RESEARCH

CE 1.5 ANCC Contact Hours

Screening Adolescent Trauma Patients for Substance Use at 10 Pediatric Trauma Centers

Michael J. Mello, MD, MPH ■ Sara J. Becker, PhD ■ Anthony Spirito, PhD ■ Julie R. Bromberg, MPH ■ Hale Wills, MD ■ Amanda Barczyk, PhD, MSW ■ Lois Lee, MD, MPH ■ Charles Pruitt, MD ■ Beth E. Ebel, MD, MSc, MPH ■ Mark R. Zonfrillo, MD, MS ■ Evelyn Nimaja, BA ■ Kelli Scott, PhD ■ Andrew Kiragu, MD ■ Isam W. Nasr, MD ■ Jeremy T. Aidlen, MD ■ R. Todd Maxson, MD ■ Janette Baird, PhD

ABSTRACT

Background: The American College of Surgeons Committee on Trauma recommends universal alcohol screening be part of the evaluation of admitted trauma patients. Yet, suboptimal screening rates have been reported for admitted adult and adolescent trauma patients. This lack of screening, in turn, has limited the ability of trauma services to provide patients with brief interventions during their hospital admission and subsequent referrals to treatment after discharge. The primary aim of this study was to examine current rates of alcohol and other drug screening with admitted injured adolescents across a national cohort of 10 pediatric trauma centers.

Methods: This retrospective observational study was nested within a larger adolescent screening, brief intervention, and referral to treatment implementation study (Clinicaltrials.gov NCT03297060). Ten pediatric trauma centers participated in a retrospective chart review of a random sample of adolescent trauma patients presenting for care between March 1, 2018, and November 30, 2018.

Results: Three hundred charts were abstracted across the 10 participating trauma centers ($n = 30$ per site). Screening rates varied substantially across centers from five (16.7%) to 28 (93.3%) of the 30 extracted charts. The most frequent screening type documented was blood alcohol concentration (BAC) ($N = 80$, 35.2% of all screens), followed by the CRAFFT ($N = 79$, 26.3%), and then the urine drug screen (UDS) ($N = 77$, 25.6%). The BAC test identified 11 patients as positive for recent alcohol use. The CRAFFT identified 11 positive patients.

Conclusions: Alcohol and drug screening is underutilized for adolescents admitted to pediatric trauma centers. More research is warranted on how best to utilize the teachable moment of the pediatric trauma visit to ensure comprehensive screening of adolescent alcohol or other drug (AOD) use.

Key Words

Alcohol screening, Drug screening, Pediatric, SBIRT, Trauma center

BACKGROUND/SIGNIFICANCE

Seventy-two percent of high school seniors report a lifetime history of drinking, with 41% reporting drinking in the past month (Kann et al., 2018). Among adolescents, alcohol increases the risk of both unintentional (motor vehicle crashes, falls, and drownings) and intentional (suicide and homicide) injuries. To improve detection and intervention of risky substance use, universal alcohol or other drug (AOD) screening of adolescents within medical settings has been endorsed by multiple medical and health organizations (American Academy of Pediatrics, 2010; American College of Emergency Physicians, 2011; American College of Surgeons Committee on Trauma,

Author Affiliations: Departments of Emergency Medicine (Drs Mello, Zonfrillo, and Baird and Ms Bromberg), Psychiatry and Human Behavior (Dr Spirito), and Surgery (Dr Wills), Alpert Medical School of Brown University, Providence, Rhode Island; Departments of Health Services, Policy and Practice (Dr Mello) and Behavioral and Social Sciences (Drs Becker and Scott), Brown University School of Public Health, Providence, Rhode Island; Injury Prevention Center of Rhode Island Hospital-Hasbro Children's Hospital, Providence, Rhode Island (Drs Mello, Wills, Zonfrillo, and Baird and Mss Bromberg and Nimaja); Dell Children's Trauma and Injury Research Center, Dell Children's Medical Center, Austin, Texas (Dr Barczyk); Division of Emergency Medicine, Boston Children's Hospital, Boston, Massachusetts (Dr Lee); Division of Pediatrics, Intermountain Primary Children's Hospital, Salt Lake City, Utah (Dr Pruitt); Department of Pediatrics, Harborview Medical Center, Seattle, Washington (Dr Ebel); Department of Pediatrics, Hennepin County Medical Center, Minneapolis, Minnesota (Dr Kiragu); Department of Pediatric Surgery, Johns Hopkins Children's Center, Baltimore, Maryland (Dr Nasr); Department of Pediatric Surgery, UMass Memorial Medical Center, Worcester, Massachusetts (Dr Aidlen); and Department of Pediatric Surgery, Arkansas Children's Hospital, Little Rock (Dr Maxson).

