Context: Physicians in emergency departments (EDs) treat more patients with alcohol-related disorders than do those in primary care settings.

Objectives: To implement an effective screening, brief intervention, and referral (SBIR) program for use in EDs. Further, to evaluate the impact of the program on alcohol-consumption levels.

Methods: A prospective cohort pilot study was conducted at a suburban community teaching hospital using a convenience sample of ED patients and an original seven-question screening tool based on well-known guidelines. Subjects screening positive for possible alcohol abuse were given treatment referrals. Follow-up telephone interviews were conducted 6 months later.

Results: Of the 1556 enrolled subjects, 251 (16%) were classified as at-risk drinkers. Seventy-nine at-risk subjects (32% [95% CI, 26%-37%]) screened positive on CAGE-based questions (Cut down, Annoyed, Guilty, Eye opener). At follow-up, 20 (25% [95% CI, 16%-35%]) were successfully contacted. Of these 20 subjects, 5 (25%) refused to participate in follow-up screening. For the remaining 15 individuals, follow-up screening indicated that the mean (SD) number of drinks consumed per week decreased from 28 (14) on study enrollment to 10 (10) at 6-month follow-up (P<.001). Maximum number of drinks per occasion decreased from 12 (8) at enrollment to 6 (7) on follow-up (P=.008). Subject scores on the CAGE-based questions decreased from pre- to post-intervention, though not significantly, with an average of 2.1 (1) affirmative answers on enrollment and 1.5 (1.4) at follow-up (P=.108).

Conclusion: Implementation of an effective SBIR program for alcohol-related disorders can be accomplished in the ED.

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An estimated 40 million adults in the United States are considered “heavy drinkers” of alcohol, with 10 million dependent on the substance, according to the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Misuse of alcohol contributes to a wide range of harmful effects in society. For example, the prevalence of alcohol abuse and dependency in individuals involved in motor vehicle accidents is estimated to be 23%. In addition, there are 66.9 alcohol-related diagnoses per 10,000 adults annually in the United States. The economic costs of alcohol abuse were estimated at $184.6 billion annually in 1998.

Based on probability sample comparisons of noninjured patients seen in emergency departments (EDs) versus noninjured patients in primary care settings, it was found that physicians in EDs treat a larger percentage of patients who misuse alcohol. Thus, there exists great potential for physicians in EDs to have a beneficial impact on intervention efforts.

The US Centers for Disease Control and Prevention, the National Highway Traffic Safety Administration (NHTSA), and the American College of Emergency Physicians (ACEP) have spearheaded a nationwide effort to incorporate patient screening for alcohol misuse into a broad-based program of injury prevention. In addition, the ACEP has received an NHTSA grant to develop an alcohol-screening and brief intervention tool to help ED physicians address alcohol-related injuries. A randomized controlled trial by Crawford et al found reduced alcohol-consumption levels and ED visits in alcohol-misusing patients who were screened and referred to follow-up care with alcohol-abuse treatment specialists. Nevertheless, there remain considerable barriers to establishing and evaluating the effectiveness of alcohol-screening programs.

Although there have been more than 30 studies revealing the beneficial impact of brief intervention in various clinical settings for patients with alcohol-related disorders, there have been few studies on the effectiveness of brief intervention under conditions commonly encountered in an ED. The goals of the present pilot study were to develop a brief alcohol-screening and referral program for this patient population, to investigate the feasibility of telephone follow-up after intervention, and to determine the 6-month self-reported change in patients’ alcohol-consumption levels and CAGE scores. The CAGE questionnaire is an internationally used assessment instrument for identifying people who misuse alcohol.
Letters in the acronym represent the standard four questions used in the test:

- Have you felt you ought to cut down on your drinking?
- Have you been annoyed by people criticizing your drinking?
- Have you felt guilty about your drinking?
- Have you had a drink first thing in the morning (ie, an eye opener) to steady your nerves, get rid of a hangover, or get your day started?

**Methods**

We conducted a prospective cohort pilot study using convenience sampling in a screening, brief intervention, and referral (SBIR) program for alcohol-use disorders in non-critical care patients seeking treatment in the ED at Lehigh Valley Hospital in Allentown, PA. Patients’ reasons for seeking ED treatment may or may not have been related to alcohol consumption.

The present project was referred to the institutional review board at Lehigh Valley Hospital. The board deemed the project to be exempt from full review because it was designated a quality-improvement initiative. Because of the social nuances of alcohol abuse, there was considerable concern that requiring written consent from the patients would diminish participation. Therefore, verbal consent was obtained from patients for ED screening and postintervention telephone follow-up. Verbal consent was logged for subjects who could be contacted for follow-up.

