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Examining the reach of a brief alcohol intervention service in routine practice at a level 1 trauma center

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Abstract

The American College of Surgeons requires Level I and II trauma centers to provide brief intervention services to traumatically injured patients who screen positive for alcohol. Despite evidence supporting substantial cost savings and reduced re-injury associated with these services, brief interventions may not be uniformly delivered owing to a variety of demographic, clinical and operational characteristics. To inform service adjustments that may improve the reach of such services, we compared trauma patients who did and did not receive brief alcohol intervention services during their hospitalizations. Electronic medical records of injured patients admitted to a Level I trauma center between September 27, 2013 and March 11, 2014 with a positive blood alcohol concentration ($N = 189$) were coded for demographic and clinical variables. Records of

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Disclosure information

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those who did not receive a brief intervention during their admission were reviewed for possible reasons why interventions were not delivered. Of the total sample, 115 patients (60.8%) received brief interventions. Patients who did and did not receive brief interventions did not differ on age, sex, race, blood alcohol concentration at admission, or mechanism of injury, indicating that patient characteristics were unlikely to bias service delivery. Instead, common features of patients who were referred but did not receive SBIRT interventions included admissions lasting fewer than two working days (12.7%) and persistent cognitive impairment following injury (9.0%). These findings align with previous studies suggesting that service reach could be improved by promoting dedicated and flexible staffing and adapting services to allow for SBIRT delivery in follow-up care settings.

Keywords

Brief intervention; Alcohol; Motivational interviewing; Screening; Trauma; Health services

1. Introduction

Alcohol use or intoxication at the time of injury is prevalent among injured patients (Soderstrom et al., 1997) and is associated with elevated risk for morbidity and mortality (Dischinger, Mitchell, Kufera, Soderstrom, & Lowenfels, 2001). Brief motivational counseling regarding alcohol use and its role in injury can substantially reduce subsequent alcohol-related injuries (Dinh-Zarr, Goss, Heitman, Roberts, & DiGuseppi, 2004; Gentilello et al., 1999; Havard, Shakeshaft, & Sanson-Fisher, 2008; Landy, Davey, Quintero, Pecora, & McShane, 2016), arrests for intoxicated driving and motor vehicle accidents (Landy et al., 2016; Schermer, Moyers, Miller, & Bloomfield, 2006), hazardous drinking (Field et al., 2014; Gentilello et al., 1999; McQueen, Howe, Allan, Mains, & Hardy, 2011; Nilsen et al., 2008; see, however, Landy et al., 2016) and health-care costs (Gentilello, Ebel, Wickizer, Salkever, & Rivara, 2005) among traumatically injured patients who screen positive for alcohol at hospital admission. Without any intervention, hazardous drinking is unlikely to resolve, worsening in about 20% of patients in the year after injury (Dunn et al., 2003). Although initial trials suggested that benefits were concentrated in patients with mild to moderate alcohol problems (Gentilello et al., 1999), recent studies suggest that brief motivational interviews can result in significant reductions in alcohol use and hazardous drinking even among patients with severe alcohol problems (Field et al., 2014). A cost-benefit analysis revealed a net savings of \$89 in health care costs for each patient screened for alcohol use, and \$330 savings for each motivational counseling intervention delivered (Gentilello et al., 2005). In light of such benefits, the American College of Surgeons (ACS) now requires alcohol screening, brief intervention and referral to treatment (SBIRT) be implemented at all national Level I and II trauma centers (American College of Surgeons Committee on Trauma, 2014). This mandate directs that all injured patients should be screened for risky alcohol use, either via laboratory test for blood alcohol concentration (BAC) or structured interview, and those with a positive screen should receive a brief psychosocial intervention to increase awareness of risky drinking, enhance motivation for change, and provide referrals to treatment if indicated. It has been estimated that routine screening of injured patients who are admitted to Level 1 trauma centers plus delivery of

SBIRT services to eligible patients would result in a total reduction in health care costs of \$1.82 billion annually (Gentilello et al., 2005).

