TELEPHONE SCREENING FOR HAZARDOUS DRINKING AMONG INJURED PATIENTS SEEN IN ACUTE CARE CLINICS: FEASIBILITY STUDY

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(Received 28 October 2005; first review notified 25 November 2005; in revised form 19 December 2005; accepted 23 March 2006; advance access publication 5 May 2006)

Abstract — Aims: We evaluated the effectiveness of telephoning injured patients after discharge, compared with contacting them in the clinic during the acute care visit, for screening for hazardous drinking and eliciting willingness to participate in a lifestyle intervention trial. Methods: We conducted a quasi-randomized controlled trial among acutely injured adult patients in trauma and acute care clinics, assigning telephone and clinic screening strategies systematically by week. During telephone weeks, we mailed study information to patients identified from computerized records, then telephoned them. During clinic weeks, researchers recruited patients awaiting care. We screened for hazardous drinking using the AUDIT-C (Alcohol Use Disorders Identification Test-C). We examined the proportion of all injured adult patients who were screened, the proportion of screened patients with hazardous drinking (AUDIT-C score ≥4), and the proportion willing to participate in a hypothetical lifestyle intervention trial. Differences were analysed with non-linear mixed models using generalized estimating equations, controlling for age, sex, and facility. Levers and barriers to screening were explored through structured interviews with research staff. Results: We enrolled 29% (469/1609) of all injured adult patients and 76% of injured patients contacted and found to be eligible. Of screened patients, 23.1% screened positive for hazardous drinking. Telephone and clinic contact were equally effective for screening patients (OR = 1.05; 95% CI = 0.59–1.87), identifying hazardous drinking (OR=0.97; 95% CI = 0.54–1.74), and eliciting willingness to participate in an intervention trial (OR=1.49; 95% CI = 0.97–2.30). Clinic site modified results: telephone was more effective than clinic contact for screening urban patients (OR = 1.99; 95% CI = 1.36–2.93), but less effective for screening suburban patients (OR = 0.70; 95% CI = 0.69–0.71). Barriers to clinic screening included lack of clinic staff support, time constraints, and difficulty recruiting elderly or acutely distressed patients. Barriers to telephone screening included erroneous contact information and failure to answer the telephone. Conclusions: Telephone screening is a feasible and efficient method for screening moderately injured adult patients for hazardous drinking, but characteristics of the clinical site (including personnel) influence its effectiveness. Trauma and acute care clinics are likely to be fruitful sites for identification of patients with hazardous drinking, whether for enrolment into brief intervention trials or treatment programmes.

BACKGROUND AND SIGNIFICANCE

Nearly half the global burden of alcohol-related mortality is attributable to injuries, accounting for several million deaths each year (Rehm et al., 2003). Worldwide, alcohol is estimated to cause 20–30% of homicide and motor vehicle crashes (Institute of Alcohol Studies, 2005). In the US and the UK, one-fourth to one-half of the fatalities from residential fires, drowning, falls, and suicide are attributable to alcohol (National Committee for Injury Prevention and Control, 2001; Institute of Alcohol Studies, 2005). Between 1992 and 2001, alcohol-related visits to US emergency departments averaged 7.6 million per year (McDonald et al., 2004), many of which were due to injuries. In the UK, up to 35% of all accident and emergency attendances, and ambulance costs are alcohol-related, commonly from road traffic accidents, assaults, and self-inflicted injuries (Institute of Alcohol Studies, 2005).