This research is supported by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) of the National Institutes of Health under award number R01AA025914.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. The NIAAA had no direct role in the study design and analysis plan and will not have a role in interpretation of data or its presentation in the article.

The authors declare no conflicts of interest.

Correspondence: Michael J. Mello, MD, MPH, Injury Prevention Center, Rhode Island Hospital, 55 Claverick Street, 2nd Floor, Providence, RI 02903 (michael_mello_md@brown.edu).

DOI: 10.1097/JTN.0000000000000537

2014; Kelleher, Renaud, Ehrlich, Burd, & Pediatric Trauma Society Guidelines Committee, 2013; National Institute on Alcohol Abuse and Alcoholism, 2011).

The American College of Surgeons Committee on Trauma requires universal alcohol screening and intervention when necessary, be part of the evaluation of admitted Level 1 trauma patients (American College of Surgeons Committee on Trauma, 2014). One option for screening is laboratory testing via blood alcohol concentration (BAC) and urine drug screen (UDS) to assess alcohol or drug (AOD) use close to the time of the patient's trauma admission. Yet, laboratory tests cannot assess patterns of substance use or related risks and problems (National Institute on Drug Abuse, n.d.). The use of a validated screening measure can assess risky patterns of use and identify substance-related problems beyond the brief period prior to hospital admission.

Currently, several questionnaires have been validated for AOD screening with adolescents (Knight, Sherritt, Harris, Gates, & Chang, 2003; Knight et al., 1999; Levy et al., 2014; Levy, Williams, Committee On Substance, & Prevention, 2016; NIAAA, 2011). A leading example is the CRAFFT (Knight et al., 1999) screener, which includes three questions about the adolescent's frequency of alcohol, marijuana, and other drug use followed by six questions assessing substance-related problems and risk behaviors (e.g., driving in a car while "high").

Earlier research has noted suboptimal screening rates with both admitted adult (Terrell et al., 2008) and adolescent (Mello et al., 2013) trauma patients. This lack of screening, in turn, has limited the ability of trauma services to provide patients with brief interventions during their hospital admission and subsequent referrals to treatment after discharge. It is unclear whether these patterns in trauma care have persisted.

Purpose/Research Question

The primary aim of this study was to examine the current rates of AOD screening with admitted injured adolescents across a national cohort of 10 pediatric trauma centers. Secondary aims included documenting the comprehensiveness of AOD screening (i.e., use of both validated questionnaires and biologic screening), identifying demographic variables that predict receipt of screening, and determining the rate of positive AOD screens among adolescents receiving trauma services.

METHODS

This retrospective observational study was nested within a larger adolescent screening, brief intervention, and referral to treatment (SBIRT) implementation study (Clinicaltrials.gov NCT03297060) (Mello et al., 2018) aimed to evaluate the effectiveness of the Science to Service Laboratory implementation strategy in increasing fidelity of SBIRT delivery at pediatric trauma centers, relative to usual implementation. All 10 pediatric trauma centers in the parent trial participated in a retrospective chart review of a random sample of adolescent trauma patients presenting for care between March 1, 2018, and November 30, 2018. Institutional review board (IRB) approval was obtained using a single central IRB at the coordinating research center.

