Solitary Confinement and Risk of Self-Harm Among Jail Inmates

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Self-harm is a prevalent and dangerous occurrence within correctional settings.[1] Inmates in jails and prisons attempt to harm themselves in many ways, resulting in outcomes ranging from trivial to fatal. Suicide is a leading cause of death among the incarcerated; however, suicide and suicide attempt represent a small share of all acts of self-harm.[2] The motivations of inmates who harm themselves are complex and often difficult to discern.[3] Inmates often arrive in correctional settings with significant preexisting mental illness and histories of self-harm, but they may also be influenced by environmental stressors within correctional settings or aim to avoid certain situations or punishments.[4]

Approximately one third of those admitted to the jail in New York City (NYC) receive care for mental health services during their incarceration, a proportion that has been increasing over time. Inmates who harm themselves become patients in the mental health service. Those who harm themselves while in solitary confinement may be diverted from that punitive setting to a therapeutic setting outside solitary confinement, which may provide an incentive for self-harm. The purpose of this analysis was to better understand the complex risk factors associated with self-harm and consider whether patients might be better served with innovative approaches to their behavioral issues.

METHODS

The NYC jail system is the nation's second-largest, representing an average daily population of approximately 12 000 persons and 80 000 annual admissions. Most inmates stay in this system for days to months while awaiting trial or serving relatively short sentences; those sentenced to longer prison terms are transferred to the New York State prison system.

Objectives. We sought to better understand acts of self-harm among inmates in correctional institutions.

Methods. We analyzed data from medical records on 244 699 incarcerations in the New York City jail system from January 1, 2010, through January 31, 2013.

Results. In 1303 (0.05%) of these incarcerations, 2182 acts of self-harm were committed, (103 potentially fatal and 7 fatal). Although only 7.3% of admissions included any solitary confinement, 53.3% of acts of self-harm and 45.0% of acts of potentially fatal self-harm occurred within this group. After we controlled for gender, age, race/ethnicity, serious mental illness, and length of stay, we found self-harm to be associated significantly with being in solitary confinement at least once, serious mental illness, being aged 18 years or younger, and being Latino or White, regardless of gender.

Conclusions. These self-harm predictors are consistent with our clinical impressions as jail health service managers. Because of this concern, the New York City jail system has modified its practices to direct inmates with mental illness who violate jail rules to more clinical settings and eliminate solitary confinement for those with serious mental illness. (*Am J Public Health.* 2014;104: 442–447. doi:10.2105/AJPH.2013.301742)

Within the NYC jail system, the Bureau of Correctional Health Services (CHS) of the NYC Department of Health and Mental Hygiene is responsible for providing all aspects of medical and mental health care for inmates, and the NYC Department of Correction is responsible for all other aspects of custody and security. Inmates in this jail system occasionally violate jail rules, ranging from refusal to follow orders of security staff to acts of serious violence against other inmates or security staff. To maintain order and safety within the jail, solitary confinement is used as punishment for inmates who violate jail rules, as it is in many jail systems throughout the United States.

We analyzed data from all jail admissions that occurred between January 1, 2010, and October 31, 2012. We counted only acts of self-harm committed during this time period, with the exception of inmates admitted to the jail system in the last 3 months of the study period. For these inmates, we extended the observation period for acts of self-harm to 3 months after their admission date with the

latest possible date of self-harm being January 31, 2013, for patients admitted October 31, 2012.

We abstracted data relating to inmate demographics, jail admission and discharge dates, utilization of emergency services, and housing placement to indicate solitary confinement from the jail electronic health record. These data are entered into the Department of Correction database by their staff as inmates are processed and are directly fed into the electronic health record. Serious mental illness (SMI) was defined with standardized criteria followed by mental health professionals throughout New York State, including DOHMH.[5]

We defined self-harm as an act performed by individuals on themselves with the potential to result in physical injury, and potentially fatal self-harm as an act with a high probability of causing significant disability or death, regardless of whether death actually occurred. We obtained information about the method, severity, and outcome of self-harm acts from a database kept by CHS to track acts of self-harm.