Brief interventions to decrease problem drinking, delivered to injured adult patients in emergency departments or hospitals, reduce subsequent emergency visits, hospitalizations, and deaths due to alcohol-related injuries (Gentilello et al., 1999; Longabaugh et al., 2001; DiClemente and Soderstrom, 2002; Din-H-Zarr et al., 2004). The acute injury event presents a ‘teachable moment’, when the patients may be more receptive to learning about alcohol and injury, and more motivated to change their subsequent behaviour (DiClemente and Soderstrom, 2002). It may not always be feasible, however, for injured patients to receive screening or intervention in the emergency department, owing to staff and time constraints, lack of facilities for interviews, or circumstances of discharge (Charalambous, 2002). In studies utilizing dedicated research staff, high rates of acceptance of screening and counselling have been reported (Hungerford et al., 2000, 2003). On the other hand, when emergency department nurses were trained to screen adult patients for hazardous drinking as part of their usual duties, only 20% of 16 654 patients were screened (Brooker et al., 1999). Screening and intervention for problem drinking may be more difficult in acute care and trauma clinics, where less severely injured patients are typically seen, treated, and discharged rapidly.

Telephone contact after clinic or emergency department discharge may be an effective way to screen injured patients for hazardous drinking and to offer brief intervention while avoiding interruptions to the flow of patient care. Studies in other domains, such as smoking cessation and cancer care, have shown telephone interventions to be effective (Cox and Wilson, 2003; Stead et al., 2003). To inform future trials of interventions for problem drinking among patients seen in clinic settings, we evaluated the feasibility of telephone contact after a clinic visit for acute injury for screening patients for hazardous drinking and determining patients’ willingness to participate in a trial of lifestyle intervention for injury prevention.

METHODS

Study design
We conducted a quasi-randomized controlled trial to compare screening injured adult patients for hazardous drinking in the...
clinic during the acute injury visit with screening by telephone after the visit. The two strategies were assigned systematically by week and study site, in a ratio of one telephone week to four clinic weeks (to allow a larger sample to be recruited in the clinics, where a secondary study was conducted among enrolled patients).

Study population
The study was conducted in a health maintenance organization (HMO) with over 350,000 members in the metropolitan area. The HMO provides comprehensive health care coverage to its members for a fixed periodic prepayment; members are required to use HMO providers (e.g., physicians, clinics) for all health services. HMO members use their home facility for acute injury care unless directed to an emergency department. Home facility is based on geographic proximity to residence. Primary HMO study sites were the minor injury clinic at a large suburban facility and the trauma clinic at a large urban facility. All study clinics were ‘hub’ facilities, indicating a similar size and range of services.

The study sample included HMO health plan members, aged ≥18 years who presented to the selected facilities for initial treatment of an acute injury between June and September 2003. We excluded chronic injuries, injuries from medical or surgical complications or misadventures, late effects of injuries, and injury follow-up visits. Subjects were excluded if they were unable to communicate verbally in English or Spanish, or were institutionalized (e.g., nursing home).

Study outcomes
The primary outcome was the screening ratio, defined as the number of injured adult patients consenting to screening for hazardous drinking divided by the total number of injured adult patients seen for care in the same clinics during the same study week. The total number seen for care was used as the denominator, rather than the total number contacted or found to be eligible, because different recruitment strategies may affect different stages of the process of contact, eligibility determination, or consent. Secondary outcomes included hazardous drinking, defined as the proportion of screened patients with AUDIT-C scores ≥4, and trial participation, defined as the proportion of screened patients who expressed willingness to take part in a hypothetical future injury prevention trial.

Data collection
Data collection was performed by research assistants (RAs), who were university graduates with prior research or counselling experience, most of whom were bilingual in English and Spanish. RAs were trained in the HMO’s policies and procedures, human subject protection, patient confidentiality, and the study protocol. The RAs role-played using scripts, then observed at least one complete recruitment and survey, and completed at least one themselves while observed by an investigator, before beginning data collection.

During telephone weeks, HMO programmers identified all HMO members aged ≥18 years, who were seen for care at study clinics and diagnosed with an acute injury (ICD-9-CM codes 800–994.9, excluding 905–909), using computerized medical records. Patients with any ICD-9-CM code indicating a follow-up visit were excluded. Programmers transmitted daily data files containing patient names, addresses, and telephone numbers. RAs mailed study information, consent statement, and a fold-over reply postcard that allowed the patient to decline contact or request specific calling times. Three weeks later, the RA telephoned all patients who had not declined contact. Up to six call attempts were made between 9:00 a.m. and 8:00 p.m. on weekdays. Once contacted, eligibility was determined, verbal consent was sought, and the questionnaire was administered.

