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Comparison of youth suicide with involuntary hold criteria and inpatient capacity

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ABSTRACT

Background: Boarding in emergency departments pending psychiatric admission significantly impacts both the patient and system. Current recommendations suggest increasing available inpatient beds, yet involuntary psychiatric admissions have not been widely correlated with improved patient outcomes.
Methods: We compared state-by-state youth suicide data clustered into 3-year intervals from 1999 to 2016 to psychiatric inpatient bed numbers and stringency on involuntary hold criteria using Poisson regression models.
Results: No significant association was found between suicide rates and bed availability or hold criteria.
Conclusions: While individual holds can be valuable in prevention of danger to self, on a population basis, the incident rate ratio of inpatient bed number and that of stringency of hold criteria was not significant when relevant variables were controlled. A focus on preventative strategies is imperative, given the equipoise for this current avenue of treatment.

1. Introduction

The number of available psychiatric inpatient beds in America, and the impact of psychiatric patients in the Emergency Department (ED) are frequently cited as a public health concern. Mental health patients presenting to the ED require admission 2.5 times more often than non-mental health patients (Owens, Mutter, & Stocks, 2007) and wait 3 times as long for beds (Nicks & Manthey, 2012). For children and adolescents requiring psychiatric admission, one study cited median boarding times of 21.1 h, with longer duration for weekend and vacation presentations and for children with autism or intellectual disability (Wharff, Ginnis, Ross, & Blood, 2011). In preadolescent children requiring transfer to psychiatric facilities, ED length of stay can range from 0.4 h to 243 h (Santillanes, Kearl, Lam, & Claudius, 2017). This time waiting for an available and appropriate psychiatric bed can have a financial impact, an impact on overall ED throughput, and potential for adverse behavioral outbursts and adverse medical outcomes. Each mental health patient awaiting admission in the ED is thought to cost $2264 and prevent 2.2 bed turnovers (Nicks & Manthey, 2012).

Studies looking at adults have found that an increase from 28 to 39 inpatient psychiatric beds per 100,000 population would be required to reduce emergency department boarding times to under 24 h for patients requiring mental health admission (La, Hassmiller, & Wells, 2015). Adding children to the population increased the target number to 50 (range 40–60) public inpatient psychiatric beds per 100,000 population (Torrey, Entsminger, Geller, Stanley, & Jaffe, 2008). In reality, per capita psychiatric bed numbers vary widely between U.S. states. In 2008, one state achieved this target number, while half of states have less than half the recommended number of public hospital beds (Torrey et al., 2008).

Many of these patients are awaiting admission as a result of having been placed on an involuntary mental health hold, legally requiring a specific duration of confinement to the hospital for mental health care. In spite of the substantial impact of these hold-related admissions, there is no federal standardization of involuntary metal health hold criteria. Twenty-two states require judicial review, nine require judge certification prior to hospitalization, and five do not guarantee assessment by a qualified mental health professional during the emergency hold (Hedman et al., 2016). The length of an involuntary hold prior to renewal action ranges from 24 h to 10 days (Policy Surveillance Program). Studies from Europe looking at tightening of hold criteria have demonstrated substantial changes in rates of involuntary psychiatric commitment, but in conflicting directions, with some finding higher rates of commitment with more stringent criteria and others finding lower (Haberfeller & Rittmannsberger, 1996; Lecompte, 1995).

Clearly, the goal of many ED psychiatric holds and inpatient admissions is to prevent danger to the patient's self. While there is significant face validity to the concept of an involuntary hospitalization in an acutely suicidal patient, few studies have actually examined the therapeutic benefit of this process. A PubMed search of the term

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Table 1
State resource capacity.

	Mean (SD)	Mean per 100 K (SD)	Range
Child psychiatrists	142 (181)	3.8 (2.1)*	3–991.5
Hospitals with psychiatric beds	26.7 (21.5)	.9 (0.41)**	1.5–103
Native American/Alaskan Native	2.5% (3.5%)	NA	0.4–19.9%
Adult suicide**	2044.2 (2014.2)	17.5 (4.8)	197–12,099
Hold restrictions	2.3 (0.7)	NA	1–3
Female	45% (1%)	NA	43.5–49.1%

* Per 100 K youth aged 5–19 years,.
** Per total population (all ages).

