

UCSF

UC San Francisco Previously Published Works

Title

Marked Reduction in Length of Stay for Patients With Psychiatric Emergencies After Implementation of a Comanagement Model

Permalink

<https://escholarship.org/uc/item/6z90x2r4>

Journal

Academic Emergency Medicine, 20(4)

ISSN

1069-6563

Authors

Polevoi, Steven K
Shim, J Jewel
McCulloch, Charles E
[et al.](#)

Publication Date

2013-04-01

DOI

10.1111/acem.12105

Peer reviewed



Published in final edited form as:

Acad Emerg Med. 2013 April ; 20(4): 338–343. doi:10.1111/acem.12105.

Marked Reduction in Length of Stay for Patients with Psychiatric Emergencies after Implementation of a Co-Management Model

Steven K. Polevoi, MD, J. Jewel Shim, MD, Charles E. McCulloch, PhD, Barbara Grimes, PhD, and Prasanthi Govindarajan, MD

Department of Emergency Medicine (SKP, PG), Department of Psychiatry (JJS); Department of Epidemiology and Biostatistics (CEM, BG), University of California, San Francisco, CA

Abstract

Objectives—Patients with psychiatric emergencies often spend excessive time in an emergency department (ED) due to limited inpatient psychiatric bed capacity. The objective was to compare traditional resident consultation with a new model (co-management) to reduce length of stay for patients with psychiatric emergencies. The costs of this model were compared to those of standard care.

Methods—This was a before-and-after study conducted in the ED of an urban academic medical center without an inpatient psychiatry unit from January 1, 2007 through December 31, 2009. Subjects were all adult patients seen by ED clinicians and determined to be a danger to self or others, or gravely disabled. At baseline, psychiatry residents evaluated patients and made therapeutic recommendations after consultation with faculty. The co-management model was fully implemented in September 2008. In this model, psychiatrists directly ordered pharmacotherapy, regularly monitored effects, and intensified efforts toward appropriate disposition. Additionally, increased attending-level involvement expedited focused evaluation and disposition of patients. An interrupted time series analysis was used to study the effects of this intervention on length of stay for all psychiatric patients transferred for inpatient psychiatric care. Secondary outcomes included average number of hours on ambulance diversion per month, and the average number of patients who left without being seen from the ED.

Results—One thousand eight hundred eighty-four patient visits were considered. Compared to the pre-intervention phase, median length of stay for patients transferred for inpatient psychiatric care decreased by about 22% (p-value < 0.0005, 95% CI = 15% to 28%) in the post-intervention phase. Ambulance diversion hours increased by about 40 hours per month (p-value 0.008, 95% CI = 11 to 69 hours) and the average number of patients who left without being seen decreased by about 26 per month (p-value 0.106; 95% CI = -60 to 5.9 visits per month) in the post-intervention phase.

Conclusions—A co-management model was associated with a marked reduction in the length of stay for this patient population.

INTRODUCTION

Patients with psychiatric emergencies face a daunting challenge in our current health care system. Starting in the 1960s and continuing today, the deinstitutionalization movement

Corresponding Author: Steven K. Polevoi, MD Department of Emergency Medicine, University of California, San Francisco 505 Parnassus Ave., San Francisco, CA 94143-0208 (415) 353-4224 steve.polevoi@emergency.ucsf.edu.

Prior Presentation: Society for Academic Emergency Medicine Annual Meeting, Phoenix, AZ, June, 2010.

The authors have no disclosures or conflicts of interest to report.

shifted care for patients with serious psychiatric conditions away from hospitals to outpatient and community mental health facilities.¹ Unfortunately, these alternative options have failed to completely meet the clinical and psychosocial needs of these patients due to a lack of funding and political forces at play. As a result, many patients suffering from mental health crises turn to the emergency department (ED) for care. Recent reports confirm an increasing proportion of ED visits are for mental health and/or substance abuse related issues.^{2,3} Furthermore, prolonged boarding of psychiatric patients is being reported nationwide,^{4,5,6,7} suggesting a critical limitation of inpatient psychiatric capacity.

This increased number of patients with mental health related emergencies can pose a challenge to crowded EDs as these patients are often resource-intensive and, as a result of the contraction of inpatient psychiatric services, can be difficult to place. As has been demonstrated in several studies, ED crowding is most often associated with delayed “output,” and patients with psychiatric emergencies tend to exacerbate this problem.⁸ In addition to delayed output, the quality of care provided to these patients may suffer as the result of multiple handoffs between ED providers and the limited experience of staff in the ongoing management of psychiatric emergencies. Finally, as a result of prolonged length of stay (LOS) in the ED and lack of bed turnover, revenue generation can be negatively affected.

