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Original Contributions

Lengths of stay for involuntarily held psychiatric patients in the ED are affected by both patient characteristics and medication use

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ABSTRACT

Background: Psychiatric patients experience longer treatment times (length of stay [LOS]) in the emergency department (ED) compared to nonpsychiatric patients. Although patients on involuntary mental health holds are relatively understudied, common wisdom would hold that times for these patients can only be affected by addressing systems issues because they are not free to leave. The objective of this study was to determine whether both selected ED and patient-specific factors were associated with longer LOS. We hypothesized that nonmodifiable factors (age, sex, agitation, presentation during evenings/nights, presentation during weekends, suicidal ideation) would prolong LOS but that potentially modifiable factors (such as use of medication) would reduce LOS.

Methods: A historical cohort of patients (January 1, 2009-August 16, 2010) placed on involuntary mental health holds was studied in 2 general EDs. A regression model was used to calculate the effects of modifiable and nonmodifiable factors on LOS.

Results: Six hundred forty patient visits met all inclusion/exclusion criteria. Longer LOSs were significantly associated with suicidal ideation, use of antipsychotics, and use of benzodiazepines, although agitation did not predict longer LOSs. Longer LOSs were also longer with presentation on the weekends.

Conclusions: Lengths of stay for patients on involuntary mental health holds are associated with several factors outside the control of the typical ED clinician such as the ability to clear holds quickly due to day of week or placement of the hold for suicidal ideation. Lengths of stay are also increased by factors within the control of the typical ED clinician, such as administration of calming medication.

1. Introduction

The majority of frequent users of the emergency department (ED) are not psychiatric patients [1]. However, psychiatric patients appear to contribute disproportionately to ED overcrowding. Psychiatry patients experience longer treatment times in the ED compared to nonpsychiatric patients regardless of acuity level [2–6], despite the fact that deleterious effects of extended lengths of stay (LOSs) have been well documented for both psychiatric and nonpsychiatric patients [7–10]. Thus, ED LOS for psychiatric patients is an important concern.

The causes of longer LOSs for psychiatric patients have been ascribed to several causes often not under the control of ED physician or staff, including patients presenting with suicidal or homicidal ideation, inpatient bed availability, the organization of the psychiatry service/willingness to conduct regular rounds, and day of the week [5,6,11–14]. Only 2 factors that are reasonably within the control of typical ED clinicians, including the length of time before specialist evaluation is requested and restraint use, have been associated with longer LOSs [11–13].

One population that is relatively understudied with respect to longer hold times in the ED is patients who have been placed on involuntary mental health holds. Involuntary mental health holds are a legal type of restraint in which patients are not allowed to leave the ED [15–17]. These patients are not infrequent in the ED setting [18]. From July 1, 2011, to June 30, 2012, nearly 133 913 adults were placed on involuntary 72-hour mental health holds in the state of California, although it is unknown how many of these patients were evaluated solely in general medical EDs as opposed to psychiatric facilities [18].

One reason that the LOSs in this population of patients may be understudied is that they are not free to leave the ED without specialist evaluation and thus are often not felt to have a disposition that is ultimately modifiable by ED clinicians. Thus, common wisdom as well as the extrapolation of results from previous studies may suggest that there is little that can be done about the disposition and discharge of these patients from the ED other than to have on-site psychiatric staff to clear holds quickly. To our knowledge, there is no literature directly evaluating the ED-specific or patient-specific factors that contribute to LOSs in patients on involuntary mental health holds. This is somewhat

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surprising, as research on treatment times for psychiatric patients has been identified as a research need [19]. Because increased LOS contributes to both ED overcrowding and boarding, studies of involuntary hold placement can potentially highlight areas for improvement in psychiatric ED care and possibly identify specific factors that may improve ED flow in general.