Study Sample

Participating centers received a list of randomly generated dates that spanned the previous 9-month study period. Each center began its review by selecting the first admitted trauma patient age 12–17 years on the randomized date list. Only admitted injured adolescent patients were included. If no patients were admitted on a randomized date, centers continued sequentially through the list of dates provided until an admission was encountered. If there were two or more patients on a given date, centers only included the first patient admitted before continuing onto the next listed date. This process was repeated until 30 electronic health records (EHRs) were reviewed. Randomization was not stratified by age or gender or any other variable. The number of EHRs was selected to meet the power analysis demands for the primary aim of this study's parent project (Mello et al., 2018).

EHR Abstraction Protocol

Each participating center designated a primary and secondary reviewer responsible for abstracting 30 randomly selected EHRs. Reviewers received training in the EHR abstraction protocol through a webinar by the coordinating research center prior to chart review. Reviewers were instructed to select the appropriate patient encounter, then to review the laboratory results section of the EHR, followed by the discharge summary note, tertiary survey trauma history, and physical examination notes, trauma service physician and nursing notes, and consult notes (social work and other services). Reviewers followed this sequence for each EHR until results of both laboratory results and a validated screening tool were found or until all designated portions of the EHR were reviewed. This sequence was developed and pilot tested by the coordinating research center for accuracy and ease of use prior to implementation.

At each center, the primary and secondary data reviewers completed the first EHR abstraction together. Subsequently, the primary EHR reviewer collected data from the remaining 29 records. To ensure reliability, secondary reviewers independently abstracted data from 10% of the records. The coordinating research center monitored submissions and provided interrater reliability feedback. Each site submitted all de-identified EHR data via REDCap electronic data collection software

(Harris et al., 2009). Data collected included the following demographic elements: year of admission, year of birth, sex, race, ethnicity, preferred language, and health insurance status. Data points related to SBIRT included biologic screening, AOD screening tool (e.g., CRAFFT, any other validated screening tools, and specific AOD questions) and result(s) of the screen(s) if applicable. If two or more AOD screening results were recorded, use of the validated screening questionnaire took precedence over single nonvalidated AOD questions (e.g., do you drink alcohol?), and positive screen results took precedence over negative results (e.g., positive biologic test took priority over a negative screening tool).

Data Analysis

Data were imported into SAS (Version 9.4, Carey, NC) for analysis. There were no missing data for patient demographic characteristics, and patient records that indicated that a screening test (biologic or standardized test) was conducted had no missing data for screening results. Descriptive data were reported using means with standard deviation and proportions with 95% confidence intervals (CIs). Differences in frequency and type of screening approaches used, and results of AOD screening were analyzed using Fisher's exact test. Given the small sample per center (n = 30), analyses were conducted using the total sample (N = 300), collapsing across centers. Agreement between reviewers at each site was calculated and reported as Cohen's κ, a metric of rater agreement that adjusts for chance, with 95% CIs. Identification of positive biologic screens via UDS was restricted to marijuana and cocaine to prevent inflation of estimate for illicit substance use, as it was not possible to determine whether other drug types (e.g., opioids, stimulants, and benzodiazepines) may have been given therapeutically or taken illicitly. Although the CRAFFT assesses frequency of alcohol, marijuana, and other drug use, these items do not add to the total CRAFFT score and are inconsistently reported in the EHR. Thus, we report CRAFFT frequency items as binary, noting the rates of adolescents who reported any AOD use over the past year.

TABLE 1 Characteristics of Patient Sample (N = 300)

Characteristic	n (%)
Sex	
Female	80 (26.7)
Age group (years)	
12–13	48 (16.0)
14–15	114 (38.0)
≥16	138 (46.0)
Race	
White	206 (68.7)
Black/African American	41 (13.7)
Other	11 (3.6)
Unknown	42 (14.0)
Ethnicity	
Hispanic	58 (20.0)

RESULTS

The participating pediatric trauma centers ranged in an annual pediatric volume from 96 to 462. As shown in Table 1, the majority of randomly selected patients were male (73.3%; 95% CI: ±5), age ≥ 16 years (46%; 95% CI: ±10.1), White (68.7%; 95% CI: ±5.3), and non-Hispanic (80%; 95% CI: ±4.5). Screening rates varied substantially across centers from 5 (16.7%) to 28 (93.3%) of the 30 extracted charts. In total, 159 patients (53%; 95% CI: ±5.6) across centers had documentation of screening, with a mean of 1.51 (SD = 0.71; range 1–3) screening tests conducted on patients per admission. The most frequent screening type documented was BAC (N = 80, 35.2% of all screens), followed by the CRAFFT (N = 79, 26.3%), and then the UDS (N = 77, 25.6%).

