

ACS COT Residents Trauma Papers Competition Title Page

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Title of the Abstract: The Impact of Early Psychiatric Consultation on Hospital Length of Stay and Cost at a Level I Trauma Center

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THE IMPACT OF EARLY PSYCHIATRIC CONSULTATION ON HOSPITAL LENGTH OF STAY AND COST AT A LEVEL 1 TRAUMA CENTER.

Background: Psychiatric disorders among hospitalized trauma patients are known to increase complication rates and make safe discharges more difficult. Recent studies have demonstrated higher complication rates and longer hospital stays in trauma patients with a co-existing psychiatric diagnosis. However, there have been few studies dedicated to cost analysis in trauma patients with a psychiatric diagnosis or substance abuse disorder. Moreover, the effect of the timing of psychiatry service consultation during hospitalization (early vs. late) on cost of care remains unknown. The purpose of this study was to identify unique characteristics of trauma patients with a psychiatric diagnosis, specifically ones that require a formal psychiatric consultation, and how these relate to the consumption of health care resources. We hypothesized that relatively early consultation of the psychiatric service in the management of such patients is associated with decreased hospital cost and length of stay.

Methods: Following approval from our Institutional Review Board, patient admissions to an ACS verified level 1 trauma center were queried from January 1, 2018 – December 31, 2018. Data collected included patient demographics, injury characteristics, in-hospital specialty consultations, length of stay, and hospital costs. Our cohort was split into three groups: (1) patients with neither a psychiatric diagnosis nor psychiatry service consultation, (2) patients with an existing and managed psychiatric condition but without psychiatry service consultation, and (3) patients who received psychiatry service consultation. Psychiatric diagnoses were categorized into one of six categories for analyses: depression, stress disorders, personality disorders, neuro-cognitive disorders, delirium, and psychosis. Time to psychiatric consult was evaluated with consultation on the day of or day following admission considered early consult and 2 or more days after admission considered late consult. Patient outcomes were compared by psychiatric diagnosis category. Multivariate linear regression models were used to determine the impact of early psychiatric consultation on hospital length of stay and cost. Due to differences discharge processes and reimbursement algorithms by payer and also be in alignment with our patient population, we focused on our multivariate models on Medicare/Medicaid patients.

Results: Our cohort consisted of 1807 patients, 1204 (66.6%) without psychiatric diagnosis or in-hospital consultation, 508 (28.1%) with psychiatric diagnosis but without in-hospital consultation, and 95 (5.3%) who received psychiatric consultation (Table 1). Patients requiring psychiatric consult were the youngest of the three groups ($P < .001$), with highest injury severity ($P = .024$), and highest incidence of injury sustained by firearm (9.5%) and stabbing (15.8%; $P < .001$). Of the three groups, patients requiring in-hospital psychiatric consultation had the longest hospital length of stay ($P < .001$), ICU length of stay ($P < .001$), were most likely to be ventilated ($P < .001$), least likely to be discharged to home ($P < .001$), and had the highest median hospital cost ($P < .001$). Self-harm was associated with longer hospital length of stay (7.4 ± 6.7 days vs 4.1 ± 4.4 days, $P = .027$) and hospital cost ($\$37,542 \pm \$31,971$ vs $\$23,674 \pm \$21,459$, $P = .045$). The correlation between time to psychiatric consult and hospital length of stay bordered moderate to large, $r(70) = .50$, $P < .001$; thus, we explored the impact of early consult on hospital length of stay and cost. Adjusted for injury severity, ICU admission, intubation,

and self-harm, early consult was associated with an average length of stay of 2.9 days less compared to late consult ($P = .021$). The same covariates with the addition of hospital length of stay were used in our model predicting hospital costs. In this model early consultation was associated with an average saving of \$7525 (Table 2).

Conclusion: This study showed that trauma patients with a psychiatric diagnosis who required a psychiatric consult were more likely to be admitted to the ICU. Additionally, the psychiatric consult cohort Trauma patients who received consultation from the hospital psychiatry service were observed to have longer hospital LOS, ICU LOS, and hospital costs. Interestingly, the patients who received psychiatric consultation comprised only 5.3% of the cohort; however, they were responsible for 7.9% of the hospital cost and 10.5% of the summed hospital days. Other studies have also supported that trauma patients with a co-morbid psychiatric condition have more complications.