This database is updated as soon as the self-harm reports are electronically cosigned by the supervising psychiatrists and faxed to CHS. All identification and recording of self-harm is done by clinical staff—clinical social workers, psychologists, or psychiatrists. The potentially fatal self-harm was assessed by 2 physicians and 1 physician assistant from CHS leadership; the reviewers had only self-harm information and were blinded to solitary confinement status. Examples of potentially fatal self-harm included ingestion of a potentially poisonous substance or object leading to a metabolic disturbance, hanging with evidence of trauma from ligature, wound requiring sutures after laceration near critical vasculature, or death. As nearly two thirds of all self-harm acts and 85% of potentially fatal self-harm act were initial occurrences, we focused on timing, incidence, and risk factors for initial self-harm acts during each jail admission.

The dependent variables, self-harm and potentially fatal self-harm, were dichotomous variables (0 = no; 1 = yes). The independent variables included ever being in solitary confinement during their incarceration, SMI, age 18 years and younger, gender, length of stay, and race/ethnicity. We identified patients who were in solitary confinement from housing placement, thus creating a dichotomous solitary confinement variable (0 = no; 1 = yes). We created another binary variable to indicate inmates aged 18 years and younger (0 = older than 18 years; 1 = 18 years and younger), based on the classification used by Department of Correction. Gender was another dichotomous variable (0 = male; 1 = female). We calculated length of stay (in 6-month increments) from jail admission and discharge dates, creating a dummy discharge date for those patients who were still in jail by January 31, 2013. The race/ethnicity was categorized as Hispanic, non-Hispanic White, non-Hispanic Black, non-Hispanic Asian/Pacific Islander, and other or unknown.

We calculated self-harm risk as number of self-harm acts per 1000 inmate days. We calculated risk ratios (RRs) of self-harm by gender, age group, race/ethnicity, mental illness status, assignment to solitary confinement, and length of jail stay. We examined the relationship between self-harm and solitary confinement first by comparing self-harm acts at any time to whether an inmate was ever in

TABLE 1—Risk and Relative Risk of a First Self-Harm Incident by Person-Days of Exposure in New York City Jail System: January 1, 2010–January 31, 2013

Characteristics	No. Person-Days	No. of Incarcerations With Any Self-Harm	Risk per 1000 Person-Days	RR Self-Harm	No. of Incarcerations With Potentially Fatal Self-Harm	Risk of Potentially Fatal Self-Harm per 1000 Persons	RR of Potentially Fatal Self-Harm
All persons	15 658 050	1303	0.083	. . .	89	0.006	. . .
Serious mental illness							
Yes	984 152	259	0.26	3.70**	25	0.025	6.30**
No (Ref)	14 685 839	1043	0.071	1.00	64	0.004	1.00
Solitary confinement while incarcerated							
Yes, but during time not in solitary	3 154 403	373	0.112	2.11**	31	0.010	2.50**
Yes, during time in solitary	919 782	322	0.35	6.6**	9	0.009	2.26*
No (Ref)	11 466 081	608	0.053	1.00	49	0.004	1.00
Age, y							
< 19	1 280 296	478	0.373	12.86**	5	0.003	1.23
19–24	3 747 687	266	0.071	2.45**	26	0.006	2.30*
25–34	4 290 543	310	0.072	2.48**	27	0.006	2.39*
35–44	3 138 083	157	0.050	1.72**	23	0.007	2.63*
> 44 (Ref)	3 184 631	92	0.029	1.00	8	0.003	1.00
Gender							
Male	14 692 524	1200	0.081	0.81	83	0.006	1.00
Female (Ref)	1 045 786	103	0.100	1.00	6	0.006	1.00
Race/ethnicity							
Hispanic	5 307 329	478	0.090	0.90	45	0.008	0.59
Non-Hispanic White (Ref)	1 044 451	106	0.10	1.00	16	0.013	1.00
Non-Hispanic Black	8 782 431	691	0.077	0.77*	28	0.003	0.21**
Non-Hispanic Asian or Pacific Islander	152 603	5	0.034	0.34*	0	. . .	. . .
Other or unknown	318 156	21	0.066	0.66	0	. . .	. . .

Note. RR = risk ratio. The sample size was n = 14 732 259 person-days.
*P < .05; **P < .01.

solitary confinement during that incarceration, and second by distinguishing acts of self-harm that occurred during inmates' time in solitary confinement from those that occurred during the incarceration but not while in solitary confinement. We determined statistical significance of differences in rates by using the χ^2 test.

