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Journal

The Journal of emergency medicine, 44(4)

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Publication Date

2013-01-12

Peer reviewed

Published in final edited form as:

J Emerg Med. 2013 April ; 44(4): 861–866. doi:10.1016/j.jemermed.2012.09.038.

Increased Detection of Alcohol Consumption and At-risk Drinking with Computerized Alcohol Screening

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Abstract

Background—The impact of alcohol use has been widely studied and is considered a public health issue. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) recommends Screening and Brief Intervention and Referral Treatment (SBIRT) but the actual practice in the Emergency Department (ED) is constrained due to limited provider time and financial resources.

Objectives—To assess the effectiveness of alcohol screening using Computerized Alcohol Screening and brief Intervention (CASI) compared to alcohol screening by triage nurse during Medical Screening Examination (MSE) in the ED.

Methods—Retrospective review of CASI/MSE database from January 2008 through December 2009, collected in the tertiary, level I Trauma ED was performed. Inclusion criteria included age ≥ 18 , and completion of both the MSE and CASI. We analyzed the database by comparing age, gender, primary language (English, Spanish), and Alcohol Use Disorders Identification Test (AUDIT) scores using McNemar's analysis.

Results—Data was available for 5,835 patients. CASI showed a significant increase in detection of at-risk drinking over MSE across all ages, gender, and primary language ($p < .05$). MSE found 2.5% at-risk drinkers while CASI found 11.5% at risk drinkers (Odds ratio 8.88, 95%CI 6.89–11.61). Similar results were found in 18 to 20 year-old patients. MSE identified 1.7% at-risk drinkers and CASI reported 15.94%. (Odds ratio 19.33, 95% CI 6.29–96.74)

Conclusion—CASI increased detection of at-risk alcohol drinkers compared with MSE across all ages, gender, and primary language. CASI is a promising innovative method for alcohol screening in the ED for the adult population including under-aged drinkers.

Keywords

tablet computer; bilingual alcohol screening; CASI; injury prevention; AUDIT

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INTRODUCTION

Alcohol abuse is ranked by the World Health Organization (WHO) as the third leading risk factor for disease and disability in the world.¹ It has been estimated that three in ten adults drink at a level affecting their health. Alcohol is directly associated with damage to multiple parts of the body.² CDC data confirms alcohol is the third lifestyle-related cause of death nationally, and correlates unhealthy alcohol use with large increases in morbidity.^{3,4} An estimated 68.6 million emergency department (ED) visits were attributed to alcohol use from 1992 to 2000, and alcohol-related ED visits have increased 18% during this period.⁵ The National Institute on Alcohol Abuse and Alcoholism (NIAAA) and multiple national bodies recommend Screening and Brief Intervention and Referral Treatment (SBIRT).^{6–9} Although the recommendations have been established, the actual practice in the ED is constrained due to provider time and financial resources, as reported by ED directors.¹⁰ Provider time has decreased due to ED crowding in academic centers and urban hospitals while financial resources have dwindled.¹¹ In addition, alcohol use is a sensitive topic for patients, especially to the elderly and those who screen positive for alcohol use. Many physicians and nurses are reluctant to intervene despite being aware of their patients' drinking problems.^{12,13}

The computerized health survey has been proven to save time, decrease errors from data entry, and clearly administer and score complex questionnaires. The survey is considered novel by subjects, while improving data quality and decreasing costs per survey as opposed to in person interviewing.^{14,15} A Swedish study also provides support that electronic Screening and Brief Intervention (SBI) is easier to use and does not increase nurses' workload.¹⁶

In our institution Computerized Alcohol Screening and brief Intervention (CASI) is used in the ED. CASI provides a short, self-administered questionnaire with minimal time requirement from providers.¹⁷ The simplicity of CASI enhances healthcare providers' adherence to alcohol screening protocol in the ED.¹⁸ We studied the effectiveness of alcohol screening using CASI by comparing it to alcohol screening performed by nursing at triage during a Medical Screening Examination (MSE) in the ED. We hypothesized that using CASI would improve detection of alcohol drinking in all age and gender groups.

