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## Nationwide Survey of Trauma Center Screening and Intervention Practices for Posttraumatic Stress Disorder, Firearm Violence, Mental Health, and Substance Use Disorders

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### Abstract

**Background:** Posttraumatic stress disorder (PTSD) symptoms, firearm violence events, alcohol and drug use problems, and major depression and suicidal ideation are endemic among patients admitted to US trauma centers. Despite increasing policy importance, the current availability of screening and intervention services for this constellation of conditions in US trauma centers is unknown.

**Study Design:** Trauma program staff at all Level I and Level II trauma centers in the United States (N=627) were contacted to complete a survey describing screening and intervention procedures for alcohol and drug use problems, PTSD symptoms, depression and suicidality, and firearm violence. Additional questions asked trauma centers about the delivery of peer interventions and information technology capacity for screening and intervention procedures.

**Results:** Fifty one percent of trauma centers (n=322) responded to the survey. Over 95% of responding sites endorsed routinely screening and/or intervening for alcohol use problems.

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Routine services addressing PTSD were less common, with 28% of centers reporting routine screening. Over 50% of sites that screened for PTSD utilized previously established trauma center alcohol use services. Programmatic screening and intervention for firearm injury sequelae was occurring at 30% of sites.

**Conclusion:** Alcohol screening and intervention is occurring frequently at US trauma centers and appears to be responsive to American College of Surgeons Committee on Trauma verification requirements. Routine screening and intervention services for PTSD and firearm injury were occurring less frequently. Regular national surveys may be a key element of tracking progress in national mental health and substance use screening, intervention, and referral policy.

## Precis

Alcohol and substance use problems and posttraumatic stress disorder (PTSD) are endemic among patients admitted to US Level I and Level II trauma centers. This national survey found that while >95% of trauma centers were screening/intervening for alcohol and substance use, 30% endorsed routine screening for PTSD symptoms.

## Keywords

Injury; PTSD; Firearms; Alcohol and Drug Use; Policy

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## Introduction

Mental health and substance use disorders are endemic among patients admitted to United States trauma centers (1–11). Alcohol and drug use problems and PTSD, depression, and suicidal ideation have been documented to occur frequently among injured trauma survivors (1–11). Furthermore, the long-term consequences of severe injury can lead to subsequent opioid addiction (12) and the development of PTSD (8). Those injured as a result of interpersonal violence are at even greater risk of these long-term sequelae (13, 14). The increase in firearm violence observed during the COVID-19 pandemic and associated social unrest (15–22) has further highlighted the need for trauma center services tailored to the needs of firearm injury survivors (13, 14, 23, 24).

The American College of Surgeons Committee on Trauma (ACS COT) is responsible for establishing the standards for trauma center verification in the United States and has incorporated evidence-based criteria targeting screening and intervention for alcohol and drug use among injured patients (25–27). In 2006, in response to a series of investigations establishing the efficacy and effectiveness of alcohol screening and brief intervention for injured patients, the ACS COT required alcohol screening and brief intervention services at Level I trauma centers in the United States (US) (25). In 2014, in response to an enhanced evidence base, the ACS COT extended universal alcohol screening to all trauma centers and required brief intervention programs at all Level I and II centers (26, 28, 29). At that time, a recommendation was made for screening procedures for other substance abuse disorders, along with referral for appropriate treatment, but this was not a requirement. In 2014, the ACS COT also published an initial guidance suggesting that screening for PTSD and

depressive symptoms among trauma patients may constitute a clinical best practice (26), but there was insufficient evidence to make this a requirement.

Previous national trauma center surveys have documented that alcohol screening and intervention have been occurring with increasing frequency in the wake of ACS COT standard updates (30, 31). This investigation aims to assess current screening and intervention practices for alcohol and other substance use disorders, including opioid and stimulant use, as well as mental health conditions, including PTSD symptoms, depression, and suicidal ideation, at US Level I and II trauma centers. The investigation also seeks to assess the availability of peer support programs for trauma survivors. Violence intervention services specifically for firearm injury survivors are also assessed. Finally, the survey assesses the capacity of trauma centers to utilize information technology to support mental health and substance use screening, intervention and referral.

## Methods

### Design Overview

All Level I and II trauma centers in the US were identified through a review of the American Trauma Society's Information Exchange system, the American College of Surgeons' listing of verified trauma programs, and internet searches of state departments of health websites. These public information sources were utilized in conjunction with hospital websites, professional society listings, and individual referrals to identify potential trauma program survey responders. Because the survey aimed to assess psychosocial screening protocols for alcohol, PTSD symptoms, and other related comorbidities at the organizational level, surveys were sent via email to trauma program managers and trauma medical directors for completion. On occasion, individuals within a trauma center provided specific referrals to other trauma program members with more detailed knowledge of mental health and substance use screening and intervention procedures. The individual completing the survey was given \$50 in compensation. Centers that failed to respond were sent an average of 1.8 reminders (range: 1–7), and efforts were made to identify additional contacts within those centers. The Society of Trauma Nurses assisted with promotion of the survey to its members. The investigation was conducted between May 14<sup>th</sup>, 2019, and May 18<sup>th</sup>, 2021. The University of Washington Institutional Review Board approved all study procedures prior to protocol implementation. Trauma center providers were asked to review the study procedures and provide electronic informed consent for the online survey.

### Survey Development

Items from prior national trauma center surveys from our study team were adapted for the current investigation (30–33). Trauma center organizational characteristics were derived from responding staff at each site and included geographic location, trauma population served (e.g., adult, pediatric or combined), university affiliation, numbers of interns and residents, hospital bed number, and inpatient admissions per year. For each disorder (e.g., alcohol/substance use problems, PTSD symptoms) or presentation (e.g., firearm injury) the survey assessed screening practices, the percentage of injured patients screened, hospital-based intervention and referral practices. These assessments included the nature and extent

of hospital-based interventions, the providers involved in the intervention, referral and community linkage practices, and staffing and full-time equivalent position allocations. A series of questions in the final section of the survey assessed trauma center information technology capacity for screening, intervention and referral activities.

