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Short Communication

Mental and substance use disorders among legal intervention injury cases in California, 2005–2014

Kriszta Farkas[a,*], Ellicott C. Matthay[a], Kara E. Rudolph[a,b], Dana E. Goin[a], Jennifer Ahern[a]

[a] Division of Epidemiology & Biostatistics, University of California, Berkeley School of Public Health, Berkeley, CA, USA
[b] Department of Emergency Medicine, University of California, Davis School of Medicine, Sacramento, CA, USA

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ABSTRACT

Police use of force is an important public health issue in the US. Recent high-profile incidents suggest a potential link between mental disorders and police use of force, however little research has examined their co-occurrence in the general population. We aimed to assess the overall association between specific mental and substance use disorders (MSUDs) and nonfatal legal intervention injury. We identified nonfatal legal intervention injury cases (n = 90,099) and MSUD diagnoses from all hospital and emergency department (ED) records in California between 2005 and 2014. Age-, sex-, and race-standardized MSUD prevalence estimates among legal intervention injury cases, stratified by inpatient status, were compared to general US population-based estimates from the National Comorbidity Survey Replication. Compared to the general US population, nonaffective psychoses, mood disorders, alcohol use disorders, and drug use disorders were substantially overrepresented among inpatient legal intervention injuries (prevalence difference [PD]: 19.2%, (95% confidence interval [CI]: 18.0, 20.4); PD: 15.3%, (95% CI: 13.9, 16.7); PD: 21.1%, (95% CI: 19.8, 22.4); PD: 29.7%, (95% CI: 28.4, 31.0), respectively). Associations for all except mood disorders were similar but attenuated among ED injury cases. In contrast, anxiety disorders were underrepresented in both inpatient and ED injury cases. Results for mood disorders and suicidal ideation were mixed. In summary, MSUDs characterized by more overt behavioral symptoms were substantially overrepresented among legal intervention injury cases. Findings support the potential importance of interventions to improve treatment and law enforcement recognition of such disorders. Additional research should disentangle the complex relationship between MSUDs and legal intervention injury.

1. Introduction

While incidents of police use of force in the US are not new, use of force by law enforcement has gained significant attention as a public health issue in the US (Krieger et al., 2015a; Cooper and Fullilove, 2016). Although some use of force may be necessary to ensure the safety of law enforcement and the public, research aimed at assessing the extent of the problem and identifying high-risk groups is important for ensuring that officers and agencies are held accountable and for informing public health and policy strategies. While use of force does not always lead to injury, and injuries due to law enforcement account for a small proportion of injuries overall in the US, the number of injuries due to law enforcement – particularly nonfatal injuries – is substantial. There were almost 6500 deaths due to injury by law enforcement in the US and almost 1.3 million nonfatal injuries due to law enforcement treated in US hospitals from 2001 to 2016 (Centers for Disease Control and Prevention National Center for Health Statistics, 2017; Centers for Disease Control and Prevention, 2003). Furthermore, the age-adjusted rates of both fatal and nonfatal injury due to law enforcement increased between 2001 and 2016 (Centers for Disease Control and Prevention National Center for Health Statistics, 2017; Centers for Disease Control and Prevention, 2003). Public health research to date on police use of force has largely focused on national trends and racial/ethnic disparities in deaths (Krieger et al., 2015b; Buehler, 2017). Far less is known about nonfatal injuries despite their much higher frequency and health system burden.

Recent high-profile deaths due to law enforcement of individuals suffering from mental illness suggest a potential link between mental disorder and injury due to law enforcement (Luca, 2016). Approximately 25 percent of firearm-related deaths due to law enforcement in the US from 2015 to 2017 involved individuals with suspected mental illness (Fatal Force Database, n.d.). However, little research has examined this intersection among nonfatal injuries. Improved understanding of contact between law enforcement and individuals with

* Corresponding author at: 2121 Berkeley Way, 5th Floor, University of California, Berkeley, Berkeley, CA 94720, USA.
E-mail address: kfarkas@berkeley.edu (K. Farkas).

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mental illness is critical given that law enforcement personnel are often the first responders to mental health crises (Lamb et al., 2002).