**Study Participants and Setting**

Patients were eligible for and included in the present pilot study if they were cognitively alert, cooperative, medically stable, at least 14 years of age, and presented with a condition that did not result in hospital admission. Subjects were enrolled in the study at the hospital’s ED during a 6-month period, from April 2004 to October 2004. Patients who were excluded from study participation were customarily cared for at the discretion of physicians and nurses. Physicians, nurses, and physician assistants in the ED performed the initial patient screening for alcohol misuse. A research assistant conducted the telephone follow-up of subjects 6 months after intervention.

Lehigh Valley Hospital is a suburban community teaching hospital with approximately 30,000 visits to its ED every year. The hospital is part of a three-site, tertiary care network that has a total ED patient volume of more than 100,000 individuals per year.

**Intervention**

Prior to the data-collection phase of the present pilot study, ED hospital staff (eg, resident and attending physicians, physician assistants, and triage and bedside nurses) were given a 1-hour training session on the importance of screening patients for alcohol-related disorders and on the use of our original screening tool. A nationally renowned expert in alcohol-use disorders conducted the training session. Pocket reference cards were developed and distributed to ED staff. An incentive program offering retail gift cards was used to increase staff participation. Local newspapers were contacted and encouraged to publish articles about the SBIR program, further contributing to staff interest and participation.

Staff determined which patients to screen, being encouraged to perform screening on any patient who answered “yes” or “yes, socially” to the question, “Do you drink alcohol?” This question is part of the standard social history obtained at triage in the ED of our hospital. Subjects who answered with either affirmative response to this question were screened—regardless of whether their presenting complaints were related to alcohol consumption. We adopted this strategy because other researchers have recommended similar screening for any ED patient who consumes alcohol. In addition, it has been shown that self-reporting of recent drinking is not a good indicator of alcohol abuse in ED populations. Subject screening was conducted by ED staff, depending on the available time and resources, workload, and staff motivation.

We developed our SBIR tool (Appendix) based on the NIAAA at-risk drinking guidelines (“at-risk drinking” defined as >14 drinks/wk or >4 drinks per occasion for men age ≤65 years; >7 drinks/wk or >3 drinks per occasion for women of all ages and men older than 65 years) and the CAGE questionnaire. One standard drink was defined as 142 mL (5 oz) of wine; 43 mL (1.5 oz), spirits; or 341 mL (12 oz), regular beer. The NIAAA at-risk drinking guidelines have previously been shown to result in the best balance of sensitivity and specificity for screening patients with alcohol-related disorders. To increase the selectivity for subjects’ current drinking patterns, we added the phrase, “Within the past year...” to the beginning of each of the four standard CAGE questions. During the study period, the SBIR tool was placed on each new ED patient record.

Subjects who answered “yes” or “yes, socially” to the question, “Do you drink alcohol?” were screened first with the three NIAAA at-risk questions evaluating current drinking habits. Subjects who screened positive according to these guidelines were then screened with the four-question CAGE-based portion of our SBIR tool. A positive result on this section of the SBIR was defined as one affirmative answer to any of the four questions. The total length of this screening process can be less than 1 minute, though we did not evaluate screening time in this pilot study. The questions used in the screening process have been validated previously with high sensitivity and specificity in EDs.

Subjects who screened positive in both portions of the SBIR were given copies of the NIAAA recommendations for safe drinking habits and a list of local treatment facilities and Alcoholics Anonymous resources. Each of these subjects were also given a motivational interview by his or her ED staff member. In this interview, the subject was encouraged to...
pursue follow-up treatment with a primary care physician. Each practitioner determined the length and nature of the motivational interview, but subjects were generally told that consuming large amounts of alcohol could be detrimental to their health and that they should strongly consider seeking follow-up consultation about their drinking. In addition, each subject’s readiness to change was determined by the screener based on the general concept of different stages of change: precontemplation, contemplation, preparation and action, or maintenance. Clinicians were asked to document intervention results on the back of each subject’s SBIR form for later reference by the research assistant during follow-up.

6-Month Follow-Up
Approximately 6 months after ED intervention, a nonblinded research assistant conducted follow-up telephone interviews with those subjects who screened positive for any of the CAGE-based questions. Subjects’ telephone numbers were obtained through ED records.

Subjects were then grouped by availability for follow-up: (1) entirely lost to follow-up, (2) lost to follow-up through attrition, and (3) successfully reached.

Subjects in the first group consisted of individuals with disconnected or incorrect telephone numbers.