## Data Analyses

Descriptive statistics were used to report the frequencies and distributions of organizational characteristics for responding trauma centers and survey item responses. For each survey item, differences between Level I and Level II trauma center sites were assessed. The  $\chi^2$  and Fisher's exact test statistics were used to compare categorical organizational and service delivery characteristics and the t-test statistic was used to compare continuous variables measuring organizational and service delivery characteristics across Level I and Level II centers.

## Results

Of the 627 Level I and II sites contacted to complete the survey, 302 sites (48.1%) did not respond and trauma program staff at 3 sites (0.5%) declined participation. Of the 322 responding sites (51.4%), 261 sites (41.7%) fully completed the survey, 21 sites (3.3%) partially completed the survey, and 40 sites (6.4%) provided minimal survey response.

The majority of responding centers were adult only trauma centers (68.9%), 19.3% served both adult and pediatric, and 11.8% pediatric only (Table 1). Among responding centers, 173 were Level I centers (53.7%) and 149 Level II (46.3%). Level I centers had significantly more annual inpatient admissions and hospital beds and were more likely to be affiliated with a university. The majority of centers in both groups were located in urban/suburban areas. Twenty-eight percent of Level II trauma centers reported a rural location. Provider respondents were predominately female (82.3%) and from nursing backgrounds (83.4%). Ninety-five percent of providers self-identified their racial background as Caucasian, 1.6% as Asian or Pacific Islander, 2.4% as African American/Black, 0.4% as American Indian and 0.8% as more than one race. Eight percent of respondents self-identified as Hispanic.

Over 99% of responding sites reported routinely screening for alcohol use using at least one of 3 screening methods (laboratory test, self-report patient-reported outcome measure, or electronic health record screen, Table 2). The percent of patients screened by laboratory test was 64.7% and the percent of patient screened by questionnaire was 82.0%. In the event of a positive alcohol screen, 50.5% sites endorsed calling a formal consult for substance use counseling and 36.2% of sites endorsed engaging patients in an informal discussion related to alcohol use. Of sites that engaged patients in a formal consult, on average 84.0% of injured patients were seen. Of sites that engaged patients in an informal discussion, on average 77.8% injured patients were seen. Most sites utilized social workers to perform this counseling (Table 2). Of sites where a formal consult was requested, further assessment of psychosocial issues occurred 68.1% of the time, evidence-based bedside counseling techniques were utilized 84.0% of the time, and a treatment referral was made 64.6% of the time.

Screening and intervention rates for opioids and stimulants were lower than those reported for alcohol (Table 2). Eighty-two percent of sites reported using one of the 3 methods to screen for opioids, and 78% of sites endorsed using one of the 3 methods to screen for stimulants. For opioids, the percent of patients screened by laboratory test was 57.6% and the percent of patient screened by questionnaire was 71.4%. Forty percent of sites reported that informal discussion was used when a screen for opioids was positive, and 33.2% reported a formal consult process. Of sites that engaged patients in an informal discussion, patients at that site were screened on average 65.7% of the time. Of sites that engaged patients in a formal consult, patients at that site were screened on average 76.3% of the time. Most sites utilized social workers to perform this counseling (Table 2). Of sites where a formal consult was requested, further assessment of psychosocial issues occurred 64.7% of the time, evidence-based bedside counseling techniques were utilized 76.3% of the time, and a treatment referral was made 57.5% of the time.

For stimulants, the percent of patients screened by laboratory test was 58.6% and the percent of patient screened by questionnaire was 68.5%. Forty percent of sites reported that informal discussion was used when a screen for stimulants was positive, and one third reported a formal consult process. Of sites that engaged patients in an informal discussion, patients at that site were screened on average 66.5% of the time. Of sites that engaged patients in a formal consult, patients at that site were screened on average 77.6% of the time. As with alcohol screening, sites most frequently used social workers to perform this counseling (Table 2). Of sites where a formal consult was requested, further assessment of psychosocial issues occurred 70.1% of the time, evidence-based bedside counseling techniques were utilized 77.1% of the time, and a treatment referral was made 61.0% of the time.

Twenty-eight percent of sites endorsed routine self-reported questionnaire or EHR screening for PTSD symptoms (Table 3). Fifty-five percent of sites that screened for PTSD symptoms utilized previously established trauma center alcohol use services. Screening rates for suicidal ideation and depressive symptoms were higher than for PTSD symptoms, with 77.5% of sites endorsing screening for suicidal ideation and 38.3% of sites endorsing depression screening. Of sites that endorsed screening, 95.2% provided routine services for suicide, 90.7% for PTSD symptoms, and 88.4% for depression. The spectrum of services routinely available at the trauma center included supportive bedside counseling, evidence-based psychotherapy, medications, and community referrals. As with consults for alcohol, opioids and stimulants, social workers were most frequently engaged for evaluation or interventions for suicidality, depression, or PTSD symptoms.

Peer support programs were only reported in 15% of centers. Existing programs had been in place an average of 4.8 years and engaged an average of 6.4 peer supporters (Table 4). Of the trauma centers that did not currently have established peer support programs, 86% expressed interest in establishing a program.

Thirty percent of trauma centers reported routinely screening for firearm injury and related sequelae and 34% endorsed routinely providing intervention services to firearm injury survivors (Table 4). Among those providing these services, 70.8% reported hospital-

based intervention programs, 71.9% community-based programs, and 38.2% engaged peer intervention specialists.

