
ARTICLES

Computer-Assisted Screening
and Intervention for Alcohol Problems
in Primary Care

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ABSTRACT. The effectiveness of a bilingual (English/Spanish) computer-assisted alcohol screening/intervention for hazardous and harmful

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alcohol use, the Health Habits Survey (HHS) was tested in primary care settings. Assessment-only patients were compared with patients exposed to the HHS. Of the 2053 recruited, 151 (7.4%) screened positive on the Alcohol Use Disorders Identification Test (AUDIT) and were re-contacted six months later for follow-up. Significant alcohol reduction was observed in both conditions. No between-group differences were observed. Computer-assisted screening and intervention are feasible in primary care settings and may be a realistic provider-extender when traditional screening is absent or inconsistently implemented. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2003 by The Haworth Press, Inc. All rights reserved.]

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INTRODUCTION

High health care costs have focused policy makers on achieving cost reductions through reduction of risk factors, early detection of disease, and increasing the role of primary care providers in disease management. Alcohol abuse is a high profile target of these efforts. More than 20% of primary care patients may be at-risk or dependent (Manwell, Fleming, Johnson & Barry, 1998). Yet, cases of alcohol abuse and alcoholism continue to be missed in medical settings (Johnson, Spitzer, Williams, Kroneke, Linzer, Brody, DeGruy & Hahn, 1995). Only 20% of primary care providers (PCPs) consider themselves prepared to identify alcoholism, less than 33% carefully screen for substance abuse, and only 13% use systematic assessments (CASA, 2000). To address this issue, the present study examined the feasibility and efficacy of using computerized assessment and feedback in naturalistic, primary care settings.

Brief Intervention in Primary Care

Brief (5-15 minute) interventions can be effective in detecting and intervening with problem drinkers (Bien, Miller & Tonigan, 1993; NIAAA, 1995; Babor & Grant, 1992; Heather, 1998). Unfortunately, barriers to assessment and intervention in medical settings include inadequate training, providers' unresolved personal or family addiction problems, nega-

tive experiences with addicted patients, rigid personality styles that prevent empathy, fear of loss of collegial support, time demands, the risk of making a diagnosis that carries a social stigma, and the frustrations of managing a chronic illness (Delbanco, 1992). The literature has for years (e.g., Alcohol, Drug Abuse, and Mental Health Administration [ADAMHA], 1985) called for greater screening for alcohol problems by PCPs. Yet, the very fact that such calls continue to be made (e.g., Center on Addiction and Substance Abuse [CASA], 2000) suggest that impacting provider behavior is difficult. Perhaps a completely different approach to this problem is required.

The Health Habits Survey: A Multimedia Intervention for At-Risk Drinking

Theoretical Background. Recently, computer technologies have been used to change problematic health-related behaviors. Multimedia technology (1) allows users to control their learning environment, move at their own pace, and receive confidential access to sensitive health topics (Cheiten & Waters, 1995); (2) appears to increase respondents' self-disclosure of sensitive material, such as alcohol use or sexual practices (Paperny, Aono, Lehman, Hammar & Risser, 1990; Turner, Ku, Rogers, Lindberg, Pleck & Sonenstein, 1998); (3) effectively addresses illiteracy and language barriers; and (4) allows interventions to be tailored to individual patient needs or situations.

Tailoring interventions and health information is thought to enhance the effectiveness of such messages for individuals with unhealthy lifestyle habits. Difficulties achieving reductions in alcohol use may result from not tailoring interventions to patients' readiness to change (Miller, 1985; Prochaska, Norcross & DiClemente, 1994). Strategies tailored to patients' readiness have reduced alcohol consumption of alcoholic patients in treatment (Miller, 1996; Project MATCH Research Group, 1997). Applying computers to tailor feedback to patients based on their stage-of-change has considerable promise (e.g., Strecher, Kreuter, Den Boer, Kobrin, Hospers & Skinner, 1994).

Description of the Health Habits Survey. Based on such research, the Health Habits Survey (HHS) was constructed as an interactive consumer education and harm reduction program to identify potentially harmful patterns of alcohol use in primary care patients. The program is delivered via a health education kiosk, equipped with a touch screen monitor, computer, and printer. An on-screen "doctor" offers a choice

of an English or Spanish version. The patient chooses the desired language to begin.

