

Effect of Training on Primary Care Residents' Performance in Brief Alcohol Intervention: A Randomized Controlled Trial

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BACKGROUND: Brief alcohol interventions (BAI) reduce alcohol use and related problems in primary care patients with hazardous drinking behavior. The effectiveness of teaching BAI on the performance of primary care residents has not been fully evaluated.

METHODS: A cluster randomized controlled trial was conducted with 26 primary care residents who were randomized to either an 8-hour, interactive BAI training workshop (intervention) or a lipid management workshop (control). During the 6-month period after training (i.e., from October 1, 2003 to March 30, 2004), 506 hazardous drinkers were identified in primary care, 260 of whom were included in the study. Patients were interviewed immediately and then 3 months after meeting with each resident to evaluate their perceptions of the BAI experience and to document drinking patterns.

RESULTS: Patients reported that BAI trained residents: conducted more components of BAI than did controls (2.4 vs 1.5, $p=.001$); were more likely to explain safe drinking limits (27% vs 10%, $p=.001$) and provide feedback on patients' alcohol use (33% vs 21%, $p=.03$); and more often sought patient opinions on drinking limits (19% vs 6%, $p=.02$). No between-group differences were observed in patient drinking patterns or in use of 9 of the 12 BAI components.

CONCLUSIONS: The BAI-trained residents did not put a majority of BAI components into practice, thus it is difficult to evaluate the influence of BAI on the reduction of alcohol use among hazardous drinkers.

KEY WORDS: residents; primary care; performance; brief alcohol intervention.

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INTRODUCTION

Helping individuals to moderate their alcohol use is one of the greatest challenges facing medical health care providers today. Research indicates that brief alcohol interventions (BAI), particularly in primary care settings,¹⁻³ are associated with a 20% decrease in alcohol consumption among nondependent hazardous drinking patients. The United States Preventive Services Task Force recommends screening and BAI for reducing alcohol misuse by adults in primary care settings.⁴

Because medical schools and residency programs devote few faculty resources or curriculum time to alcohol issues, introducing new prevention and intervention activities into primary care practice presents significant logistical and behavioral challenges.⁵⁻⁷ Many primary care physicians are inadequately trained to deal with patients with alcohol-related problems, and often miss opportunities to counsel hazardous drinkers.⁸ They either lack the knowledge and skills necessary to intervene on heavy alcohol consumption among patients, find time restricts them from practicing the skills they have learned, or do not have confidence in their clinical skills.⁹⁻¹¹

In the medical education field there have been several controlled trials, as well as uncontrolled studies, that have shown that BAI training can be effective in improving physician knowledge and skills to address alcohol use.¹²⁻¹⁷ One randomized trial demonstrated that BAI-trained physicians and health care providers used more BAI components on hazardous drinking patients when encouraged and supported to do so by a primary care office system.¹⁶ In most of this research, providers knew that their clinical skills were being assessed. In the only study to date in which participants were blinded to the overall aim of improving frequency of BAI being conducted after training, a control group was lacking.¹⁴ This presented a significant risk of not identifying confounding variables that could have impacted on the performance of the residents.

The present research assessed the performance of residents trained in BAI. To our knowledge, it is the first trial where primary care providers were blinded to the study aims. Two hypotheses were tested:

- (1) The effect of BAI training on resident outcomes would increase the number of BAI counseling components used and would be sustained over time.

- (2) The effect of BAI training on hazardous drinking outcomes would reduce the overall quantity of alcohol used and reduce the frequency of heavy drinking.

METHODS

Study Description

The study was a cluster randomized controlled trial conducted in the general Internal Medicine outpatient academic centers of Lausanne and Geneva University Hospitals, which contain public services to provide adult ambulatory health care. All patients were assigned to primary care residents who provide walk-in and follow-up care. The research protocol was approved by the ethics committees of both institutions.