The objective of this study was to evaluate the effectiveness of a new model of care for psychiatric patients, called the ED-psychiatry co-management model. In this model, patient care was shared between the psychiatry consultation-liaison service and ED providers, with psychiatric management directed closely by attending-level psychiatrists. In conjunction with medical and psychiatric care, intensive efforts to achieve disposition were provided by ED social workers. Outcomes considered were ED LOS, effect on the number of patients who leave without being seen (LWBS), and hours on ambulance diversion. The effect of this model on revenue generation was also estimated.

METHODS

Study Design

This was a secondary analysis of a prospective cohort of patients who were being evaluated for psychiatric emergencies. We used data previously collected for a city-wide survey that sought to determine the effect of psychiatric patients on ED operations. This study was deemed exempt from informed consent requirements by the Committee on Human Research at the University of California, San Francisco.

Study Setting and Population

The study site is a 29-bed urban academic ED with approximately 38,000 patient visits per year and a 25% admission rate. While there is no inpatient psychiatric unit or dedicated psychiatric emergency service, an affiliated private psychiatric facility, which operates under a separate license, is physically adjacent to the medical center. This facility provides faculty and resident trainees for consultation to the ED.

Prior to implementation of the co-management model, ED clinicians (residents, nurse practitioners, physician assistants, attending physicians) performed an evaluation and medical clearance based on the presenting condition of the patient. Psychiatry consultation was requested by ED clinicians and provided by psychiatry residents, but direct psychiatry faculty contact was limited to those patients deemed eligible for discharge.

Police officers or trained mental health clinicians in the community may place an involuntary psychiatric hold if they have probable cause to believe that a person is a danger

to himself or herself or others, or gravely disabled (unable to provide food, clothing, shelter) as a result of a mental disorder. ED providers may place a temporary psychiatric involuntary hold to detain a patient in the hospital until further evaluation by a psychiatrist can occur. Many of the involuntary holds included in this study were placed by the psychiatry service after ED evaluation. During the study, the hours of social work availability to assist in the placement of psychiatric patients did not change. Furthermore, staffing ratios (nurses, ancillary staff) and ED management strategies other than those explicitly highlighted in this study remained unchanged.

However, during the study period the local county hospital that serves the uninsured closed 42 inpatient psychiatric beds (almost half of its capacity). In addition, a gero-psychiatric unit with 20 inpatient beds and two psychiatric outpatient day programs closed. In February 2009, the affiliated private psychiatric facility began accepting all psychiatric referrals, regardless of insurance status.

Subjects were all adult patients placed on involuntary psychiatric holds seen at the study site from January 1, 2007 through December 31, 2009. Pediatric patients (age less than 18 years) and those patients not felt to be in need of an involuntary hold after evaluation by psychiatry were excluded.

Study Protocol

In the ED-psychiatry co-management model, initial ED care proceeded exactly as before, but after consultation was requested, the psychiatric consultation and liaison service assumed full responsibility for providing direct psychiatric care. This included the ordering of any necessary psychotropic medications and additional laboratory studies that might be requested by an inpatient psychiatric unit. Additionally, there was increased direct involvement by the attending psychiatrists. This was in contrast with the baseline pre-intervention state, when recommendations were made by the psychiatry service but were carried out by ED providers, with only a subset of these patients seen by attending psychiatrists (those determined to be eligible for discharge). All patients were regularly re-evaluated, with an emphasis on achieving disposition. Implementation of co-management was staged. Beginning in July 2007, psychiatry faculty began seeing all patients five days per week. Full implementation began in September 2008, with seven days per week of psychiatry faculty contact plus direct psychiatric care of patients.

Outcome Measures

The primary outcome considered was length of stay (LOS) for all patients transferred for inpatient psychiatric care. Secondary outcomes included average number of hours of ambulance diversion, and the average number of patients who LWBS per month. Time to medical clearance and LOS for all patients admitted to a non-psychiatric service was also determined to explore the secular trends in LOS patterns during the study period.

Data Analysis

An interrupted time series model (a type of before-and-after study design) was used to determine if the intervention had an effect on outcome greater than the underlying secular trend. This model included a pre-intervention period (January 1, 2007 to July 1, 2007), an intermediate ramp-in period (July 1, 2007 to September 1, 2008), and a post-intervention period (September 1, 2008 through December 31, 2009). The change in the outcome from pre- to post-intervention was estimated by regression analysis. Residuals were checked for approximate normality and outliers. Sensitivity analyses were conducted by re-doing the analyses after removing outliers, and transformations of the outcome were applied when

necessary to improve the normality assumption. Autocorrelation of the residuals was assessed using a Durbin-Watson test.

