The Probability of Hospitalizations for Mild-to-Moderate Injuries by Trauma Center Ownership Type

Etienne E. Pracht, Barbara Langland-Orban, and Jessica L. Ryan

Objective. To corroborate anecdotal evidence with systematic evidence of a lower threshold for admission among for-profit hospitals.

Data Sources. The study used Florida emergency department and hospital discharge datasets for 2012 to 2014. The treatment variable of interest was for-profit-designated trauma center status. The dependent variable indicated whether a patient with mild-to-moderate injuries was admitted after presenting as a trauma alert and then discharged to home. A separate analysis was conducted of discharges that had a 1-day length of stay.

Study Design. Generalized estimation equations with logistic distribution models were used to control for the confounding influences and developed for four groups of patients: $ICISS = 1$ (no probability of mortality), $ICISS \geq 0.99$, $ICISS \geq 0.95$, and $ICISS \geq 0.85$ (zero to 15 percent probability of mortality, which includes all mild and moderate injury patients).

Principal Findings. For the $ICISS = 1$ and $ICISS \geq 0.99$ models, the centers' for-profit status was the most important predictor. In the $ICISS \geq 0.95$ and $ICISS \geq 0.85$ models, injury type played a more important role, but for-profit status remained important. For patients with a 1-day stay, for-profit status was associated with an even higher probability of hospitalization.

Conclusions. Considerable differences exist between for-profit and not-for-profit trauma centers concerning hospitalization among the study population, which may be explained by supplier-induced demand.

Key Words. Incentives in Health Care, ownership, hospitals, supplier-induced demand

For-profit (FP), also known as investor-owned, and not-for-profit (NFP) hospitals differ in important ways. Perhaps most important is the influence of shareholder preferences on the behavior of the hospital firm. Basic microeconomic theory suggests that the overriding objective of any investor, and ultimately the firm, is to maximize the return on investment. This happens via one of two

avenues. First, a return occurs from the distribution of residual revenue to shareholders, suggesting the importance of pricing strategies and controlling expense. Second, shareholder return also depends on the changes in the value of the firm's stock price. Increasing stock value can be achieved through sustained above-normal profits or growth in revenue. As such, for-profit hospitals seeking growth to maximize shareholder wealth are expected to behave differently concerning the probability of "marginal" patients being admitted for inpatient services once they present at the hospital. This behavior has been well documented by various news, government, and industry agencies (Evans and Carlson 2012; USDOJ, 2016).

The objective of this study was to determine whether systematic evidence exists that corroborates a lower threshold for admission among FP hospitals. It focused on mildly injured patients who were transported to a state-designated trauma center (DTC) and classified as "trauma alerts." A DTC is a "type of hospital that provides trauma surgeons, neurosurgeons and other surgical and nonsurgical specialists and medical personnel, equipment and facilities for immediate treatment for severely injured patients, 24 hours-a-day, seven-days-a-week" (DOH, 2014). Numerous studies have demonstrated that DTCs are associated with improved probability of survival following severe injury (Nathens et al. 2000; Mann et al. 2001; Celso et al. 2006; Durham et al. 2006; MacKenzie et al. 2006; Pracht et al. 2007, 2008; Pracht, Langland-Orban, and Flint 2011). Typically, patients are categorized as a "trauma alert" by paramedics at the scene of the injury, using a predetermined method or local criteria (Flint et al. 2005). The trauma alert designation results in the trauma team being activated to manage the patient upon arrival to the emergency department (ED). Unfortunately, the decision making process is imprecise and some trauma alerts are false alarms. In retrospect, some patients classified as trauma alerts are determined to involve only minor or moderate non-life-threatening injuries. The primary hypothesis of this study is that for-profit centers are more likely to hospitalize such patients due to supplier-induced demand (SID). Florida provides a unique environment to assess differences in behavior as Florida has the highest percent of for-profit hospitals (51.7 percent) among the 50 states (KKF, 2016).

