

Impact of an Opioid Use Disorder Consult Service on Hospitalized Trauma Patients with Opioid Use Disorder

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Author Contribution Statement

MM, MA, and GW performed the literature review. All authors contributed to study design. MM, MA and GW performed the data collection and analysis. MM, MA, and GW contributed to data interpretation and writing of the manuscript. All authors contributed to critical revision.

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Abstract

Background. Opioid use disorder (OUD) is common in the hospitalized trauma population, being a comorbid diagnosis in ~1% of operative trauma cases. The impact of an addiction consult service (ACS) in this population has been less well-studied, but may lead to increased provision of evidence-based OUD treatment and improved post-discharge outcomes.

Methods. One hundred thirteen patients with an ICD diagnosis of OUD who were admitted to the trauma service at a single academic hospital between January 2020–December 2021 were included in a retrospective chart review. Wilcoxon rank-sum tests were used to evaluate differences between patients who received an OUD consult and those who did not. Regression analysis was used to assess differences in post-discharge acute care utilization, attendance of follow-up appointments, initiation of and discharge on medication for opioid use disorder (MOUD), naloxone prescribing at discharge, and length of stay (LOS) between the consult and no-consult groups.

Results. Eighty-one patients in the study population received a consult and 32 did not. Patients in the consult group were more likely to have started MOUD during their admission (OR = 2.09, $P < .001$), to be discharged with naloxone (OR = 1.89, $P < .001$), to have a plan in place for continued OUD treatment at discharge (OR = 1.43, $P < .001$), and to attend scheduled follow-up appointments with the trauma team (OR = 1.76, $P = .02$). Differences in acute care utilization and LOS between the two groups were not statistically significant.

Conclusions. An OUD consult service can provide benefit to hospitalized trauma patients by increasing likelihood of starting MOUD, of discharging with MOUD and naloxone, and of attending trauma follow-up appointments without increasing LOS or acute care utilization. Thus, ACS interventions during hospital admissions for trauma may serve to facilitate both evidence-based OUD care and post-hospitalization trauma care.

Level of Evidence. Level IV, Therapeutic/Care Management

Keywords: opioid use disorder, addiction, addiction consult service, trauma co-management

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Introduction

Amid an unrelenting opioid epidemic, opioid-related morbidity and mortality in the United States continues to rise. Overdose deaths have risen by 60% between 2019 and 2021, with over 80,000 opioid overdose deaths estimated in 2021.¹ However, it has been estimated that 86.6% of individuals with opioid use disorder (OUD) in 2019 were not receiving evidence-based treatment, which includes medications for opioid use disorder (MOUD).² Specifically among hospitalized trauma patients, OUD is quite prevalent, representing a comorbid diagnosis in at least 1% of operative trauma cases in the US between 2010-2018.³ Further, OUD is associated with higher readmission rates in this population.⁴ Adequately controlling acute pain while managing comorbid OUD or opioid withdrawal may be additionally challenging. This population is also demographically different and more complex; trauma populations with OUD tend to be younger, to have more medical comorbidities, and to be of lower socioeconomic status than their counterparts without OUD.⁵

An addiction consult service (ACS) is a tool to improve care for hospitalized patients with OUD. An ACS can provide MOUD (i.e., methadone, buprenorphine, and naltrexone), harm reduction (i.e., naloxone and counseling on safer drug use practices), and linkage to substance use treatment in the community. Addiction consult services are associated with improved patient and provider experience, increased evidence-based treatments, more days of abstinence following discharge, increased participation in outpatient substance use treatment, and decreased all-cause mortality at 90 days.⁶⁻¹² Patients with substance use disorders, such as OUD, may not have robust access to primary care services and thus may be more likely to interface with the healthcare system in the acute care setting, making hospitalization a key event, a “reachable

moment”, during which they can be linked to community resources.¹³ However, amongst hospitalized patients, patients with OUD admitted to trauma services have been less well studied.