Participants

Component 1—Residents. All primary care residents at Lausanne and Geneva were considered for study participation (Fig. 1), but residents with prior training in BAI were excluded. All others were enrolled and randomly assigned to the experimental (BAI training) or control (traditional didactic training program on lipid management) group. Residents were blinded to the aims of the trial, to not bias their BAI performance. However, they were informed that a health screening study would be conducted in the waiting room, and that they would be able to take advantage of the data collected for prevention purposes (via a feedback form given to each patient). The study’s focus on alcohol counseling was masked by not informing residents that hazardous drinkers would be interviewed after the medical visit (Patient Exit Interview).

BAI training occurred in 2 group sessions, 2 weeks apart, lasting one half-day each. The first session included the following: (1) a didactic component that taught the definition and prevalence of low-risk, hazardous, and dependent drinkers in the primary care setting and reviewed brief intervention efficacy studies; (2) a theoretical model to learn patient-centered BAI approaches; (3) discussion of a videotape demonstrating the practice of BAI; (4) role-play exercises, and (5) distribution of a

summary checklist of the BAI components, a textbook on alcohol,¹⁸ and educational materials for the patient. The second session allowed each resident to practice BAI with standardized patients previously trained in techniques described elsewhere.^{19,20} The BAI components were: (1) to address alcohol consumption; (2) to explain safe drinking limits; (3) to provide feedback on patient alcohol use; (4) to ask patients their opinion regarding limits; (5) to ask patients their opinion regarding feedback; (6) to ask patients their opinion regarding positive aspects of alcohol use; (7) to ask patients their opinion regarding negative aspects of alcohol use; (8) to ask patients their opinion regarding the importance of change; (9) to ask patients their opinion regarding readiness to change; (10) to help patients set goals; (11) to support patient self-efficacy; and (12) to provide an information leaflet.

Control group residents were given a half-day traditional didactic training program on lipid management.²¹ No counseling components were included in this program, but control group participants received BAI training after the collection of patient data at the 3-month follow-up.

Component 2—Patients. A week after the completion of the residents’ training, consecutive regular primary care patients at the 2 study sites were considered for study inclusion (Fig. 2). As French is the predominant language in this part of Switzerland, a self-administered questionnaire about health and lifestyle issues was used to screen French-speaking patients before their visit with 1 of the enrolled residents. Data on demography, frequency and quantity of alcohol use, tobacco and other drug use, cholesterol, immunization, depression, and accidents were collected. Eligible patients were 18 years and older, had a scheduled appointment, and were hazardous drinkers during the past 12 months (defined as more than 14 drinks per week, and/or more than 4 drinks per occasion for men under 65 years old; and more than 7 drinks per week, and/or more than 3 drinks per occasion for women and for men over 65 years old).²² Patients were blinded to the aims of the study during the screening, but were fully informed when invited to take part in the study phase.

A staff researcher assisted patients in filling out the self-administered questionnaire, and copied the responses onto the

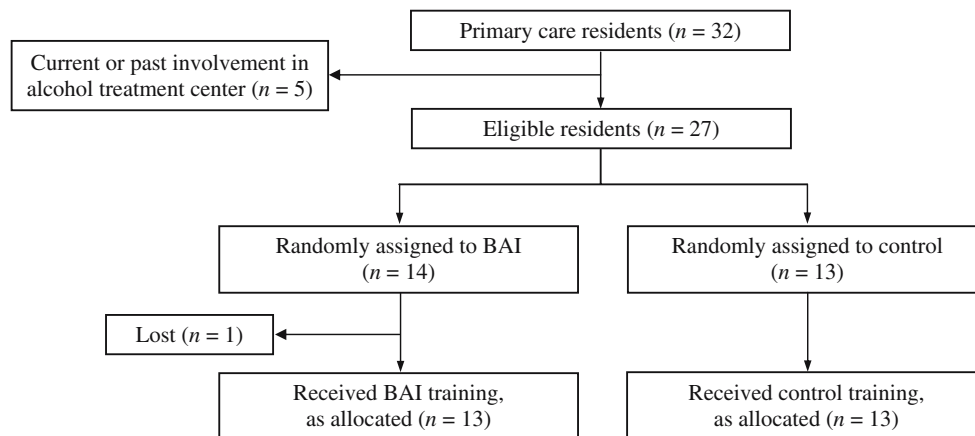


Figure 1. Resident enrollment and randomization.