MATERIALS AND METHODS

Study design

This retrospective study was performed in the ED at an urban, Level I trauma center. Research associates collected data from January 2008 to December 2009. Inclusion criteria were English-speaking or Spanish-speaking ED patients aged 18 or older. Exclusion criteria were psychiatric and intoxicated patients. Only data from subjects who completed both MSE and CASI were used in the study. The university human subject Institutional Review Board approved this study.

Measures

Medical Screening Exam (MSE)—The MSE was a two-part questionnaire administered in English and Spanish by a triage nurse based on the NIAAA clinician's guide.¹⁹ Patients were asked if they drink alcohol. If the patient reported he/she drinks alcohol, the nurse would ask whether the patient drinks over the limit by World Health Organization criteria (>14 drinks/week men and >7 drinks/week for women).²⁰ These patients are defined as at-risk by the NIAAA clinicians guide.¹⁹ The MSE did not provide any intervention. After MSE completion, CASI was administered.

Computerized Alcohol Screening and brief Intervention (CASI)—The CASI program was developed based on SBIRT.^{7,17} The program is an interactive questionnaire, operating on a touch screen tablet with large icons and headphones. It administers AUDIT, with logic branching to shorten the screening for non-drinkers and those who drink less than the NIAAA recommended thresholds,¹⁹ and provides a brief intervention as necessary. At the end of the questionnaire, CASI selects an appropriate plan with referral for treatment if indicated. After CASI completion, the research associate provided the patient with a personalized alcohol-reduction plan and local counseling resources within their community.

Data Analysis—Following NIAAA guidelines, at-risk drinking was defined as >14 drinks/week for males aged under 65, and >7 drinks/week for females and males aged over 65.¹⁹ From our CASI results, we multiplied the number of drinking days by the number of drinks on a typical drinking day to estimate the number of drinks per week. CASI generated a database with the patient's medical record number and the screening results. The corresponding MSE results were added to the database by research associates. We performed data analysis with Stata (version 12.0, StataCorp, College Station, TX) using conventional matched-pair statistics.

RESULTS

Demographic characteristics

A total of 7,163 patients were found in the CASI/MSE database from January 2008 to December 2009, and 5,835 patients were eligible for the study. Of the 1,338 excluded patients, 706 patients had performed CASI but did not have an entry in the MSE database as it was incomplete, and 622 patients had completed only CASI, including 269 trauma patients. The patient characteristics are listed in Table 1, with 49% male (n=2,874) and 51% females (n=2,961), primary language of English-speaking patients 89%(5,200) and 11% Spanish-speaking (n=635). Patients from all age groups were represented, including 7% teenagers (Ages 18–20), 44% young adults (Ages 19–40), 40% middle aged (Ages 41–64), and 9% seniors (Age ≥ 65).

Results on CASI

Overall, CASI as compared to MSE showed increased at-risk alcohol use. In total, 143 (2.45%) patients reported at-risk drinking to MSE, while 671 (11.48%) patients reported at-risk alcohol consumption to CASI. CASI had greater than an 8-fold higher probability in screening for at-risk alcohol use over MSE (Table 2).

When comparing CASI and MSE by age group, CASI had higher percentages for screening at-risk drinking than MSE in all age groups ($p<.05$). The odds ratios for at-risk use with CASI over MSE were highest in teenagers (19.33) and in seniors (17.5), while they also remained high in young adults (7.57) and middle-aged groups (8.92).

CASI also showed higher screening rates for at-risk alcohol use than MSE by gender and primary languages of English and Spanish ($p<.05$). A total of 10.57% of female patients and 12.46% of male patients were screened as at-risk drinkers by CASI, while 0.98% of female and 3.97% of male patients were screened at-risk by MSE. Moreover, CASI captured more at-risk Spanish-speaking patients than MSE, reporting 8.98% vs. 1.57% respectively, while there was also increased detection of at-risk alcohol use with CASI (11.81%) over MSE (2.56%) in English-speaking patients.