Recognizing and addressing addiction during a trauma hospitalization has several potential benefits. It has been shown that trauma patients with OUD who are started on buprenorphine in the hospital setting are at least as likely to attend outpatient substance use treatment appointments as patients admitted for a non-trauma complaint, solidifying the idea that a hospital admission for trauma is a key opportunity to connect patients to addiction treatment.¹⁴

Additionally, shared management among different medical specialties in the care of trauma patients with specific risk factors or comorbidities has been shown to improve outcomes for trauma patients. Geriatrician co-management in elderly patients presenting with traumatic injury has been shown to decrease mortality, as well as improve rates of discharge directly to home.^{15,16} The involvement of a designated, internal medicine-trained “trauma hospitalist” in a trauma team has also been shown to decrease mortality and readmission rates in medically complex patients.¹⁷ More specific to addiction, the inclusion of a psychiatrist on trauma rounds resulted in a 10% increase in psychiatry consults for trauma patients with substance use disorders such as OUD.¹⁸

Given the demonstrated efficacy of ACS across other patient populations and the efficacy of co-management paradigms in trauma treatment, ACS intervention among trauma patients with OUD merits further exploration. A comparison of outcomes between hospitalized trauma patients with OUD receiving an ACS consult and those who do not receive a consult has not, to our knowledge, been previously explored.

This study aimed to assess the impact of an OUD-specific ACS for trauma patients with OUD at an urban, academic level I trauma center through a retrospective cohort study of all trauma patients with a documented diagnosis of OUD admitted between January 2020 and December 2021. The primary aim was to compare the rates of post-discharge care utilization (emergency department (ED) visits and hospital readmissions) within 30 and 90 days post-discharge for trauma patients with OUD who received a consult versus those who did not. Secondary outcomes included induction of MOUD during hospitalization, discharge with a plan for outpatient MOUD, discharge with naloxone, length of stay, and attendance of scheduled follow-up appointments.

Methods

Setting. The Opioid Use Disorder Consult Service at the study institution was launched in late 2019. Developed in response to the urgent clinical need to improve care for hospitalized patients with OUD and increases in opioid-related morbidity and mortality in the surrounding metropolitan area, the consult service provides harm reduction education, withdrawal management, and initiation of MOUD to hospitalized patients with a diagnosis of OUD. Bridging scripts for up to one month of buprenorphine-naloxone, to last until the patient's outpatient substance use follow-up appointment, can be provided through our discharge pharmacy. The OUD consult service can also facilitate direct delivery of naloxone and fentanyl test kits to the bedside; while naloxone is available at pharmacies in many states through a standing order, this paradigm of direct delivery through our discharge pharmacy decreases barriers, such as stigma, that may be faced when obtaining it.¹⁹ Further, the service provides linkage to community-based treatment referral partners after discharge for continuity of OUD care.

The OUD consult service consists of three attending general internal medicine physicians and an advanced practice nurse with specific interest and additional training in addiction medicine, a consultative pharmacist, and rotating medical students and residents. Forty to sixty new inpatient consults are requested monthly. The decision to consult the OUD service is at the discretion of the primary team.

The study institution is a Level I trauma center, with twelve fellowship-trained trauma surgeons on faculty. The center is also home to fellowships in trauma and surgical critical care. The center's catchment area is 200 miles. Over the course of the study period, the service encountered 7,898 adult trauma activations with 4,900 total admissions.

Data Collection. Information relating to patients' trauma events and substance use patterns was collected using a REDCap instrument.^{20,21} Demographic information was obtained from the OUD service's data dashboard. This dashboard was developed and is maintained by a hospital employed data analyst in collaboration with the OUD consult team. The data populating the dashboard comes from the hospital's electronic health record (EHR) data warehouse, called EPIC Clarity, based on a query of OUD-related ICD-10 codes, OUD consult orders, and OUD consult notes within the EHR. The dashboard is hosted on the hospital's data visualization application, called Tableau, and updates automatically on a monthly basis. Data collected includes patient-reported race and ethnicity data, to assess whether there are differences in consult rates across racial and ethnic groups. Information regarding the mechanism of traumatic injury, as well as the injury severity score (ISS), was obtained from the trauma data registry. All other information, including post-discharge care utilization occurring at the study site, was

obtained via chart review. Outside hospital post-discharge utilization is not consistently available in our EHR and was not included in our analysis.