To date most research on the co-occurrence of mental and substance use disorders (MSUDs) and police use of force has used law enforcement agency data (Kaminski et al., 2004; Johnson, 2011; Morabito and Socia, 2015; Rossler and Terrill, 2017), which may be inaccurate due to reliance on officer perceptions and reporting of mental status and use of force (Alpert, 2015; Teplin, 1984; Alpert and Dunham, 2004). These studies have also typically included few jurisdictions, which limits generalizability of findings (Kaminski et al., 2004; Johnson, 2011; Morabito and Socia, 2015; Rossler and Terrill, 2017). To our knowledge, only two US-based epidemiologic studies have assessed the prevalence of specific MSUD diagnoses among injuries due to law enforcement (Holloway-Beth et al., 2016; Mills et al., 2018). While they reported co-occurrence between MSUDs and injuries, one was limited to 31 firearm-related injuries in Seattle, WA, 2010–2014 (Mills et al., 2018); the other included 836 injuries in Illinois, 2000–2009, that either resulted in hospitalization or were treated in outpatient trauma centers (Holloway-Beth et al., 2016). Thus, the findings may not be generalizable to other populations. Furthermore, neither study examined nonfatal injuries separately.

In this study, we aimed to assess the overall association between specific MSUDs and nonfatal injury due to law enforcement using California hospital and ED records from 2005 to 2014. We assessed the extent to which the prevalence of nonaffective psychoses, anxiety disorders, mood disorders, suicidal ideation, alcohol use disorders, and drug use disorders may be overrepresented among legal intervention injury cases compared to the general US population. Examining the overall association using a large population-based dataset is an important first step that can help inform strategies for reducing legal intervention injury.

2. Methods

We used statewide data from California's Office of Statewide Health Planning and Development on all inpatient hospitalizations and ED visits in California, between January 1, 2005 and December 31, 2014. ICD-9-CM external cause of injury codes (e-codes) and diagnostic codes were used to identify nonfatal legal intervention injuries and MSUD diagnoses, respectively (Appendix Table 1). The ICD defines legal intervention injuries as “injuries inflicted by police or other law-enforcing agents, including military on duty, in the course of arresting or attempting to arrest lawbreakers, suppressing disturbances, maintaining order, and performing other legal action” (Centers for Disease Control and Prevention National Center for Health Statistics and Centers for Medicare and Medicaid Services, 2007).

Analyses were restricted to adult nonfatal legal intervention injury cases 18 years and older to compare disorder prevalence estimates with general US adult population-based estimates from the National Comorbidity Survey Replication (NCS-R) (Kessler et al., 2005a; Harvard Medical School, 2007; Kessler et al., 2005b). The NCS-R is a nationally representative survey that captured specific MSUDs among adults in the US, 2001–2003, which map onto DSM-IV and ICD-10 criteria and definitions (Kessler et al., 2005c). Adults, ages 18 years and older, accounted for 91.5% of all nonfatal legal intervention injury cases in California over the study period.

For each MSUD, we calculated the percent of legal intervention injury cases with a documented disorder diagnosis in their inpatient or ED record. To account for important demographic characteristics associated with law enforcement encounter and use of force (Krieger et al., 2015b), we also standardized estimates by age, sex, and race for injury cases with complete demographic data, using the 2000 Census US population as the standard because it closely aligns with the NCS-R survey years. We then calculated prevalence difference (PD) estimates and 95% confidence intervals (CI) for statistical inference. Results were stratified by inpatient status (i.e., hospitalization vs. ED treatment) because MSUD prevalence may vary by injury severity and inpatient hospitalization may indicate more severe injury.

Recognizing that individuals may have been treated for legal intervention injuries on multiple occasions over the study period, we also performed analyses on the subset of patients present in our data only once. Results were consistent with those from the main analysis (Appendix Table 5). Further methodological details are presented in the appendix. Analyses were conducted using SAS version 9.3 (SAS Institute Inc., Cary, NC). The California Health and Human Services Agency and University of California, Berkeley Committees for the Protection of Human Subjects approved this study.

3. Results

Between 2005 and 2014, there were 90,099 adult patients treated for nonfatal legal intervention injury in California hospitals and EDs. Approximately 5.8% of cases were hospitalized. Compared to the general California and US populations, legal intervention injury cases were disproportionately male, young, and non-Hispanic Black (Table 1). The distribution of MSUDs by specific means of legal intervention injury and by primary diagnosis are presented in Appendix Tables 2 and 3. Annual MSUD prevalence, 2005–2014, is shown in Appendix Fig. 1a–b.