With regard to technologic capacity for screening and intervention procedures, while over 70% of sites endorsed an interest in automated screening procedures for alcohol and drug use, only 20% of sites reported current use of automated screening procedures. Similarly, while over 80% of sites endorsed an interest in automated screening procedures for PTSD symptoms, depression and suicidal ideation, less than 10% of sites endorsed current use of automated screening procedures (Table 5).

Few comparisons between Level I and II centers achieved statistically significant differences for alcohol and drug screening. Level II centers were significantly more likely to use laboratory tests to screen for alcohol when compared to Level I centers (90.2% vs. 80.1%). Level I centers were significantly more likely to endorse screening for PTSD symptoms when compared to Level II centers (34.3% vs. 20.6%). Level I centers were also significantly more likely to endorse screening and intervention services for firearm injury survivors (43.6% vs. 23.1%) and the availability of peer support (23.6% vs. 5.7%) when compared to Level II centers. There were no significant differences across Level I and II centers in response to the technologic capacity survey items.

## Discussion

Annually, millions of individuals present to trauma centers after injury. Mental health, substance use and other related problems such as firearm violence are common among injury survivors. The American College of Surgeons Committee on Trauma has committed to improving the quality of care through verification requirements and guideline recommendations for trauma center care of patients suffering from this constellation of psychosocial difficulties.

National trauma program surveys can serve to inform the extent to which trauma centers across the U.S. are incorporating screening, intervention and referral services for mental health and substance use problems and related psychosocial challenges. In 2008, prior to the full mandate implementation, it was documented that alcohol screening was frequently occurring at Level I trauma centers, with approximately 70% conducting a blood screen, but only 25% using evidence-based interventions following a positive screen (30). Temporally concordant with the ACS standards published in 2014, which required alcohol screening and brief intervention, a nationwide survey documented that rates of alcohol screening and intervention had increased substantially, with over 90% of Level I and II trauma centers routinely screening for alcohol use problems with either a laboratory test or patient self-report questionnaire (31). These practices for alcohol screening and intervention raised awareness of the opportunity to intervene and reduce the risk of subsequent injury, and while this level of effectiveness has not been clearly demonstrated for other drugs of abuse, many trauma centers naturally extended this practice for all intoxicating substances. The current survey documents that the ACS COT requirement has resulted in the vast majority of Level I and II trauma centers screening and intervening for alcohol abuse. These serial national surveys document a progressive increase in routine alcohol service delivery and extension

of the practice to screening and intervention for other substance abuse disorders in many centers.

In addition to addressing substance abuse disorders, it is clear that mental health challenges both from pre-existing conditions and as a result of the development of PTSD also have a major impact in this patient population and can increase the risk of post-injury functional impairments and rehospitalization (34–36). The national survey results published in 2014 suggested that only 7% of trauma centers were screening for PTSD symptoms (31). As a result, in 2014, the ACS COT published an initial guidance suggesting that screening for PTSD and depressive symptoms among trauma patients may constitute a clinical best practice (26), but there was insufficient evidence to make this a requirement. In 2019, a survey of US Level I trauma centers reported that 25% of trauma centers treating adult patients were screening for PTSD symptoms, which is consistent with this survey which reports 28% (37). The current investigation corroborates and extends these prior reports suggesting that while screening for suicide risk is becoming more common, there is considerable opportunity to continue to increase screening and intervention for PTSD symptoms in US trauma centers.

Firearm injury rates continue to rise in the US, particularly in the wake of the COVID-19 pandemic (18–22). Marginalized and minority populations are disproportionately impacted by firearm violence in the US (13, 23, 38). Recent investigations have documented significant psychosocial challenges facing firearm injury survivors admitted to US trauma centers (13, 14, 23, 24). Initial investigations suggest that peer support may be an effective intervention for trauma survivors and can be especially important for victims of firearm injury (39–42). As a result, many trauma centers have implemented hospital-based violence prevention programs to provide this level of support, both in the hospital and following discharge. This national survey suggests there is considerable opportunity to continue to develop these programs, with only 34% of centers reporting programs to support violence prevention and only 15% reporting more general peer support programs. An evolving research evidence base for these conditions could help shape ACS COT policy requirements that could in turn catalyze greater national uptake of routine service delivery (13, 43, 44).

Prior investigation also suggests that information technology capacity enhancements could facilitate efficiencies in mental health and substance use screening, intervention and referral practices at US trauma centers (33). In the current investigation, over 60% of sites reported using information exchanges of linked medical records systems that can assist in the tracking of health services utilization outcomes such as emergency department visits longitudinally after acute care admissions (45, 46). The observation that numerous sites nationally have access to longitudinal electronic health service utilization data could have important implications for ACS COT efforts to systematically extend outcome assessments beyond the acute care hospital setting.

Across alcohol and drug, PTSD, depression and suicide domains, the screening, intervention and referral procedures were most frequently conducted by trauma center social workers. This observation corroborates previous national studies that also reported that social workers

were most frequently involved in trauma center psychosocial screening and intervention procedures (31).

This investigation has limitations. Unlike our prior national trauma program surveys which yielded a 70% response rate, the current investigation attained just over a 50% response rate (30, 31). Additionally, approximately 10% of responses were incomplete. The COVID-19 pandemic is the most likely explanation for the difficulty in obtaining higher trauma program response rates. Current reporting guidelines suggest that research investigations transparently report issues that occurred during the pandemic in publication submissions, rather than not attempting to publish results that have been challenged methodologically (47). The investigation is also limited by reliance upon the self-reports from a single trauma center provider for all survey responses. The data derived from the investigation are dependent on each survey respondent's knowledge of specific screening, intervention, and referral services delivered at their site; some potential respondents may have left items, major portions or the entire survey incomplete due to unfamiliarity with the topic. Finally, the current investigation did not perform multivariate analyses to assess independent associations between trauma center characteristics and specific screening and intervention procedures, and future investigations could address this question.