All charts were reviewed by the first author; charts that contained discrepancies or instances of unclear documentation were reviewed by both the first author and last author. A consensus was reached before the data in REDCap was finalized. The institutional review board at the study institution approved the project (IRB22-0714).

Statistical Analyses. Trauma patients with OUD were divided into the consult group or the non-consult group based on receipt of an OUD consult during admission. After assessing for normality using the Shapiro-Wilk test, the values for each of the variables assessed in the collection instrument were compared between the two groups using the Wilcoxon Rank Sum test ($\alpha = .05$). A logistic regression model ($\alpha = .05$) for each of the primary and secondary outcome variables was then created controlling for injury severity and active OUD status (defined as active opioid use, with or without being on MOUD; those on MOUD but not actively using were included in the study but were considered “in remission”).²²

The study methodology conforms to the STROBE recommendations for cohort studies as put forth by the Equator Network (Supplemental Digital Content, Appendix 1, <http://links.lww.com/TA/C934>).

Results

One hundred thirty-eight patients admitted to the institution’s trauma service between January 2020-December 2021 with evidence of OUD were identified. Of these, 25 patients were

excluded from the analysis because it was not possible to confirm if they met diagnostic criteria for OUD (defined as either active OUD, or OUD currently in remission on MOUD) on chart review ($N = 11$), the OUD service found no evidence of OUD during their consult ($N = 9$), they represented readmissions of the same patient after the index trauma event ($N = 3$), and due to unknown patient identity and therefore an inability to assess follow-up ($N = 2$) (Figure 1).

The study population had a median age of 52 years. Seventy-five patients (66.4%) identified as male, and 90 patients (79.6%) identified as Black or African-American. Ninety-two patients (81.4%) held Medicaid as their primary insurance. The median LOS was 6 days, and the median ISS score was 10. Other baseline and demographic characteristics are recorded in Table 1. Of the 113 patients included in the analysis, 81 received a consult (72%) and 32 (28%) did not. The consult population had greater median ISS and was less likely to be uninsured.

Eighty-one patients (72.3%) were admitted to the trauma service following a blunt trauma event (versus penetrating trauma). Ninety-four patients (83.2%) had active OUD on admission, and 33 patients (29.2%) were on MOUD prior to arrival. Other data relating to substance use, hospital course and discharge is found in Tables 2 and 3. The consult population was more likely to have active OUD and to have presented with penetrating trauma, while the non-consult population was more likely to be on MOUD prior to arrival, to have had no positive results on UDS, and to have been discharged to home. Of patients with active OUD whose substance use history was documented, 95.7% (88/92) patients reported using heroin, and 82.3% (65/79) of patients reported using intranasally. A greater proportion of patients in the consult group (100% for type and 97.3% for route) had this information documented than in the non-consult group (90.5% for type and 38.1% for route).

Among patients who received a consult, 12.3% (10/81 patients) utilized the study site's ED within 30 days of discharge, as compared to 0 in the non-consult group. When adjusted for injury severity and active opioid use, this difference was not statistically significant (adjusted OR = 1.24, $P = .0501$). Similarly, from 31-90 days post-discharge, 13.6% (11/81) of consult patients utilized the study site's ED as compared to 9.4% (3/32) of non-consult patients, a difference that was not statistically significant (adjusted OR = 1.17, $P = .28$) (Table 4). Hospital readmissions at the study site at 30 days and 31-90 days were also not statistically significant. At 30 days, 11.1% (9/81) of consult patients had been readmitted, as compared to 0 non-consult patients (adjusted OR = 1.21, $P = .07$). At 31-90 days, 4.9% (4/81) of consult patients were readmitted, as compared to 9.4% (3/32) of non-consult patients (adjusted OR = .91, $P = .46$) (Table 4).

Eighty patients, 64 in the consult group and 16 in the non-consult group, were eligible to receive MOUD induction during their admission (i.e., were not on MOUD prior to arrival). Those in the consult group were 2.09 times as likely ($P < .001$) to have started MOUD during their admission (52/64 patients, 81.3%) compared to 1/16 (6.3%) eligible non-consult patients (Table 5). Patients in the consult group were also 1.89 times more likely ($P < .001$) than those in the non-consult group to be discharged with naloxone; 74.1% of consult patients (60/81) had a discharge naloxone prescription, while 9.4% (3/32) of non-consult patients did. Additionally, patients in the consult group were 1.43 times as likely ($P < .001$) to have a plan in place for continued MOUD at discharge, defined as having a plan to return to a prior-to-arrival addiction treatment provider, a discharge bridging prescription for MOUD (buprenorphine-naloxone), or an intake appointment scheduled with an outpatient MOUD provider. Amongst the consult patients, 75.3% (61/81) had such a plan in place, while 50% (16/32) of non-consult patients did (Table 5).