Questions are presented in text with accompanying voice over and are answered by touching choices on the screen. Questions tap: (1) basic demographic information on age, sex and race of the respondent; (2) tobacco use, diet and exercise habits; and (3) alcohol use patterns. The HHS presents a variety of health-related questions because alcohol screening questions are more effective when embedded in a broader health assessment (Bradley, 1994). Alcohol use is assessed with a computer-assisted version of the Alcohol Use Disorders Identification Test (AUDIT). The AUDIT was specifically developed to facilitate *early* detection of alcohol problems in general medical settings (Babor & Grant, 1992; Saunders, Aasland, de la Fuente, Babor & Grant, 1993). The AUDIT questionnaire consists of 10 items on alcohol consumption, drinking behavior, adverse reactions, and alcohol-related problems. The AUDIT is equally valid for Caucasians, African-Americans and Hispanics (Volk, Cantor, Steinbauer & Cass, 1997), and has been translated into Spanish.

Following completion of the health questions, the patient selects from a series of statements (Prochaska et al., 1994) regarding his or her attitude toward making changes in drinking habits. These statements classify the patient as being in: (1) "precontemplation," where the patient lacks recognition of an addictive problem; (2) "contemplation," where the patient recognizes a problem but is ambivalent about change; (3) "preparation," where the patient makes a decision to change and prepares for action; (4) "action," where the patient implements a plan of change; and (5) "maintenance," where the patient adopts strategies to avoid a return of the problem behavior. The stages-of-change model has a harm reduction focus that is ideally suited for alcohol screening in primary practice, since the model does not assume that a person who should reduce alcohol intake is alcohol dependent (Prochaska et al., 1994).

The HHS generates a tailored, feedback report based on patients' alcohol use patterns (AUDIT score) and stage-of-change. The patient can view the feedback on screen or print a report. The report presents information intended to reduce risky usage (Miller et al., 1994). The patient can also authorize a printed report for the provider to review. The provider printout provides brief interventions tailored to the patient's alcohol use patterns and patient readiness.

The present study addressed the following questions: (1) Is the HHS feasible to use in the primary care setting? That is, is the HHS brief enough so as to not interfere with patient flow? (2) Does the HHS detect

“positive” AUDIT scores at rates generally comparable to those obtained by the standard administration of the AUDIT? (3) Does exposure to HHS improve the likelihood that patients will discuss alcohol use with their providers? There is ample evidence that providers tend not to raise the issue of alcohol use. We hoped to see if the HHS would stimulate at least some patients to raise the issue. (4) Finally, is exposure to HHS associated with reductions in quantity and frequency of alcohol use at follow-up? That is, whether or not patients talk with their provider about their alcohol intake, it may be possible that the self-assessment and tailored feedback provided by the HHS results in reductions of alcohol intake.

METHOD

Establishing Feasibility Parameters for HHS Use in Primary Care Settings

During the development phase, a focus group was conducted with five physicians, three nurse practitioners, and one RN to determine how best to construct the HHS so that it could realistically be integrated into a primary care practice. These PCPs indicated that any screening device must be less than 25 minutes so as not to disturb the patient-flow of the office. Thus, we determined that the HHS should take less than 20 minutes to complete for patients with the most complicated histories (there are skip-outs for patients who, for instance, never drink). These PCPs also warned that a system requiring providers to raise alcohol concerns with patients would fail. They recommended that patients should be given the option of having the data reported to their provider, making it easier for providers to address alcohol problems.

Clinical Settings and Providers

The field trial was conducted at six primary care practices in Massachusetts, New York and Florida, including an HMO-based practice, a medium-sized, inner-city health center, a large suburban private group practice and three independent practices. The sites in Florida were predominantly Spanish speaking. In all, 48 PCPs met with patients in the study. Most (69%) were physicians, 15% were nurse practitioners, 10% were nurses, and 6% were physician assistants. During the assessment-only period, providers were informed of the study but given no

additional information to impact as little as possible on the usual treatment. At the onset of the HHS phase, the HHS was briefly introduced to providers, generally at staff meetings.