RESULTS

Demographics and patient disposition over the three-year study period are displayed in Table 1. Patient age, sex, and insurance type did not vary significantly when comparing pre-intervention and post-intervention phases. The majority of patients were either transferred to inpatient psychiatric facilities (74%) or discharged to the community (21%), and these proportions varied little throughout the study. Because of associated medical acuity, a small percentage of patients (5%) were admitted to inpatient beds on non-psychiatric services while the involuntary holds were maintained.

Compared to the pre-intervention phase, median ED LOS for patients transferred for inpatient psychiatric care decreased by about 22% (p-value < 0.0005, 95% CI = 15% to 28%) in the post-intervention phase (Figure 1). Of the secondary outcomes, ambulance diversion hours increased by 40 hours per month (p-value 0.008, 95% CI = 11 to 69 hours) from the pre- to the post- intervention phase (Figure 2). The average number of patients who LWBS decreased by about 26 patients per month, but this was not a statistically significant change (p-value 0.106; 95% CI = -60 to 5.9 patients) (Figure 3). For all outcomes, there are visible changes as the co-management model is implemented followed by stabilization after full implementation.

We also calculated the time to medical clearance and LOS for all patients admitted for non-psychiatric inpatient care. These measures served as a control group and demonstrated the overall LOS trends during the study (Table 2). We defined medical clearance as the absence of active medical condition, as determined by the ED physician, that would preclude transfer to a psychiatric inpatient facility. There was no reduction in the time to medical clearance (in hours) of psychiatric patients during the course of the study (p-value 0.07; 95% CI = -0.05 to 1.06 hours). There was an increase of 0.5 hours in the mean LOS in the post-intervention phase for all patients admitted to non-psychiatric services (p-value 0.04; 95% CI = 0.02 to 0.99 hours).

In the post-intervention phase there was an absolute reduction by 26.1 hours in mean LOS for patients placed on psychiatric holds and ultimately discharged (p < 0.0005, 95% CI = -34.09 to -18.26 hours), compared to the pre-intervention phase. A clinical scenario that leads to discharge from the ED after an involuntary psychiatric hold is placed is concomitant alcohol or substance use; after a period of observation and reassessment, such patients are deemed by the psychiatry service to no longer warrant an involuntary hold.

A reduction in the LOS as demonstrated resulted in increased capacity for new patients. Compared to the pre-intervention phase, ED charges increased by \$2.1 million (sum of professional and technical fees) in the post-intervention phase. While we cannot attribute this increase in charges directly to the co-management model, the resulting revenue was sufficient to cover the cost of hiring 1.5 full-time equivalent psychiatrists and additional social workers, the additional personnel needed for this model.

DISCUSSION

We have demonstrated that the co-management model was associated with a significant reduction in the ED LOS for patients with psychiatric emergencies. As definitive psychiatric treatment cannot be delivered in an ED setting without compromises in privacy, therapeutic environment, and access to mental health professionals, our intervention resulted in more timely transfer to facilities best able to provide this care. Additionally, the co-management

model dramatically reduced the LOS for those patients who, after a period of observation and treatment, no longer met criteria for psychiatric holds, reducing the burden both on the ED and receiving facilities. The co-management model provides both expert emergency medical and psychiatric care by using the most skilled individuals available in our academic facility. The ED social worker added further value by interacting with our patients, their families, and the receiving facilities.

Because we did not randomize patients to the co-management model or usual care, we attempted to control for secular trends by using an interrupted time series analysis, and by comparing the LOS of study patients with non-psychiatric patients who were being admitted to inpatient services. The patients in this control group did not experience any reductions in LOS during the study period, which suggests that the co-management model, not overall improvements in throughput, led to the observed reduction in LOS for patients with psychiatric emergencies. Moreover, other factors, such as the availability of social work, nursing, and other ancillary staff ratios, did not change, making it unlikely that these factors played a role in the observed reduction in LOS. Further supporting this conclusion is the observation that time to medical clearance, the interval directly associated with ED providers and not psychiatrists, was unchanged during the study period.