Future research could also examine the effectiveness of the screening, intervention, and referral services trauma center providers report delivering, as previous study team investigations have documented variable quality in the services for alcohol delivered across US trauma centers (48). A majority of the sites surveyed in this investigation indicated that screening, intervention and referral procedures were most often performed by social workers; nurses also frequently performed screening, intervention, and referral services. Future studies examining effectiveness could comprehensively evaluate the competing demands social workers and nurses face in simultaneously addressing multiple psychosocial issues and other job requirements. Future investigations could also assess the time on average required per patient to deliver screening, intervention, and referral services at trauma centers.

## Conclusions

Our series of national surveys document that the integration of screening, intervention and referral procedures has advanced considerably over the past decade. The results of this investigation document that alcohol and suicide screening and intervention are common in US trauma centers. Future orchestrated clinical investigation and policy implementation could productively address screening and intervention procedures for other substances of abuse and highly prevalent conditions such as PTSD symptoms and firearm violence that afflict diverse patient populations presenting to US trauma centers. Opportunities to leverage electronic health records and information exchanges to enhance screening and referral procedures should be explored, and increased implementation of peer support programs, such as those offered through Trauma Survivors Network of the American Trauma Society and hospital-based violence intervention programs as described by the Health Alliance for Violence Intervention, offer the opportunity to continue to enhance peer support resources for these patients (49, 50). Finally, the results of the investigation suggest that although



progress has been made over the past two decades in requirements for alcohol screening, intervention, and referral procedures, in other domains such as firearm violence and posttraumatic stress disorder, trauma centers could benefit from further refinement of trauma center-based service development.

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**Table 1.**

## Organizational Characteristics of US Level I and II Trauma Centers

Variable	All (N = 322)	Level I (n = 173)	Level II (n = 149)	p Value
Region, n (%)				0.01
Midwest	113 (35.1)	55 (31.8)	58 (38.9)	
South or Southeast	81 (25.2)	53 (30.6)	28 (18.8)	
Northeast	51 (15.8)	33 (19.1)	18 (12.1)	
West	49 (15.2)	18 (10.4)	31 (20.8)	
Central	28 (8.7)	14 (8.1)	14 (9.4)	
Rural, n (%)	52 (17.9)	13 (8.6)	39 (28.1)	<0.0001
Population served, n (%)				<0.0001
Adult	222 (68.9)	85 (49.1)	137 (92.0)	
Adult and pediatric	62 (19.3)	56 (32.4)	6 (4.0)	
Pediatric	38 (11.8)	32 (18.5)	6 (4.0)	
University affiliations, n (%)	157 (53.6)	123 (80.4)	34 (24.3)	<0.0001
Interns and Residents, mean (SD)	82 (148)	95 (164)	55 (104)	0.07
Hospital beds, mean (SD)	452 (266)	536 (311)	360 (165)	<0.0001
Annual inpatient trauma admissions, mean (SD)	1941 (1435)	2432 (1251)	1399 (1434)	<0.0001

**Table 2.** Alcohol, Opioid, and Stimulant Screening and Intervention Practices at Level I and II Trauma Centers

Variable	Alcohol screening and intervention, n (%)			Opioid screening and intervention, n (%)			Stimulant screening and intervention, n (%)					
	Total (N = 281)	Level I (n = 147)	Level II (n = 134)	p Value	Total (N = 279)	Level I (n = 147)	Level II (n = 132)	p Value	Total (N = 272)	Level I (n = 144)	Level II (n = 128)	p Value
Routinely screen admitted trauma center patients (any method)	279(99.3)	146(99.3)	133(99.3)	1.0	229(82.1)	119(81.0)	110(83.3)	0.60	213(78.3)	108(75.0)	105(82.0)	0.16
Routinely use laboratory tests for screening admitted trauma patients *	236(84.9)	117(80.1)	119(90.2)	0.02	210(91.7)	105(88.2)	105(95.5)	0.05	198(93.0)	97(89.8)	101(96.2)	0.16
Use a screening questionnaire *	248(89.2)	132(90.4)	116(87.9)	0.34	73(32.2)	37(31.4)	36(33.0)	0.36	70(33.8)	37(35.2)	33(32.4)	0.44
Routinely use the EHR to screen admitted trauma patients *	186(67.2)	97(66.4)	89(67.9)	0.65	96(42.9)	53(45.3)	43(40.2)	0.33	77(37.2)	40(38.1)	37(36.3)	0.24
EHR screen method *				0.38				0.79				0.36
Automated screen	81(44.8)	45(47.9)	36(41.4)		45(47.4)	24(46.2)	21(48.8)		37(48.7)	21(53.9)	16(43.2)	
Manual review	100(55.2)	49(52.1)	51(58.6)		50(52.6)	28(53.9)	22(51.2)		39(51.3)	18(46.1)	21(56.8)	
If the lab test, questionnaire or EHR screen is positive what typically happens before the patient is discharged? *												
Nothing	3(1.1)	0(0.0)	3(2.3)	0.07	24(10.5)	14(11.8)	10(9.1)	0.51	21(9.9)	11(10.2)	10(9.5)	0.87
Informal discussion	101(36.2)	61(41.8)	40(30.1)	0.04	91(39.7)	46(38.7)	45(40.9)	0.73	86(40.4)	43(39.8)	43(41.0)	0.87
Formal consult	141(50.5)	67(45.9)	74(55.6)	0.10	76(33.2)	39(32.8)	37(33.6)	0.89	69(32.4)	40(37.0)	29(27.6)	0.14
Other	62(22.2)	35(24.0)	27(20.3)	0.46	40(17.5)	26(21.9)	14(12.7)	0.07	27(12.7)	15(13.9)	12(11.4)	0.59
Don't know	8(2.9)	4(2.7)	4(3.0)	1.0	21(9.2)	9(7.6)	12(10.9)	0.38	24(11.3)	7(6.5)	17(16.2)	0.03
Type of staff person responsible for conducting consults and interventions *												
Social worker	212(76.0)	121(82.9)	91(68.4)	0.01	137(59.8)	78(65.6)	59(53.6)	0.07	118(55.4)	68(63.0)	50(47.6)	0.02