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SUPPLIER-INDUCED DEMAND AND FOR-PROFIT STATUS

The SID concept provides a potential explanation for the hypothesized difference in the probability to admit low-severity patients for inpatient services. According to this theory, substantial information asymmetries allow providers to maximize their profits by creating demand for their own services, even in cases where those services are medically unnecessary (Wennberg, Barnes, and Zubkoff 1982). While it is difficult to definitively prove the existence of SID, for this would require disentangling demand- from supply-side factors, it is possible to examine the financial incentive systems faced by different types of hospitals. While FP and NFP hospitals both have strong incentives to maximize growth, in the FP hospital case, the primary objective is to maximize the return for shareholders.

This study focuses on patients who were transported to the hospital ED as trauma alerts indicating immediate need for trauma services. Once presenting to the hospital as a trauma alert, the institution's physicians determine the utilization of subsequent services, including inpatient services. The objective of this study was to compare the probability of hospital admission among very low-acuity patients who were transported to a trauma center ED as "trauma alerts" between FP hospitals and NFP hospitals.

DATA AND METHODS

This study uses the Florida AHCA inpatient discharge and ED datasets for 2012 to 2014. Previous years were not used in the analysis because four new FP hospitals became DTCs in November 2011. The four new DTCs were FP hospitals before their certification, so there was no change in ownership status. A fifth hospital became a DTC in December 2013 and is included in the data as such in 2014. It changed ownership status from NFP to FP more than a year before its DTC certification and is classified in the data as the latter for 2014. The datasets contain information concerning insurance status, patient demographics, and case mix-related characteristics, such as age, sex, race, type of diagnosis, source of admission, and patient status at the end of the episode. The treatment variable of interest was a hospital's FP status. The dependent variable of interest was dichotomous and indicates whether a patient with mild-to-moderate injuries was admitted for inpatient services after presenting

as a trauma alert, recognizing trauma alerts is intended for severe injury patients. Trauma alert patients were identified by the presence of a trauma alert charge assessed by the DTC. All patients included in the data were admitted through the ED and discharged to home following treatment. Therefore, the data do not include any patients who were transferred to or from another hospital.

The data included all Florida DTC hospitals over a period of 3 years. This implies the potential existence of correlation among repeated observations for the hospitals. To account for this correlation in the data, a generalized estimation equations (GEE) model, with logistic distribution, was used in the analysis to produce robust standard errors and examine the influence of the treatment variable (Zeger and Liang 1986, 1992).

During the time period considered in the analysis, there were 27 adult DTCs in the state, of which eight were classified as FP. The FP DTCs were generally smaller with an average bed size of 355 compared to 660 in the NFP hospitals. Four of the NFP hospitals were public institutions. There were seven Level I DTCs, all of which were classified as NFP and teaching hospitals. All others were classified as Level II.

Patients with non-life-threatening or low-mortality injuries were identified using International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) Injury Severity Scores (ICISS). The ICISS were calculated using survival risk ratios (SRRs) compiled from the 1991 to 2010 AHCA inpatient discharge data. The ICISS methodology was developed by Osler et al. (1996) as an alternative to anatomic-derived measures. Unlike the alternatives, the ICISS are continuous and bounded by zero and one. High ICISS values indicate lower severity allowing classification of injuries, ranging from no probability of mortality (ICISS = 1) to life-threatening (ICISS = 0) (Osler et al. 1996).

Twenty years of data were used to calculate the SRRs to maximize the history associated with each ICD-9-CM code. An ICISS of unity indicated that no patient died with the specific injury, or combination of injuries, for at least 20 years prior to the study period. The model was estimated for four levels of severity: zero probability of mortality (ICISS = 1), less than or equal to 1 percent probability (ICISS $\geq$ 0.99), less than or equal to 5 percent probability (ICISS $\geq$ 0.95), and less than or equal to 15 percent probability (ICISS $\geq$ 0.85). It should be noted that patients with an ICISS of less than 0.85 are typically defined as severe injury, or at-risk, patients (Flint et al. 2005; Durham et al. 2006; Pracht et al. 2006, 2007).