Table 2 shows the frequency of positive AOD drug identification using the three screening types. Of 77 patients with documented biologic UDS, 23 had positive

TABLE 2 Substance Screening Type, Frequency, and Results

Screening Type	Frequency Administered n (%)	Positive Results n (%)
Biologic test		
Urine drug screen	77 (25.7)	25 (32.5)[a]
Serum drug screen	0	N/A
Blood alcohol concentration	80 (26.7)	11 (13.8)
Validated questionnaires	79 (26.3)	11 (13.9)

[a]*Administered tests.*

results for marijuana (32.5%; 95% CI: ±10.5), one had a positive result for cocaine (2.6%; 95% CI: ±3.5), and one had positive results for both cocaine and marijuana use (2.6%; 95% CI: ±3.5). The BAC test identified 11 patients as positive for recent alcohol use (13.8%; 95% CI: ±8.1). Of 79 patients who received the CRAFFT, 11 were CRAFFT positive (13.9%; 95% CI: ±7.3): five had positive results for alcohol, 10 for marijuana (four conjoint alcohol and marijuana), and one for other substances. The CRAFFT identified marijuana use in six patients with negative UDS, and alcohol use in three patients with negative BAC levels.

Among the 159 patients screened with any validated measure, 19 (11.9%) had documentation of comprehensive screening with BAC, UDS, and a validated questionnaire. We examined differences between these patients and other patients with partial screening (either only BAC, or UDS, or only validated questionnaire). There was no significant difference in comprehensive screening rates by age (12–13 years 10% vs. 14–15 years 14.6% vs. 16 years or older 12%; $\chi^2(2) = 0.33$, $p = .85$), sex (male 14.6% vs. female 8.5%, $\chi^2(1) = 1.07$, $p = .30$), race (White 16.7% vs. Black/African American 0%, vs. other 6.3%, $\chi^2(2) = 4.98$, $p = .08$), or ethnicity (Hispanic 15.2% vs. non-Hispanic 12.6%, $\chi^2(1) = 0.14$, $p = .71$). Examining across centers, only five (50%) conducted comprehensive screening with at least one patient. One of the five centers administered 11 of the 19 (57.9%) comprehensive screenings, highlighting significant differences in screening practices across centers.

As shown in Table 3, there were no significant differences in receiving any AOD screen by patient demographic characteristics. However, there were significant differences by age group when examining the types of screening used. Relative to older adolescents (≥16 years), adolescents in the youngest age group (12–13 years) were screened significantly less often by UDS (26.6% vs. 59.6%; $\chi^2(2) = 10.8$, $p = .01$), and significantly more often via the CRAFFT (48.3% vs. 23.1%; $\chi^2(2) = 10.8$, $p = .01$).

Interrater agreement between reviewers at each center was calculated across two main categories: demographic data (age, biologic sex, race, and ethnicity) and screening data (conducted and type). The overall κ values for demographic and screening data were 0.99 (95% CI: 0.98, 1), and 0.98 (95% CI: 0.96, 1), respectively, indicating excellent agreement between rater pairs.