In spite of a marked reduction in LOS for patients with psychiatric emergencies, we did not see the anticipated reduction in the rate at which patients LWBS, or a decrease in the number of hours on ambulance diversion over the course of the study period. It is possible that these metrics are insensitive to anything but large-scale improvements in throughput. Alternatively, countervailing forces may have been at play that tended to neutralize the effect of the reduction in LOS experienced. For instance, the LOS for patients being admitted to a medical service, a much larger proportion of patients, increased during the study period.

In spite of the failure to demonstrate a reduction in the rate of patients LWBS, or a decrease in ambulance diversion, a financial argument can be made in favor of implementing this model of care. The excess capacity and potential for enhanced revenue generation that is created by reducing the LOS for this group of patients was substantial. Given this, we feel that a strong case can be made with hospital administration that additional faculty and social work staff should be financially supported.

Studies to determine clinical or other operational outcomes of the co-management model, such as the frequencies of the use of physical restraints, assaultive behavior on staff, and inpatient LOS, would be useful. Favorable outcomes would support more widespread use of such a model. Additionally, the educational effect of this model should be studied given that residents are more closely paired with and supervised by psychiatry faculty. It is notable that other specialties, including internal medicine,⁹⁻¹¹ general surgery,¹² and neurology^{13,14} have recently piloted analogous “hospitalist” models to enhance the care of patients in the ED.

LIMITATIONS

The study was conducted at a single academic ED, and therefore the findings may not be generalizable to other facilities with different patient populations, consultation models, and better access to inpatient psychiatric care. Second, because subjects were not randomized, findings can be confounded by unmeasured and uncontrolled variables. For instance, the number of recipient psychiatric facilities and their acceptance policies changed during the course of the study. This could have resulted in either more or less acceptance of referrals; it is impossible to determine the magnitude and direction of these changes. However, it is important to note that there was a net decrease in the number of inpatient psychiatric beds in the community during the study period. Third, given that these data were collected by social

workers prior to our analysis, we did not have the opportunity to conduct quality control to ensure accurate data entry. Finally, our analysis does not allow us to determine what components of the co-management model (e.g. directly ordered pharmacotherapy, regular faculty input, or focused social worker efforts) had the greatest effect on LOS.

CONCLUSIONS

The co-management model was found to be associated with a marked reduction in overall length of stay for patients with psychiatric emergencies. The effect was most profound for those patients ultimately discharged from the ED. While a concomitant reduction in the rate of patients leaving without being seen or in hours of ambulance diversion was not seen, we feel this is a promising model to improve the care of patients with psychiatric emergencies that should be supported by hospital administrators.

Acknowledgments

Dominic Tarpey, LCSW, and Ellen J. Weber, MD

Funding Sources: This publication was supported by the National Center for Advancing Translational Sciences, National Institutes of Health, through UCSF-CTSI Grant Number UL1 TR000004. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIH.

REFERENCES

1. Salinsky E, Loftis C. Shrinking inpatient psychiatric capacity: cause for celebration or concern? Issue Brief Natl Health Policy Forum. 2007; (823):1–21.
2. Hazlett SB, McCarthy ML, Londner MS, Onyike CU. Epidemiology of adult psychiatric visits to US emergency departments. Acad Emerg Med. 2004; 11:193–5. [PubMed: 14759965]
3. Owens, PL.; Mutter, R.; Stocks, C. [Jan 12, 2013] Mental health and substance abuse-related emergency department visits among adults, 2007. Statistical Brief #92.. Available at: <http://www.hcupus.ahrq.gov/reports/statbriefs/sb92.pdf>.
4. American College of Emergency Physicians. [Jan 12, 2013] ACEP psychiatric and substance abuse survey 2008.. Available at: http://www.acep.org/uploadedFiles/ACEP/Advocacy/federal_issues/PsychiatricBoardingSummary.pdf.
5. Slade EP, Dixon LB, Semmel S. Trends in the duration of emergency department visits, 2001–2006. Psychiatr Serv. 2010; 61(9):878–84. [PubMed: 20810585]
6. Alakeson V, Pande N, Ludwig M. A plan to reduce emergency room ‘boarding’ of psychiatric patients. Health Aff (Millwood). 2010; 29(9):1637–42. [PubMed: 20820019]
7. Chang G, Weiss AP, Orav EJ, et al. Hospital variability in emergency department length of stay for adult patients receiving psychiatric consultation: a prospective study. Ann Emerg Med. 2011; 58(2): 127–36. [PubMed: 21227544]
8. Moskop JC, Sklar DP, Geiderman JM, Schears RM, Bookman KJ. Emergency department crowding, part 1--concept, causes, and moral consequences. Ann Emerg Med. 2009; 53(5):605–11. [PubMed: 19027193]
9. Howell E, Bessman E, Marshall R, Wright S. Hospitalist bed management effecting throughput from the emergency department to the intensive care unit. J Crit Care. 2010; 25(2):184–9. [PubMed: 19828284]
10. Defilippis AP, Tellez I, Winawer N, Di Francesco L, Manning KD, Kripalani S. On-site night float by attending physicians: a model to improve resident education and patient care. J Grad Med Educ. 2010; 2(1):57–61. [PubMed: 21975885]
11. Briones A, Markoff B, Kathuria N, et al. A model of a hospitalist role in the care of admitted patients in the emergency department. J Hosp Med. 2010; 5(6):360–4. [PubMed: 20803676]
12. Maa J, Carter JT, Gosnell JE, Wachter R, Harris HW. The surgical hospitalist: a new model for emergency surgical care. J Am Coll Surg. 2007; 205(5):704–11. [PubMed: 17964447]