Of those who had a scheduled follow-up appointment with the trauma surgery team, those who received a consult were also 1.76 times as likely ($P = .02$) to attend scheduled follow-up appointments with the trauma team (16/21 patients with scheduled appointments, 76.2%) than their non-consult peers (2/6, 33.3%) (Table 5). There was no statistically significant difference in likelihood between the two groups in attending all scheduled follow-up appointments with non-trauma surgical teams (adjusted OR = 1.10, $P = .57$). Adjusted LOS between the two groups was similar ($P = .07$) (Table 5).

Discussion

This study found that trauma patients who received an OUD consult had significantly increased rates of initiation of MOUD while in the hospital, discharge with naloxone, and a plan for outpatient MOUD, indicating that an OUD consult can act as a conduit to connect patients with harm reduction and treatment resources during hospitalizations for acute trauma events. An OUD consult did not significantly impact length of stay, 30-day acute care utilization, or 31-90-day acute care utilization. With significant numbers of individuals with OUD not receiving evidence-based treatment, an OUD consult service intervention to provide MOUD in hospital settings can help to close this gap for patients with trauma, without substantially increasing resource utilization.²³

The associated increase in likelihood of attending trauma follow-up appointments for patients receiving a consult in this study also demonstrates a potential benefit provided by the consult service. Attendance of trauma follow-up appointments has been shown to be important to full recovery from traumatic injury, as well as for continued receipt of physical rehabilitation services and referral to subspecialists as needed.²⁴ Of note, the number of patients in the study

who had appointments scheduled was small (27 across both groups, as compared to the total cohort size of 113). Instead, many patients were given strict return precautions and contact information if issues arose in lieu of a formal appointment.

Further, patients in the consult group were less likely to be discharged directly to home, and more likely to be discharged to a skilled nursing or subacute rehabilitation facility, than those who did not receive a consult. Prior research has shown that patients with OUD experience referral failure to post-acute care facilities at higher rates than their counterparts without OUD.²⁵ The increase in consult patients being successfully referred to post-acute care in this study may be explained in part by consult service involvement (i.e., optimization of opioid pain control and MOUD prior to discharge), although other factors, such as insurance status, merit further exploration.

The study period included the early months of the COVID-19 pandemic, which may have affected our results. Patients may have been less likely to receive consults at this time due to strains on hospital resources and staffing. During the 90-day follow-up window, patients may have also been less likely to present to the emergency department and to attend follow-up appointments due to concerns about COVID-19 exposure. This time period also coincides with the early months of the consult service's inception at the study site, when trauma providers may have been less aware of the service. Twenty patients out of 32 in the non-consult group had been admitted to the hospital during the first half of 2020, while 4 out of 81 in the consult group were seen in that time frame. Later in the study period, the consult to non-consult ratio shifted in favor of consults. Currently, the trauma service consults the OUD service on a higher percentage of their OUD patients compared to other admitting services.

Individuals may not have received consults if their drug use was not recognized as an active issue by the trauma team, as consults were at the discretion of the primary team. This could be due to shorter individual LOS or lower ISS (i.e., the patient was ready for discharge from the trauma standpoint prior to a consult being made), or due to lack of outward signs of OUD as clinically significant (for example, a patient showing no or minimal withdrawal symptoms, possibly due to receiving opioids for acute injuries). The American College of Surgeons' "Best Practices Guidelines: Screening and Intervention for Mental Health Disorders and Substance Use and Misuse in the Acute Trauma Patient," puts forth a paradigm of Screening, Brief Intervention, and Referral to Treatment (SBIRT) for managing substance use in patients admitted to trauma centers after experiencing traumatic injury.²⁶ These recommendations are well-aligned to encourage accessing an OUD consult. Once patients are screened by the primary team, a consult service can engage patients in brief intervention and referral to treatment as necessary. Further, patients demonstrating stability on outpatient MOUD may not have been perceived as needing a consult, as prior-to-arrival MOUD could be continued similar to other medications.