Telephone contact information for subjects in the second group was valid, but the research assistant remained unable to contact these individuals after two telephone calls. These telephone calls were separated by at least 1 week and both attempts resulted in either an unanswered line or a message left with another person.

The third group was composed of subjects who the research assistant spoke to within two telephone calls. Contacted subjects were asked the same series of questions on the SBIR tool.

Primary Data Analysis
The percentage of drinkers who were determined to be at-risk based on their responses to the first three questions of the SBIR tool and the percentage of at-risk drinkers who screened positive on the CAGE-based questions were calculated. Percentages of subjects in each follow-up availability category were also calculated.

Changes in subjects’ alcohol-consumption levels and CAGE scores from pre- to postintervention were determined. Confidence intervals (CI) were calculated for each proportion of data, and paired t tests were computed for pre- and postintervention continuous level data. A P value of less than .05 was considered statistically significant.

Results
A total of 1556 subjects were enrolled and screened in the present pilot study, including 794 women (51%) and 762 men (49%). The mean (SD) age of these subjects was 38 (11.3) years.

Of the 1556 screened subjects, 251 (16% [95% CI, 14%-18%]) were classified as at-risk drinkers based on their responses. Seventy-nine (32% [95% CI, 26%-37%]) of these at-risk subjects also screened positive in the CAGE-based questions.

Of these 79 subjects, at 6-month follow-up, 27 (34% [95% CI, 24%-45%]) were entirely lost to follow-up, most commonly because of an incorrect telephone number. Thirty-two subjects (40% [95% CI, 30%-51%]) could not be reached by the research assistant after two telephone calls and were lost to follow-up through attrition. Twenty subjects (25% [95% CI, 16%-35%]) were successfully contacted by the research assistant within two telephone calls. Of the 20 subjects successfully contacted, 5 (25%) refused to participate in follow-up screening.

Screening of the remaining 15 contacted individuals indicated that the mean (SD) number of drinks they consumed per week decreased from 28 (14) at baseline to 10 (10) at 6-month follow-up (P < .001). The maximum number of drinks consumed by subjects per occasion decreased from 12 (8) at baseline to 6 (7) at follow-up (P = .008).

Mean (SD) subject scores on the CAGE-based questions decreased from pre- to postintervention. However, this decrease was not statistically significant, with an average of 2.1 (1) “yes” answers in the ED and 1.5 (1.4) “yes” answers at follow-up (P = .108).

Figure 1 presents a flowchart overview of the enrollment, intervention, and results of the present pilot study. Figure 2 displays the results in bar-graph format.

Limitations
There are a number of limitations to the present study. The study’s prospective cohort design does not allow us to determine whether the ED intervention was, by itself, the cause of the reduced alcohol use observed in subjects at 6-month follow-up. Even without intervention, subjects may view a visit to the ED alone as a sentinel event, leading to reduced alcohol consumption. Similarly, spontaneous counseling by staff in non-SBIR ED visits may lead to reduced alcohol consumption. Future studies would optimally include a control group with randomization.

Selection of subjects who were able to be contacted within two telephone calls may have led to bias in favor of individuals who are more likely to have reduced their alcohol consumption (ie, individuals who have reliable contact information may be more likely to reduce their problem drinking).

Self-reporting by patients is not an objective measurement. Nevertheless, it has previously been shown to have overall consistency. In the present study and in other alcohol-consumption studies, self-reporting is a routine method for studying patterns of substance use over time. The only objective measurements available for such purposes are breathalyzer tests and measurements of blood-alcohol level, both of which have the limitation of providing only a single data point. More-

"Downloaded From: http://jaoa.org/pdfsaccess.aspx?url=/data/journals/jaoa/932086/ on 10/29/2018"
Patients Enrolled: 1556

SBIR Screen—NIAAA At-Risk:
25 (16% [95% CI, 14%-18%])

SBIR Screen—CAGE-Positive:
79 (32% [95% CI, 26%-37%])

Brief Intervention:
• Printed Recommendations
• Motivational Interview
• Referral

6-Month Follow-Up—
Impossible to Contact:
27 (34% [95% CI, 24%-45%])

6-Month Follow-Up—
Unable to Contact:
32 (40% [95% CI, 30%-51%])

6-Month Follow-Up—
Successfully Contacted:
20 (25% [95% CI, 16%-35%])

Follow-Up Screening:
15 (75%)