13. Josephson SA, Engstrom JW, Wachter RM. Neurohospitalists: an emerging model for inpatient neurological care. *Ann Neurol*. 2008; 63(2):135–40. [PubMed: 18306369]
14. Likosky D, Shulman S, Restrepo L, Freeman WD. Survey of neurohospitalists: subspecialty definition and practice characteristics. *Front Neurol*. 2010; 1:9. [PubMed: 21206522]

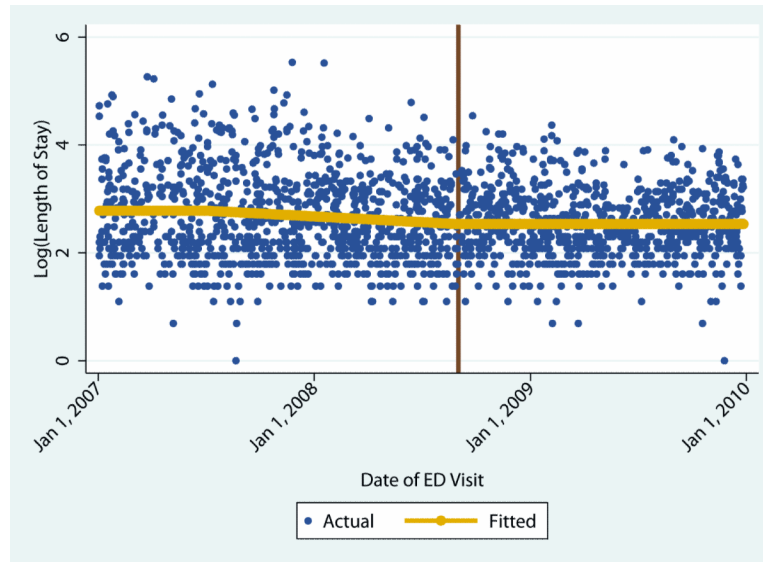


Figure 1. ED LOS for patients transferred to a psychiatric inpatient facility. LOS is log transformed. The vertical line represents full implementation of the co-management model.

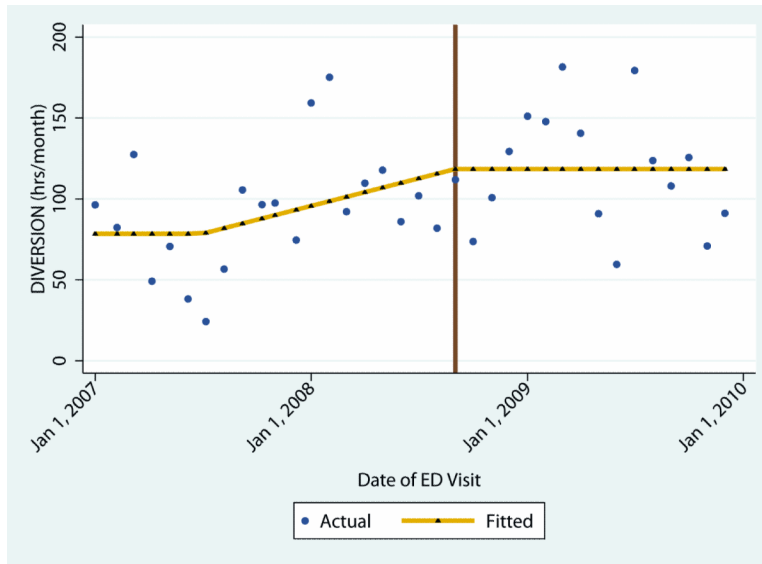


Figure 2. Change in the average hours of ambulance diversion per month. The vertical line represents full implementation of the co-management model.