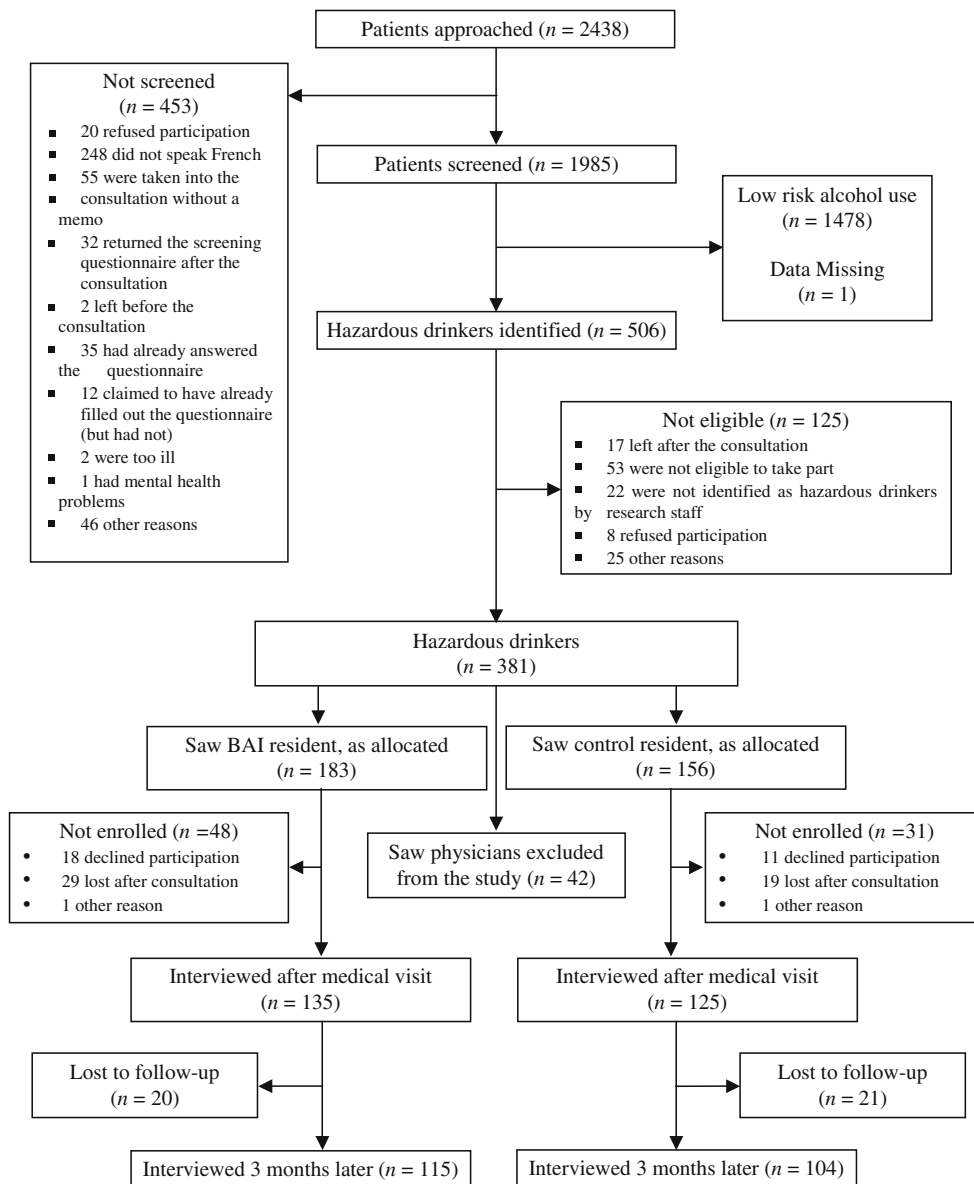


Figure 2. Hazardous drinker enrollment and follow-up.