Measures

Alcohol Use Disorders Identification Test (AUDIT). The AUDIT is described in the introduction. Its psychometric properties are well documented. Schmidt, Barry, and Fleming (1995) obtained internal reliability of .77. Most authors recommend using the cutoff score of eight for primary care settings (e.g., Allen & Columbus, 1995; Allen, Litten, Fertig & Babor, 1997). Participants received the AUDIT either via computer as part of the HHS or paper-and-pencil questionnaire for those in the assessment-only condition. Quantity and frequency of alcohol intake at follow-up were assessed using telephone interviews. The first three questions of the AUDIT were used to assess quantity and frequency of alcohol use (Bradley, McDonnell, Bush, Kivlahan, Diehr & Fihn, 1998; Bush, Kivlahan, McDonnell, Fihn & Bradley, 1998).

Exit Interview. An exit interview was conducted by a trained research assistant (R.A.). The R.A. asked the patient five, yes-no questions in a structured, interview format: "Did you and your doctor/provider discuss or mention: Exercise? Smoking? Diet? Alcohol Use?" A similar "exit interview" format was used by Schmidt, Barry, and Fleming (1995) in their examination of the predictive validity of the AUDIT.

Stage-of-Change Questions. Patients who completed the HHS and scored positive on the AUDIT were presented with a series of statements to determine which stage-of-change they were in with respect to their drinking habits. Note that these data were collected only on participants who took the HHS, and the questions were only asked of patients whose AUDIT score was positive.

Participants

Two thousand fifty-two (2,052) adult patients were recruited from consecutive routine visits. Average age of the patient sample was 47.7 years old (SD = 17.3, 18 to 99), most (68%) were women and 48.4% were white, with 19.3% African-American and 28.6% Hispanic. Most (88%) had at least a high school education. Three-quarters reported English as their language preference. The Spanish-speaking sample was significantly older than the English-speaking one (mean difference = 18.6 years, $t = 23.6$, $df = 2050$, $p < .001$). Only 5% of the English-speak-

ing sample had less than a high-school education, compared to 34% in the Spanish-speaking sample ($\chi^2 = 295.2$, $df = 1$, $p < .001$). This may have been an artifact of the age difference, since the significance level diminishes if the analysis includes only those in the sample under 40 years of age (5% English, 10% Spanish with less than a high-school education). Differences between the demographic characteristics of patients assigned to the experimental and assessment-only groups of the field trial were insignificant and inconsequential.

Of the 2,052 patients, a total of 151 patients screened positive on the AUDIT (score > 8). In this group, the average age was 40.8 years (SD = 14.4, range 21 to 83). The mean AUDIT score for this positive group was 13.1 (SD = 5.7 range 8 to 34). Based on USDA guidelines (USDA, 2000) and quantity and frequency items of the AUDIT, we estimated that 68% of those patients who screened positive drank more than the recommended level for moderate drinking.

Design and Procedure

Study Design. The design used in this study was intended to control for variation between sites with respect to attention to and attitudes toward alcohol misuse, and to minimize contamination of the assessment-only and HHS conditions. In order to control for possible site differences, each site served as its own control and switched from the assessment-only phase to the experimental phase. Having each site serve as its own control was intended to minimize the effect of outlier programs that may be more (or less) progressive, for instance, or serve different populations. Furthermore, randomization to simultaneously run groups would have meant that the same PCP would have simultaneously seen patients who were in both conditions. Any effect of the HHS on provider behavior would have contaminated the assessment-only condition. Once the assessment-only phase was completed, the HHS phase was implemented, so that all participants received the HHS. The transition from assessment-only to the HHS condition was staggered over about three months. This helped control for a threat to internal validity, described by Campbell and Stanley (1963), called history. This refers to the possibility that some over-riding policy or other historical change (e.g., changes in national initiatives, insurance coverage) could occur coincidentally with the onset of the intervention. In such a case, an external event might change provider or patient behavior and be erroneously attributed to the intervention.