Although the ACS mandate has been in effect since 2007, only a few studies have examined the reach of SBIRT services. Within public health service frameworks, reach is defined as “the percentage and risk characteristics of persons who receive or are affected by a policy or program”, compared to patients who do not participate in a given service (Glasgow, Vogt, & Boles, 1999). Evidence points to several barriers that impede the reach of SBIRT services in trauma centers. Early feasibility trials suggested low rates of SBIRT service delivery among patients with a positive alcohol screen, with only 41 to 55% of such patients being offered an intervention (Hungerford, Pollock, & Todd, 2000; Peters, Brooker, McCabe, & Short, 1998). Fortunately, service delivery rates improved substantially in subsequent randomized clinical trials; nonetheless, approximately 11 to 30% of injured patients with a positive alcohol screen who consented to study participation were discharged before interventions could be delivered (Blow et al., 2009; Crawford et al., 2010; Gentilello et al., 1999; Roudsari, Caetano, Frankowski, & Field, 2009). Moreover, a major trial evaluating SBIRT services in 14 academic emergency departments in the US revealed that 23.5% of patients with a positive alcohol screen were not enrolled in the trial because they were unable to provide consent or were excluded from the trial based on other clinical characteristics (Academic ED SBIRT Research Collaborative, 2007). Common barriers to SBIRT delivery reported in research trials include insufficient language proficiency, impaired consciousness, pain or physical discomfort associated with injury, and logistic barriers such as insufficient staff resources (Blow et al., 2009; Crawford et al., 2010; Dauer, Rubio, Coris, & Valls, 2006; Désy, Howard, Perhats, & Li, 2010; Drummond et al., 2014). Whereas clinical trials are an important source of information regarding possible obstacles to service delivery, it is unclear to what extent such reports are representative of the barriers encountered in routine SBIRT implementation.

To quantify the implementation and reach of SBIRT services in routine practice, Terrell et al. (2008) surveyed 204 Level 1 trauma centers nationwide regarding their standard practices in the year after the ACS mandate. Of the 148 Level 1 centers that responded to this survey, 79% had implemented routine screening for alcohol use in injured patients and 64% provided bedside interventions to patients who screened positive. However, practitioners at these sites self-reported that as many as 25% of patients who screened positive did not receive motivational interventions (Terrell et al., 2008). Indeed, based on their experiences in routine practice, SBIRT clinicians have estimated that approximately 20 to 30% of patients who screen positive and are referred to SBIRT services are discharged without receiving a brief intervention, often due to clinical characteristics (e.g., level of sedation or cognitive impairment following injury) and operational or logistic issues (e.g., language barriers, lack of staffing over the weekends; Dunn & Ostafin, 2005). To our knowledge, however, systematic study of SBIRT service reach and the obstacles to SBIRT service delivery in routine practice has not yet been undertaken.

So far, information regarding SBIRT service reach has been derived primarily from randomized clinical trials, which may differ in important ways from routine practice, and from clinician self-reports, which may be influenced by recall and other biases. Undertaking

a systematic evaluation of service reach and obstacles to service delivery in routine practice is an important direction for maximizing the potential benefits of the ACS mandate. Identifying demographic, clinical and operational factors that limit service delivery using objective records can enhance the ability to make evidence-based recommendations for service adjustments that could improve SBIRT service reach (Glasgow et al., 1999). This is an important gap in knowledge, given the tremendous cost savings and health impact associated with successful SBIRT implementation and delivery in traumatically injured patients (Gentilello et al., 1999; Gentilello et al., 2005; Schermer et al., 2006). The current study had two aims: first, to use an electronic medical record review to describe patients who did and did not receive SBIRT brief interventions following a positive screen for alcohol at admission, in order to better characterize the reach of such services, and second, to identify obstacles to brief intervention delivery among injured patients with a positive alcohol screen.