feedback form. All patients received a feedback form containing information regarding alcohol use and the other health issues described above. They were asked to give this form to the resident during the visit. After each visit, all hazardous drinkers were immediately enrolled and interviewed face-to-face (Patient Exit Interview) to determine the type and number of BAI components the resident conducted, then the initial alcohol use assessment was completed with the Alcohol Use Disorder Identification Test (AUDIT).²³ The reliability and validity of the data collected has been previously established for the screening instrument and AUDIT.²³⁻²⁵

Three months later, patients were interviewed by telephone to determine their alcohol consumption because the visit (number of drinks per day, number of drinks per week, and number of hazardous drinking episodes per month during the last 3 months). If applicable at the 3-month follow-up, patients were asked again about the number of BAI components used

by residents “during the last 3 months,” if another medical visit had occurred within that time. Staff researchers were blinded to group assignment.

Statistical Analysis

Because groups of patients, rather than individuals, were allocated to the intervention and control groups, respectively (because patients were assigned to specific residents who had taken part in either the BAI or the control training), responses from each group of patients assigned to a particular resident may be correlated. To account for this lack of independence,²⁶ a cluster randomized design was appropriate. In both the resident performance outcome and the patient drinking outcome, the unit of inference was the patient. This is because the study ultimately aimed to establish whether patients who

received the intervention were more likely to decrease their hazardous drinking behavior.

The primary outcomes were the numbers of reported BAI components performed by the residents at the first consultation after training and at the 3-month follow-up. Sample size calculation was based on the difference in alcohol consumption (i.e., quantity/frequency of alcohol use) at 3-month follow-up between patients seen by BAI-trained residents and control residents (as demonstrated in a prior study conducted by Adams and colleagues¹⁶). Intraclass correlation coefficients were calculated for all variables. Adjusted chi-square tests, 2 sample *t* tests, or Mann-Whitney *U* tests were conducted on each BAI component, total number of BAI components, and alcohol use at the 3-month follow-up, respectively, to establish whether there were significant differences between BAI-trained and control residents. Any variables with intraclass correlation coefficients equal to (or less than) zero were not adjusted for the effect of clustering.²⁶

Role of the Funding Source

The funding source (Swiss Research Foundation on Alcohol) played no role in the study design, data collection, data analysis, data interpretation, or manuscript writing.

RESULTS

Baseline

Figure 1 indicates that of 32 residents in both outpatient centers, 27 were eligible for inclusion into the study and were randomly assigned to the BAI or control groups, but owing to maternity leave, 1 left the BAI group. Eligible and ineligible residents were similar in terms of age, sex, and number of years experience in clinical practice. In the BAI group, residents had a median age of 32 years (interquartile range 3.6), were predominantly female (58.3%), and had a median number of 5 years experience in clinical practice (interquartile range 2.0). Those in the control group had a median age of 31 years (interquartile range 5.9), were predominantly female (64.3%), and had a median number of 4 years experience in clinical practice (interquartile range 2.0).

Figure 2 indicates that 2,438 consecutive patients were approached, 506 (20.8%) of whom were identified as current hazardous drinkers; of these, 381 (15.6%) met the eligibility criteria and 260 (68.2%) were enrolled and interviewed after the medical visit (Patient Exit Interview). Enrolled patients were similar in sex and current level of alcohol use to patients who were not enrolled, but were significantly younger (44.2 vs 48.7 years, *p* = .03).

The Patient Exit Interview gathered data on rates and types of BAI components used by the residents. Table 1 shows that BAI-trained residents, compared to control residents: performed significantly more BAI components (mean number of components 2.4 vs 1.5, *p* = .001); explained safe drinking limits more often (27% vs 10%, *p* = .001); provided more feedback on patient alcohol use (33% vs 21%, *p* = .03); and more frequently asked patient opinions on safe drinking limits (19% vs 6%, *p* = .02). No between-group differences were observed in the use of the 9 other BAI components. Overall, only 54% of the BAI-trained residents addressed alcohol consumption, whereas 46% of the controls did so during the consultation.