We conducted 4 logistic regression models to estimate odds ratios (ORs) and 95% confidence intervals for predictors associated with self-harm and potentially fatal self-harm. The first model looked at the effects of solitary confinement, SMI, age 18 years or younger or older than 18 years, length of stay, gender, and race/ethnicity on self-harm, and the second model looked at the effects of the same independent variables on potentially fatal self-harm. The third model explored the impact of gender, length of stay, race/ethnicity, and the interaction of solitary confinement with SMI, and age on self-harm, and the fourth model investigated the association of these variables and their interaction with potentially fatal self-harm. For persons who experienced solitary confinement and also committed self-harm during the same incarceration, we calculated and graphed the timing of the first self-harm act relative to the week of placement in solitary confinement.

RESULTS

The study population consisted of 134 188 individuals who experienced 244 699 incarcerations. Of all incarcerations included in this study, 4.0% involved inmates diagnosed with SMI, 7.3% involved inmates who spent some time in solitary confinement, 34.8% involved inmates who spent more than 30 days in jail, 6.4% involved inmates who were aged 18 years or younger, and 90.8% involved male inmates. By race/ethnicity, 56.1% were non-Hispanic Black, 31.6% were Hispanic, and 8.4% were non-Hispanic White, with other categories accounting for the remainder.

In 1303 of these incarcerations there were 2182 acts of self-harm; in 89 incarcerations there were 103 acts of potentially fatal self-harm. The most common methods of self-harm were laceration (34%), ligature (28%), swallowing a foreign body (15%), and overdose (14%). In addition, 15% of acts of self-harm

were categorized as "other" (e.g., head banging and setting self or cell on fire) and 6% of incidents involved multiple methods. For the 103 acts of potentially fatal self-harm, common methods included ligature (29%), swallowing a foreign body (23%), laceration (19%), overdose (16%), other (21%), and multiple (8%). Of the 2079 self-harm acts judged not to be potentially fatal, 1715 (82%) were treated by jail medical staff (physician or physician's assistant) and 373 (18%) required transfer to a higher level of care (emergency medicine physician, inpatient admission, or diagnostic imaging) for further evaluation or treatment.

The absolute risk for self-harm during an incarceration was 0.5% and for potentially fatal self-harm was 0.03% (Table A, available as a supplement to the online version of this article at http://www.ajph.org). The RRs for self-harm increased sharply with the length of stay in jail, from 0.02% for those with stays of less than 8 days to 1.4% for those with stays of 31 days or more. The RRs were highest for inmates with SMI (6.0; $P<.01$), and those aged 18 years or younger (18.9; $P<.01$). Those ever in solitary confinement had a far greater risk of self-harm than did those never in solitary (14.4; $P<.01$), but these inmates also had longer lengths of stay. The RR for potentially fatal self-harm among inmates with SMI was 9.5 ($P<.01$), and the RR for potentially fatal self-harm among inmates ever in solitary confinement was 10.2 ($P<.01$).

When we calculated the risk of self-harm as per 1000 person-days (rather than per incarceration), the RR for self-harm was highest for inmates with SMI (3.7; $P<.01$) and those aged 18 years or younger (12.9; $P<.01$; Table 1). Inmates ever assigned to solitary confinement were 3.2 times as likely to commit an act of self-harm per 1000 days at some time during their incarceration as those never assigned to solitary ($P<.01$). These inmates assigned to solitary were 2.1 times as likely to commit acts of self-harm during the days that they were actually in solitary confinement and 6.6 times as likely to commit acts of self-harm during the days that they were not in solitary confinement, relative to inmates never assigned to solitary confinement ($P<.01$ for each).

The RR for potentially fatal self-harm among inmates with SMI was 6.3 ($P<.01$). The RR for potentially fatal self-harm coincident with

actual solitary confinement was 2.3 and for potentially fatal self-harm during the jail admission but not coincident with solitary confinement, RR was 2.5 ($P<.01$ for both values).

The first 2 logistic regression models demonstrated that self-harm and potentially fatal self-harm were significantly associated with being in solitary confinement, SMI, length of stay, and race/ethnicity. In other words, inmates who were ever in solitary confinement, had SMI, stayed in jail longer, and were White or Hispanic compared with Black were more likely to self-harm and commit potentially fatal self-harm. Inmates who were aged 18 years and younger were significantly more likely to self-harm, and older patients were more likely to do potentially fatal self-harm, but this relationship was not statistically significant (Table 2).