Overall, MSUDs were overrepresented among legal intervention injuries compared to the general US population; however, results varied by MSUD type and inpatient status (Table 2). The prevalence of nonaffective psychoses (PD: 19.2%, 95% CI: 18.0, 20.4), mood disorders (PD: 15.3%, 95% CI: 13.9, 16.7), alcohol use disorders (PD: 21.1%, 95% CI: 19.8, 22.4), and drug use disorders (PD: 29.7%, 95% CI: 28.4, 31.0) was substantially higher among inpatient legal intervention injury cases compared to the general US population. Suicidal ideation was slightly elevated (PD: 1.7%, 95% CI: 0.9, 2.5). In contrast, anxiety disorders were substantially underrepresented (PD: −12.0%, 95% CI: −13.5, −10.5). The prevalence of all disorders was substantially lower among ED injury cases compared to inpatient cases, but the pattern of association was generally similar, with the exception of mood disorders and suicidal ideation. All associations based on standardized prevalence estimates were statistically significant.

4. Discussion

We found that certain MSUDs, particularly nonaffective psychoses, alcohol use disorders, and drug use disorders, were substantially overrepresented among adults treated for nonfatal legal intervention injury in California hospitals and EDs from 2005 to 2014, compared to the general US adult population. Nonaffective psychoses are characterized by delusions and agitated body movements, among other symptoms (American Psychiatric Association, 2013). Similarly, individuals with substance use disorders may experience disturbances in perception, judgement, and psychomotor behavior (American Psychiatric Association, 2013). Thus, individuals with these disorders may exhibit behaviors perceived as resistant/hostile during law enforcement encounters. Research suggests that psychosis and substance use disorder, both individually and in combination, increase the risk of criminal offending and violent behavior (Swanson et al., 1997; Wallace et al., 1998). Individuals with mental illness are also more likely to resist and assault officers during encounters, which are both linked to increased injury risk (Morabito and Socia, 2015). Lastly, these disorders can also lead to more frequent law enforcement encounters through increased risk of victimization (Maniglio, 2009) and because law enforcement are often first responders to mental health crises (Lamb et al., 2002). Therefore, the combination of increased risk of police encounter and increased risk of actual or perceived resistant behavior during encounters may result in higher injury risk for these groups.

Whereas results for mood disorders and suicidal ideation were mixed by inpatient status, the prevalence of anxiety was substantially lower among both inpatient and ED legal intervention injury cases

Table 1
Demographic characteristics of adult nonfatal legal intervention injury cases in California, 2005–2014, and the general California and US adult populations, 2000.

Characteristic	Inpatient LI injury cases[a]	ED LI injury cases[a]	California[b]	US[b]
	N (%)	N (%)	N (%)	N (%)
Total	5267 (100)	84,832 (100)	23,848,000 (100)	201,672,000 (100)
Age (years)				
18–24	941 (17.9)	21,360 (25.2)	3,128,000 (13.1)	24,315,000 (12.1)
25–34	1502 (28.5)	28,701 (33.8)	5,091,000 (21.3)	38,899,000 (19.3)
35–44	1335 (25.4)	18,947 (22.3)	5,356,000 (22.5)	44,252,000 (21.9)
45–54	942 (17.9)	11,504 (13.6)	4,264,000 (17.9)	37,196,000 (18.4)
55–64	380 (7.2)	3434 (4.1)	2,583,000 (10.8)	24,013,000 (11.9)
65 and over	167 (3.2)	886 (1.0)	3,426,000 (14.4)	32,998,000 (16.4)
Sex				
Female	512 (9.7)	9425 (11.1)	12,216,000 (51.2)	104,965,000 (52.0)
Male	4755 (90.3)	75,334 (88.8)	11,632,000 (48.8)	96,707,000 (48.0)
Missing	0 (0.0)	73 (0.1)	N/A	N/A
Race/ethnicity				
Hispanic	1799 (34.2)	28,958 (34.1)	6,611,000 (27.7)	21,848,000 (10.8)
White, NH	2007 (38.1)	32,859 (38.7)	12,411,000 (52.0)	146,532,000 (72.7)
Black, NH	1040 (19.8)	14,595 (17.2)	1,418,000 (5.9)	21,784,000 (10.8)
American Indian, NH	16 (0.3)	455 (0.5)	125,000 (0.5)	1,315,000 (0.7)
Asian/Pacific Islander, NH	183 (3.5)	1849 (2.2)	2,726,000 (11.4)	7,388,000 (3.7)
Other/multiple races, NH	125 (2.4)	3615 (4.3)	557,000 (2.3)	2,806,000 (1.4)
Missing	97 (1.8)	2501 (3.0)	N/A	N/A