Table 1. Completion of Each BAI Component Based on the Patient Exit Interview, by Condition

12 BAI components	260 Patient Exit Interviews	
	BAI group residents N (%)	Control group residents N (%)
1. Addressed alcohol consumption	73 (54)	58 (46)
2. Explained safe drinking limits*	37 (27) [†]	13 (10)
3. Provided feedback on patient's alcohol use	45 (33) [‡]	26 (21)
4. Asked patient's opinion on limits	26 (19) [§]	7 (6)
5. Asked patient's opinion on feedback	29 (22)	15 (12)
6. Asked patient's opinion on positive aspects of alcohol use*	18 (13)	10 (8)
7. Asked patient's opinion on negative aspects of alcohol use	24 (18)	16 (13)
8. Assessed patient's importance of change*	17 (13)	8 (6)
9. Assessed patient's readiness to change	17 (13)	12 (10)
10. Helped the patient to set a goal*	12 (9)	11 (9)
11. Supported patient's self-efficacy	15 (11)	12 (10)
12. Provided information leaflet ^d	6 (4)	1 (1)

BAI = brief alcohol intervention

*Adjusted for clustering.

[†]*p* = 0.001; chi-square test

[‡]*p* = 0.03; chi-square test

[§]*p* = 0.02; chi-square test.

Follow-up

Of the 260 enrolled hazardous drinkers, 219 (84.2%) completed the 3-month follow-up. Patients remaining at 3 months were similar in age, sex, and alcohol use to those who dropped out.

The follow-up interview indicated that there were no significant differences in the number of BAI components performed or in the use of specific BAI components between groups, as reported by patients who saw their resident for a medical visit during this period. In both groups, about 37% of the hazardous drinkers had become low-risk drinkers during the intervening 3 months. Data indicate (not represented in table) that there were no significant group differences between patients seen by BAI-trained or control residents in the number of drinks per drinking day at baseline (median [interquartile range]: 2.0 [4.0] vs 3.0 [2.0], respectively) or at the 3-month follow-up (median [interquartile range]: 3.0 [3.0] vs 3.0 [2.0], respectively). No between-group differences were observed in the number of occasions of heavy drinking in the last 30 days (more than 4 drinks per occasion for men, or more than 3 drinks per occasion for women) at baseline (median [interquartile range]: 3.0 [3.7] vs 2.0 [3.2], respectively) but patients seen by BAI residents reported more occasions of heavy drinking per month at the 3-month follow-up than those seen by control residents (median [interquartile range]: 2.5 [5.0] vs 2.0 [2.7], *p* = .05, respectively). In addition, there were no significant differences in the mean

number of drinks per week between patients seen by BAI-trained or control residents at baseline (mean [standard deviation]: 16.3 [23.3] vs 15.2 [19.1], respectively) or at the 3-month follow-up (mean [standard deviation]: 14.6 [18.4] vs 12.2 [10.5], respectively).

The above analyses were repeated after removing 66 patients (29 in the control group and 37 in the BAI group) with AUDIT scores >12 to see if including patients with more severe alcohol use disorders caused between-group differences among hazardous drinkers to be minimized. However, no significant differences were found between groups in drinks per drinking day, drinks per week, or occasions of heavy drinking per month when those patients were excluded.

DISCUSSION

The first hypothesis, that BAI training would increase the number of BAI counseling components used by the residents, was confirmed, but on average, trained residents delivered only 1 more BAI component than did controls. Earlier, Adams et al.¹⁶ reported a greater difference in the number of BAI components completed by trained physicians compared to controls. These residents were aware that their skills in BAI were being assessed and they were cued and encouraged to deliver the intervention; in the present study they were not.