During clinic weeks, during all hours of operation, the regular reception staff at each study facility asked adult patients aged ≥18 years presenting with any injury whether an RA could talk to them about a questionnaire to be done in the waiting area. HMO reception staff typically welcome and provide general assistance to patients, process paperwork, schedule appointments, and field telephone calls, requiring communication, customer service, and general computer skills, and knowledge of basic medical terminology. Receptionists were oriented to the study in the clinic during the pilot testing procedure; receptionists hired subsequently were oriented individually by the project coordinator. A brief script was provided to each receptionist and posted at each reception desk. Receptionists were not asked to screen for eligibility other than age and presenting complaint. Patients who agreed to referral were referred to the RA, who explained the study, determined eligibility, obtained written consent, and administered the questionnaire.

For each recruitment strategy, RAs tracked the number of patients contacted, found to be eligible, and consenting to study participation, and reasons for ineligibility or refusal.

We screened for hazardous drinking using the AUDIT-C, an abbreviated Alcohol Use Disorders Identification Test (Bush et al., 1998; Gordon et al., 2001; Rumpf et al., 2002; Dawson et al., 2005). A score ≥4 points defined a positive screen. Dawson et al. (2005) found that a cut point of ≥4 points yielded the best combined sensitivity and specificity for the outcome of risk drinking in a U.S. population. The three AUDIT-C questions were incorporated into the confidential health profile, a brief lifestyle risk assessment instrument covering a range of behaviours (e.g., exercise, diet, and smoking), which is administered routinely to individuals when they become members of the HMO. We asked patients about their readiness to participate in a (hypothetical) future randomized controlled trial of telephone versus control intervention to prevent injuries through lifestyle changes. We also requested injury and demographic information.

To estimate the total number of injured adult patients seen at study facilities during the study period (i.e., the denominator for the screening ratio), HMO programmers created a deidentified database of all patients who met study eligibility criteria for age, facility, visit date, and diagnosis code (using the same ICD-9 codes as used for telephone screening, above). Because the database did not include information on language spoken, communication ability, or institutionalization, the eligibility of the patients included in the denominator could not be assessed completely.

To explore levers and barriers to subject recruitment and screening in this feasibility study, investigators conducted a structured group interview with research assistants to learn the RAs’ perceptions of and reflections on each strategy.
Questions were based around a topic guide, with follow-up prompts. The topic guide included all aspects of the process, including recruitment; patient contact and screening for eligibility; obtaining consent; and questionnaire procedures, formats, and content. Critical incidents (e.g. instances when a consenting subject was unable to complete the survey or a receptionist did not refer patients) were explored in more depth. We offered an opportunity for feedback on topics of importance to the RAs that we had not covered. Two researchers facilitated the group session and independently recorded and transcribed detailed interview notes.

**Patient management**

Patients scoring ≥6 points on the AUDIT-C were given written information that their reported pattern of alcohol use might increase their injury risk, and offered a ‘drinker’s check-up’ group medical visit. Because the study protocol did not allow for detailed evaluation of screen-positive patients, we chose a higher, more specific cut-off of six for patient referral (Dawson et al., 2005). This cut-off was consistent with the inflection point of a scattergram of screening data previously collected from HMO members. We mailed written information, with a similar offer of a ‘drinker’s check-up’ visit, to telephone subjects who met this criterion and to clinic subjects who left before receiving the information. The offer of a drinker’s check-up visit was made independently of the patient’s response to the question about participation in a lifestyle intervention trial.