While not statistically significant, a greater proportion of individuals in the consult group (59.3%) were discharged with non-MOUD full-agonist opioids than those in the non-consult group (43.8%), even though similar proportions received opioids during hospitalization (92.6% and 90.6%, respectively). This may indicate that the OUD consult service can provide further benefit to trauma teams via input on managing co-occurring pain and OUD while patients are hospitalized, although further research controlling for variables such as injury severity and race/ethnicity (due to the potential for provider bias) is needed.^{27,28} Patients with OUD may experience withdrawal symptoms in addition to pain from injuries, and so the use and titration of

methadone and buprenorphine (both for pain and withdrawal management), as well as guiding use of full-agonist opioids, may help to achieve better pain control and lessen patient withdrawal-related discomfort.^{29,30} Provision of opioids for acute pain management in patients with OUD can be challenging, as these patients will likely require higher doses of opioids to maintain adequate pain control than those who are opioid-naïve.³¹

Additionally, while not statistically significant, receiving a consult was associated with higher numbers of ED visits within the study site, though this finding is limited by not being able to study utilization outside the study site. This may be associated with the higher proportion of patients in this group receiving follow-up care with the trauma team; patients may have been more likely to present internally rather than to an outside ED due to an ongoing therapeutic relationship with the trauma team. Further, those who received a consult may have felt less stigmatized regarding their drug use, and may have been more likely to present internally at the study institution.³² Additional research is needed to better understand potential reasons for these findings.

This study's findings are limited by the single-site nature of the study. Additionally, it was only possible to measure ED visits and readmissions that occurred within the study institution due to incomplete data about ED visits and readmissions from outside systems. Similarly, attendance at OUD-related follow-up appointments could not be tracked, as all referrals were made to outside institutions. However, previous research demonstrates that patients hospitalized for a trauma event are at least as likely as those hospitalized for other concerns to attend scheduled follow-up appointments addressing substance use disorders, including OUD.³³ Lastly, the analysis was limited due to sample size and homogeneity. The

sample was largely composed of individuals identifying as Black and who were insured via Medicaid. As a result, these findings may not be generalizable to other populations and institutions.

ODU consult services can facilitate evidence-based treatment for patients with OUD presenting with trauma by utilizing the “reachable moment” that hospitalization may offer. Similar to other consulting or co-management services, the involvement of an OUD provider during the hospital course of a trauma patient can help to optimize management and ultimately improve patient outcomes. Potential ways to augment reach that deserve further study include universal screening to identify more trauma patients with OUD, with automatic consults for those who screen positive, as well as the integration of a provider with OUD management experience into an interdisciplinary trauma team.

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Figure Legends

Figure 1. Participant Identification

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Supplemental Digital Content

Appendix 1 contains the STROBE Checklist for Cohort Studies.