Regarding completion of each of the 12 BAI components, the trained residents may not have directly addressed alcohol consumption significantly more often than did control residents (component 1) but they did complete 3 of the other BAI components significantly more often. For example, explaining safe drinking limits (component 2), providing feedback on alcohol use (component 3) and asking patient opinions about safe drinking limits (component 4). In addition, with the exception of component 10 (where there was no difference between the 2 groups of residents) the remaining 8 components were completed more often by the trained versus the control residents (although not reaching statistical significance), suggesting a patient-centered approach to information giving²⁷ by the trained residents. Rather than simply telling patients that their levels of alcohol consumption were too high, BAI-trained residents seemed to tailor the information for each individual and get each person to think about what the implications of their drinking might mean. Leading patients with a guiding style are positive steps taken by the trained residents that may be an effective way to promote behavior change in the primary care setting.^{28,29}

Alcohol consumption was addressed by control residents (46%) nearly as often as by BAI-trained residents (54%) and may be a consequence of controls receiving a feedback form that included information about alcohol use by their patients. Simply addressing drinking with patients may have led to changes in drinking behavior, which may explain why there was a decrease in hazardous drinking in the control, as well as in the BAI-trained group.^{30,31} The more frequent use of BAI components by trained residents did not appear to be sustained over time. Patients returning within 3 months after the initial consultation did not report any significant differences between the numbers of BAI components delivered by BAI-trained or control residents. It may be that 2 half-day sessions are a very brief (and likely weak) educational intervention in the life of the study residents. It may also be difficult to remember the components over time.

The second hypothesis, that BAI training would reduce the overall quantity and frequency of drinking, was not supported in this study. Given the sometimes small differences between groups in the number of BAI components conducted, the finding that BAI did not appear to have any appreciable effect on hazardous drinking behavior is not surprising. These results underscore the importance of evaluating the extent to which complex interventions such as BAI are executed in clinical practice.³² The decrease in consumption among hazardous drinkers in the control group (rather than in the BAI group) parallels findings of some previous studies.³³⁻³⁵ Approximately 37% of hazardous drinkers became low-risk drinkers at follow-up in both the control and BAI-trained groups. One possible reason for this may be that the screening, talking about alcohol use, AUDIT, and patient exit interview had an effect on patients' drinking in the control group.

There were several limitations in this study. A relatively small number of hazardous drinkers were enrolled, caused in part by the limited number of participating physicians. In general, cluster randomized trials require a larger sample size than do other types of research designs²⁶ and the reduced statistical power makes it more difficult to detect significant differences unless the effect size is quite large.

During the first few weeks of the study, it was discovered that a small number of patients had not given their written feedback form detailing their alcohol use to their resident before the consultation. This omission was noted, and attempts to secure this information were (in most cases) successful; however, there may be a small number of instances where this was never made available, leaving the Patient Exit Interview (PEI) database incomplete.

It should be noted that during the 3-month follow-up period some patients may have seen their doctor more recently than others, and this too may have had an impact on their ability to recall which components of BAI were delivered. The PEI was created to evaluate how effectively residents used the BAI components in practice and has not been cross-validated with records of actual consultations to help verify that patient perceptions of BAI match up with the components, as executed by the residents. It should also be acknowledged that patients may not have been happy to talk about their alcohol use at this point, and may have chosen not to report components of BAI that were implemented. Although this raises questions as to how reliable an assessment this may have been, residents were trained to accept patient choice and to "roll with their resistance,"³⁶ rather than directing the patient what to do. PEI questions were formatted in the same way that the components of the BAI were meant to be implemented, thus it is hoped that most patients still were able to give a fairly accurate reflection of BAI components conducted.

Although efforts were made to optimize the accuracy of the data, information obtained on residents' attitudes and practice of BAI relied solely on the patients estimates and recollections. This was also true regarding the assessment of patients alcohol use at baseline and follow-up. Although this measurement is not objective, a number of studies have demonstrated that self-report is often a reliable measure of patients' alcohol consumption³⁷ and that self-reporting of drinking behavior is stable over time.^{38,39}

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Conflict of interest: None disclosed.