DISCUSSION

The goal of our study was to compare CASI with current person-to-person interview in a university hospital. Overall CASI improved screening and detection of at-risk alcohol drinking behavior when compared to traditional person-to-person interview (MSE) in the ED. Our results were consistent with other studies showing that a computerized screening tool has benefit and utility in a healthcare system with higher compliance from both parties: healthcare providers and patients.^{14, 21}

CASI may also be more sensitive because the wording of the questions may be more understandable to patients. CASI asks separate questions about the quantity and frequency of drinking, but the MSE asks a single question about exceeding a two-part threshold.

Prior to the use of computerized screening tool, healthcare providers perceived alcohol screening to be a time consuming process and patients could be sensitive to the subject.²² CASI provides a short, self-administered questionnaire with a minimal time requirement from providers.¹⁷ The simplicity of CASI enhances healthcare providers' adherence to alcohol screening protocol in the ED. CASI improved patient's compliance and encouraged increased detection of alcohol use by allowing patients to take the questionnaire in a private room without the healthcare provider's involvement and assuring the confidentiality and anonymity of the answers. The results are indicative that CASI has the potential to become a mainstay of alcohol screening in the ED as it may lead to increased detection and intervention for patients with at-risk drinking habits, and in-turn could lead to decreased alcohol-related morbidity, mortality, and healthcare associated costs.

Because patient characteristics often have a significant impact on the effectiveness of screening tools, we decided to perform subgroup analysis by age, gender and language. Previous studies have suggested the need for better screening technology in older adult populations.²³ This is consistent with our study, which found CASI to improve screening in older adults. In addition, CASI improved probability of detecting at-risk drinkers in all other age groups including teenagers, young adults, and middle-aged adults.

Future enhancements for effective screening would be to integrate the AUDIT results from CASI with the Electronic Medical Record (EMR). CASI provides better categorization of patient drinking habits by using the AUDIT questionnaire. This categorization is used by healthcare providers to address patient-specific alcohol-related problems. The integration of CASI and EMR would save valuable time by allowing the healthcare team to spend most of their time treating the patients rather than screening them.

Limitations

The study was conducted in one institution. Further studies are needed to assess external validity and generalization of CASI. Additionally, patients were first administered MSE that was then followed by CASI, which could have also increased the number of reported at-risk drinkers. A separate study of CASI without prior MSE would be helpful to assess for any bias brought on by first administering the MSE prior to CASI. The sample size of teenage, older adult and Spanish speaking patients is relatively small, causing high odds ratio with wide 95% confidence intervals. A larger sample size would give more accurate results in these specific populations. Another limitation is the incomplete MSE database. MSE is conducted person to person and the missing MSE data could adversely affect the results of this study. Previous studies have compared at-risk drinking to gold standards in order to validate AUDIT including interviews based on DSM IV, diagnostic codes, and risk factors.^{24,25,26} A consideration for future study would be to evaluate CASI and MSE against a gold standard for at-risk drinking, such as a biological measure of usual alcohol use.

CONCLUSION

CASI is a promising innovative method to increase alcohol screening in the ED. Moreover, CASI seems to encourage patients to divulge a greater alcohol drinking behavior, resulting in a higher percentage of detection for at-risk drinkers in all age groups, genders, and both English and Spanish-speaking patients. CASI or other equivalent computerized screening programs should be promoted as novel and effective methods for detecting at-risk alcohol use in ED patients.

Acknowledgments

The project described was supported by grantUL1 RR031985 from the National Center for Research Resources (NCRR), a component of the National Institutes of Health (NIH) and the NIH Roadmap for Medical Research. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH. We would like to thank the members of the Emergency Medicine Research Associate Program, Dr. David Franklin, June Casey, and Christy Carroll for their help with this project. Computerized Alcohol Screening and Brief Intervention was created by the Center for Trauma and Injury Prevention with the assistance of Diane Winn and Dr. Federico Vaca.