Model Variables

Model variables may be grouped into four categories: hospital characteristics, demographics, insurance and residence status, and injury severity and type. In addition to the treatment variable of interest, the following hospital characteristics were accounted for in the model. Level I DTCs tend to be larger and have to meet additional certification requirements such as fulfilling a teaching mission and having pediatric capability. To the extent that these additional requirements lead to a higher probability of more complicated cases, utilization of services may also differ. However, because the focus is on low-to-very low-severity patients, this distinction is not expected to be significant. The required teaching mission of Level I DTC indicates that this variable also serves as a proxy for the hospitals' teaching status. The model also contains the hospital's bed size. Finally, following the SID hypothesis, publicly owned hospitals likely operate under different incentive systems which could lead to a higher admission threshold. All DTCs are located in relatively large metropolitan areas, making an urban/rural designation unnecessary. Instead, hospital county level fixed effects were included in the model to account for the influence of relevant but unobserved characteristics that may be associated with the hospital's location.

Injury severity is usually considered an important predictor of resource utilization; however, because the model includes only mild-to-moderate injury severity patients, the ICISS itself embody little if any variability. Therefore, the number of injuries is included as a measure for perceived severity. In the $ICISS \geq 0.95$ and $ICISS \geq 0.85$ models, the ICISS are included as an additional measure of severity. The model also accounts for injury type. Following previous research focused on trauma system effectiveness, injuries typically associated with potentially true trauma were identified as (1) traumatic brain injury—TBI; (2) other skull and spinal cord injuries—SSCI—not involving TBI; (3) other fractures not involving TBI or SSCI; (4) internal injury of the thorax, abdomen, or pelvis; (5) injury of blood vessels; and (6) burns (Durham et al. 2006; Pracht et al. 2007; Ciesla et al. 2013). Alternatively, some injuries not typically associated with true trauma include (7) late effects from injuries—ICD-9-CM codes 905-909; (8) superficial injuries, and contusions only injuries—910-924; (9) dislocations and sprains—ICD-9-CM codes 830-848; and (10) foreign bodies entering through orifice—ICD-9-CM codes 930-939. This group of injuries is defined as not-true-trauma by the Florida Department of Health (Flint et al. 2005; Pracht et al. 2007). To account for these differences, the model included six binary variables

indicating the true-trauma injury types based on the principal diagnosis. The true-trauma injury types are mutually exclusive and all-inclusive of “true-trauma” cases. The control for these variables consists of patients whose injuries were solely in the not-true-trauma category.

The model also included an indicator of the patient’s out-of-state residence status. To the extent patients have the ability to influence the decision for hospitalization, out-of-state residents may have different preferences, for example, based on a desire to seek care in more a familiar geographic setting. On the other hand, travel time is likely longer for such patients who may therefore be advised to remain in the hospital longer to assure they will not require urgent follow-up care shortly after being discharged. The impact of this variable will be assessed empirically. Finally, following existing literature concerning trauma care (Pracht et al. 2007; Tepas et al. 2011), the model includes variables indicating the patient’s insurance status, age, race, Hispanic origin, and gender to account for potential differences associated with these demographic variables.

The dependent variable is dichotomous, indicating whether the patient had been admitted as an inpatient and was, subsequently, discharged to “home.” This restriction was implemented to reduce the heterogeneity among patients based on unrecorded indicators of worsening patient physiology or injury severity. Thus, all patients in the main analysis were similar based on (1) presentation as a trauma alert, (2) discharge status, and (3) retrospectively determined injury severity. The number of observations for the four subsets of the data was as follows: $ICISS = 1.00$, $N = 790$; $ICISS \geq 0.99$, $N = 2,674$; $ICISS \geq 0.95$, $N = 13,133$; $ICISS \geq 0.85$, $N = 26,858$.

In a secondary analysis, the data were further restricted to only include patients with a length of stay of 1 day in the event of hospitalization. This additional restriction further reduces the variation that may result from unobserved indicators of worsening patient physiology or injury severity. Because the objective of the study was to examine the role of ownership status on the probability of inpatient services that may not have been necessary, this restriction increases the likelihood that such services were unnecessary.