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REFERENCES

1. **Wilk AI, Jensen NM, Havighurst TC.** Meta-analysis of randomized control trials addressing brief interventions in heavy alcohol drinkers. *J Gen Intern Med.* 1997;12:274-83.
2. **Moyer A, Finney JW, Swearingen CE, Vergun P.** Brief interventions for alcohol problems: a meta-analytic review of controlled investigations in treatment-seeking and non-treatment-seeking populations. *Addiction.* 2002;97:279-92.
3. **Bertholet N, Daeppen JB, Wietlisbach V, Fleming M, Burnand B.** Reduction of alcohol consumption by brief alcohol intervention in primary care: systematic review and meta-analysis. *Arch Intern Med.* 2005;165:986-95.
4. Screening and behavioral counseling interventions in primary care to reduce alcohol misuse: recommendation statement. *Ann Intern Med.* 2004;140:554-6.
5. **Fleming MF, Manwell LB, Kraus M, Isaacson JH, Kahn R, Stauffacher EA.** Who teaches residents about the prevention and treatment of substance use disorders? A national survey. *J Fam Pract.* 1999;48:725-9.
6. **Fleming M, Barry K, Davis A, Kropp S, Kahn R, Rivo M.** Medical education about substance abuse: changes in curriculum and faculty between 1976 and 1992. *Acad Med.* 1994;69:362-9.
7. **Brewster JM, Single E, Ashley MJ, Chow YC, Skinner HA, Rankin JG.** Preventing alcohol problems: survey of Canadian medical schools. *CMAJ.* 1990;143:1076-82.
8. **Saitz R, Mulvey KP, Plough A, Samet JH.** Physician unawareness of serious substance abuse. *Am J Drug Alcohol Abuse.* 1997;23:343-54.
9. **Beich A, Gannik D, Malterud K.** Screening and brief intervention for excessive alcohol use: qualitative interview study of the experiences of general practitioners. *Br Med J.* 2002;325:870-4.
10. **Saitz R, Friedmann PD, Sullivan LM et al.** Professional satisfaction experienced when caring for substance-abusing patients: faculty and resident physician perspectives. *J Gen Intern Med.* 2002;17:373-6.
11. **Friedmann PD, McCullough D, Chin MH, Saitz R.** Screening and Intervention for Alcohol Problems. A National Survey of Primary Care Physicians and Psychiatrists. *J Gen Intern Med.* 2000;15:84-91.
12. **Seale JP, Shellenberger S, Boltri JM, Okosun IS, Barton B.** Effects of screening and brief intervention training on resident and faculty alcohol intervention behaviours: a pre- post-intervention assessment. *BMC Fam Pract.* 2005;6:46; DOI:10.1186/1471-2296-6-46
13. **Babor TF, Higgins-Biddle JC, Higgins PS, Gassman RA, Gould BE.** Training medical providers to conduct alcohol screening and brief interventions. *Subst Abuse.* 2004;25:17-26.
14. **Wilk AI, Jensen NM.** Investigation of a brief teaching encounter using standardized patients—teaching residents alcohol screening and intervention. *J Gen Intern Med.* 2002;17:356-60.
15. **Bendtsen P, Akerlind I.** Changes in attitudes and practices in primary health care with regard to early intervention for problem drinkers. *Alcohol Alcohol.* 1999;34:795-800.
16. **Adams A, Ockene JK, Wheeler EV, Hurley TG.** Alcohol counseling—physicians will do it. *J Gen Intern Med.* 1998;13:692-8.
17. **Ockene JK, Wheeler EV, Adams A, Hurley TG, Hebert J.** Provider training for patient-centered alcohol counseling in a primary care setting. *Arch Intern Med.* 1997;157:2334-41.
18. **Daeppen J-B.** *Vade Mecum d'Alcoologie.* Médecine & Hygiène ed. Genève: 2003.
19. **King AM, Perkowski-Rogers LC, Pohl HS.** Planning standardized patient programs: case development, patient training, and costs. *Teaching and learning in medicine.* 1994;6:6-14.
20. **Stillman PL.** Technical issues: logistics. *AAMC. Acad Med.* 1993;68:464-8.