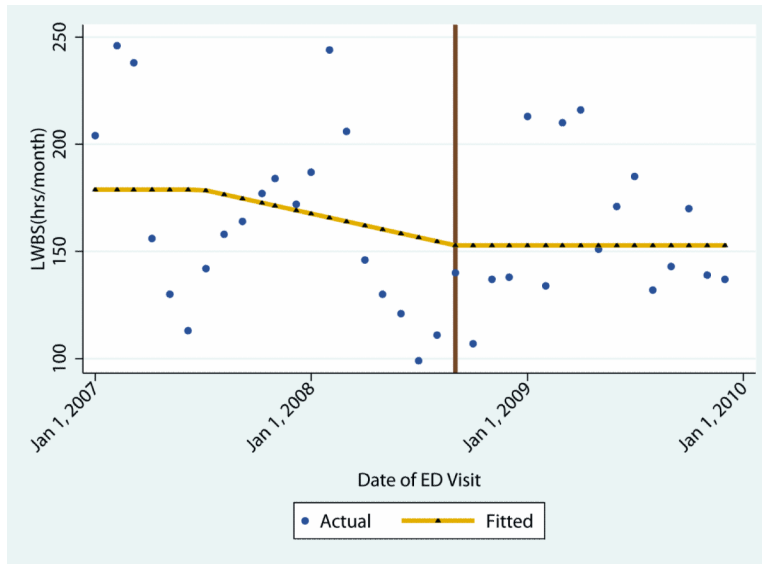


Figure 3. Change in the average number of patients per month who left the ED without being seen by physicians. The vertical line represents full implementation of the co-management model.

Table 1

Demographics and Disposition of Study Patients

Variable	Pre-intervention phase (2007-08)	Post-intervention phase (2008-09)	Total	p-value
Age, yrs mean (\pm SD)	41.7 (\pm 14.5)	41.2 (\pm 14.9)		0.41 [*]
Age, yrs median (range)	41 (18-96)	40 (18-89)		
Missing age, n	28	14		
Sex				
Male	543 (53.0)	425 (52.0)	968 (52.6)	0.92 [†]
Female	467 (45.6)	380 (46.5)	847 (46.0)	
Transgender	15 (1.5)	12 (1.5)	27 (1.5)	
Missing, n	28	14		
Insurance type				
Medicare	279 (26.5)	250 (30.1)	529 (28.1)	0.16 [†]
Private	342 (32.5)	251 (30.2)	593 (31.5)	
Medicaid	245 (23.3)	170 (20.5)	415 (22.0)	
None	187 (17.8)	160 (19.3)	347 (18.4)	
Disposition				
Transfer-psych	775 (73.8)	610 (73.4)	1385 (73.6)	0.84 [†]
Released	221 (21.0)	180 (21.7)	401 (21.3)	
Admit-medical	53 (5.0)	39 (4.7)	92 (4.9)	
Eloped	1 (0.1)	2 (0.2)	3 (0.2)	
Missing, n	3			
Total	1,053	831	1,884	

Transfer-psych: patients transferred to psychiatric facility after medical clearance. Released: patients discharged to the community after release from psychiatric hold. Admit-medical: patients on psychiatric holds who were admitted to non-psychiatric inpatient services

Values are reported as n (%) unless otherwise noted.

* based on Mann-Whitney test

† based on chi-square test

Table 2

Secondary Outcomes

Variable	Pre-intervention (2007-08)	Post-intervention (2008-09)	Estimated change (95% CI)	p-value
LWBS (n)	179	153	-26 (-57.90 to 5.87)	0.106
Diversion hours (aggregate/month)	78.47	118.49	40.02 (11.02 to 69.02)	0.008
Medical clearance time (hours)	3.22	3.73	0.51 (-0.05 to 1.06)	0.073
LOS medical admit (hours)	8.41	8.92	0.51 (0.02 to 0.99)	0.044
5150 discharge (hours)	44.88	18.70	-26.18 (-34.09 to -18.27)	0.000

LWBS = number of patients who left without being seen by physicians per month; diversion hours = aggregated ambulance diversion hours per month; medical clearance time = time in hours to medically cleared patients for transfer to psychiatric facilities; LOS medical admit = ED length of stay for patients admitted to non-psychiatric services; 5150 discharge = ED length of stay for patients placed on involuntary holds and then released.