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Variable	Alcohol screening and intervention, n (%)				Opioid screening and intervention, n (%)				Stimulant screening and intervention, n (%)			
	Total (N = 281)	Level I (n = 147)	Level II (n = 134)	p Value	Total (N = 279)	Level I (n = 147)	Level II (n = 132)	p Value	Total (N = 272)	Level I (n = 144)	Level II (n = 128)	p Value
Chemical dependency counselor	48(17.2)	24(16.4)	24(18.1)	0.72	46(20.1)	24(20.2)	22(20.0)	0.97	36(16.9)	20(18.5)	16(15.2)	0.52
Attending surgeon	19(6.8)	6(4.1)	13(9.8)	0.06	23(10.0)	9(7.6)	14(12.7)	0.19	23(10.8)	9(8.3)	14(13.3)	0.24
Surgery residents	20(7.2)	15(10.3)	5(3.8)	0.04	17(7.4)	11(9.2)	6(5.5)	0.27	15(7.0)	13(12.0)	2(1.9)	0.004
Psychologist	19(6.8)	12(8.2)	7(5.3)	0.33	12(5.2)	7(5.9)	5(4.6)	0.65	15(7.0)	9(8.3)	6(5.7)	0.46
Psychiatrist	25(9.0)	12(8.2)	13(9.8)	0.65	22(9.6)	10(8.4)	12(10.9)	0.52	20(9.4)	8(7.4)	12(11.4)	0.31
RN	52(18.6)	30(20.6)	22(16.5)	0.39	30(13.1)	15(12.6)	15(13.6)	0.82	27(12.7)	14(13.0)	13(12.4)	0.90
Other	56(20.1)	30(20.6)	26(19.6)	0.84	33(14.4)	18(15.1)	15(13.6)	0.75	27(12.7)	15(13.9)	12(11.4)	0.59
No one designated	1(0.4)	0(0.0)	1(0.8)	0.48	8(3.5)	4(3.4)	4(3.6)	1.0	8(3.8)	4(3.7)	4(3.8)	1.0
Uncertain	2(0.7)	0(0.0)	2(1.5)	0.23	1(0.4)	0(0.0)	1(0.9)	0.48	0(0.0)	0(0.0)	0(0.0)	NA
Pain MD/other pain service	-	-	-	-	11(4.8)	7(5.9)	4(3.6)	0.43	-	-	-	-
Further assessment of psychosocial issues*	101(73.7)	52(78.8)	49(69.0)	0.24	56(77.8)	29(76.3)	27(79.4)	0.93	50(73.5)	32(80.0)	18(64.3)	0.06
Evidence-based bedside counseling techniques, such as brief negotiated interventions or motivational interviewing*	107(77.5)	56(84.9)	51(70.8)	0.14	55(77.5)	31(83.8)	24(70.6)	0.41	47(70.2)	30(79.0)	17(58.6)	0.19
Treatment referral for specialized services*	125(90.6)	62(96.9)	63(85.1)	0.06	65(90.3)	34(89.5)	31(91.2)	0.35	57(83.8)	35(87.5)	22(78.6)	0.05
Specialized alcohol treatment services are patients referred to												
Inpatient services	65(23.3)	33(22.6)	32(24.1)	0.77	37(16.2)	23(19.3)	14(12.7)	0.18	31(14.6)	19(17.6)	12(11.4)	0.20
Outpatient services	118(42.3)	58(39.7)	60(45.1)	0.36	62(27.1)	33(27.7)	29(26.4)	0.82	54(25.4)	33(30.6)	21(20.0)	0.08
Detox	52(18.6)	26(17.8)	26(19.6)	0.71	24(10.5)	15(12.6)	9(8.2)	0.27	18(8.5)	14(13.0)	4(3.8)	0.02
Other	5(1.8)	4(2.7)	1(0.8)	0.37	0(0.0)	0(0.0)	0(0.0)	NA	1(0.5)	1(0.9)	0(0.0)	1.0
Hospital provides salary support (FTE) to individual(s) to provide screening and brief intervention services*	77(28.7)	46(32.4)	31(24.6)	0.37	52(28.7)	33(35.1)	19(21.8)	0.12	47(29.4)	28(33.3)	19(25.0)	0.37