Procedure. Patients were recruited from consecutive routine visits from December 1997 to December 1998. At least 70% of patients approached agreed to participate. Participating patients signed informed consent. During the assessment-only phase, participants completed their medical visit as usual and were met by the R.A. immediately afterwards to complete the paper-and-pencil version of the AUDIT along with a post-visit exit interview. In the HHS phase, all participants completed the HHS prior to their regular medical visit. Following the medical visit, these patients also met with the R.A. to complete the post-visit exit interview. Patients who scored positive on the AUDIT were re-contacted for follow-up six months later and administered the quantity and frequency questions from the AUDIT (the first three questions).

RESULTS

Time to Complete the HHS. The first question addressed the feasibility of using the HHS in primary care practices in terms of the time it takes for patients to complete it. We established an a priori goal of less than 20 minutes. The computer program tracked the time each patient took to complete the program. For the 997 administrations of the HHS, the average time to complete the program was 6.3 minutes (SD = 2.3), with a median of 5.8 minutes. The times to completion ranged from 2.6 minutes to 26.5 minutes. The vast majority of patients (93.5%) completed the program in under 10 minutes, and almost all (99.2%) completed the program in less than 15 minutes. Thus, it appears that the HHS can be completed very briefly, and integration into most practices should be feasible.

Detection of Hazardous or Harmful Alcohol Use. The second question addressed whether the HHS detected "positive" AUDIT scores at rates comparable to the standard administration of the AUDIT. Detection rates are presented in Table 1 for both the computerized AUDIT and the traditional, questionnaire AUDIT by subsample. Overall, 151 (7.4%) of the 2,052 screened patients scored in the positive range on the AUDIT. This is true, even for Spanish-speaking patients despite a detection rate of 3.6% for the computerized AUDIT and a 6.0% detection rate for the questionnaire, as this difference did not reach significance. Although no significant difference was observed between the English (7.5%) and Spanish (6.0%) detection rates of the traditional questionnaire method, a significant difference was found between the detection

TABLE 1. Percent of Patients Identified as Positive by the Computer-Assisted AUDIT and Traditional AUDIT by Total Sample and Subsamples and Percent of Patients Reporting a Discussion About Alcohol Use with Their Primary Care Provider

	Total Sample N = 2,052	Language Preference		Gender		Age Category	
		English Sample N = 1,544	Spanish Sample N = 508	Men N = 654	Women N = 1,398	Less than 40 N = 1,232	Greater than or equal to 40 N = 820
<u>Identification Rates</u>	7.6%	8.8%	3.6%	13.2%	4.9%	9.7%	6.4%
Computerized AUDIT N = 997							
Questionnaire AUDIT N = 1,055	7.1%	7.5%	6.0%	13.7%	4.1%	9.8%	5.3%
<u>Discussion with Primary Care Provider Rates</u>	23.9%	20.9%	34.9%	33.3%	19.4%	24.5%	23.6%
Computerized AUDIT							
Questionnaire AUDIT	27.5%	25.0%	34.2%	31.6%	25.6%	30.0%	25.8%

rate for the English language computerized version (8.8%) and Spanish language computerized version (3.6%; $\chi^2 = 6.6$, $df = 1$, $p = .01$).

Initially, we thought this difference might be due to age, since the Spanish-speaking group was older than the English-speaking group. Correlations of age with the total AUDIT score yielded a significant, albeit modest, correlation of $-.17$ ($p < .001$), suggesting that higher AUDIT scores were modestly associated with younger ages. Examination of the language groups separately revealed this correlation was much weaker for the group of English-speaking patients ($-.09$) than the Spanish-speaking ones ($-.27$). However, the mean age for Spanish-speaking patients in the assessment-only condition was virtually the same as the HHS condition ($M = 62$ years). Thus, it is unlikely that age disparities accounted for the different detection rates observed between the traditional and computerized assessment methods within the Spanish-speaking population. That is, if the greater detection rate between the English and Spanish version of the HHS were due to the fact that the Spanish-speaking population was older than the English-speaking one, this should have held for the traditional assessment method as well. Since it did not, these data suggest that the HHS may underestimate problem drinking in a Spanish-speaking population. Further research involving a younger population of Spanish-speaking patients is required.