TABLE 3 Characteristics of Positive Screening Results

Characteristic	%	Statistic
Sex		
Female vs. male	58.4 vs. 46.8	$\chi^2(1) = 3.3$, $p = .07$
Age group (years)		
12–13	41.7	$\chi^2(2) = 2.5$, $p = .22$
14–15	48.3	
≥16	54.4	
Race		
White	49.5	$\chi^2(2) = 4.3$, $p = .12$
Black/African American	39.1	
Other/Unknown	60.4	
Ethnicity		
Hispanic vs. non-Hispanic	56.9 vs. 47.8	$\chi^2(1) = 1.52$, $p = .28$

DISCUSSION

In this sample of 12- to 17-year-old adolescent patients, we found that only 53% had any type of AOD screening completed during their trauma admission. This finding of low screening rates is consistent with older studies conducted at pediatric trauma centers (Johnson et al., 2014; Robinson, Tarzi, Zhou, & Bailey, 2020). Furthermore, the best practice of administering both biologic screening via BAC and UDS for acute use, and a validated questionnaire to assess more distal use, was done in only a minority of patients (12.7%) with the majority of this comprehensive screening occurring at one of the study's 10 centers. Relying only on biologic screening has also been previously reported in national survey data from pediatric hospitals treating injured adolescents (Schweer, 2009). We found several patients who were negative on biologic testing but positive when questioned with a validated questionnaire. This has been documented in other studies of adolescent trauma patients (Johnson et al., 2014) and reinforces the need for comprehensive screening. This comprehensive approach has been previously advocated by the Pediatric Trauma Society Guidelines Committee (Kelleher et al., 2013). It is concerning that despite recommendations for universal alcohol screening of trauma patients, this study suggests that screening continues to be inconsistently administered to admitted adolescent patients.

When examining the differential frequency of screening by patient demographic characteristics, there were no differences based on age, sex, race, or ethnicity. This may reflect our limited sample size but provides encouraging data that when screening is completed, it is done systematically. However, when examining partial screening via one or two methods, there were significant differences by age, with the youngest patients more likely to be screened by validated questionnaires and less likely to receive UDS.

Barriers exist that can influence the successful implementation of SBIRT with adolescent trauma patients (Noffsinger & Cooley, 2012). Prior work demonstrates that institutional policy regarding screening adolescent trauma patients can improve screening rates (Mello et al.,

2013); the current results suggest that a policy requiring comprehensive screening via laboratory testing and validated screening tools may be necessary to improve the quality of universal screening. Furthermore, previously identified barriers to screening at pediatric trauma centers, including the need for staff training and support for the implementation of screening, can be improved when championed by a member of the institution's trauma service leadership (Mello et al., 2013).

Consistent with other epidemiological data (Bromberg et al., 2019; Ehrlich et al., 2010; Johnson et al., 2014; Nicolson, Lank, & Crandall, 2014; Noffsinger et al., 2019; Robinson et al., 2020), we found rates of AOD use varying from 13.8% to 32.5% among admitted adolescents. The low rate of screening across centers highlights a missed opportunity to intervene with these at-risk youth and prevent further escalation of AOD use. This could be accomplished through brief interventions during the inpatient trauma stay by social work/mental health staff or referral for ongoing primary care monitoring or more intensive treatment for those found to have severe alcohol or drug use. Understanding the differences that lead to success or failure in implementing pediatric trauma AOD screening is needed to inform clinical practice.

Limitations

Our study had several limitations. Most notably, it was nested within a larger study and was not powered to detect differences by patient characteristics or between sites. In addition, our conclusions are limited by the quality of data in the EHR. We can only report on screening documented in the EHR, which could underestimate actual screening. Although our use of data from 10 pediatric trauma centers improves the generalizability of findings, we invited centers to participate in the parent trial, so they may not be representative of all pediatric trauma centers. However, the centers are diverse in their location, and pediatric trauma volume, and our findings are consistent with what has previously been reported in U.S. and Canadian pediatric trauma centers (Mello et al., 2013; Robinson et al., 2020).

CONCLUSIONS

In summary, we found AOD screening in general and comprehensive screening, in particular, are both underutilized for adolescents admitted to pediatric trauma centers. More research is warranted on how best to utilize the opportunity of a trauma admission to ensure comprehensive screening of adolescent AOD use and provide intervention for those with positive screens.

Acknowledgments

We thank Pina Violano RN, PhD, for her contributions to this project and her review of an earlier version of this manuscript.

KEY POINTS

- Screening rates varied substantially across centers from 16.7% to 93.3%.
- The most frequent screening type documented was BAC followed by the CRAFFT.
- AOD screening is underutilized for adolescents admitted to pediatric trauma centers.