**Table 3.** PTSD, Depression and Suicide Screening and Intervention Practices at Level I and II Trauma Centers

Variable	PTSD symptom screening and intervention				Depression screening and intervention				Suicide screening and intervention			
	Total (n=269)	Level I (n=143)	Level II (n=126)	p Value	Total (n=269)	Level I (n=144)	Level II (n=125)	p Value	Total (n=267)	Level I (n=142)	Level II (n=125)	p Value
Institution routinely screens admitted trauma patients for symptoms, n (%)	75(27.9)	49(34.3)	26(20.6)	0.03	103(38.3)	49(34.0)	54(43.2)	0.23	207(77.5)	109(76.8)	98(78.4)	0.94
Percent of the time, mean (SD) *	73.7(24.6)	77.9(21.1)	64.5(29.4)	0.05	89.7(19.0)	87.7(20.2)	91.9(17.5)	0.34	92.8(17.2)	90.7(20.6)	95.2(12.1)	0.10
Institution routinely uses a screening questionnaire *, n (%)	50(66.7)	33(67.4)	17(65.4)	0.89	77(76.2)	33(68.8)	44(83.0)	0.24	158(77.5)	73(68.2)	85(87.6)	0.001
Percent of admitted trauma patients screened with a questionnaire, mean (SD) *	68.2(28.6)	66.7(27.9)	71.2(31.0)	0.65	90.0(19.1)	86.3(24.2)	93.1(13.0)	0.20	90.4(20.5)	86.0(26.3)	94.3(12.4)	0.03
Institution routinely uses the EHR to screen, n (%)	23(30.7)	13(26.5)	10(38.5)	0.53	67(66.3)	32(66.7)	35(66.0)	0.69	132(63.8)	69(63.3)	63(64.3)	0.26
EHR screen method *, n (%)				0.67				0.58				0.22
Automated screen	8(36.4)	5(41.7)	3(30.0)		39(59.1)	20(62.5)	19(55.9)		86(65.7)	48(70.6)	38(60.3)	
Manual review	14(63.6)	7(58.3)	7(70.0)		27(40.9)	12(37.5)	15(44.1)		45(34.3)	20(29.4)	25(39.7)	
Institution provides services to admitted trauma patients with symptoms <sup>a</sup> , n (%)	68(90.7)	47(95.9)	21(80.8)	0.03	91(88.4)	45(91.8)	46(85.2)	0.24	196(95.2)	102(94.4)	94(95.9)	0.85
Intervention available at the trauma center *, n (%)												
Medication	27(36.0)	20(40.8)	7(26.9)	0.23	71(68.9)	31(63.3)	40(74.1)	0.24	140(67.6)	72(66.1)	68(69.4)	0.61
Supportive bedside counseling	50(66.7)	37(75.5)	13(50.0)	0.03	69(67.0)	34(69.4)	35(64.8)	0.62	155(74.9)	81(74.3)	74(75.5)	0.84
Evidence-based psychotherapy	38(50.7)	30(61.2)	8(30.8)	0.01	50(48.5)	25(51.0)	25(46.3)	0.63	95(45.9)	53(48.6)	42(42.9)	0.41
Community referrals	57(76.0)	38(77.6)	19(73.1)	0.67	73(70.9)	39(79.6)	34(63.0)	0.06	147(71.0)	74(67.9)	73(74.5)	0.30
Other	9(12.0)	8(16.3)	1(3.9)	0.11	12(11.7)	11(22.5)	1(1.9)	0.001	29(14.0)	18(16.5)	11(11.2)	0.27



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Variable	PTSD symptom screening and intervention			Depression screening and intervention			Suicide screening and intervention			P Value		
	Total (n=269)	Level I (n=143)	Level II (n=126)	P Value	Total (n=269)	Level I (n=144)	Level II (n=125)	P Value	Total (n=267)		Level I (n=142)	Level II (n=125)
Don't know	0(0.0)	0(0.0)	0(0.0)	NA	2(1.9)	1(2.0)	1(1.9)	1.0	5(2.4)	3(2.8)	2(2.0)	1.0
Type of staff person responsible for conducting consults and interventions *, n (%)												
Social worker	39(52.0)	30(61.2)	9(34.6)	0.03	58(56.3)	31(63.3)	27(50.0)	0.18	108(52.2)	58(53.2)	50(51.0)	0.75
Chemical dependency counselor	4(5.3)	4(8.2)	0(0.0)	0.29	10(9.7)	6(12.2)	4(7.4)	0.51	19(9.2)	11(10.1)	8(8.2)	0.63
Psychologist	28(37.3)	23(46.9)	5(19.2)	0.02	33(32.0)	18(36.7)	15(27.8)	0.33	79(38.2)	44(40.4)	35(35.7)	0.49
Psychiatrist	22(29.3)	17(34.7)	5(19.2)	0.16	60(58.3)	28(57.1)	32(59.3)	0.83	153(73.9)	85(78.0)	68(69.4)	0.16
RN	11(14.7)	10(20.4)	1(3.9)	0.08	29(28.2)	11(22.5)	18(33.3)	0.22	42(20.3)	17(15.6)	25(25.5)	0.08
Other	17(22.7)	10(20.4)	7(26.9)	0.52	9(8.7)	4(8.2)	5(9.3)	1.0	22(10.6)	12(11.0)	10(10.2)	0.85
No one designated	1(1.3)	0(0.0)	1(3.9)	0.35	0(0.0)	0(0.0)	0(0.0)	NA	0(0.0)	0(0.0)	0(0.0)	NA
Don't know	2(2.7)	0(0.0)	2(7.7)	0.12	2(1.9)	1(2.0)	1(1.9)	1.0	1(0.5)	0(0.0)	1(1.0)	0.47
Same person who is called for alcohol also called for mental health symptoms *, n (%)	36(54.6)	26(56.5)	10(50.0)	0.77	44(48.4)	21(46.7)	23(50.0)	0.95	67(34.2)	31(30.4)	36(38.3)	0.15
Hospital provides salary support (FTE) to individual(s) to provide screening and intervention services *, n (%)	26(39.4)	21(45.7)	5(25.0)	0.25	29(31.9)	21(46.7)	8(17.4)	0.01	52(26.9)	29(29.3)	23(24.5)	0.50
Number of FTE, mean (SD)	1.8(2.2)	1.5(1.5)	3.0(4.8)	0.66	3.4(4.9)	3.6(5.1)	0.2(NA)	0.53	3.1(4.0)	3.5(4.5)	1.8(1.6)	0.19
Are both pediatric and adult patients screened? *, n (%)				0.02				0.53				0.03
Only adult patients	27(37.0)	12(25.5)	15(57.7)		25(24.8)	9(19.2)	16(29.6)		35(17.2)	13(12.3)	22(22.4)	
Only peds patients	8(11.0)	6(12.8)	2(7.7)		3(3.0)	1(2.1)	2(3.7)		16(7.8)	13(12.3)	3(3.1)	
Both	37(50.7)	29(61.7)	8(30.8)		63(62.4)	31(66.0)	32(59.3)		137(67.2)	73(68.9)	64(65.3)	
Don't know	1(1.4)	0(0.0)	1(3.8)		10(9.9)	6(12.8)	4(7.4)		16(7.8)	7(6.6)	9(9.2)	
Are interventions available for both				0.13				0.09				0.01