2. Study objectives

The primary objective of this study was to determine if LOSs were associated with both factors beyond the control of ED clinicians as well as factors that might reasonably be considered to be within the control of ED clinicians. The reasoning is that if only factors beyond the control of an ED clinician were associated with longer LOSs, then system issues and resources would be the most important factors to address in a typical practice setting. In this study, such variables as patient age, sex, placement of the mental health hold for suicidal ideation, associated agitation, off-hours (when attending psychiatrists are not present in-house), and weekends (when the psychiatry service does not typically round in the ED) were expected to be important but not ultimately modifiable by ED clinicians.

If, on the other hand, clinician-specific factors are also important, then this suggests that LOSs may at least be partially modifiable by the actions of ED clinicians. Given that individual emergency clinicians often have little or no control either over patients who present to the ED or over the mental health resources in their community, one potentially modifiable factor of particular interest is clinician utilization of calming medication. We theorized that use of this medication would permit specialist evaluation and thus be associated with speedier discharge.

In summary, this study examined the associations between LOSs and several variables thought to be important for influencing these times. We examined nonmodifiable factors (age, sex, placement of mental health hold for suicidal ideation, agitation, off-hour times, weekends), which were assumed to prolong LOSs. We also examined the potentially modifiable factor of earlier clinician administration of calming medication, which was assumed to associate with shorter LOSs.

3. Methods

This is a structured review of a historical cohort of patients over 18 months (January 1, 2009-August 16, 2010) in 2 general EDs, one an academic urban site and the other a suburban site, seeing a combined 65 000 patients per year. The academic urban site is a licensed Lanterman-Petris-Short facility, whereas the suburban site is not. Approval was obtained from the local Institutional Review Board before data collection.

3.1. Selection of participants

The cohort was identified by a query of physician orders or nursing note sections of the electronic medical record. Inclusion criteria included all visits on which a patient older than 18 years was placed on an involuntary mental health hold either before arrival or during the ED evaluation. Patient visits were excluded if times were not documented; if the chart was irretrievable; if the patients were referred from the local county mental health facility, as these patients typically require medical screening examinations only; or if the mental health hold was placed by the psychiatry service simply for the purpose of involuntary admission to the hospital.

3.2. Data collection and processing

Variables queried from each record included the patient identifier, age, sex, and triage date/time. Additional data were then abstracted from each record using a prespecified abstraction protocol. This included the mental health hold start and end date/time, final disposition, discharge date/time, use and timing of antipsychotics, and the use and timing of benzodiazepines. For the purposes of this study, *daytime hours* were defined as presentation by the patient between 7:00 AM and 4:59 PM, whereas *off-hours* were defined as 5:00 PM to 6:59 AM. *Weekdays* were defined as Monday through Friday inclusive. Duration of the mental health hold was calculated by taking the earliest start (no earlier than the triage start time) and stop times (no later than the discharge time) noted in the electronic health record. The *mental health hold end time* was defined for purposes of this study as the nursing staff discharge time, which typically approximates the time that the patient left the ED, even if the patient was admitted with the hold being maintained. Length of stay was calculated as time that a final disposition order to admit, discharge, or transfer was placed by the ED physician minus the triage time. Although LOSs are typically defined as time leaving the ED minus triage time, this calculation includes many potential confounders that cannot be controlled in a historical fashion such as community resources available to the ED clinician. As the focus of this study was on intra-ED variables affecting LOS, this calculation was used instead of the standard definition. A final disposition order that was placed well after the patient left the ED was arbitrarily assumed to be in error, and the case was excluded from further analysis because charted times were likely inaccurate.

The reason for the mental health hold was coded in the following manner: The mental hold was deemed to be for suicidality if notes from the emergency clinician or psychiatry consult specifically noted this indication. The patient was considered to be agitated if clinician notes specifically mentioned that the patient was “agitated,” “disruptive,” or “homicidal,” or if, following expert consensus definitions, the patient had increased verbal or motor activity [20]. The timing of the mental health hold was calculated relative to the triage time and was considered as placed early in the ED stay if mental health hold time minus triage time was less than 60 minutes. Placement of the mental health hold was considered late if placed at least 180 minutes after triage time, and midway through the ED course if placed at least 60 but less than 180 minutes after triage.