**Monitoring study conduct**

The project coordinator reviewed records weekly to assure protocol adherence. A sample of 38 subjects was contacted by telephone several weeks after initial screening for quality assurance monitoring. All recalled consenting to the study and completing the questionnaire. No complaints were voiced. There was excellent test–retest agreement on variables that are fixed or unlikely to change in the short-term, i.e., \( \kappa = 1.0 \) for gender, \( \kappa = 0.92 \) for age group, and \( \kappa = 0.89 \) for ‘ever smoked’.

**Data analysis**

Demographic variables are described for each strategy. We analysed differences between strategies with non-linear mixed models using generalized estimating equations to handle facility clustering effect, with binomial distribution and a logit link function (Zeger and Liang, 1986). In the non-linear models, outcomes were as defined above and the two screening strategies were main effects, simultaneously controlling for facility, and patient age and sex. Tests for interactions between covariates and outcomes were performed.

Two investigators independently reviewed detailed notes from the structured interviews conducted with the RAs. Each investigator identified recurring themes, as well as single issues raised by respondents that appeared to have implications for methodological feasibility and future practice. Within each strategy, the key themes and issues identified were grouped into levers and barriers. Because the themes and issues raised were relatively straightforward, simple discussion between the two researchers was sufficient to resolve differences in interpretation.

**Protection of human subjects**

The study was approved by the Kaiser Foundation Research Institute Institutional Review Board and the Colorado Multiple Institutional Review Board. A certificate of confidentiality was obtained.

**RESULTS**

A total of 1609 injured adult patients presented for care at study facilities during the study period. Distribution by facility, time of visit, sex, and age group is shown in Table 1. Mean patient age was 46.2 years (SD = 17.4, range = 18–90+). Common injuries included joint sprain or strain (27%), contusion and other superficial injury (19%), laceration (13%), and fracture (9%).

A total of 469 eligible patients consented to participate in the study (Table 1). Study participants were similar to all injured adult patients in the facility, time of visit, sex, and age group distribution. Almost all injuries were unintentional (99.5%). The most common causes of injury were falls (30%), and sports and recreation injuries (26%). Facility, time of visit, and patient sex distributions were similar for the two screening strategies (Table 1). Telephone screening yielded relatively more patients aged 18–24 and ≥65, and relatively fewer persons aged 25–34 years.

Patient recruitment and screening by strategy is shown in Fig. 1. During telephone weeks, 52.5% of injured adult patients were successfully contacted, and more than half (55%) of those contacted were found to be eligible, consented to the study, and screened. Among those successfully contacted but not enrolled into the study, similar proportions were ineligible and refused participation. We enrolled

### Table 1. Characteristics of injured adult patients, and of study participants, in total and by screening strategy

<table>
<thead>
<tr>
<th>Facility</th>
<th>Total injured adult patients</th>
<th>Total study participants</th>
<th>Telephone screening</th>
<th>Clinic screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suburban</td>
<td>961 (60)</td>
<td>283 (60)</td>
<td>55 (56)</td>
<td>228 (62)</td>
</tr>
<tr>
<td>Urban</td>
<td>648 (40)</td>
<td>186 (40)</td>
<td>44 (44)</td>
<td>142 (38)</td>
</tr>
<tr>
<td>Hours of visit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekday</td>
<td>1096 (68)</td>
<td>328 (70)</td>
<td>73 (74)</td>
<td>255 (69)</td>
</tr>
<tr>
<td>After hours (^a)</td>
<td>513 (32)</td>
<td>141 (30)</td>
<td>26 (26)</td>
<td>115 (31)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (^b)</td>
<td>876 (54)</td>
<td>250 (56)</td>
<td>60 (62)</td>
<td>190 (54)</td>
</tr>
<tr>
<td>Male</td>
<td>733 (46)</td>
<td>200 (44)</td>
<td>37 (38)</td>
<td>163 (46)</td>
</tr>
<tr>
<td>Age group (years)(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>181 (11)</td>
<td>49 (11)</td>
<td>15 (15)</td>
<td>34 (10)</td>
</tr>
<tr>
<td>25–34</td>
<td>303 (19)</td>
<td>99 (22)</td>
<td>9 (9)</td>
<td>90 (25)</td>
</tr>
<tr>
<td>35–44</td>
<td>299 (19)</td>
<td>94 (21)</td>
<td>18 (19)</td>
<td>76 (21)</td>
</tr>
<tr>
<td>45–64</td>
<td>554 (34)</td>
<td>158 (35)</td>
<td>34 (35)</td>
<td>124 (35)</td>
</tr>
<tr>
<td>&gt;65</td>
<td>272 (17)</td>
<td>52 (12)</td>
<td>21 (22)</td>
<td>31 (9)</td>
</tr>
</tbody>
</table>