"involuntary psychiatric hold" yields a mere 26 results, with only one directly addressing benefit. In this study, 28% of patients felt that the hold was justified, and data was not collected on whether patients or providers deemed the hold therapeutic (Laengle, Durr, Renner, Guenthner, & Foerster, 2000).

In reality, decisions relating to involuntary hold status and admission are made on an individual basis. However, some insight into the optimal use of psychiatric admission for youth can potentially be found in population data. Our aim was to investigate, on a state-wide population level, the relationship between child and adolescent suicide and barriers to inpatient psychiatric care. While the issues related to involuntary holds apply to adults as well, this paper focuses on youth because the rate of completed suicide compared with ideation and attempt is relatively low when compared with the adult population. The hypothesis was that states with difficult to place and/ or brief holds and fewer inpatient psychiatric beds would also have increased youth suicide rates.

2. Materials and methods

Data was collected on suicide deaths in children and adolescents aged 5–19 years per state from 1999 to 2016. Because the state-level annual numbers were small, these were grouped into 3-year periods, yielding 6 time periods per state. The same process was followed for adult suicides. Additional data was collected for the midpoint of each three-year observation period: number of hospitals with inpatient psychiatric beds, stringency of hold criteria, sex, race/ethnicity, firearm background checks, and number of child psychiatrists per 100,000 children aged 5–19 year. Demographic and psychiatric availability was available for all observation dates; hold criteria only for the most recent (2014–2016).

2.1. Definitions

Child and adolescent suicide included age 5–19 years.

Adult suicide included age 20 years and up.

Hospitals with psychiatric beds were defined as the number of hospitals having any psychiatric inpatient beds.

Hold criteria were coded one through three based on difficulty of placement (e.g. requiring court order or not) and length of hold prior to additional action. A designation of 1 represented a short hold (≤ 3 days) that did not require a court order, while a 3 represented a longer hold (>3 days) that was easy to place. States with a single stringent feature were designated a 2.

2.2. Sources

CDC Wonder (https://wonder.cdc.gov) was queried for all suicide deaths in both the pediatric and adult age groups. The number of child psychiatrists and inpatient psychiatric beds were recorded for each of these time periods using data from the Area Resource File. County-level metrics were aggregated to the state-year level. Hold criteria was obtained from the Policy Surveillance Program (http://lawatlas.org/datasets/short-term-civil-commitment) by state. States with a single stringent feature were designated a 2. Demographic data came from the American Community Survey (https://www.census.gov/programs-surveys/acs) (American Community Survey).

2.3. Statistics

As suicide death is a relatively rare outcome, we employ multivariate Poisson regression models. The models control for the following co-variates: demographic characteristics (share Native American or Alaska Native, share non-white, non-native, and share female), estimates of psychiatric availability (count of hospitals with psychiatric beds or child psychiatrists per 100,000 population), firearm background checks, and adult suicide rates per 100,000. Regressions include state fixed effects (state-related time invariant factors such as income) and time fixed effects and robust standard errors clustered at the state level. All results are reported as incident rate ratios for ease of interpretation.

3. Results

The mean number of youth suicide deaths was 119.7 (range 10–682; SD 105), which accounts for 4.1 deaths (range 1.5–13.5, SD 2.1) per 100,000 youth. State resource capacity is detailed in Table 1.

There were 300 observation periods possible. 299 observations were available for analysis. One observation (Vermont, 1999–2001) was eliminated due to small numbers. After controlling for demographic and other variables as well as state fixed effects, we found no evidence of a significant association between youth suicides per 100,000 and hospitals with psychiatric beds per 100,000 nor evidence of an association between moderate or stringent hold criteria compared to relatively lax criteria on youth suicide rates. The incident rate ratios and confidence intervals from these regressions controlling for these and other variables are listed in Table 2. There was no change in significance when adult suicide rates were omitted as a control variable.

4. Discussion

In this small data set, we were unable to find a significant relationship between youth suicide and state inpatient psychiatric bed capacity. We were also unable to find a relationship between youth suicide and the ease of hold placement /length of an involuntary

Table 2
Incident rate ratio for youth suicide.