Following best practices, every medical record was reviewed and abstracted by at least 2 trained research associates who were blinded to study results. Data abstraction was conducted using a prespecified data abstraction tool as above, entered into a standardized computer worksheet using Excel 2010 (Microsoft, Redmond, WA), and then checked for nonsensical values. Following this check, manual data reabstraction was performed. In this process, 25 subjects were randomly chosen using a Web-based randomizer (www.random.org). Reliability of key variables above was compared to data contained in the standardized worksheet, with strong consensus predefined as a $\kappa > .6$ [21].

3.3. Outcome measures

The primary outcome measure was the duration of LOSs as affected by the modifiable and nonmodifiable variables as defined above.

3.4. Primary data analysis

Statistics involving categorical data such as sex were investigated using χ^2. Statistics involving continuous data used t tests with separate variance. As LOSs were expected to be nonnormally distributed, times are presented in actual minutes but were log-transformed for all statistical analyses below. The association between the above variables and the log-transformed LOSs was investigated using ordinary least-squares linear regression using Systat 13 (Systat, San Jose, CA), with categorical variables dummy-coded for inclusion into the model. The method for calculating the percentage change of the LOS based on a change in the dummy-coded predictor variable is somewhat controversial when the dependent variable is log-transformed. Following

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Table 1
Reasons for exclusion by visit

Younger than 18 y	27
Did not meet inclusion criteria (for instance, mental health hold never placed)	266
Referred from local mental health facility	341
Mental health hold placed only for admission to psychiatry	20
Other (such as inaccurate chart times)	19

Kennedy (1981) [22], the following equation was used:

$$g = \exp(c - 1/2V(c)) - 1$$

where g is the log-transformed dependent variable, c is the coefficient of the dummy-coded categorical variable, and $V(c)$ is the variance of the regression coefficient. The resulting value was then multiplied by 100 to determine percentage change [22].

4. Results

During the study period, 1313 visits, representing 1162 unique patients, were identified by electronic record query. Six hundred forty visits, representing 590 unique patients, were included for further analysis after all inclusion and exclusion criteria were applied. Reasons for exclusion are listed in Table 1. The κ upon manual reabstraction was 0.77.

For patients included in the study, the median age was 41, with 37% being female. The median LOS was 840 minutes (interquartile range, 450-1319 min). During 304 (48%) patient visits, there was associated agitation. Patients who were agitated did not differ in age (41 vs 42; 95% confidence interval [CI] of difference, −1.6 to 3.0) or sex from patients who were not ($P = .07$).

During 367 (57%) of the ED visits, patients were treated with either an antipsychotic or a benzodiazepine by clinicians. Patients on a mental health hold who required antipsychotics did not differ from patients who did not on the basis of age (41 vs 42; 95% CI of difference, −0.9 to 3.8), although a higher percentage of men on a mental health hold received an antipsychotic than women ($P = .054$). Patients who received a benzodiazepine did not differ from patients who did not on the basis of age (41 vs 42; 95% CI of difference, −0.8 to 3.8) or sex ($P = .284$). There was no difference in the use of antipsychotics or benzodiazepines in admitted/transferred patients compared to patients who were eventually discharged ($P = .374$). Regardless of eventual disposition, more patients with associated agitation were administered medication ($P < .001$).

A regression model was constructed using both modifiable and nonmodifiable factors. Please see Table 2.

In a simple correlation, the duration of the mental health hold was highly related to the LOS in the ED both for discharged patients (.76) and for patients admitted/transferred (.63).

5. Discussion

Psychiatric patients experience some of the longest LOSs regardless of acuity level. The median LOSs reported in this study are long (840 min) and are actually longer than those reported by similar studies of psychiatric patients (Weiss et al [13], for instance, documented a mean LOS of 690 min). Given the extraordinary wait times experienced by psychiatric patients, it is important to document factors associated with increased LOSs [23].