\(^a\)After hours’ includes visits made on the weekend or in the evening on a weekday. All other visits were made during regular business hours on weekdays.

\(^b\)Data on sex and age group missing for 19 (4%) and 17 (4%) subjects, respectively.
69.7% of eligible patients contacted by telephone. Of the 161 patients never contacted by telephone, 67 (41.6%) never answered the telephone, 34 (21.1%) had an incorrect mailing address or telephone number in the HMO database, 29 (18.0%) refused contact by reply postcard, 18 (11.2%) were not contacted despite contact with another household member, and 13 (8.1%) were not contacted for other reasons.

During clinic weeks, the majority (60.9%) of injured adult patients were never contacted by the RA (Fig. 1); 98% of these were not referred by the receptionist. We enrolled 77.9% of eligible patients contacted in the clinic. Among 105 patients contacted but not screened, 44 (41.9%) refused consent, 42 (40.0%) were called for treatment before the survey could be administered, 10 (9.5%) decided they could not participate owing to their injury or pain, and 9 (8.6%) were not screened for other reasons.

**Screening**

Ratios of screened patients to all injured adult patients were the same with telephone (29.0%) and clinic (29.2%) contact (Fig. 1). Overall, after adjustment for sex, age group, and study facility, telephone recruitment was as successful as clinic recruitment for screening patients (OR = 1.05; 95% CI = 0.59–1.87; P = 0.87). However, there was a significant interaction between study facility and recruitment method. At the suburban site, patients were significantly less likely to be screened by telephone than when contacted in the clinic, whereas at the urban site, telephone contact was twice as successful as screening in the clinic (Table 2). Modest differences in screening by age and sex were not statistically significant.

**Trial participation**

Of the subjects screened by telephone (whether screen-positive or not), 64.6% indicated willingness to participate in a future intervention trial, compared with 51.3% of patients screened in the clinic. After accounting for age, sex, and facility, telephone screening was somewhat more often associated with willingness to participate in a future trial (OR = 1.49;...
95% CI = 0.97–2.30), although this difference may have been due to chance. There was again a significant interaction with study site. At the suburban site, telephone screening was significantly more likely than clinic screening to result in agreement to future trial participation, whereas at the urban site there was no difference between the two strategies (Table 2). There were significant differences by age in willingness to participate in a future trial, but no difference by sex.

Identification of hazardous drinking

Among the 454 patients who completed the AUDIT-C, 105 (23.1%) were screen-positive (AUDIT-C Score ≥4) for hazardous drinking. The mean score was 2.1 (95% CI = 1.9–2.3; range = 0–11). The majority (81%) of those who screened positive reported drinking 6 or more drinks on one occasion within the past year, with 11.5% reporting binge drinking at least weekly. Most screen-positive subjects (60.6%) reported drinking at least 3–4 drinks on a typical drinking day, while 24.1% drank at least 5–6 drinks on typical drinking days.

Among 98 telephone respondents who completed the AUDIT-C, 21 (21.4%) screened positive for hazardous drinking. Among 356 clinic respondents, 84 (23.6%) screened positive. When adjusted for facility, age, and sex, there was no difference between telephone and clinic screening in the identification of patients who were screen-positive for hazardous drinking (Table 3). Suburban and female patients were significantly less likely to screen positive for hazardous drinking, and the likelihood of a positive screen decreased significantly with increasing age (Table 3). There was no interaction by study site.