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Figure 1

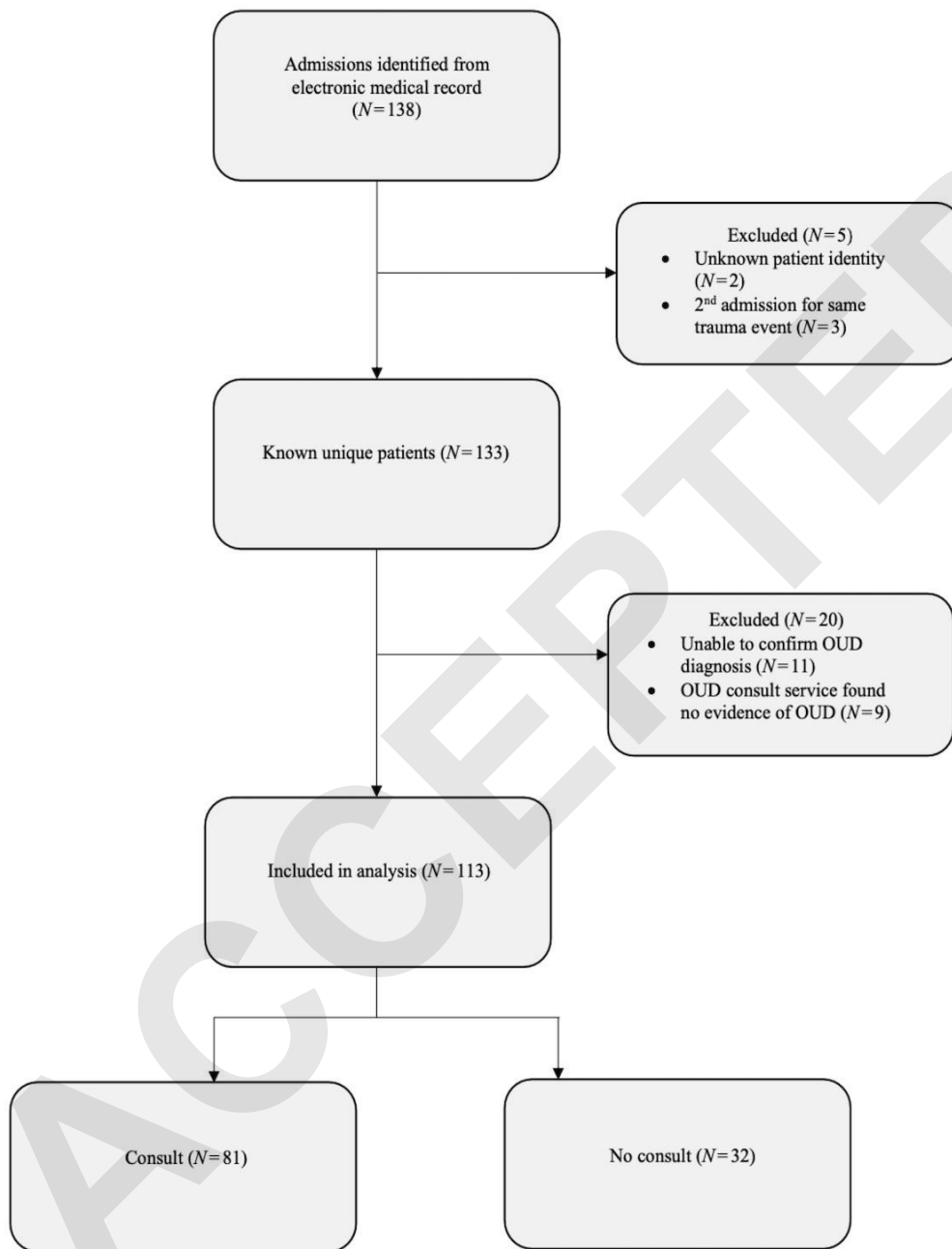


Table 1. Descriptive Statistics

Characteristics	Consult (N = 81)	No Consult (N = 32)	P-value ¹
Median age (IQR)	53 (20)	50.5 (12.25)	0.6902
Male	53 (65.4%)	22 (68.8%)	0.7407
Race			
White	14 (17.3%)	2 (6.3%)	0.1326
Black or African-American	63 (77.8%)	27 (84.8%)	0.4373
Multiracial	0 (0%)	2 (6.3%)	0.0247*
Unknown	4 (4.9%)	1 (3.1%)	0.6807
Ethnicity			
Hispanic or Latino	2 (2.5%)	3 (9.4%)	0.1113
Not Hispanic or Latino	77 (95.1%)	28 (87.5%)	0.1619
Unknown	2 (2.5%)	1 (3.1%)	0.8547
Primary insurance			
Private insurance	4 (4.9%)	1 (3.1%)	0.6807
Medicaid	69 (85.2%)	23 (79.1%)	0.1038
Medicare	7 (8.6%)	5 (15.6%)	0.2825
Uninsured or self-pay	1 (1.2%)	3 (9.4%)	0.0366*
Trauma type			
Penetrating	27 (33.3%)	4 (12.5%)	0.0240*
Blunt	54 (66.7%)	28 (87.5%)	
Trauma mechanism			
Gunshot wound	20 (24.7%)	1 (3.1%)	0.0083*
Assault ²	5 (6.2%)	1 (3.1%)	0.5222
Stabbing	7 (8.6%)	3 (9.4%)	0.9072
Motor vehicle collision	26 (32.1%)	16 (50.0%)	0.0780
Falls	7 (8.6%)	8 (25%)	0.0218*
Auto vs. pedestrian or bicycle	16 (19.8%)	3 (9.4%)	0.1874
Median ISS ³ (IQR)	13 (16)	5 (10.75)	0.0153*
OUD status			
Active OUD ⁴	73 (90.1%)	21 (65.6%)	0.0018*
In remission on MOUD	8 (9.9%)	11 (34.4%)	
On MOUD prior to admission	17 (21.0%)	16 (50%)	0.0024*