2. Method

2.1. Subjects and setting

The investigation was approved by the University of Washington Institutional Review Board and included all consecutively admitted injured patients at Harborview Medical Center, a Level I trauma center, between September 27, 2013 and March 11, 2014 who screened positive for at-risk alcohol use (blood alcohol concentration [BAC] > 0 mg/dL). During the study period, a total of 837 traumatically injured patients were admitted to the emergency department and were tested for blood alcohol concentration, of whom 189 had a positive screen and were referred to SBIRT services, thus meeting criteria for inclusion in the present study. Licensed psychologists and/or supervised psychology and psychiatry residents aimed to conduct brief (10–40 min) interventions (Dunn & Ostafin, 2005) with referred patients as part of the trauma center's alcohol SBIRT service. SBIRT services were available between the hours of 8 a.m. to 5 p.m. Monday through Friday, at 0.70 FTE.

2.2. Study variables

Prior to variable extraction, the first author created a codebook based a preliminary review of the electronic medical record (EMR) and discussions with the second and third authors to specify criteria for coding the clinical and operational variables as well as obstacles to service delivery. The first and second authors then abstracted data from the EMR. Patient demographics retrieved from the EMR included age, sex, and race/ethnicity. Clinical and operational variables included the patient's length of stay, BAC on admission, and injury mechanism. For patients who did not receive brief interventions during their admission, the EMR was reviewed for potential primary reason that the patient was not seen by the service based on daily nursing progress notes. This 7-level variable included: 1) short length of stay (i.e., hospitalization for less than two full working days), 2) cognitive impairment (i.e., nursing notes indicating that the patient was consistently less than fully alert and oriented and/or experiencing persistent impulsivity for the majority of their admission duration), 3) weekend admission (i.e., an admission that began after 5 p.m. on a Thursday with a discharge on or before Monday) or holiday admission (i.e., an admission that began after 5 p.m. the day before a holiday with a discharge on or before the first full workday after the holiday), 4) patient deceased during admission, 5) patient experienced a catastrophic injury

(i.e., patient was not expected to regain sufficient functioning to be able to sustain previous hazardous drinking behaviors, e.g., devastating spinal cord injuries), 6) patient experienced poor hospital course (i.e., nursing notes indicating the patient was uncooperative with care or refusing assessments, was aggressive, was unable to tolerate the interview due to poor health, pain or physical discomfort), and 7) unable to determine a potential reason the patient was not seen by the service. The first and second author double coded the primary potential reason for a random sample (30%) of patient records, achieving 95% agreement.

2.3. Plan of analysis

We examined frequencies and distributions of demographic, clinical and operational variables and compared patients who did versus did not receive brief interventions using chi-square and *t*-tests. The investigation was powered at $\beta = 0.80$ to detect a small to medium effects for χ^2 comparisons and *t*-tests ($\omega_s = 0.20$ to 0.26 , $d = 0.42$), given $\alpha = 0.05$.

3. Results

Injured patients who screened positive for alcohol at admission and were referred for brief interventions were predominantly male (78.3%), Caucasian (60.8%) and had a mean age of 40.44 ($SD = 16.78$ years, range = 15 to 98). Their median length of stay in the hospital was four days ($SD = 19.78$, range = 0 to 211). The median BAC on admission was 181 mg/dL ($SD = 102.21$, range = 15 to 399). Mechanisms of injury included motor vehicle accidents ($n = 68$, 36.0%), falls ($n = 47$, 24.9%), assaults ($n = 34$, 18.0%), pedestrian and bicycle accidents ($n = 20$, 10.6%), gunshot wounds ($n = 13$, 6.9%), burns ($n = 11$, 5.8%), and other acute mechanisms of injury (e.g., sports accidents; $n = 5$, 2.6%).

With respect to Aim 1, there were no significant differences between injured patients with positive alcohol screens who received brief interventions ($n = 115$, 60.8%) and those who did not ($n = 74$, 39.2%) on any demographic or clinical variables, including age, sex, race, length of stay, BAC on admission, or mechanism of injury (see Table 1). Moreover, effect sizes were small across all comparisons ($d < 0.20$, $\phi < 0.10$). Brief interventions occurred on average within 5.10 days of admission (median days until intervention = 3.00, $SD = 7.40$, range = 1 to 58).