REFERENCES

1. Glasper A. Can nurses stem the rising tide of alcohol abuse? *Br J Nurs*. 2012 Mar 6; 21(5):312–313. [PubMed: 22399007]
2. Leonard B. Helping Patients Who Drink Too Much: A Clinician's Guide. National Institute on Alcohol Abuse and Alcoholism. 2005:51.
3. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA*. 2004; 291(10):1238–1245. [PubMed: 15010446]
4. Lotfipour S, Mortazavi R, Chakravarthy B, Lotfipour S. MoraCommentary: Alcohol and Motor Vehicle–Related Crashes—Driver Attitudes Need Further Intervention. *Ann Emerg Med*. 2011; 57(4):405–406. [PubMed: 21553399]
5. McDonald, Alden J., III, B.N.W., BS; Camargo, Carlos A, JR, MD, DrPH. US Emergency Department Visits for Alcohol-Related Diseases and Injuries Between 1992 and 2000. *Arch Int Med*. 2004; 164:531–537. [PubMed: 15006830]
6. Substance Abuse and Mental Health Services Administration. Alcohol Screening and Brief Intervention (SBI) for Trauma Patients. Rockville, MD: 2006. p. 1-16.
7. Vaca FE, Winn D. The basics of alcohol screening, brief intervention and referral to treatment in the emergency department. *The Western Journal of Emergency Medicine*. 2007; 8(3):88–92. [PubMed: 19561690]
8. Rehm J, Gmel G, Sempos CT, Trevisan M. Alcohol-related morbidity and mortality. *Alcohol Research & Health: The Journal of the National Institute on Alcohol Abuse and Alcoholism*. 2003; 27(1):39–51.
9. Saunders J, Aasland O, Babor T, Fuente J, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction*. 2006; 88(6):791–804. [PubMed: 8329970]
10. Cunningham RM, Harrison SR, Mckay MP, et al. National Survey of Emergency Department Alcohol Screening and Intervention Practices. *Ann Emerg Med*. 2010; 55:556–562. [PubMed: 20363530]
11. Mahler SA, McCartney JR, Swoboda TK, et al. The Impact of Emergency Department Overcrowding on Resident Education. *J Emerg Med*. 2012; 42(1):69–73. Epub ahead of print. [PubMed: 21536400]
12. Broyles LM, Rosenberger E, Hanusa BH, et al. Hospitalized Patients' Acceptability of Nurse-Delivered Screening, Brief Intervention, and Referral to Treatment. *Alcohol Clin Exp Res*. 2012 [Epub ahead of print].