Of the 21 screen-positive patients recruited by telephone, 13 (61.9%) indicated readiness to participate in a hypothetical treatment trial, compared with 39 of 84 (46.4%) screen-positive subjects recruited in the clinic. Modelling for statistical significance could not be performed owing to small sample size.

Levers and barriers reported by research assistants

Telephone strategy. A perceived advantage to telephone recruitment was that subjects who were reached at an inconvenient time could be asked for a better time to call back. However, requested call back times were not always reliable, and a few people were never reached again. All RAs agreed that the waiver of documentation of consent was a benefit of telephone surveys because it decreased the time to complete the study. RAs felt that the consent process was faster and easier by telephone. They attributed this to the fact that participants received the consent and authorization forms by mail and could review them in advance.

One important barrier to telephone contact reported by the RAs was the failure of subjects to answer the telephone. RAs reported that several research subjects asked why the name of the HMO did not appear on the telephone’s caller identification system. RAs believed that the absence of the HMO’s name may have prevented some potential subjects from answering the telephone. The phone bank set-up lacked the capacity to allow potential subjects to call researchers back; RAs thought that this reduced enrolment.

Clinic strategy. All RAs agreed that receptionists, as the initial contact point for clinic patients, had a ‘huge impact’ on recruitment. RAs thought referral rates were better if they knew the receptionist, and ‘got along with [her] on a personal level’. The full-time receptionist at the suburban site was reported to have recruited enthusiastically for the study. At the urban site, RAs reported that other staff members were filling in as receptionists owing to a staffing shortage; these staff saw referrals as ‘one more thing to remember’. One temporary receptionist refused to refer any patients because it was ‘not part of [her] job’. Some receptionists complained to RAs about the extra work involved; some viewed the project as ‘a nuisance’.

RAs reported that some receptionists had expressed concerns to them that taking time to ask patients about the study might slow patient flow; receptionists were perceived to make fewer referrals when the clinics were busy. On the other hand, if the clinic was not busy, it was difficult to finish the consent process before the patient was called in to the examination room. Participants who signed the consent and began the questionnaire before being called for care were perceived by RAs to be more likely to complete the study than those who had not signed the consent before being called. One RA commented that there was therefore ‘a race for the last signature [on the consent forms]’ before the patient was called for treatment.

Elderly people were perceived as less receptive to study participation in the clinic. Several elderly patients declined participation because their poor hearing or failure to bring reading glasses with them made participation difficult. Enrolling elderly participants was believed to take longer, making it difficult to complete the consent form and questionnaire before the patient was called back to the examination room. RAs also found it difficult to enrol patients who were in pain or bleeding or who had a more serious injury, because the RAs felt uncomfortable approaching them and they believed that receptionists were less likely to refer such patients. Patients were also reported to have declined specifically because of their injury or pain.

**Table 3. Identification of hazardous drinking by screening strategy**

<table>
<thead>
<tr>
<th>Hazardous drinking (AUDIT-C ≥ 4)</th>
<th>OR (95% CI)</th>
<th>P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>0.97 (0.54–1.74)</td>
<td>0.918</td>
</tr>
<tr>
<td>Facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Suburban</td>
<td>0.55 (0.40–0.74)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>25–34</td>
<td>0.64 (0.57–0.72)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>35–44</td>
<td>0.42 (0.29–0.63)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>45–64</td>
<td>0.23 (0.18–0.29)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>65+</td>
<td>0.16 (0.05–0.52)</td>
<td>0.003</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0.30 (0.17–0.55)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Our results indicate that telephone contact is as effective overall as contact in the acute care clinic for screening
patients, identifying hazardous drinking, and identifying patients willing to participate in a future (hypothetical) intervention trial. Although we enrolled only 29% of all injured adult patients into the study, the study participants were similar to all injured adult patients in terms of the clinic site visited, after hours versus weekday visit, and patient sex and age distribution. This suggests that study subjects were representative of the HMO population and that our results can be generalized to similar (i.e. insured and employed) populations.