With respect to Aim 2, the most common potential obstacles for brief intervention delivery gleaned from the EMR review included a short length of stay (12.7% of patients who were referred to SBIRT services [referred patients]) and persistent cognitive impairments following injury (9.0% of referred patients; see Fig. 1). There were 10 patients (5% of referred patients) for whom a possible reason for the missed intervention could not be identified; it is likely these patients did not receive interventions due to staffing limitations (e.g., competing priorities).

4. Discussion

This study describes the reach of a routine SBIRT service for traumatically injured patients who screened positive for alcohol at the time of admission, and has a couple of important findings. First, consistent with service reach reported in previous clinical trials (Crawford et

al., 2010; Dauer et al., 2006; Désy et al., 2010; Drummond et al., 2014), practitioner self-assessments (Terrell et al., 2008), and clinical reports (Dunn & Ostafin, 2005), our EMR review found that a substantial minority of the patients who were admitted with a positive alcohol screen (39%) did not receive a brief intervention. A formal evaluation of service reach found no differences between the patients who did and did not receive brief interventions, including on patient age, sex, race, BAC at admission, or mechanism of injury. This suggests that SBIRT service reach is likely to be robust across patient demographics and clinical characteristics. However, given that nearly 40% patients with a positive screen who were referred to SBIRT services did not receive brief interventions, an essential question is what obstacles prevent successful service delivery.

The EMRs of referred patients with a positive screen who did not receive brief interventions were coded for possible reasons for failure to deliver services, in order to provide recommendations for improving SBIRT service reach. Consistent with descriptions from previous literature (Crawford et al., 2010; Dauer et al., 2006; Désy et al., 2010; Drummond et al., 2014; Dunn & Ostafin, 2005), common reasons for not receiving intervention fell into two broad categories: operational obstacles, and clinical obstacles. Operational obstacles included features of the hospital stay that impeded service delivery, such as an admission of fewer than two business days or admission over a weekend or holiday. Clinical obstacles included features of the patient's clinical course following injury that impeded service delivery, such as impaired consciousness and catastrophic injuries. An equal proportion of missed interventions were attributable to each obstacle category ($n = 31$ in each). Overall, our results align with previous studies suggesting that approximately 20 to 40% of injured patients with a positive screen for alcohol may not receive brief interventions as a combined result of clinical and operational obstacles to service delivery.

Identifying operational obstacles to service delivery is important for informing service delivery adjustments that may improve the reach of SBIRT services. Specifically, staffing adjustments that improve the ability to provide timely response and provide greater coverage over weekends or holidays may improve service reach. Many patients who are referred to SBIRT services will have a total admission lasting less than two days, emphasizing the importance of flexible and dedicated staffing that can provide intervention within 48 h of admission when it is clinically feasible to do so. Moreover, previous trials suggest that providing weekend staffing can be particularly advantageous in enrolling high-risk patients in SBIRT services (Field, Claassen, & O'Keefe, 2001; Field & O'Keefe, 2004). Other promising possibilities for expanding service reach include the use of computer-assisted screening and intervention provided during admission (Murphy, Bijur, Rosenbloom, Bernstein, & Gallagher, 2013; Vaca, Winn, Anderson, Kim, & Arcila, 2011), or telephone interventions following discharge (Field et al., 2014; Mello, Longabaugh, Baird, Nirenberg, & Woolard, 2008). Indeed, a recent trial showed that brief motivational interviews plus a booster telephone session resulted in greater reductions in alcohol use and heavy drinking compared to brief advice or motivational interviews alone (Field et al., 2014). Adaptations of this nature could allow for more flexible scheduling of the intervention, increasing the probability that a patient with a short stay or a weekend admission will receive SBIRT interventions. However, further evaluation of SBIRT adaptations is needed to support their acceptability, efficacy, and cost-effectiveness.