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Variable	PTSD symptom screening and intervention				Depression screening and intervention				Suicide screening and intervention			
	Total (n=269)	Level I (n=143)	Level II (n=126)	P Value	Total (n=269)	Level I (n=144)	Level II (n=125)	p Value	Total (n=267)	Level I (n=142)	Level II (n=125)	P Value
pediatric and adult patients who screen positive? *, n (%)												
Only adult patients	22(32.8)	11(23.9)	11(52.4)		25(27.5)	8(17.8)	17(37.0)		38(19.6)	11(11.0)	27(28.7)	
Only peds patients	7(10.5)	5(10.9)	2(9.5)		3(3.3)	1(2.2)	2(4.4)		12(6.2)	9(9.0)	3(3.2)	
Both	35(52.2)	28(60.9)	7(33.3)		59(64.8)	35(77.8)	24(52.2)		135(69.6)	75(75.0)	60(63.8)	
Don't know	3(4.5)	2(4.4)	1(4.8)		4(4.4)	1(2.2)	3(6.5)		9(4.6)	5(5.0)	4(4.3)	

\* Denominator is number of institutions who endorsed routinely screening admitted trauma patients for symptoms

**Table 4.**

## Peer Support Practices and Firearm Violence Screening and Intervention at Level I and II Trauma Centers

Variable	Total (n=263)	Level I (n=141)	Level II (n=122)	p Value
Peer support				
Currently, does your institution have a peer support program for injured trauma patients?	40(15.3)	33(23.6)	7(5.7)	0.0001
How long has your program been in existence? Years, mean (SD)	4.8(5.3)	5.2(5.7)	3.2(2.4)	0.43
Which elements of peer support does your program employ? *, n (%)				
Bedside visitation	30(75.0)	25(75.8)	5(71.4)	1.0
Printed support materials	29(72.5)	24(72.7)	5(71.4)	1.0
Post-injury support group meetings	27(67.5)	22(66.7)	5(71.4)	1.0
Connection to national peer societies	26(65.0)	23(69.7)	3(42.9)	0.21
Other	3(7.5)	3(9.1)	0(0.0)	1.0
Which national peer societies your program is connected with? *, n (%)				
The American Trauma Society's Trauma Survivors Network	21(52.5)	19(57.6)	2(28.6)	0.23
The Phoenix Society	5(12.5)	5(15.2)	0(0.0)	0.56
Amputee Coalition	3(7.5)	3(9.1)	0(0.0)	1.0
Traumatic Brain Injury Support Group	10(25.0)	9(27.3)	1(14.3)	0.66
Other	2(5.0)	2(6.1)	0(0.0)	1.0
How many peers are involved in your program? Mean (SD)	6.4(8.0)	6.7(8.3)	3.5(2.1)	0.61
What training and support do the peers receive? *, n (%)				
Initial clinical interview	17(42.5)	15(45.5)	2(28.6)	0.68
Observed clinical interaction	14(35.0)	12(36.4)	2(28.6)	1.0
Ongoing peer-to-peer supervision	22(55.0)	19(57.6)	3(42.9)	0.68
Other	8(20.0)	8(24.2)	0(0.0)	0.31
How many patients does your program serve in a typical week? Mean (SD)	17.1(41.2)	18.8(43.0)	1.3(1.1)	0.09
Does your peer program serve both pediatric and adult patients? *, n (%)				0.002
Only adult patients	18(47.4)	15(48.4)	3(42.9)	
Only peds patients	1(2.6)	0(0.0)	1(14.3)	
Both	17(44.7)	16(51.6)	1(14.3)	
Don't know	2(5.3)	0(0.0)	2(28.6)	
Firearm screening and intervention				
Currently, does your institution routinely screen admitted trauma patients for injuries and other problems related to firearm violence? n (%)	80(30.4)	55(39.0)	25(20.5)	0.003
Currently, what percent of admitted trauma patients do you screen for firearm-related violence? Mean (SD)	64.7(40.1)	69.6(37.4)	53.2(44.8)	0.13
Currently, does your institution provide intervention services to admitted trauma patients for injuries and other problems related to firearm violence? n (%)	89(34.1)	61(43.6)	28(23.1)	0.001