	Controlled for year and other variables		Controlled for year, other variables, and state fixed effects	
	IRR	95% CI	IRR	95% CI
Hospitals with psychiatric beds	1.10	1.00–1.21	1.00	0.88–1.14
Moderate hold criteria	0.94	0.84–1.05		
Stringent hold criteria	0.91	0.81–1.02		

psychiatric hold. This does not necessarily indicate that these factors are unrelated, merely that in our population, on an aggregate state level, we were unable to see a clear association.

There are a number of potential reasons for such a finding that merit further evaluation on both a capacity and individual level. From a capacity standpoint, there is poor documentation of how many pediatric psychiatric beds are realistically available at any given time. Many facilities have certain age cutoffs, and beds that theoretically can be utilized by an adult or child may be rarely available to pediatric patients. Therefore, number of psychiatric beds may not correlate with number of available youth psychiatric beds. However, as a crude marker of this, when the 21 states which do not use inpatient state psychiatric facilities for pediatric care are compared with the 29 which do allow pediatric admissions to state psychiatric facilities, the 2016 youth suicide rate is the same for each group at 4.1 deaths per 100,000 population (Lutterman, Shaw, & Fisher, 2017). Additionally, the location of these beds within each state is largely unknown. It is possible that most staffed pediatric psychiatric beds map to urban locations, poorly serving rural populations in outlying communities. Using 2013 urbanization data, the youth suicide rate was 4.9/100,000 in non-metro areas across the U.S. compared with 2.5/100,000 in large central metro areas (American Community Survey). Potentially, better mapping of beds to vulnerable patients could help insure that appropriate beds are available in areas with the highest need or that transfer agreements are developed in situations in which this would outstrip resources.

Additionally, there are potentially barriers to timely identification and treatment of mental health concerns in the outpatient setting. It is known that a sizable number of patients who die by suicide do not have a prior attempt (Bostwick, Pabbati, Geske, & McKean, 2016; Jamison & Bol, 2016; McKean, Pabbati, Geske, & Bostwick, 2018), or even present for psychiatric care. For youth, only 35% of suicide decedents have ever received mental health treatment (Karch, Logari, McDaniel, Floyd, & Vagi, 2013). This group would not be identified for a psychiatric admission without further effort placed on screening and identification of suicidal youth. Additionally, it is known that pediatric patients with recognized psychopathology are often not linked to follow-up, with estimates citing only 21% receiving symptomatic care and wait times of 3–12 months being common (Krishna, Shapiro, & Houston, 2016). The short-term therapeutic potential of a psychiatric admission remains largely unknown and, if inadequate follow-up is unavailable following an inpatient admission, this may limit its long-term therapeutic potential.

There is no lack of publications citing a current shortage of psychiatric beds in the United States. While this is unequivocally true, this study has not linked number of psychiatric beds or easier to place holds to a decrease in youth suicides. As increasing potential psychiatric inpatient beds by the recommended 165% is an unlikely short-term possibility (Torrey et al., 2008), further research into maximizing the utilization of currently available beds for suicide prevention and augmenting preventative services might be warranted in addressing this public health crisis.

Unquestionably, there are patients who benefit from emergent psychiatric care, and the acutely suicidal patient needs close observation while this care is administered. However, the lack of identified relationship between suicide and markers of hold evaluated in this study cast the current utilization of the youth psychiatric hold into question. In light of the current mismatch between youth psychiatric holds and capacity, refining the understanding of which patients require an involuntary mental health hold and identifying other emergent interventions which might be productive without requiring a psychiatric hold is warranted. Moreover, community and individual interventions prior to the escalation of emergent treatment needs, while expensive, may prove cost-effective if the number of non-therapeutic mental health holds is decreased.

5. Limitations

Although the numbers of child and adolescent suicides are unacceptably high, from a statistical standpoint, the numbers per state per 3-year period are low. While we did not find a significant difference, there is the possibility that a difference exists that was not identified, either due to random error or due to small sample size. Due to difficulties identifying numbers of psychiatric beds earmarked exclusively for children and adolescents, we included all hospitals with inpatient psychiatric capacity. While unlikely, it is possible that the number of these beds which accept patients under 20 years of age varies widely by state.

6. Conclusions

While individual holds can be valuable in prevention of danger to self, on a population basis, the incident rate ratio of inpatient bed number was not significant when relevant variables were controlled.

Conflicts of interest

There are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.mhp.2019.200172.

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