¹ P-values are derived from the Wilcoxon Rank Sum test; * denotes significance at $\alpha = 0.05$

² "Assault" refers to any assault other than a gunshot wound or stabbing

³ ISS: Injury Severity Score

⁴ Active OUD: active opioid use, with or without being on MOUD, versus those in remission (not using) on MOUD

Table 2. Results of Urine Drug Screen and Self-Reported Opioid Use

Urine Drug Screen Results	Consult (N = 81)	No Consult (N = 32)	P-Value ¹
Received UDS ² on admission	74 (91.4%)	29 (90.6%)	0.9072
Positives on UDS			
Opiates	60 (81.1%)	22 (75.9%)	0.5598
Methadone	29 (39.2%)	14 (48.3%)	0.4050
Amphetamines	4 (5.4%)	1 (3.4%)	0.6864
Cocaine	39 (52.7%)	9 (31.0%)	0.0490*
Phencyclidine	0	1 (3.4%)	0.1151
Benzodiazepines	25 (33.8%)	6 (20.7%)	0.1963
None	2 (2.7%)	4 (13.8%)	0.0322*
Self-Reported Opioid Use	Consult (N = 73) ³	No Consult (N = 21) ³	P-value
Type of Opioid Recorded ⁴	73 (100%)	19 (90.5%)	0.0085*
Heroin	70 (95.9%)	18 (94.7%)	0.8377
Fentanyl	5 (6.8%)	0	0.2483
Opioid medications (non-prescribed)	4 (5.5%)	1 (5.3%)	0.9804
Methadone (non-dispensed) ⁵	15 (20.5%)	0	0.0323*
Route of Use Recorded	71 (97.3%)	8 (38.1%)	<0.001*
Injection	13 (18.3%)	1 (12.5%)	0.6942
Intranasal	61 (85.9%)	4 (50%)	0.0126*
Pills	4 (5.6%)	1 (12.5%)	0.4641
Smoking	0	2 (25%)	<0.001*

¹ P-values are derived from the Wilcoxon Rank Sum test; * denotes significance at $\alpha = 0.05$

² UDS: Urine Drug Screen. Can include medications given for pain relief by emergency medical services, emergency department, or hospital providers prior to obtaining a UDS. Fentanyl was not reported on institutional UDS during the study period.

³ Numbers represent patients with active OUD (as noted in Table 1).

⁴ These numbers represent self-reported data. Given the prevalence of fentanyl in the illicit heroin supply, the actual number of patients using fentanyl is likely higher.

⁵ Patients receiving methadone as part of an opioid treatment program were not included under "Methadone (non-dispensed)."

Table 3. Hospital Course and Discharge

	Consult (N = 81)	No Consult (N = 32)	P-value ¹
One or more operative procedures	45 (55.6%)	10 (31.3%)	0.0206*
Opioids for pain relief during admission	75 (92.6%)	29 (90.6%)	0.7341
Discharge location			
Home	50 (61.7%)	26 (81.3%)	0.0478*
Skilled nursing or subacute rehabilitation facility	22 (27.2%)	3 (9.4%)	0.0415*
Self-directed discharge	6 (7.4%)	1 (3.1%)	0.4012
Psychiatric facility	3 (3.7%)	1 (3.1%)	0.8892
Jail	0	1 (3.1%)	0.1161
Discharged with opioids for pain relief	48 (59.3%)	14 (43.8%)	0.1382

¹P-values derived from Wilcoxon Rank Sum test; * denotes significance at $\alpha = 0.05$