Variable	Total (n=263)	Level I (n=141)	Level II (n=122)	p Value
What type of interventions are available at your trauma center for firearm-related violence? <sup>†</sup> n (%)				
Hospital-based intervention	63(70.8)	45(73.8)	18(64.3)	0.37
Community-based intervention	64(71.9)	46(75.4)	18(64.3)	0.28
Peer violence interventionists	34(38.2)	28(45.9)	6(21.4)	0.03
Other	2(2.3)	2(3.3)	0(0.0)	1.0
I don't know	3(3.4)	2(3.3)	1(3.6)	1.0
What type of staff person is currently responsible for conducting firearm-related violence consults and interventions at your hospital? <sup>†</sup> n (%)				
Social worker	57(64.0)	40(65.6)	17(60.7)	0.66
Chemical dependency counselor	5(5.6)	3(4.9)	2(7.1)	0.65
Psychologist	16(18.0)	12(19.7)	4(14.3)	0.54
Psychiatrist	13(14.6)	7(11.5)	6(21.4)	0.22
RN	18(20.2)	11(18.0)	7(25.0)	0.45
Other	37(41.6)	29(47.5)	8(28.6)	0.09
No one designated	3(3.4)	1(1.6)	2(7.1)	0.23
Don't know	2(2.3)	1(1.6)	1(3.6)	0.53
Is the same person who is called for alcohol counseling, also called for firearm-related violence? <sup>†</sup> n (%)	35(40.7)	23(38.3)	12(46.2)	0.06
Is the same person who is called for posttraumatic stress symptoms or depression, also called for firearm-related violence? <sup>†</sup> n (%)	34(39.5)	23(38.3)	11(42.3)	0.46
Does your hospital currently provide salary support (FTE) to any individual(s) to provide firearm-related violence screening and intervention services? <sup>†</sup> n (%)	29(34.1)	24(40.7)	5(19.2)	0.10
How many FTE? Mean (SD)	5.7(12.8)	6.4(13.7)	1.1(0.4)	0.11
Are both pediatric and adult patients screen for firearm-related violence? <sup>†</sup> n (%)				0.05
Only adult patients	9(15.5)	4(9.1)	5(35.7)	
Only peds patients	1(1.7)	1(2.3)	0(0.0)	
Both	48(82.8)	39(88.6)	9(64.3)	
Are interventions available for both pediatric and adult patients who screen positive for firearm-related violence? <sup>†</sup> n (%)				0.03
Only adult patients	18(20.7)	7(11.9)	11(39.3)	
Only peds patients	1(1.2)	1(1.7)	0(0.0)	
Both	64(73.6)	48(81.4)	16(57.1)	
Don't know	4(4.6)	3(5.1)	1(3.6)	

\* Denominator is number of institutions who endorsed routinely screening admitted trauma patients for symptoms

<sup>†</sup> Denominator is number of institutions who endorsed providing intervention services trauma patients for symptoms

**Table 5.**

## Technology Use for Patient Screening

Variable	Total (n=258)	Level I (n=139)	Level II (n=119)	p Value
Does your trauma center currently use an automated screening program that generates a computerized list of all trauma patients with positive blood alcohol tests or positive drug lab tests (eg opioids, stimulants)?	51(19.8)	32(23.0)	19(16.0)	0.34
Would such an automated screening procedure be of interest to you/your trauma center?	139(72.8)	68(70.1)	71(75.5)	0.40
Does your trauma center currently use an automated screening program to generate a computerized list of all trauma patients screening positive for mental health diagnoses and problems (eg PTSD, depression, suicidal ideation)?	24(9.3)	10(7.3)	14(11.6)	0.47
Would such an automated screening procedure be of interest to you/your trauma center?	167(80.3)	94(81.7)	73(78.5)	0.56
Does your trauma center currently use real-time clinical data feeds for local development of electronic quality improvement tools, such as the alcohol screening program above?	67(26.0)	42(30.7)	25(20.7)	0.12
If no, why not?				
Inadequate funds to purchase required information technologies	92(69.2)	45(65.2)	47(73.4)	0.31
Concerns about information technologies maintenance costs	84(66.1)	41(63.1)	43(69.4)	0.45
Lack of adequate information technologies support staff	90(70.3)	45(68.2)	45(72.6)	0.59
Resistance on the part of clinical staff to use new information	42(34.7)	24(38.1)	18(31.0)	0.42
Other reason	23(33.3)	13(34.2)	10(32.3)	0.86
Does your trauma center currently use information exchange or linked medical records systems (eg EPIC CareEverywhere, Emergency Department Information Exchange (EDIE))?	163(63.2)	89(64.5)	74(61.7)	0.49
If no, why not?				
Inadequate funds to purchase information exchange technology	45(77.6)	22(71.0)	23(85.2)	0.20
Concerns about information exchange technology maintenance	39(68.4)	21(67.7)	18(69.2)	0.90
Lack of information exchange technology support staff	39(69.6)	22(71.0)	17(68.0)	0.81
Resistance on the part of clinical staff to use new information technologies	16(30.8)	12(44.4)	4(16.0)	0.03
Other reason	15(38.5)	6(35.3)	9(40.9)	0.72
Does your trauma center currently have electronic medical record alerts that notify providers when designated outpatients revisit your or another institution's emergency department?	59(23.1)	27(19.9)	32(26.7)	0.41
If no, why not?				
Inadequate funds to purchase required technologies	80(69.0)	44(68.8)	36(69.2)	0.96
Concerns about technology maintenance costs	73(63.5)	40(63.5)	33(63.5)	0.99
Lack of adequate technology support staff	83(74.1)	46(73.0)	37(75.5)	0.77
Resistance on the part of clinical staff to use new technologies	36(35.0)	20(35.1)	16(34.8)	0.97
Other reason	20(32.8)	12(36.4)	8(28.6)	0.52
Does your trauma center currently have an on-call clinician who can be reached via phone, text or video call 24/7?	202(78.3)	106(76.8)	96(80.0)	0.73
If no, why not?				
Inadequate funds to support 24/7 on call clinician	34(85.0)	16(76.2)	18(94.7)	0.10
Resistance on the part of clinical staff	11(34.4)	6(37.5)	5(31.3)	0.71

<b>Variable</b>	<b>Total (n=258)</b>	<b>Level I (n=139)</b>	<b>Level II (n=119)</b>	<b>p Value</b>
Other reason	4(19.1)	2(16.7)	2(22.2)	1.0

Data presented as n (%)

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