The third and fourth regression models introduced the interactive terms. We wanted to understand whether the interaction of solitary confinement with SMI and age had stronger or weaker associations with self-harm and potentially fatal self-harm than those variables on their own. Table 3 shows the predictors of self-harm and potentially fatal self-harm when we included the interaction terms. Self-harm is

TABLE 2—Multivariate Analysis Results for Predictors of Self-Harm in New York City Jails, No Interactions: January 1, 2010–January 31, 2013

Variables	OR (95% CI)
Self-harm	
Solitary confinement	6.89 (6.07, 7.82)
SMI	7.97 (6.85, 9.29)
Age ≤ 18 y	7.50 (6.61, 8.52)
Length of stay (6 mos)	1.43 (1.38, 1.48)
Hispanic vs Black	1.43 (1.26, 1.61)
White vs Black	1.83 (1.48, 2.27)
Potentially fatal self-harm	
Solitary confinement	6.27 (3.92, 10.01)
SMI	8.15 (5.5, 13.16)
Length of stay (6 mos)	1.43 (1.28, 1.69)
Hispanic vs Black	3.09 (1.93, 4.97)
White vs Black	4.92 (2.63, 9.17)

Note. CI = confidence interval; OR = odds ratio; SMI = serious mental illness. All variables were significant at $P < .001$.

TABLE 3—Multivariate Analysis Results for Predictors of Self-Harm in New York City Jails, With Interactions: January 1, 2010–January 31, 2013

Variables	OR (95% CI)
Self-harm	
Solitary confinement and not SMI and aged > 18 y	10.15 (8.53, 12.08)
Solitary confinement and not SMI and aged ≤ 18 y	5.89 (4.80, 7.20)
Solitary confinement and SMI and aged > 18 y	4.03 (3.10, 5.24)
Solitary confinement and SMI and aged ≤ 18 y	2.34 (1.65, 3.31)
SMI and solitary confinement	4.71 (3.72, 5.97)
SMI and not solitary confinement	11.68 (9.78, 14.40)
Aged ≤ 18 y and solitary confinement	5.73 (4.85, 6.77)
Aged ≤ 18 y and no solitary confinement	9.88 (8.21, 11.89)
Length of stay (6 mo)	1.40 (1.36, 1.46)
Hispanic vs Black	1.43 (1.27, 1.61)
White vs Black	1.84 (1.49, 2.28)
Potentially fatal self-harm	
Solitary confinement and not SMI and aged > 18 y	6.16 (3.47, 10.96)
Solitary confinement and SMI and aged > 18 y	9.06 (4.03, 20.40)
SMI and solitary confinement	9.80 (5.02, 19.18)
SMI and not solitary confinement	6.67 (3.30, 13.50)
Length of stay (6 mo)	1.46 (1.30, 1.63)
Hispanic vs Black	3.08 (1.92, 4.95)
White vs Black	4.96 (2.66, 9.26)

Note. CI = confidence interval; OR = odds ratio; SMI = serious mental illness. All variables were significant at $P < .001$.

significantly correlated with patients who were in solitary confinement, irrespective of SMI status or age. The strongest correlations were for patients in solitary confinement, not having SMI, and older than 18 years (OR = 10.15) or aged 18 years or younger (OR = 5.89). This indicates the strong effect of solitary confinement on self-harm regardless of the SMI or age status. Interaction of SMI and solitary confinement shows that the effect of SMI on self-harm is quite strong regardless of simultaneously being in solitary confinement (OR = 4.71) or not (OR = 11.86). Finally, interaction of age with solitary confinement demonstrated that patients who were aged 18 years or younger and were in solitary confinement were significantly likely to self-harm (OR = 5.73). Potentially fatal self-harm was significantly correlated with solitary confinement and being older than 18 years and having SMI (OR = 9.06) or older than 18 years and not having SMI (OR = 6.16). It was also significantly associated with having SMI and solitary confinement (OR = 9.80).