Identifying clinical obstacles to service delivery, on the other hand, is important for informing “hard limits” to SBIRT service reach, as these obstacles are less likely to be responsive to service adjustments. Specifically, our study suggests that approximately 16% of all patients who were admitted to a trauma center with a positive alcohol screen and who were referred for SBIRT services experienced clinical features during their admission that prevented intervention delivery, including persistent cognitive impairment, poor hospital course, catastrophic injury, or death. It is possible that patients with cognitive impairment could benefit from brief interventions at follow-up or aftercare outpatient appointments. Moreover, documenting the rate of clinical obstacles that prevent service delivery can inform future cost and healthcare savings analyses.

Several study limitations warrant mention. First, this study examined routine SBIRT delivery in a single trauma center. There is significant heterogeneity in how SBIRT services have been implemented (Terrell et al., 2008); thus, results may not generalize to other implementations. A multisite extension is an important next step in this research. Second, although EMR review provided relatively complete data on BAC screenings, referrals to SBIRT services, and SBIRT service delivery, the variables included in the study may include error, particularly for service delivery obstacles. Finally, the study period was limited to approximately seven months; longer study periods would allow examination of consistency versus seasonal variability in SBIRT reach. While these results should be considered preliminary, they underscore the importance of future multi-site investigations of SBIRT reach that can direct service adjustments to maximize the intended impact of the ACS mandate.

5. Conclusions

Study results suggest that 60% of injured patients who were admitted to a Level I trauma center with a positive alcohol screen received a brief, motivational counseling session focused on alcohol during their admissions. Service reach was not influenced by patient demographics (i.e., age, sex, race) or clinical characteristics (i.e., BAC on admission, mechanism of injury). Short stay admissions of less than two business days characterized 32% of the patients who were referred to SBIRT services but did not receive the intervention prior to discharge (“missed cases”). Impaired patient cognition was identified in 23% of missed cases. Admissions occurring over weekends and holidays characterized an additional 9.5% of missed cases. Service delivery adjustments, including increasing dedicated and flexible staffing for SBIRT (e.g., providing 1.0 FTE for SBIRT; expanding services over weekends and holidays), as well as adapting services to allow for delivery of SBIRT interventions following acute inpatient admissions by phone or in aftercare clinics, when acute cognitive impairments may have resolved, could improve the reach of SBIRT services. These findings therefore have important implications for understanding and strengthening SBIRT as it is implemented in routine practice.

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Fig. 1.
Reasons patients were not seen after screening positive for brief intervention services.

Table 1
Demographic and clinical characteristics in patients who did and did not receive brief alcohol interventions.

	Brief intervention <i>n</i> = 115		No intervention <i>n</i> = 74		χ^2/df	<i>p</i>	<i>d/f</i>
Age <i>M</i> (<i>SD</i>)	39.30 (16.15)		42.23 (17.68)		<i>t</i> = 1.17	0.24	0.17
Male % (n)	74.8% (86)		83.8% (62)		$\chi^2 = 2.15$	0.14	0.11
White % (n)	61.7% (71)		59.5% (44)		$\chi^2 = 6.76$	0.34	0.02
Length of stay <i>M</i> (<i>SD</i>) ^a	10.55 (12.92)		11.66 (27.31)		<i>t</i> = 0.33 ^a	.74 ^a	0.05
Admission BAC <i>M</i> (<i>SD</i>)	173.31 (105.25)		187.91 (97.33)		<i>t</i> = 0.96	0.34	0.14
Reason for admission					$\chi^2 = 4.03$	0.67	0.15
MVC % (n)	40.9% (47)		28.4% (21)				
Fall % (n)	18.3% (21)		23.0% (17)				
Gunshot wound % (n)	5.2% (6)		9.5% (7)				
All other assault % (n)	16.5% (19)		20.3% (15)				
Recreation % (n)	10.4% (12)		10.8% (8)				
Burns % (n)	6.1% (7)		5.4% (4)				
Other % (n)	2.6% (3)		2.7% (2)				

BAC = blood alcohol concentration. MVC = motor vehicle crash.

^aDue to heterogeneous group variances, we report the adjusted *t* and *d* values (without the assumption of unequal variances between groups).