SBIR Screen—
No. of Drinks/Wk (SD):
PRE 28 (14)
POST 10 (10)
P = .001*

SBIR Screen—
Maximum No. of Drinks
per Occasion:
PRE 12 (8)
POST 6 (7)
P = .008*

SBIR Screen—
CAGE Score:
PRE 2.1 (1.0)
POST 1.5 (1.4)
P = .108

Figure 1. Flowchart overview of the enrollment, intervention, and results of the emergency-department screening, brief intervention, and referral (SBIR) program for patients with alcohol-related disorders developed by Aaron Craig Love, DO; Marna Rayl Greenberg, DO; Matthew Brice, DO; and Michael Weinstock, MD. Numbers and percentages of subjects, along with confidence intervals (CIs), are shown at different stages of the program. Final results, comparing pre- (PRE) with postintervention (POST), are shown as mean (SD). * P value is statistically significant. Abbreviations: CAGE, Cut down, Annoyed, Guilty, Eye opener; NIAAA, National Institute on Alcohol Abuse and Alcoholism.

over, it has previously been reported that using a set of closed questions addressing both recent and long-term recall of drinking patterns would capture the most accurate record of self-reported alcohol-consumption levels. The SBIR tool used in the present study accomplished this goal.

Although the SBIR tool and ED discharge instructions were the same for all study subjects, there could have been considerable variation in the duration and content of the motivational interviews conducted by ED staff. A scripted motivational interview could assist in controlling for this possibility. This variability could also be corrected by using an alcohol-abuse treatment specialist to perform each intervention in the same manner—a step that might have the added benefit of helping to improve patient follow-up.

Achieving adequate patient follow-up has been challenging to previous researchers, though using an alcohol-treat-
A ment specialist has been shown to be an effective measure for ED alcohol-abuse intervention.17 Due to financial constraints, employing a dedicated specialist was not feasible in the present pilot study. Moreover, our aim was to conduct an SBIR program with the resources available in most EDs. Therefore, this limitation can also be viewed as a strength, making our intervention more applicable to most ED settings.

Variation resulting from different practitioners may have been reduced by the fact that intervention results were documented on the back of the original SBIR form, allowing our telephone follow-up research assistant access to each subject’s previous SBIR results.

Comment
The need for alcohol-abuse intervention has been well established.8 Ensuring the recognition of alcohol’s relation to disease and injury is of paramount importance in the ED, and an SBIR program could help achieve this goal. The two main barriers
that hinder the implementation of an SBIR program in EDs already overwhelmed by existing workloads are efficacy and time constraints for implementation.

Findings in the present pilot study reveal that, among heavy drinkers, the SBIR program resulted in significant reductions in alcohol consumption at 6-month follow-up, as measured in the number of drinks consumed per week ($P<.001$) and maximum number of drinks consumed per occasion ($P=.008$). These results are comparable to those described in a large meta-analysis conducted by D’Onofrio and Degutis, who reported reductions in alcohol consumption 3 to 6 months after brief intervention. However, the studies included in that meta-analysis show that significant reductions were found when patients with the most severe alcohol-consumption patterns were excluded. Our results, by contrast, show decreased alcohol use in subjects with the highest consumption rates.

It is difficult to ensure patient compliance with nontreatment follow-up appointments. Encouraging, however, Crawford et al. found reduced alcohol-consumption patterns in patients after brief intervention, regardless of whether they kept follow-up appointments. Our pilot study was not designed to investigate whether patients kept their follow-up referrals. Instead, our objective was to investigate change in alcohol-consumption patterns after an ED intervention and referral—perhaps the simplest variable we can affect in the ED.

After a search of the National Library of Medicine’s PubMed database using the keywords alcohol abuse, alcohol intervention, and CAGE score for literature published since 1980, we are aware of no prior study that has followed patients’ CAGE scores 6 months after an ED SBIR. Nor, to our knowledge, has an SBIR program previously been validated as a useful measure for alcohol-related disorders. The use of the SBIR program allowed us to ascertain subjects’ perceptions about the potential harm of their alcohol-consumption patterns. Although these results did not reach statistical significance, a reduction in CAGE scores was seen. Bias in self-reporting due to differences in subject willingness to change at follow-up versus baseline may have also contributed to reduced CAGE scores. In addition, there may have been a Hawthorne effect resulting from the subjects’ awareness that they were participating in a study—though the relative anonymity of telephone follow-up should have made answering “yes” to the CAGE-based questions easier.

The difficulties involved in follow-up are of utmost importance in planning future investigations of alcohol-cessation interventions. To date, much of the alcohol-cessation research reported in the literature has been performed outside the ED setting, often consisting of pooled data and meta-analyses. However, several studies have demonstrated the efficacy of ED SBIR programs, finding short-term reductions in alcohol consumption and in repeat visits to the ED.5,17

We enhanced physician and nurse participation in the present study by placing the SBIR tool on each new patient record, alleviating the logistical paper barrier and providing reference materials at point-of-care. An ongoing incentive pro-
gram further enhanced staff participation, as did publicity from local media outlets.