Although it is not surprising that psychiatric comorbidity would contribute to increased hospital resource use, our results suggest that hospital costs may be, in part, modifiable with respect to the timing of psychiatric consultation. To our knowledge, this is the first study to explore whether the timing of psychiatric consultation has an effect on length of stay and hospital costs in trauma patients. The underlying reasons for the cost savings associated with relatively early involvement of the psychiatry service, however, remains unclear. It is possible that earlier initiation of treatment contributed to shorter length of stays. Similarly, earlier determination of psychiatric disposition for discharge planning may have also contributed to shorter stays. Additionally, it remains possible, despite adjustment for injury severity, that relatively later psychiatry service involvement in patient care was attributable, at times, to patient injury burden taking precedence over psychiatric issues. Nonetheless, the results of this study suggest that cost savings and reduction in length of stay may be achieved with relatively early involvement of the psychiatry service in the management of trauma patients with concomitant psychiatric conditions.

Table 1. Patient demographics, injury characteristics and outcomes.

| | All (N=1807) | No Psychiatric Condition (n=1204, 66.6%) | Psychiatric Condition without Consultation (n=508, 28.1%) | Psychiatric Consultation (n=95, 5.3%) | P- value |
|---------------------------------------|---------------------|---|--|---|-------------|
| Age, years | 50.2±21.5 | 52.4±22.4 | 46.6±18.8 | 42.2±17.1 | <.001 |
| Male Sex | 1054(58.3%) | 642(53.3%) | 354(69.7%) | 58(61.1%) | <.001 |
| Injury Severity Score | 8.9±6.9 | 8.7±6.8 | 9.0±6.9 | 10.7±8.4 | .024 |
| Mechanism of Injury | | | | | <.001 |
| Stab | 86(4.8%) | 34(2.8%) | 37(7.3%) | 15(15.8%) | |
| Fall | 720(39.8%) | 515(42.8%) | 174(34.3%) | 31(32.6%) | |
| Firearm | 86(4.8%) | 42(3.5%) | 35(6.9%) | 9(9.5%) | |
| Motor Vehicle Accident | 567(31.4%) | 411(34.1%) | 134(26.4%) | 22(23.2%) | |
| OTHER | 112(6.2%) | 67(5.6%) | 36(7.1%) | 9(9.5%) | |
| Ped/Bike | 37(2.0%) | 23(1.9%) | 14(2.8%) | 0 | |
| Struck by or Against Rec Vehicle | 167(9.2%) | 91(7.6%) | 70(13.8%) | 6(6.3%) | |
| 32(1.8%) | 21(1.7%) | 8(1.6%) | 3(3.2%) | | |
| Tox Screen: | 466(25.8%) | 139(11.5%) | 274(53.9%) | 53(55.8%) | <.001 |
| Drugs/Alcohol | | | | | |
| Hospital LOS, days | 3(1-5) | 2(1-5) | 3(1-5) | 6(3-13) | <.001 |
| ICU Y/N | 745 (41.2%) | 458(38.0%) | 231(45.5%) | 56(58.9%) | <.001 |
| ICU LOS, days | 3(2-6) | 3(2-5) | 3(2-5) | 6(3-10.8) | <.001 |
| Ventilated, Y/N | 212 (11.7%) | 100(8.3%) | 78(15.4%) | 34(35.8%) | <.001 |
| Ventilated days | 3(2 – 5.8) | 3(2 – 8) | 2(2-4.3) | 3.5 (2-6) | .216 |
| Median hospital cost, \$ thousands | 18.3(9.1 – 18.8) | 17.6(8.8 – 27.8) | 18.7(9.1-29.3) | 26.0(13.3 – 51.7) | <.001 |

Table 2. Summary of Regression Models predicting Hospital Length of Stay and Cost.

| | Unstandardized Beta | Standard error | 91% CI for beta | p-value |
|------------------------------|------------------------|-------------------|-----------------|---------|
| Dependent Variable: | | | | |
| Hospital Length of Stay | | | | |
| Injury severity score | 0.33 | 0.08 | 0.18 – 0.48 | <.001 |
| ICU admission | 3.16 | 1.55 | 0.07 – 6.25 | .045 |
| Ventilated | 0.70 | 1.64 | -2.58 – 3.98 | .671 |
| Self-harm | -1.02 | 1.35 | -3.72 – 1.68 | .451 |
| Early psychiatric consult | -2.90 | 1.23 | -5.36 - -0.45 | .021 |
| Dependent Variable: | | | | |
| Hospital Cost, \$ | | | | |
| Injury severity score | \$594 | 246 | 101 – 14027 | .019 |
| Hospital length of stay | \$2707 | 366 | 1975 – 3439 | <.001 |
| ICU admission | \$4850 | 4608 | 4364 – 14066 | .297 |

| | | | | |
|------------------------------|---------|------|---------------|------|
| Ventilated | \$2096 | 4737 | 7376 – 11570 | .660 |
| Self-harm | \$7933 | 3910 | 113 – 15753 | .047 |
| Early psychiatric consult | -\$7525 | 3699 | -14923 - -127 | .046 |