Not surprisingly, the duration of the mental health hold is highly correlated with the LOS in this study; and so patients that have a mental health hold placed early or midway through the ED course stay less time than patients that have this hold placed later. However, patient-specific factors, such as holds for suicidal ideation, also contributed to longer LOSs, perhaps because of the additional evaluation time for patients with this concern [17,24]. In addition, institution-specific factors also contributed to longer holds. In this study, presentation on the weekend predicted longer LOSs likely because, in our institution, psychiatry attendings do not round on ED patients during the weekends. Institutions with regular rounds by the psychiatry service have noted decreases in LOSs among patients with the longest waiting times [12].

Perhaps more surprising is that LOSs are lengthened by factors typically under the control of ED clinicians, such as use of calming medication. Although this study predicted shorter LOSs for patients who were administered calming medication, the reverse is actually true, with patients administered either antipsychotics or benzodiazepines staying longer. This increased LOS is present despite the fact that agitation, which is the most common reason medications are administered, is itself not associated with longer stays. It is tempting to speculate that use of overly sedating medications, particularly delivered intramuscularly or intravenously by emergency medicine clinicians, might increase LOSs [25–27]. However, this awaits more prospectively collected data. It is also possible that patients requiring medication have a higher percentage of serious mental illness or substance-related issues, thus requiring extended evaluation time. However, this too awaits further prospectively collected data.

6. Limitations

There are several important limitations in this analysis. First, this is an analysis of a retrospective cohort of patients. Although every effort was made to select all patients on mental health holds during the period studied, it is possible that some patients were inadvertently missed in the analysis secondary to faulty charting. Second, the analysis above

Table 2
Regression model of the association between selected factors and LOS

Predictor variable	B	*P*	95% CI	% Change in LOS[a]
Age	−.002	.204	−.006, .001	–
Sex	.019	.749	−.098, .135	–
Placement of mental health hold for suicidal ideation	.309	<.001	.181, .436	35.9%
Associated agitation	.010	.879	−.118, .138	–
Antipsychotics given	.277	<.001	.150, .404	31.6%
Benzodiazepines given	.208	<.01	.086, .330	22.9%
Presentation during off-hours[b]	−.068	.250	−.183,.048	–
Presentation on weekend[c]	.309	<.001	.180,.439	35.9%
Mental health hold placed early in ED course[d]	−.604	<.001	−.736, −.473	−45.5%
Mental health hold placed midway in ED course[e]	−.417	<.001	−.570, −.264	−34.3%

[a] Percent change in LOS listed for statistically significant variables only; see methods section for calculation.
[b] Daytime hours, 7 AM to 4:59 PM.
[c] Weekday, Monday to Friday inclusive.
[d] Mental health hold placed early if placed less than 60 minutes after triage.
[e] Mental health hold placed midway if placed greater than or equal to 60 minutes but less than 180 minutes after triage.

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relies on the accurate classification of associated agitation and reasons for the placement of the mental health hold. Although every effort was made to blind research associates to the study questions and ensure the accuracy of these classifications, it is possible that these categorizations inadvertently included or excluded patients that many clinicians would consider "agitated." Third, this study is dependent on the accuracy of times as reported in the electronic medical record; and there is no independent way to verify the accuracy of this data. Finally, this study is limited in scope because it did not investigate all possible contributors to LOSs. Some factors, for instance, need for diagnostic imaging or alcohol use, have also been shown to contribute to longer LOSs [13]. One additional factor that might be important is the type of medication that is used by ED clinicians. Nonsedating oral medication, for example, would be expected to decrease LOSs but is infrequently used by ED clinicians [26,27]. However, given the multiplicity of doses and types of medication in the ED, it is difficult to compare across medications, routes of administration, and doses in this study. Consequently, like additional factors contributing to LOSs, this awaits further research.

7. Conclusions

In this study, total LOSs of patients on mental health holds were affected by several factors. These include factors outside the control of the typical ED clinician, such as the ability of psychiatry consultants to clear mental health holds quickly and the patient's chief concern, and those within the control of the typical ED clinician, such as administration of calming medication. We found that, in patients on involuntary health holds, use of calming medications but not presence of agitation was associated with increases in the LOS, although a causal relationship cannot be determined. Avoiding overly sedating medications, where possible, may decrease LOSs for involuntarily held psychiatric patients in the ED setting.

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