Abbreviations: LI: legal intervention. ED: emergency department. US: United States. NH: non-Hispanic.
[a] There were a total of 5323 and 85,495 legal intervention injury diagnoses among inpatient cases and ED cases, respectively.
[b] General California and US adult population characteristics are from the 2000 Census.

compared to the general US population. While research suggests that these disorders may also be linked to criminal offending and violence (Wallace et al., 1998), victimization (Maniglio, 2009; Silver et al., 2005), and more frequent police encounters during crises (Lamb et al., 2002), they are generally characterized by fewer overt symptoms (American Psychiatric Association, 2013). Thus, they may be missed more often in legal intervention injury cases, for whom injury is likely the primary reason for care, and particularly if they are treated in the fast-paced ED environment.

Nonaffective psychoses, mood disorders, alcohol use disorders, and drug use disorders were most strongly overrepresented among inpatient legal intervention injury cases. Because individuals with these disorders may exhibit behaviors that can be perceived as resistant/hostile, they may be more likely to experience injuries severe enough to require inpatient hospitalization rather than injuries treatable in outpatient ED settings. However, differences in disorder diagnosis between inpatient hospital services and fast-paced ED environments may also lead to under-diagnosis of MSUDs in ED records.

We used general US rather than California-specific population-based prevalence estimates as a comparison in this study. To our knowledge, while other sources such as the National Survey on Drug Use and Health (NSDUH) provide state-specific estimates of broader mental disorder categories (e.g., severe mental illness and any mental illness), they do not provide estimates for specific mental disorders. However, estimates

Table 2
Prevalence and prevalence difference estimates of mental and substance use disorders comparing adult nonfatal legal intervention injury cases in California, 2005–2014, and the general US population.

Disorder	Prevalence (%), LI injury cases		12-mo prevalence (%), US NCS-R	Prevalence difference, LI injury vs. US	
	Crude[a]	Standardized[b]		Crude % (95% CI)	Standardized % (95% CI)
Inpatient legal intervention injury cases					
Nonaffective psychosis	15.2	19.5	0.3	14.9 (13.8, 16.0)*	19.2 (18.0, 20.4)*
Anxiety disorder	4.9	7.1	19.1	−14.2 (−15.7, −12.7)*	−12.0 (−13.5, −10.5)*
Mood disorder	13.7	25.0	9.7	4.0 (2.8, 5.2)*	15.3 (13.9, 16.7)*
Suicidal ideation	4.0	5.0	3.3	0.7 (−0.09, 1.5)	1.7 (0.9, 2.5)*
Alcohol use disorder	22.3	24.2	3.1	19.2 (17.9, 20.5)*	21.1 (19.8, 22.4)*
Drug use disorder	31.7	31.1	1.4	30.3 (29.0, 31.6)*	29.7 (28.4, 31.0)*
Emergency department legal intervention injury cases					
Nonaffective psychosis	2.2	3.1	0.3	1.9 (1.5, 2.3)*	2.8 (2.4, 3.2)*
Anxiety disorder	1.1	2.6	19.1	−18.0 (−19.4, −16.6)*	−16.5 (−17.9, −15.1)*
Mood disorder	1.7	3.3	9.7	−8.0 (−8.7, −7.2)*	−6.4 (−7.2, −5.6)*
Suicidal ideation	0.7	1.3	3.3	−2.6 (−3.2, −2.0)*	−2.0 (−2.6, −1.4)*
Alcohol use disorder	11.0	11.3	3.1	7.9 (7.3, 8.5)*	8.2 (7.6, 8.8)*
Drug use disorder	7.3	6.2	1.4	5.9 (5.5, 6.3)*	4.8 (4.4, 5.2)*