Even with the successes of the present pilot study, we had limited subject follow-up, reaching a total of only 15 (0.96%) of the 1556 screened individuals. Larger studies would require substantially more resources and effort in obtaining reliable contact information for subjects to allow better patient follow-up.

Conclusion
The present study demonstrates that the development of a brief but effective SBIR program for patients with alcohol-related disorders can be accomplished in the ED. However, challenges remain in obtaining patient follow-up for quantifying the impact of the ED intervention. The intervention used with subjects in the present study appeared to reduce at-risk behaviors in individuals contacted at 6-month follow-up.

References
4. Runge J. Put the brakes on the next drunk driver. Lecture presented at: American College of Emergency Physicians Scientific Assembly 2002; October 6, 2002; Seattle, Wash.
Appendix

Screening, brief intervention, and referral (SBIR) tool for alcohol-related disorders. This form was developed by Aaron Craig Love, DO; Marna Rayl Greenberg, DO; Matthew Brice, DO; and Michael Weinstock, MD, and was based on the three at-risk questions for current drinkers recommended by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and the four-question CAGE (Cut down, Annoyed, Guilty, Eye opener) questionnaire.7,10,11 At-risk and intervention guidelines from the NIAAA are also included. To enhance staff participation, researchers obtained institutional permission to place the SBIR tool on each new patient record, alleviating the logistical paper barrier and providing point-of-care reference.

Lehigh Valley Hospital and Health Network
Screen for Alcohol Problems

Instructions: To be completed by a physician or nurse. Ask current drinkers the following questions. Fill in or check the patient’s responses. Sign form at bottom.

Check here if patient refuses to answer.

1. On average, how many days per week do you drink alcohol?
   _____ days/week

2. On a typical day when you drink, how many drinks do you have?
   _____ drinks/day

3. What is the maximum number of drinks you had on a given occasion in the last month?
   _____ drinks

NIAAA At-Risk Screen

CAGE Screen

Within the past year,

4. have you felt you ought to cut down on your drinking?
   ____ Yes   ____ No

5. have you been annoyed by people criticizing your drinking?
   ____ Yes   ____ No

6. have you felt guilty about your drinking?
   ____ Yes   ____ No

7. have you had a drink first thing in the morning (ie, an eye opener) to steady your nerves, get rid of a hangover, or get your day started?
   ____ Yes   ____ No

Readiness-to-Change Ruler

Instructions: Circle one number.

(Least Ready) 0 1 2 3 4 5 6 7 8 9 10 (Most Ready)

NIAAA At-Risk Drinking Guidelines

<table>
<thead>
<tr>
<th>Sex/Age</th>
<th>No. of Drinks/Wk</th>
<th>No. of Drinks per Occasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men, ≤65 Years</td>
<td>&gt;14</td>
<td>&gt;4</td>
</tr>
<tr>
<td>Men, &gt;65 Years</td>
<td>&gt;7</td>
<td>&gt;3</td>
</tr>
<tr>
<td>Women, All Ages</td>
<td>&gt;7</td>
<td>&gt;3</td>
</tr>
</tbody>
</table>

Standard drink = 1.5 oz spirits; 5 oz wine; 12 oz beer.
### Lehigh Valley Hospital and Health Network

**Screen for Alcohol Problems (continued)**

**Intervention Guidelines**

<table>
<thead>
<tr>
<th>Result of Screen</th>
<th>Basic Intervention</th>
<th>Primary Intervention</th>
<th>Negotiable Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Counsel regarding safe drinking habits.</td>
<td>Counsel to not drink and drive.</td>
<td>...</td>
</tr>
<tr>
<td>At Risk (Based on NIAAA guidelines or CAGE = 1)</td>
<td>Counsel on moderate-to-safe drinking. Advise about health risks.</td>
<td>Follow-up with primary care provider.</td>
<td>Refer to Alcoholics Anonymous if deemed clinically useful.</td>
</tr>
<tr>
<td>Dependent (Based on CAGE ≥ 2 or clinical diagnosis)</td>
<td>Recommend goal toward abstinence. Advise about health risks.</td>
<td>Follow-up with primary care provider. Refer to Alcoholics Anonymous/specialized alcohol treatment.</td>
<td>Consult with Psychiatric Emergency Services in emergency department.</td>
</tr>
</tbody>
</table>

This form is NOT part of the permanent medical record; it is for internal quality-improvement purposes only.

___________________________  ___________________________
Physician                  Nurse