Table 4. Post-Discharge Acute Care Utilization

	Consult (N = 81)	No Consult (N = 32)	Adjusted Odds Ratio ¹ (95% CI)	P-value ²
30-Day ED Visit	10 (12.3%)	0	1.24 (1.00-1.52)	0.0501
30-Day Readmission	9 (11.1%)	0	1.21 (0.99-1.48)	0.0713
31-90 Day ED Visit	11 (13.6%)	3 (9.4%)	1.17 (0.88-1.56)	0.2760
31-90 Day Readmission	4 (4.9%)	3 (9.4%)	0.91 (0.72-1.16)	0.4577

¹ Odds ratios are adjusted for ISS and active OUD status

² P-values are derived from logistic regression analysis, * denotes significance at $\alpha = 0.05$

Table 5. Receipt of MOUD and Naloxone, Follow-up Attendance, and Length of Stay

	Consult (eligible = 64)	No Consult (eligible = 16)	Adjusted Odds Ratio ¹ (95% CI)	P-value ²
In-Hospital MOUD Induction	52 (81.3%)	1 (6.3%)	2.09 (1.68-2.59)	<0.001*
	Consult (N=81)	No Consult (N= 32)	Adjusted Odds Ratio (95% CI)	P-value ²
Discharge with Naloxone	60 (74.1%)	3 (9.4%)	1.89 (1.58-2.26)	<0.001*
Plan for MOUD at Discharge	61 (75.3%)	16 (50%)	1.43 (1.18-1.72)	<0.001*
	Consult (N= 21)	No Consult (N= 6)	Adjusted Odds Ratio (95% CI)	P-value ²
Attended Trauma Follow-up	16 (76.2%)	2 (33.3%)	1.76 (1.13-2.74)	0.0201*
	Consult (N= 44)	No Consult (N= 15)	Adjusted Odds Ratio (95% CI)	P-value ²
Attended All Non-Trauma Follow-ups	23 (52.3%)	9 (60%)	1.10 (0.80-1.52)	0.5693
	Consult (N= 81)	No Consult (N= 32)	Linear Regression Coefficient (95% CI)	P-value ³
Median LOS (IQR)	7 (6)	3 (3.25)	2.74 (-0.21-5.70)	0.0713

¹ Odds ratios are adjusted for ISS and active OUD status

² P-values are derived from logistic regression analysis; * denotes significance at $\alpha = 0.05$

³ P-value derived from generalized linear modeling

STROBE Statement—Checklist of items that should be included in reports of *cohort studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	Abstract
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Abstract
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	1-2
Objectives	3	State specific objectives, including any prespecified hypotheses	2-3
Methods			
Study design	4	Present key elements of study design early in the paper	3-4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	3-4
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	3-4
		(b) For matched studies, give matching criteria and number of exposed and unexposed	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	3-4
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	3-4
Bias	9	Describe any efforts to address potential sources of bias	4
Study size	10	Explain how the study size was arrived at	3-4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	4
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	4
		(b) Describe any methods used to examine subgroups and interactions	4

		(c) Explain how missing data were addressed	N/A
		(d) If applicable, explain how loss to follow-up was addressed	N/A
		(e) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	4-5
		(b) Give reasons for non-participation at each stage	4-5
		(c) Consider use of a flow diagram	Figures
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	5
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) Summarise follow-up time (eg, average and total amount)	5
Outcome data	15*	Report numbers of outcome events or summary measures over time	5
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	5
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	6-7
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	8-9
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	6-10
Generalisability	21	Discuss the generalisability (external validity) of the study results	9-10

Other information

Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title Page
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*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at <http://www.strobe-statement.org>.

Impact of an Opioid Use Disorder Consult Service on Hospitalized Trauma Patients with Opioid Use Disorder

Opioid use disorder (OUD):

- Common in trauma patients
- Associated with higher rates of care utilization
- Hospitalization can be an opportunity to engage patients in treatment



OD Consult Service:

- Evidence-based OUD treatment
- Linkage to outpatient OUD care



OD Consult Service:

- Increased rates of medications for OUD (OR = 2.09, P<.001)
- Increased rates of trauma follow-up (OR = 1.76, P=.02)
- Did not increase acute care utilization

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