REFERENCES

American Academy of Pediatrics. (2010). Policy statement—alcohol use by youth and adolescents: A pediatric concern. *Pediatrics*, *125*(4), 1078–1087.

American College of Emergency Physicians. (2011). *Alcohol screening in the emergency department policy statement.* Retrieved from http://www.acep.org/Content.aspx?id=29074

American College of Surgeons Committee on Trauma. (2014). *Resources for the optimal care of the injured patient.* Chicago, IL: Author.

Bromberg, J., Spirito, A., Chun, T., Mello, M. J., Casper, T. C., Ahmad, F., … Pediatric Emergency Care Applied Research Network. (2019). Methodology and demographics of a brief adolescent alcohol screen validation study. *Pediatric Emergency Care*, *35*(11), 737–744. doi:10.1097/PEC.0000000000001221

Ehrlich, P. F., Maio, R., Drongowski, R., Wagaman, M., Cunningham, R., & Walton, M. A. (2010). Alcohol interventions for trauma patients are not just for adults: Justification for brief interventions for the injured adolescent at a pediatric trauma center. *Journal of Trauma*, *69*(1), 202–210. doi:10.1097/TA.0b013e3181df646a

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap): A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, *42*(2), 377–381.

Johnson, K. N., Raetz, A., Harte, M., McMahon, L. E., Grandsoult, V., Garcia-Filion, P., & Notrica, D. M. (2014). Pediatric trauma patient alcohol screening: A 3 year review of screening at a Level I pediatric trauma center using the CRAFFT tool. *Journal of Pediatric Surgery*, *49*(2), 330–332. doi:10.1016/j.jpedsurg.2013.10.012

Kann, L., McManus, T., Harris, W. A., Shanklin, S. L., Flint, K. H., Queen, B., … Ethier, K. A. (2018). Youth risk behavior surveillance—United States, 2017. *MMWR Surveillance Summaries*, *67*(8), 1–114.

Kelleher, D. C., Renaud, E. J., Ehrlich, P. F., & Burd, R. S., & Pediatric Trauma Society Guidelines Committee. (2013). Guidelines for alcohol screening in adolescent trauma patients: A report from the Pediatric Trauma Society Guidelines Committee. *The Journal of Trauma and Acute Care Surgery*, *74*(2), 671–682. doi:10.1097/TA.0b013e31827d5f80

Knight, J. R., Sherritt, L., Harris, S. K., Gates, E. C., & Chang, G. (2003). Validity of brief alcohol screening tests among adolescents: A comparison of the AUDIT, POSIT, CAGE, and CRAFFT. *Alcoholism, Clinical and Experimental Research*, *27*(1), 67–73. doi:10.1097/01.ALC.0000046598.59317.3A

Knight, J. R., Shrier, L. A., Bravender, T. D., Farrell, M., Vander Bilt, J., & Shaffer, H. J. (1999). A new brief screen for adolescent substance abuse. *Archives of Pediatrics & Adolescent Medicine*, *153*(6), 591–596.

Levy, S. J., & Williams, J. F., & Committee On Substance Use and Prevention. (2016). Substance use screening, brief intervention, and referral to treatment. *Pediatrics*, *138*(1), e20161211. doi:10.1542/peds.2016-1211

Levy, S., Weiss, R., Sherritt, L., Ziemnik, R., Spalding, A., Van Hook, S., & Shrier, L. A. (2014). An electronic screen for triaging

adolescent substance use by risk levels. *JAMA Pediatrics*, *168*(9), 822–828. doi:10.1001/jamapediatrics.2014.774

Mello, M. J., Becker, S. J., Bromberg, J., Baird, J., Zonfrillo, M. R., & Spirito, A. (2018). Implementing alcohol misuse SBIRT in a national cohort of pediatric trauma centers—a type III hybrid effectiveness-implementation trial. *Implementation Science*, *13*(1), 35. doi:10.1186/s13012-018-0725-x