Discussions About Alcohol Use with PCPs. The third question examined the extent to which exposure to HHS might stimulate patients to discuss alcohol use with their providers due to exposure to the computer-assisted screening and receipt of the printout prior to the visit with the provider. Since those in the assessment-only group were exposed to the questionnaire version of the AUDIT after the visit, no such stimulus would presumably be present. As seen in Table 1, there was no evidence to support our hypothesis. Similar percentages of patients reported discussions with their provider about alcohol in both the HHS group and the group receiving the AUDIT questionnaire after the visit. Indeed, in most cases the percentage of patients who reported discussions with the provider was higher, though nonsignificantly so, in the group that did *not* receive the AUDIT until after the session.

In this context, it is interesting to note that, while 24% of those with negative AUDIT scores in both conditions reported discussions with their PCP, nearly half (47%) of those with positive AUDIT scores reported such discussions ($\chi^2 = 38.7$, $df = 1$, $p < .001$). The percentages of positive scoring patients in the two conditions did not differ signifi-

cantly (42% in the HHS condition; 53% for the assessment-only condition). These data suggest that patients who report hazardous and harmful drinking on the AUDIT are more likely to also report having discussions with PCPs about alcohol. This finding is interesting given the prediction by some providers that those with problems would deny their use to providers. However, rather than being reluctant to discuss their alcohol use, a significant proportion of those with drinking problems appear open to discussions with their provider. It is possible that response bias may have inflated patients' reports of discussions in general and inflated even more the reports of patients who score positive on the AUDIT. There was no independent source for determining whether a discussion had actually occurred, so it remains a possibility that the levels of discussion reported are inflated. However, since there is no reason to expect a differential bias in the HHS and assessment-only conditions, it is unlikely that response bias would mask significant differences between condition in the analyses.

Patients exposed to the HHS were offered options: (1) to print out a report of their results for their own use or not and (2) to send a report to their provider or not. Of all patients exposed to the HHS ($N = 997$), 68% requested a printout for themselves and 59% requested the report be sent to the provider. It might be predicted that only those without drinking problems would request reports or have their providers notified of their results. Independent t -tests compared total AUDIT scores for those who did and those who did not request a printout or have a report sent to their provider. Results suggested that those with positive AUDIT scores were as likely as those with negative ones to request feedback reports or to have reports sent to providers.

Outcome: Change in Quantity and Frequency of Alcohol Use. Of the 2,052 patients who volunteered, the 151 (7.4%) who had positive scores on the AUDIT were followed six months later to determine the extent to which their alcohol intake had changed. One hundred twenty-eight (128) patients (85%) were successfully reached and re-interviewed. Of the 128 patients followed, 66 were in the assessment-only condition, and 62 were in the HHS condition.

Using the first three questions of the AUDIT, we created a composite variable consisting of the sum of the three AUDIT items. To ensure that the sum reflected a single dimension, a principal components factor analysis was conducted using the baseline data on these items for all 2,052 patients. One factor accounted for 67% of the variance (eigenvalue = 2). Cronbach's alpha reliability statistic was .69 for the

composite variable. Thus, it was concluded that one primary, composite variable could be entered into the outcome analyses.

The primary analytic procedure was a repeated measures MANVOA with two factors: Condition (assessment-only versus HHS) and language (English versus Spanish). Analyses revealed a highly significant within-subjects effect for change on the AUDIT composite score ($F = 15.5$, $df = 1,124$, $p < .001$). Mean for the assessment-only group (traditional AUDIT) at baseline was 6.3 ($SD = 2.5$; $N = 66$) and 6.4 ($SD = 2.1$; $N = 62$) for the HHS group (computerized AUDIT). These values were reduced to a mean of 4.7 ($SD = 2.6$) for the assessment-only group and 5.2 ($SD = 2.5$) for the HHS group. No other significant main effects or interactions were observed. These results suggest that the patients with elevated AUDIT scores improved over the six-month follow-up period of the study. However, the primary hypothesis of the study, that those exposed to the computer program with its pre-visit assessment and self-administered, stage-of-change-based feedback, did not improve more than the assessment-only group.