Nearly one-fourth of the patients presenting to the trauma and acute care clinics for injury were screen-positive. The prevalence of hazardous drinking was consistent with studies of injured patients seen in the emergency department (Brooker et al., 1999; D’Onofrio et al., 2001; Williams and Vinson, 2001; Nordqvist et al., 2004) and somewhat higher than the prevalence reported in primary care patients (U.S. Preventive Services Task Force, 1996). In all 81% of our subjects screened positive owing to binge drinking, and Nordqvist et al. (2004) found that 99% of screen-positive patients reported heavy episodic drinking. This suggests that the majority of screen-positive patients presenting for acute injuries may be identifiable by asking only about binge drinking.

Had we examined the success of enrolment and screening only among patients who were actually contacted, clinic recruitment would have been apparently more successful than telephone recruitment, with 77.9 versus 69.7%, respectively, of contacted persons being enrolled. However, <40% of patients presenting to the clinics were ever contacted, whereas more than half of the patients in the telephone group were successfully contacted. Because our denominator consisted of all injured adult patients seen at the study sites during the study period, whether or not they were contacted, overall success in enrolment and screening was shown to be similar with the two methods.

The facility in which the patient was seen significantly modified the relationships between the two strategies and both screening and trial participation. In the suburban facility, telephone contact was less effective for screening, and more effective for identifying potential trial participants, than was contact in the clinic. On the other hand, in the urban facilities, telephone contact was more effective than clinic contact for screening, while there was no difference by strategy in readiness for trial participation. One possible explanation is that the urban and suburban patient populations differed in ways that affected their interest in screening and trial participation. We were able to account for differences in age and sex in our analyses, and all patients in the study population were insured. The prevalence of hazardous drinking did differ by site, but we found no difference in hazardous drinking by strategy, hence this difference would not have confounded our results. There may have been other, unmeasured differences between urban and suburban patients (e.g. education, socioeconomic status) that affected the success of recruitment in the clinic versus recruitment by telephone.

Differences between strategies may also reflect true differences in their efficacy at the different sites. One likely explanation is differences between sites in receptionist referrals. At the suburban clinic, an enthusiastic, supportive, experienced full-time receptionist encouraged clinic patients to take part, which may have resulted in better recruitment in the clinic than by telephone contact. In the urban clinic, where receptionists were reported by RAs to be inexperienced, temporary, overworked, and uninterested, telephone recruitment was twice as effective as clinic recruitment. Differences in readiness for trial participation by study site may also reflect true differences between strategies. At the suburban site, the trial participation ratio was significantly higher with telephone screening, possibly attributable to freedom from constraints of time and efficient patient care flow. Such constraints may have been less relevant at the urban site, where no such differences were seen.

Telephone screening required ~44 RA-hours per telephone week to prepare and send mailings, make calls, and consent and survey the patients. Additional resources required included programming time to create and run mailing lists (minimal after the initial code was written), and the hiring, training, and supervision of two RAs by a project coordinator. It required ~159 RA-hours per clinic week to prepare and stock clinic materials; recruit, enrol, and screen patients during all available clinic opening hours; and return completed materials from each clinic to the study office. Additional resources required included the hiring, training, scheduling, and supervision of seven RAs by the project coordinator. Overall, fewer resources were required for telephone screening than clinic screening.

Limitations

Programmers were unable to exclude patients from the denominator based on language, communication, or institutionalization because these were not included in the electronic record. In addition, because of incomplete coding, it was not always possible to exclude chronic injuries or follow-up visits. The denominator database of injured adult patients, therefore, included at least some patients who were not actually eligible, thus overestimating the relevant denominator. However, the same method was used to calculate denominators for both telephone and clinic weeks, hence this overestimate would not have biased our results.

