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Traumatic Brain Injury Among Newly Admitted Adolescents in the New York City Jail System

Fatos Kaba, M.A.^a, Pamela Diamond, Ph.D.^b, Alpha Haque, M.S.^a, Ross MacDonald, M.D.^a, and Homer Venters, M.D., M.S.^{a,*}

^aNew York City Department of Health and Mental Hygiene, Queens, New York

^bDivision of Health Promotion and Behavioral Sciences, University of Texas, Houston, Texas

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A B S T R A C T

Purpose: Relatively little is known about the prevalence of traumatic brain injury (TBI) among adolescents who come into contact with the criminal justice system.

Methods: We undertook screening for TBI among newly admitted adolescents in the New York City jail system using a validated TBI screening tool. A convenience sample of 300 male and 84 female screenings was examined.

Results: Screening revealed that 50% of male and 49% of female adolescents enter jail with a history of TBI. Incidence of TBI was assessed using patient health records, and revealed an incidence of 3,107 TBI per 100,000 person-years.

Conclusions: Elevated prevalence and incidence of TBI among incarcerated adolescents may relate to criminal justice involvement as well as friction in jail. Given the large representation of violence as a cause of TBI among our patients, we have begun focus groups with them to elicit meaningful strategies for living with and avoiding TBI.

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IMPLICATIONS AND CONTRIBUTION

The high prevalence and incidence of TBI among adolescents the New York City jail system may represent an important opportunity to rethink how to prevent adolescent entanglement with criminal justice, as well as how to manage adolescents' needs while incarcerated.

Traumatic brain injury (TBI) represents a significant source of morbidity and mortality among adolescents [1]. It represents a clinical entity with a largely social and familial impact and intervention. In correctional settings, high rates of TBI have been reported among adult inmates [2]. Traumatic brain injury has been identified as important variable in youth delinquency [3]. However, relatively little is known about the prevalence among adolescents in jail settings [4]. As part of an injury surveillance and reduction program begun in 2010, we undertook screening of adolescent inmates arriving in jail for the presence of TBI in 2012.

Methods

Traumatic brain injury prevalence was determined by screening newly arrived adolescent inmates using the Traumatic

Brain Injury Questionnaire. The screening queries patients about head injury history, with circumstances as symptoms graded by frequency and severity, yielding a Total Symptom Severity Scale (TSSS) and a Total Symptom Frequency Scale (TSFS) [5].

Over 12 months, a convenience sample of newly admitted, English-speaking adolescents (300 male and 84 female) were screened. Other data used in the analysis (TBI incidence, mental health services, recidivism, solitary confinement, and injuries) were abstracted directly from the jail electronic health records.

Analysis

Head injuries were categorized by group: (1) no head injury history or only one minimal/suspected injury; (2) multiple minimal or suspected head injuries but no loss of consciousness or posttraumatic amnesia; and (3) at least one injury with loss of consciousness and/or posttraumatic amnesia, which is the accepted definition of TBI. This analysis represented routine

* Address correspondence to: Homer Venters, M.D., M.S., NYC DOHMH, 42-09 28th Street, Queens, NY 11101.

E-mail address: Hventer1@health.nyc.gov (H. Venters).

Table 1
Traumatic brain injury prevalence

	No injury or one minimal injury but no altered state (n = 125)	Multiple minimal injuries (n = 68)	Traumatic brain injury (One or more injuries with altered mental state) (n = 191)	Total (N = 384)
Male	98	52	150 (50%)	300
Female	27	16	41 (49%)	84
Age (mean) (16–18 years)	17.0	17.2	17.2	17.1
Mental health diagnosis	45 (36.0%)	28 (41.2%)	102 (53.4%)**	45.6%
Reported head injuries, n ^a	.71	3.51**	5.36**	3.5
Assault-related injuries	20.8%	75.8%**	70.7%**	55.5%
Total Symptom Severity Scale (0–3.0) ^b	1.02	1.26*	1.70**	1.40
Total Symptom Frequency Scale (0–5.5) ^c	.96	1.43	2.07**	1.60
Ever injured in jail, all incarcerations	51.2%	50.0%	61.6%	56.2%
Recidivist	56.8%	65.2%	65.8%	62.7%
Ever in solitary confinement, all incarcerations	22.4%	21.2%	30.5%	26.2%

Differences among categories were determined by one-way analysis of variance, post hoc Tukey's test.

* $p < .05$.

** $p < .01$.

^a $F_{(2,378)} = 92.26; p < .001$.

^b $F_{(2,381)} = 25.26; p < .001$.

^c $F_{(2,380)} = 37.68; p < .001$.

public health surveillance and was thus exempt from institutional review board oversight.

Results

At least one head injury was reported by 259 (67.4%) of the 384 screened inmates. The most frequent injury circumstances were assault (55.5%) and fall-related (41%). A total of 125 inmates (32.5%) were in group 1, 68 (17.3%) in group 2, and 191 (49.7%) in group 3 (Table 1). Group 3 patients used significantly more in-jail mental health services and scored significantly higher on severity and frequency scales. Females in group 3 were significantly more likely to use mental health services (75.0% vs. 48.0%; $p = .002$), and TSSS and TSFS were significantly higher for girls in group 3 than for boys in the same group (TSSS: 2.2 vs. 1.56, $p < .0001$; and TSFS: 2.79 vs. 1.86, $p < .0001$). Males in group 3 were significantly more likely to recidivate than females (73.3% vs. 37.5%; $p < .0001$). Risk of head injury per 100,000 person-years for adolescents was 21,757, and of TBI was 3,107 (Table 2). A total of 26% of screened patients were ever in solitary confinement in their incarcerations.

Discussion

Our observation that approximately half of adolescents arriving in the New York City jail system have a history of TBI is well in excess of 32% reported elsewhere [6]. We observed that female adolescents in group 1 had significantly higher TSSS scores than males, which could reflect differences in the nature of their injuries or some contribution of non-TBI factors such as

mental health concerns. The incidence of TBI in our setting appears to be significantly higher than widely reported community rates (3,107 vs. 100–700 per 100,000 person-years) [7–9]. Internal data identify solitary confinement as associated with a higher rate of injury in our jail setting [10]. The observation that over a quarter of adolescents in our study were placed in solitary confinement during their incarcerations raises the concern that these environmental and personal variables may interact to heighten risk new TBI while in jail.

Two of the most common features of TBI, emotional dysregulation and processing speed, may be linked to criminal justice involvement as well as problems once in jail. We believe that educating all adolescents and health and correctional staff may be beneficial. Toward this end, we have begun educational sessions with adolescents focused on eliciting perceptions about violence, head injury, and health. We plan to expand these sessions to include health and security staff. Limitations of this analysis include difficulty in differentiating between TBI and substance abuse or mental health problems. In addition, the Traumatic Brain Injury Questionnaire has been validated among incarcerated adults, but not among incarcerated adolescents.

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Table 2
Traumatic brain injury incidence

	N	Risk per 100,000 person-years
Injuries	4,284	251,197
Head injuries	371 (8.6%)	21,757
Head injuries with altered states	53 (14.2%)	3,107

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