Abbreviations: LI: legal intervention. US: United States. NCS-R: National Comorbidity Survey Replication. CI: confidence interval.
[a] Crude prevalence estimates are based on all legal intervention injury cases over the study period (inpatient: n = 5267; ED: n = 84,832). There were a total of 5323 and 85,495 legal intervention injury diagnoses among inpatient and emergency department cases, respectively.
[b] Sex-, age-, and race-standardized estimates are based on all legal intervention injury cases with complete demographic data over the study period (inpatient: n = 5170; ED: n = 82,266). There were a total of 5225 and 82,906 legal intervention injury diagnoses among inpatient and emergency department cases in this subset, respectively. The 2000 US Census population was used as the standard.
* $p < 0.05$.

of MSUD measures from the 2013–2014 NSDUH were similar for California and the US (Substance Abuse and Mental Health Services Administration Center for Behavioral Health Statistics and Quality, 2014), suggesting that a general US comparison group may be appropriate.

A general population comparison group may not be seen as appropriate if the study aim is to examine whether MSUDs are overrepresented among law enforcement encounters resulting in injury. Our aim was to examine the overall association between specific MSUDs and legal intervention injury, which incorporates both risk of encounter and risk of injury given encounter. While law enforcement encounter is a more proximal (and certainly necessary) cause of legal intervention injury, certain subgroups of the general population may be at increased risk of encounters. For example, individuals with severe mental illness suffering from periods of intense symptoms (e.g., a psychotic or manic episode) may be at particularly increased risk of law enforcement encounter. Thus, to estimate the overall association between MSUDs and legal intervention injury, we need a general population comparison group to allow for this disparate likelihood of encounter (Ross et al., 2018). Although this study does not distinguish the risk of encounter from the risk of injury given encounter for people with MSUDs, it is a valuable first step, with implications for policy and clinical practice. Symptoms associated with MSUDs likely play an important role in both pieces of this pathway. Therefore, our findings support the importance of research on interventions to improve treatment and law enforcement recognition of disorders most strongly associated with legal intervention injury. Furthermore, clinician knowledge of the relationship between MSUDs and legal intervention injury has implications for MSUD evaluation and treatment of patients receiving care for legal intervention injury in clinical settings. However, further research is needed to identity factors along the pathway that are most salient for public health and policy interventions.

This study has several limitations. First, while the NCS-R provides nationally representative prevalence estimates for specific MSUDs, MSUDs in the NCS-R were captured using a different process and for a different time period from that used among the legal intervention injury cases in this study (i.e., community-based survey, 2001–2003 vs. physician documentation and hospital coding/billing, 2005–2014). Second, misclassification of MSUDs and legal intervention injuries is possible in hospital administrative data. However, validation studies suggest that MSUDs are more likely to be underreported rather than overreported in hospital administrative data (Quan et al., 2008). Similarly, studies indicate that fatal legal intervention injuries are underestimated using ICD-10 mortality codes from death certificate data (Barber et al., 2016); limited research suggests that this may also be true for nonfatal legal intervention injuries in hospital administrative data, although validation studies are needed (Strote and Hickman, 2018). Finally, given the cross-sectional nature of the data, we cannot determine temporal ordering. Thus, while MSUDs may contribute to legal intervention injury risk, it could also be that experiences of legal intervention injury may lead to incident or exacerbated existing MSUD.

Despite these limitations, to our knowledge, this is the first study to assess the overall association between specific MSUDs and nonfatal legal intervention injury using a large, US population-based dataset. Further, our study used objective clinical measures of legal intervention injury and specific MSUD diagnoses, whereas prior research has largely relied on officer perceptions and reporting of use of force and mental status (Alpert, 2015; Teplin, 1984; Alpert and Dunham, 2004).

5. Conclusions

Study findings indicate a strong association between MSUDs characterized by overt behavioral symptoms and nonfatal legal intervention injury among adults. These findings support the importance of research on interventions to improve treatment and law enforcement recognition of MSUDs most strongly associated with legal intervention injury, as a means of reducing injuries. Further research is also needed to disentangle the complex relationship that likely exists between MSUDs and legal intervention injury to identify key points of intervention.

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Conflicts of interest

The authors have no conflicts of interest to report.

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