcomes suggests that protocols can change practice and thereby benefit the patient population through facilitating appropriate referrals for counseling and treatment.

Nurses are in excellent positions to lead the policy change and address many of the untapped research questions related to alcohol use. As this project demonstrates, nurses can identify alcohol relapse, synthesize the best available evidence on relapse risk assessment, and assume leadership roles to improve outcomes for liver transplant patients. ✪

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