Clearly, there was no evidence to support the efficacy of the HHS-delivered, stage-of-change-based feedback for this population. Stage-of-change data were collected only on patients in the HHS group as this assessment was part of the HHS computer program. Staging of the assessment-only group was avoided in order to minimize contact between research personnel and assessment-only patients. Data collected on the HHS group were used to examine the effect of stage on outcome within that group. These analyses revealed no significant effects of stage on outcome. The analysis was hampered by the fact that the majority (63%, $N = 39$) of the 62 patients exposed to the HHS program, were classified as in preparation or action. Only 11 patients (18%) were in contemplation and only 12 (19%) were in precontemplation. These figures compare well with those reported by Samet and O'Connor (1998). If similar percentages of patients had been classified as ready-to-change in the assessment-only group of this study (something we did not assess), a ceiling effect may have masked an incremental effect of the stage-based feedback.

DISCUSSION

This article describes the development and testing of a bilingual, computer-assisted screening for harmful and hazardous alcohol use in primary care populations. Five questions were addressed. First, results

supported the contention that administration of the HHS is brief enough to be integrated into many primary care practices. Second, the data supported the ability of the computer version of the AUDIT to detect rates of hazardous and harmful drinking patterns similar to rates obtained by administering the AUDIT via questionnaire. Furthermore, the detection rates of hazardous or harmful drinking patterns observed in the primary care populations examined here (7.6% for the computerized AUDIT) are similar to those reported in other studies of primary care populations (5% to 9%, e.g., Burge, Amodei, Elkin, Catala, Andrew, Lane, & Seale, 1997; Johnson et al., 1995; Strecher, Korbin, Kreuter, Roodhouse et al., 1994; Conigliaro, Lafgren & Hanusa, 1998; and Senft, Freeborn, Polen & Hollis, 1997). Thus, the HHS with its computer-administered AUDIT appears to identify problem drinking in primary care patients as well as traditional questionnaires or interviews. The ability of the computerized AUDIT to detect problem drinking is less clear for Spanish-speaking patients than English-speaking ones. Further research will be required to ensure that the HHS is appropriate for Spanish-speaking patients. Certainly it must be concluded at this point, that any use of the HHS with a Spanish population may underestimate problem drinking.

Third, contrary to expectations, exposure to the HHS was not associated with greater rates of provider-patient discussions about alcohol. Rather, both conditions had surprisingly high levels of alcohol-use discussions and nearly half of those with positive scores reported alcohol-related discussions with their providers. One obvious interpretation is that providers are already talking with patients about their alcohol use. Note that we expected providers to discuss alcohol use with any patient who reports using alcohol, whether or not they are engaging in problem drinking (i.e., have a positive AUDIT score). In this context, it is interesting that those who scored positive on the AUDIT were much more likely than those scoring negative to report having a discussion on alcohol with their provider, *regardless of condition*. It was somewhat surprising that patients with positive AUDIT scores (i.e., those engaging in problem drinking and presumably resistant to change) in the assessment-only condition reported high levels of spontaneous (unprompted) discussions with their providers. This seems to fly in the face of the general consensus in the literature that providers tend to avoid assessment and intervention or referral for alcohol problems with such patients (CASA, 2000; Friedmann, McCullough, Chin & Saitz, 2000).

Are there other ways to account for the exceptional level of discussions with control-group patients? It is possible that the discussions with the providers in this study were an artifact of our research proce-

dures. All patients, including assessment-only subjects, signed informed consent prior to meeting with their provider. The informed consent clearly stated the purpose of the study as regarding their "alcohol use." It is at least possible that this statement alone could be responsible for stimulating curiosity about the study, leading to questions during the medical visit about the study and about alcohol use. Indeed, curiosity about the study may account for the slightly higher level of discussions with providers in assessment-only participants than HHS participants, whose curiosity might have been satisfied by exposure to the HHS program. We purposefully discouraged probing in the exit interview to minimize possible intervention-like impact. It is possible, therefore, that patients interpreted discussion about the *study* as discussions about "alcohol use." Due to our arrangements with the clinical sites to limit intrusion on provider time, we were unable to interview PCPs about each patient. Thus, we cannot verify the content of the patient-provider discussions.