21. Arbeitsgruppe Lipide der Schweizerischen Gesellschaft für Kardiologie und der Schweizerischen Ärztestiftung. Lipide und die Prävention der koronaren Herzkrankheit: Diagnostic und Massnahmen, aktualisierte Empfehlungen. *Schweiz Ärztezeitung* 2000;780:1593-602.
22. National Institute on Alcohol Abuse and Alcoholism. The physicians' guide to helping patients with alcohol problems. 1995. National Institutes of Health.
23. **Gache P, Michaud P, Landry U et al.** The Alcohol Use Disorders Identification Test (AUDIT) as a screening tool for excessive drinking in primary care: reliability and validity of a French version. *Alcohol Clin Exp Res.* 2005;29:2001-7.
24. **Daeppen JB, Yersin B, Landry U, Pecoud A, Decrey H.** Reliability and validity of the Alcohol Use Disorders Identification Test (AUDIT) imbedded within a general health risk screening questionnaire: results of a survey in 332 primary care patients. *Alcohol Clin Exp Res.* 2000;24:659-65.
25. **Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA.** The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Arch Intern Med.* 1998;158:1789-95.
26. **Donner A, Klar N.** Design and analysis of cluster randomized trials in health research. London: Arnold, 2000.
27. **Stewart M, Weston W, McWhinney I, McWilliam C, Freeman T.** Patient-centered Medicine: Transforming the Clinical Method. Radcliffe Medical Press, 2003.
28. **Rollnick S, Butler CC, McCambridge J, Kinnersley P, Elwyn G, Resnicow K.** Consultations about changing behaviour. *BMJ.* 2006;331:961-3.
29. **Amrhein P, Miller WR, Yahne C, Palmer M, Fulcher L.** Client commitment language during motivational interviewing predicts drug use outcomes. *J Consult Clin Psychol.* 2003;71:862-78.
30. **Saitz R, Horton NJ, Sullivan LM, Moskowitz MA, Samet JH.** Addressing alcohol problems in primary care: a cluster randomized, controlled trial of a systems intervention—the screening and intervention in primary care (SIP) study. *Ann Intern Med.* 2003;138:372-82.
31. **Buchsbaum DG, Buchanan RG, Lawton MJ, Elswick R, Schnoll SH.** A program of screening and prompting improves short-term physician counseling of dependent and non-dependent harmful drinkers. *Arch Intern Med.* 1993;153:1573-77.
32. Medical Research Council. A Framework for the Development and Evaluation of Randomised Controlled Trials for Complex Interventions. London, Medical Research Council; 2000.
33. **Ockene JK, Adams A, Hurley TG, Wheeler EV, Hebert JR.** Brief physician- and nurse practitioner-delivered counseling for high-risk drinkers. Does it work? *Arch Intern Med.* 1999;159:2198-205.
34. **Fleming MF, Barry KL, Manwell LB, Johnson K, London R.** Brief physician advice for problem alcohol drinkers. A randomized controlled trial in community-based primary care practices. *JAMA.* 1997;277:1039-45.
35. **Kristenson H, Ohlin H, Hulten-Nosslin MB, Trelle E, Hood B.** Identification and intervention of heavy drinking in middle-aged men: results and follow-up of 24-60 months of long-term study with randomized controls. *Alcohol Clin Exp Res.* 1983;7:203-9.
36. **Miller WR, Rollnick S.** Motivational interviewing: preparing people for change. 2nd ed. New York: Guilford Press, 2002.
37. **Embree BG, Whitehead PC.** Validity and reliability of self-reported drinking behavior: dealing with the problem of response bias. *J Stud Alcohol.* 1993;54:334-44.
38. **Longnecker MP, Newcomb PA, Mittendorf R et al.** The reliability of self-reported alcohol consumption in the remote past. *Epidemiology.* 1992;3:535-39.
39. **Czarnecki DM, Russell M, Cooper ML, Salter D.** Five-year reliability of self-reported alcohol consumption. *J Stud Alcohol.* 1990;51:68-76.