Review of self-harm frequency revealed that 314 inmates (24.1%) who committed self-harm did so more than once. Among inmates with a stay in solitary confinement, 1.1% had multiple acts of self-harm, whereas only 0.1% of inmates never in solitary confinement had multiple acts of self-harm. Among inmates with SMI, 0.9% committed multiple acts of self-harm whereas 0.1% of the non-SMI inmates did so. Similarly, 0.6% of inmates aged 18 years or younger committed multiple acts of self-harm whereas only 0.1% of those older than 18 years did so. Multiple potentially fatal self-harm acts were done by 11 inmates; 6 inmates in the multiple self-harm group had a low-lethality act before they had a potentially fatal act.

To better understand the relationship between solitary confinement and self-harm, we plotted the timing of initial acts of self-harm for those who did enter solitary confinement relative to the day of admission to solitary confinement and those who did not relative to the week of admission to jail. Once inmates are given a sentence of solitary confinement for

violation of jail rules, they may wait days or weeks before being placed in these settings. The histogram of self-harm among inmates by week of jail stay shows that both those who did and did not experience solitary confinement had falling weekly rates of self-harm, although this decline appears to be more pronounced among those who did experience solitary confinement and this decline appears to stall around week 41 for all groups (Figure A, available as a supplement to the online version of this article at http://www.ajph.org). The histogram of self-harm among those who spent some time in solitary confinement shows a near-normal distribution, with the peak frequency shortly before entry into solitary confinement. The similar plot of potentially fatal acts is not so tightly grouped around entry to solitary confinement (Figure A).

DISCUSSION

We found that acts of self-harm were strongly associated with assignment of inmates to solitary confinement. Inmates punished by solitary confinement were approximately 6.9 times as likely to commit acts of self-harm after we controlled for the length of jail stay, SMI, age, and race/ethnicity. This association also held true for potentially fatal self-harm with a slightly lower OR, 6.3. It is notable that acts of self-harm often preceded the actual time spent in solitary confinement. Both SMI (OR = 7.97) and aged 18 years or younger (OR = 7.5) were also predictive of self-harm; nonetheless, the risk of self-harm and potentially fatal self-harm associated with solitary confinement was higher independent of mental illness status and age group.

The analysis showed that a small proportion of inmates, those in solitary confinement, with SMI, and aged 18 years or younger, accounted for the majority of acts of self-harm. Approximately 7% of these acts were potentially fatal self-harm. Our clinical experience with adolescents is that they have a much lower rate of SMI and are very adaptive to jail rules. Inmates often confide that their self-harm acts are used as a means to avoid the rigors of solitary confinement. The logistic regression analysis with solitary confinement and SMI and age interaction demonstrated that inmates who are older and in solitary confinements were more likely to commit potentially fatal self-harm

(OR = 9.1), whereas inmates who were younger and in solitary confinement were more likely (OR = 5.73) to engage in the lower-lethality acts of self-harm.

This analysis is consistent with our clinical observations regarding self-harm. In addition to the clear indication from patients with SMI that they self-harm in response to the overall stressors of the jail setting, adolescents appear to commit lower-lethality acts of self-harm, though with not infrequent unintended consequences. Regarding solitary confinement, many inmates report to us that they have and will continue to do anything to escape these settings. Mental health providers are in an ethically complex role with these inmates because currently, they are asked to "clear" them for solitary confinement. Those inmates who appear to self-harm to escape solitary confinement are often judged to exhibit "volitional" or "goal-oriented" behavior, as opposed to suffering from psychosis, mania, or another more recognized mental health symptom.[6] This judgment tracks loosely with the assessment of security staff, who often refer to inmates who self-harm as "bing-beaters," with the "bing" as the recognized term for solitary confinement.

The peak of self-harm around the time of entry to solitary confinement (Figure 1)

suggests that these observations by clinical and security staff are credible. Because it is difficult or impossible to distinguish purely manipulative acts from those reflecting a true interest in severe self-harm or suicide, and even "goal-oriented" acts of self-harm can have severe consequences. Related to these attempts to escape solitary confinement, we have observed some types of self-harm that occur exclusively in these settings. One patient with relatively mild mental illness inserted a deodorant canister into his rectum, requiring surgical removal, all in an attempt to be taken out of his cell. Others set fire to their cells or smear their own feces. In our experience, these are actions that are solely associated with seeking to escape solitary confinement.