13. Vadlamudi RS, Adams S, Hogan B, Wu T, Wahid Z. Nurses' attitudes, beliefs and confidence levels regarding care for those who abuse alcohol: impact of educational intervention. *Nurse Educ Pract.* 2008; 8(4):290–298. Epub 2007. [PubMed: 18042433]
14. de Leeuw E, Hox J, Kef S. Computer-assisted self-interviewing tailored for special populations and topics. *Field Methods.* 2003; 15(3):223.
15. Newman JCDJD, Turner CF, Gribble J, Cooley P, Paone D. The Differential Effects of Face-To-Face and Computer Interview Modes. *Am J Public Health.* 2002; 92(2):294–297. [PubMed: 11818309]
16. Nilsen P, Festin K, Guldbrandsson K, et al. Implementation of a computerized alcohol advice concept in routine emergency care. *Int Emerg Nurs.* 2009; 17(2):113–121. [PubMed: 19341997]
17. Shahram L, Cisneros V, et al. Assessment of readiness to change and relationship to AUDIT score in a trauma population utilizing computerized alcohol screening and brief intervention. *Substance Abuse.* In Press.
18. Bendtsen P, Holmqvist M, Johansson K. Implementation of computerized alcohol screening and advice in an emergency department-a nursing staff perspective. *Accident and Emergency Nursing.* 2007; 15:3–9. [PubMed: 17113773]
19. NIAAA Clinicians Guide. [Accessed March 27, 2012] Available at: <http://pubs.niaaa.nih.gov/publications/Practitioner/CliniciansGuide2005/guide.pdf>
20. Babor, TF.; Higgins-Biddle, JC.; Saunders, JB.; Monteiro, MG. *The Alcohol Use Disorders and Identification Test: Guidelines for Use in Primary Care.* Geneva: World Health Organization; 2001.
21. Neumann T, Bruno N, Weiss-Gerlach E, et al. The Effect of Computerized Tailored Brief Advice on At-risk. 2006; 61(4):805–814.
22. Karlsson A, Johansson K, Nordqvist C, et al. Feasibility of a computerized alcohol screening and personalized written advice in the ED: opportunities and obstacles. *Accident and Emergency Nursing.* 2005; 13:44–53. [PubMed: 15649687]
23. Blow FC, Barry LK. Older Patients with At-Risk and Problem Drinking Patterns: New Developments in Brief Interventions. *Journal of Geriatric Psychiatry and Neurology.* 2000; 13(3): 115–123. [PubMed: 11001133] Seale JP, Shellenberger S, Boltri JM, et al. Effects of screening and brief intervention training on resident and faculty alcohol intervention behaviours: a pre- post-intervention assessment. *BMC Fam Pract.* 2005; 4(6):46. [PubMed: 16271146]
24. Bohn MJ, Babor TF, Kranzler HR. The Alcohol Use Disorders Identification Test (AUDIT): validation of a screening instrument for use in medical settings. *J Stud Alcohol.* 1995 Jul; 56(4): 423–432. [PubMed: 7674678]
25. Chung T, Colby SM, Barnett NP, Rohsenow DJ, Spirito A, Monti PM. Screening adolescents for problem drinking: performance of brief screens against DSM-IV alcohol diagnoses. *J Stud Alcohol.* 2000 Jul; 61(4):579–587. [PubMed: 10928728]
26. Frank D, DeBenedetti AF, Volk RJ, Williams EC, Kivlahan DR, Bradley KA. Effectiveness of the AUDIT-C as a screening test for alcohol misuse in three race/ethnic groups. *J Gen Intern Med.* 2008 Jun; 23(6):781–787. Epub 2008 Apr 18. [PubMed: 18421511]

Article Summary

1. Why is this topic important?
Alcohol misuse is a major public health concern. Alcohol-related injuries constitute a large percentage of ED visits and the ED is an ideal place which provides a teachable moment for patients.
2. What does this study attempt to show?
CASI is a feasible alternative for improved detection and screening for alcohol misuse and alcohol related injuries within the ED.
3. What are the key findings?
CASI showed a significant increase in detection of at-risk drinking over MSE across all ages, gender, and primary language.
4. How is patient care impacted?
Patient care can be improved due to better detection of alcohol consumption with the use of CASI. This tool, if integrated in an ED setting, can provide hospital staff with more time to allocate towards interventions rather than screening.

Table 1

Demographic data of eligible patients

Characteristic	Number (%)
Age	
18–20	389 (6.67)
21–39	2575 (44.13)
40–64	2325 (39.85)
65 and over	546 (9)
Gender	
Female	2874 (49.26)
Male	2961 (50.74)
Language	
Spanish	635 (10.88)
English	5200 (89.12)

Table 2
Comparison of alcohol screening positive for at-risk behavior by CASI and MSE

	MSE (%)	CASI (%)	Odds Ratio	95% CI	P-value
Total (5835)	143 (2.45)	671 (11.48)	8.88	6.89–11.61	<0.05
Age					
18–20 (389)	7 (1.70)	62 (15.94)	19.33	6.29–96.47	<0.05
21–39 (2575)	75 (2.17)	325 (12.62)	7.57	5.39–10.93	<0.05
40–64 (2325)	56 (2.40)	246 (10.58)	8.92	5.83–14.22	<0.05
65 and older (546)	5 (0.92)	38 (6.96)	17.5	4.50–150.18	<0.05
Gender					
Female (2961)	29 (0.98)	313 (10.57)	17.71	10.87–30.80	<0.05
Male (2874)	114 (3.97)	358 (12.46)	5.88	4.34–8.10	<0.05
Language					
Spanish (635)	10 (1.57)	57 (8.98)	6.88	3.26–16.71	<0.05
English (5200)	133 (2.56)	614 (11.81)	9.15	6.99–12.19	<0.05