Logistical constraints (e.g. clinic administrator requests, availability of telephone rooms) prevented us from randomly allocating weeks to the two recruitment and screening strategies. However, there was no evidence that non-random allocation resulted in differences between groups in terms of clinic site, after-hours versus daytime visits, or patient sex. Apparent differences in age group distribution between the telephone and clinic groups are most probably attributable to real differences between the strategies rather than to non-random assignment, based on barriers to clinic recruitment of elderly subjects identified by the research assistants.

The success of telephone recruitment was largely dependent on the contact information provided by the HMO and the ability to find patients at home. Of all patients in the telephone group, 10% could not be contacted owing to incorrect contact information and 25% were never found at home, despite our calling each patient multiple times at different times of day. Additional resources applied to seeking correct contact information and making additional call attempts might increase contact success rate. The HMO did not permit us to
call patients between 8:00 p.m. and 9:00 a.m. or on weekends. Telephone contact might be more successful than clinic contact in situations and settings where expanded calling hours and days are possible.

The success of clinic recruitment was largely dependent on the receptionists, who referred only 40% of presenting patients to the RA. Receptionists were asked to query all adult patients presenting with injuries about their willingness to learn about a survey being conducted in the waiting room. Receptionists were not provided with detailed eligibility criteria, as it was the RA’s responsibility to determine eligibility. Nevertheless, at least some ineligible patients were presumably excluded by the receptionists, since <2% of patients contacted in the clinic by the RA were found to be ineligible, compared with 11% of those contacted by telephone. However, receptionists’ reluctance to refer also reduced recruitment. Reception staff turnover at one site made it difficult to keep staff informed about and interested in the study. Clinic contact is likely to be more effective in situations where research staff is allowed to contact patients directly, as has been demonstrated in other studies (Hungerford et al., 2000, 2003). For non-research intervention programmes, clinic contact might be more successful in settings where more consistent receptionist staffing is implemented, where more extensive training is provided to receptionists, or where incentives are provided for making referrals.

**Implications**

Telephone contact is a feasible, effective, and efficient method for screening for and identifying hazardous drinking among injured adult patients and for recruiting such patients to a lifestyle intervention trial. The efficacy of this method compared with screening during the clinic visit appears to be influenced by characteristics of the clinical site where the patients are seen. Hence, the decision of whether or not to adopt telephone contact to screen for hazardous drinking should take into account the characteristics of the site (including personnel) at which the strategy is to be implemented. Clinic recruitment is likely to be successful where staff time is dedicated to screening, rather than screening being added to existing duties. When this is not possible, telephone recruitment may be a more efficient alternative.

Nearly one in four subjects screened positive for hazardous drinking. This indicates that there is a substantial unmet need for screening and intervention for hazardous drinking in the population of injured patients seen in acute care clinics. Our study was not designed to determine which, if any, of these individuals were already aware of the hazardous nature of their drinking patterns. Even if they were already aware, however, their risky drinking patterns had clearly not yet been adequately addressed. Approximately half of the screen-positive patients indicated readiness to participate in a future intervention trial. Acute care clinics are likely to be a fruitful site for identification of patients with hazardous drinking, whether for immediate intervention, subsequent telephone intervention, or referral.

**Acknowledgements** — Michael Emerson, Ph.D., played a vital role in the initial implementation of the study and also assisted with data collection. We thank Fabio Almeida, Kristen Rahbar, Anna Sukhanova, and Kristi Wishcorn, who assisted with data collection. We gratefully acknowledge the assistance of the clinical and administrative staff and patients of Kaiser Permanente of Colorado. This study was supported by Grant Number R03/AA015708-01 from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Dr Xu and Dr DiGuiseppe also received support from Grant Number R49-CCR811509 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIAAA or the CDC.

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