An additional layer of complexity is that patients placed in solitary confinement, especially those with mental illness, will often earn new infractions, resulting in even more solitary time. In the most extreme type of example, a patient held in solitary confinement may break off a sprinkler head, use that metal to slash themselves, and then earn not only a new infraction and more solitary confinement time, but also a new criminal charge for destruction of government property.

In addition to the clinical significance of self-harm, this practice represents a significant and

increasing drain on resources. When self-harm occurs, inmates receive immediate medical and mental health evaluations, and may require transfer to a higher level of care, which also requires 2 correction officers to escort them. These transfers utilize local emergency medical services, hospital emergency departments, and inpatient wards. On the basis of these data, we estimate that every 100 acts of self-harm result in 36 transfers to a higher level of care and 10 hospital admissions. Every 100 acts of self-harm conservatively represent approximately 3760 hours of additional time by correction officers (for hospital transport and suicide watch) and approximately 450 excess clinical encounters in the jail system.

Most of the published studies concerning the health effects of solitary confinement have focused on prison systems, which are quite different from jails in that solitary confinement in prisons may last for decades.[7–9] Although to our knowledge this is the first analysis of these predictors of self-harm in a jail setting, a previous study did observe a similar relationship between self-harm and solitary confinement among 132 inmates in a prison setting.[10] One important area for future research is a better understanding of how self-harm in jail relates to overall mental health status while in jail. In addition, the strong association between SMI and self-harm suggests that inmates with a history of mental illness are susceptible to self-harm when facing the solitary confinement in the jail setting.

Limitations

This study has several limitations. First, because of the delay in placement in solitary confinement for rules violations and because jail is a short-stay setting, many inmates are sentenced to solitary confinement but leave before their punishment occurs. Some inmates may have engaged in self-harm anticipating stays in solitary confinement that never occurred.

A second limitation is the lack of data regarding criminal charge or jail rules violations. These nonclinical characteristics may have some bearing on self-harm. The practice of removing actively violent inmates from the presence of others represents a legitimate security act and information regarding why inmates are placed into solitary confinement
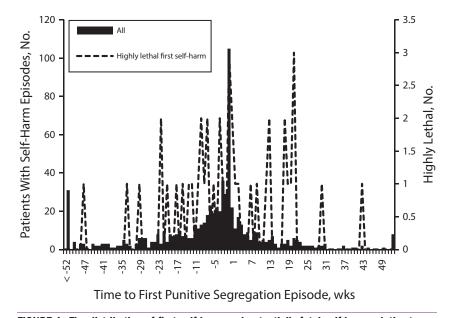

FIGURE 1—The distribution of first self-harm and potentially fatal self-harm relative to the date of the first solitary confinement in New York City jails: January 1, 2010–January 31, 2013.

may hold data that bear on self-harm. A third limitation is that we have no systematic data on self-harm from previous incarcerations and, thus, cannot examine the extent to which previous acts might be independent predictors of jail behavior or self-harm.

Conclusions

According to our analysis, length of stay in jail, SMI, solitary confinement, and young age appear to be important and independent predictors of self-harm in jail. These data support the need to reconsider the use of solitary confinement as punishment in jails, especially for those with SMI and for adolescents. Recently, professional societies for adult and adolescent mental health care have made recommendations against the use of solitary confinement as punishment for adolescents and seriously mentally ill inmates.[11,12]

The NYC Department of Correction and the Department of Health and Mental Hygiene have recently announced a plan to eliminate the practice of solitary confinement for inmates with SMI. Instead, inmates with SMI who violate jail rules will be placed in clinical settings where they will receive a high level of individual and group therapy aimed at promoting treatment adherence and prosocial behaviors. This exchange of a punishment model for a treatment approach will result in clinical staff making decisions about how best to respond to problematic behavior among inmates with SMI. The plan also restructures the approach to punishment for inmates with mental illness whose illness is not categorized as "serious," such as those with mild to moderate behavioral problems and those with personality disorders. These inmates will be managed in a setting designed to provide tangible incentives such as increasing time out of cell and reduction in length of solitary confinement sentence for engagement with programming and following of jail rules. These reforms provide an opportunity to evaluate the effect of increased clinical management and decreased reliance on solitary confinement as a means to reduce self-harm and other behaviors among inmates with mental illness. ∎

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