Mello, M. J., Bromberg, J., Baird, J., Nirenberg, T., Chun, T., Lee, C., & Linakis, J. G. (2013). Translation of alcohol screening and brief intervention guidelines to pediatric trauma centers. *The Journal of Trauma and Acute Care Surgery*, *75*(4, Suppl. 3), S301–S307. doi:10.1097/TA.0b013e318292423a

National Institute on Alcohol Abuse and Alcoholism. (2011). *Alcohol screening and brief intervention for youth: A practitioner's guide*. Retrieved from www.niaaa.nih.gov/YouthGuide

National Institute on Drug Abuse. (n.d.). *Laboratory evaluation: Testing for alcohol and substance use*. Retrieved from https://www.drugabuse.gov/sites/default/files/files/LaboratryEvaluation.pdf

NIAAA. (2011). *Alcohol screening and brief intervention for youth: A practitioner's guide*. Retrieved from https://pubs.niaaa.nih.gov/publications/Practitioner/YouthGuide/YouthGuide.pdf

Nicolson, N. G., Lank, P. M., & Crandall, M. L. (2014). Emergency department alcohol and drug screening for Illinois pediatric trauma patients, 1999 to 2009. *American Journal of Surgery*, *208*(4), 531–535. doi:10.1016/j.amjsurg.2014.06.003

Noffsinger, D. L., & Cooley, J. (2012). Screening, brief intervention, and referral to treatment in the adolescent trauma population: Examining barriers to implementation. *Journal of Trauma Nursing*, *19*(3), 148–153. doi:10.1097/JTN.0b013e318261d38f

Noffsinger, D. L., Wurster, L. A., Cooley, J., Buchanan, L., Wheeler, K. K., Shi, J., & Groner, J. I. (2019). Alcohol and drug screening of adolescent trauma alert patients at a level 1 pediatric trauma center. *American Journal of Emergency Medicine*, *37*(9), 1672–1676. doi:10.1016/j.ajem.2018.11.043

Robinson, T., Tarzi, C., Zhou, X. G., & Bailey, K. (2020). Screening for alcohol and substance use in pediatric trauma patients: A retrospective review. *Journal of Pediatric Surgery*, *55*(5), 921–925. doi:10.1016/j.jpedsurg.2020.01.042

Schweer, L. H. (2009). Pediatric SBIRT: Understanding the magnitude of the problem. *Journal of Trauma Nursing*, *16*(3), 142–147. doi:10.1097/JTN.0b013e3181b9e0ee

Terrell, F., Zatzick, D. F., Jurkovich, G. J., Rivara, F. P., Donovan, D. M., Dunn, C. W., … Gentilello, L. M. (2008). Nationwide survey of alcohol screening and brief intervention practices at US Level I trauma centers. *Journal of the American College of Surgeons*, *207*(5), 630–638. doi:10.1016/j.jamcollsurg.2008.05.021

Instructions:

- Read the article. The test for this CE activity is to be taken online at NursingCenter.com.
- You will need to create (it is free!) and login to your personal CE Planner account before taking online tests. Your planner will keep track of all your Lippincott Professional Development online CE activities for you.
- There is only one correct answer for each question.
- A passing score for this test is 14 correct answers. If you pass, you can print your certificate of earned contact hours and access the answer key. If you fail, you have the option of taking the test again at no additional cost.
- Questions? Contact Lippincott Professional Development: 800-787-8985.

Registration Deadline: December 2, 2022

Provider Accreditation:

LPD will award 1.5 contact hours for this continuing nursing education activity.

LPD is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 1.5 contact hours. Lippincott Professional Development is also an approved provider of continuing nursing education by the District of Columbia, Georgia, and Florida #50-1223. Your certificate is valid in all states.

Disclosure Statement:

The authors and planners have disclosed that they have no financial relationships related to this article.

Payment and Discounts:

- The registration fee for this test is FREE for STN members and $17.95 for nonmembers.
- STN members can take JTN CE for free using the discount code available in the members-only section of the STN website. Use the discount code when payment is requested during the check-out process.

DOI: 10.1097/JTN.0000000000000548