The present data do not support the conclusion that the computer was uniquely effective in stimulating such discussions. However, the fact that both conditions produced higher than expected alcohol discussions raises the interesting possibility that it may be relatively easy to stimulate such discussions in a primary care practice. Our finding, that most people with positive AUDITs were classified as ready to change (a finding also reported by Samet & O'Connor, 1998), further supports this possibility. It remains for future research to determine whether the computer alone (without the interaction with a research assistant, signing consent, and so forth) would yield similarly high levels of patient-provider discussion of alcohol use.

Finally, we examined the impact of the HHS on patients' alcohol use. Outcome analyses revealed an important and highly significant reduction in the quantity and frequency composite score over the six-month follow-up. This reduction appeared to be virtually identical for the English-speaking and Spanish-speaking primary care patients. However, results did not support our primary hypothesis that the computer-assisted screening with staged-based feedback would lead to a differentially greater rate of reduction than an assessment-only, control condition.

This study joins several others in which formal assessment or screening for alcohol abuse appears to function as an active intervention. Burge et al. (1997), using a similar design to ours, also obtained no difference between their intervention and an assessment-only group. They concluded that assessment can be confounded with brief intervention and recommend that future investigations utilize "non-assessed control

groups” (p. 1715). Based on similar findings, Conigliaro et al. (1998) concluded that a “simple screening program may act as a brief intervention for problem drinkers” (p. 255). Other recent studies in primary care settings found a decrease in alcohol consumption, but no differential effects for very brief interventions over assessment-only, control conditions (e.g., Aalto, Saksanen, Laine, Forsstroem, Raikaa, Kiviluoto, Seppae, & Sillanaukee, 2000; Vinson & Devera-Sales, 2000; Chang, Wilkins-Haug, Berman, & Goetz, 1999; see also Van Beurden, Reilly, Dight, Mitchell, & Beard, 2000). In the present study, administration of the AUDIT questionnaire to control patients may have served as an active “intervention” for individuals who were open to even subtle harm reduction messages.

Regression to the mean remains an alternative explanation for the decrease in drinking for these studies, as well as the present study. However, Bradley et al. (1998) found that questions 1 through 3 of the AUDIT (which comprised our composite score) to be highly responsive to change using the Guyatt statistic. The Guyatt responsiveness statistic is “the ratio of a (preselected) clinically meaningful change in a measure, divided by the standard deviation of the mean change in the measure, among patients *known to be stable*” (p. 1843, italics in original). Thus, there is a reasonable likelihood that the change measured in the present investigation reflects actual change.

The lack of support for the differential effectiveness of the stage-based feedback was unexpected (e.g., Strecher et al., 1994). Further examination of the relationship of stage-based feedback to outcome was hampered by the fact that patients in the assessment-only group were not staged and by the unexpectedly high percentage of hazardous or harmful drinkers in the HHS group who indicated readiness to change. This high incidence of readiness to change, if confirmed by other studies (e.g., Samet & O’Connor, 1998), might suggest that problem drinkers in primary care settings are a relatively motivated group that may talk about their drinking with providers and, with a very brief assessment/intervention, be stimulated to reduce their alcohol intake. As so often pointed out, primary care can be an ideal setting to screen for alcohol problems. Failure to do so risks losing an important opportunity for harm reduction.

This study demonstrated that computer-based screening is feasible in primary care settings and acceptable to patients. Patients exposed to the HHS reported less alcohol use at six-month follow-up, although the extent of decreased alcohol use was not significantly different from that observed in the assessment-only group. Furthermore, there was no evi-

dence to support the use of stage-based feedback in these patients, most of whom described themselves as ready to change. Nevertheless, a major finding was that use of a computerized screening device yielded a moderate reduction in alcohol use (effect size $d = .49$) in primary care patients whose alcohol use may be hazardous or harmful. This effect was achieved in an automated, systematic manner *without* additional staff burden. A computer-based screening like the HHS may be a practical provider-extender in the majority of primary care practices where patients are not being systematically assessed by providers.

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