RESULTS

Table 1 contains the percentages and means for the model variables by severity level. NFP hospitals account for approximately 70 percent of low-acuity patients. The data indicate that FP hospitals consistently admit a larger

Table 1: Distribution of Trauma Alerts That Resulted in Hospitalization by Hospital Type and Severity

	<i>ICISS = 1</i>	<i>ICISS ≥ 0.99</i>	<i>ICISS ≥ 0.95</i>	<i>ICISS ≥ 0.85</i>
Percent trauma alerts by hospital type (hospitalized and ED)				
For-profit	28.6	30.6	27.6	29.2
Not-for-profit	71.4	69.4	72.4	70.8
Percent hospitalized				
For-profit	81.0	75.5	71.1	79.2
Not-for-profit	50.9	45.9	40.3	51.4
Total percent hospitalized	59.5	55.0	48.8	59.5
Percentages for other model variables				
Female	30.4	31.3	27.3	27.4
Children	68.9	41.1	16.2	10.3
Elderly	4.6	1.7	5.1	9.8
Black	30.1	28.3	28.0	24.2
Hispanic	12.8	16.6	16.4	15.8
Uninsured	13.5	20.3	28.7	25.8
Out-of-state resident	6.8	6.4	6.8	7.1
Traumatic brain injury	47.7	41.9	23.9	27.8
Skull/spinal cord injury	2.9	6.7	7.6	15.4
Fracture	11.8	11.2	13.7	12.9
Vascular	0.8	1.7	1.4	1.8
Burn	5.6	8.4	4.1	3.3
Torso	1.4	0.4	1.0	7.1
Not-true trauma	30.3	29.9	48.7	32.2
Means				
Injury count	1.21	1.36	1.61	2.35
ICISS	1.00	1.00	0.97	0.94

percentage of low-acuity patients for inpatient services. The difference ranges from 28 to 31 percentage points.

The second half of the table shows the percentages, or mean values, for the complete set of model variables. Female patients made up a slightly larger percent (30 and 31) in the lower severity samples compared to the relatively higher severity groups (27 percent). Children are more prevalent in the lowest severity samples (69 percent), but their proportion tapers off quickly, dropping to 10 percent in the $ICISS \geq 0.85$ sample. Concerning race, blacks and Hispanics account for between 24 and 16 percent of patients.

In the $ICISS = 1$ group, 48 percent were identified as having a TBI diagnosis. The percentage with TBI falls to 28 in the $ICISS \geq 0.85$ group. In the injury-type groups, the only other noteworthy finding is the percent of patients with non-true-trauma injuries only. In the $ICISS = 1$ group, the proportion was 30 percent, jumping to 49 percent in the $ICISS \geq 0.95$ group; it was 36

percent in the $ICISS \geq 0.85$ group. In the $ICISS = 1$ and $ICISS \geq 0.99$, the most common such injury was in sprains and strains category. In the $ICISS \geq 0.95$ and $ICISS \geq 0.85$ groups, the most common such injury was in the contusions with intact skin surface classification. The percentage of patients with injuries falling solely in the not-true-trauma category increases significantly ($p < .01$) from the $ICISS = 1$ to the $ICISS \geq 0.95$ samples from 30.3 to 48.7 percent. In the larger sample ($ICISS \geq 0.85$), it falls back to 32.3 percent ($p < .01$). The mean number of individual injuries increases from 1.21 in the $ICISS = 1$ population to 2.35 in the $ICISS \geq 0.85$ sample.

Finally, the results indicate that more established FP centers had admission rates for mildly injured patients ranging from 77 to 83 percent. The newer FP centers had admission rates ranging from 80 to 90 percent. In contrast, the NFP hospitals had an average admission rate of 57 percent, with a single outlier reaching 80 percent.

Regression Results

The GEE regression results are shown in Table 2. GEE logistic regression coefficients are not directly interpretable, so the marginal effects (ME) are included. The results indicate that FP status was significantly associated with hospitalization of mildly injured patients. In the $ICISS = 1$ equation, the ME of FP is 0.63. For-profit hospital ownership and public ownership were the only institutional characteristics that had significant explanatory power in this equation. The next most important variable explaining hospitalization in this equation is the fracture injury type with a ME of 0.32. Compared to patients with non-true-trauma injuries only, patients with burns are associated with -0.27 decrease in the probability of hospitalization. The uninsured are significantly less likely to be hospitalized ($ME = -0.20$), while the number of injuries significantly increased the probability of hospitalization. Female patients were slightly less likely to be hospitalized. The remaining demographic variables were not statistically significant.

In the sample including $ICISS \geq 0.99$ patients, FP status remains the most important predictor of hospitalization with an ME of 0.63. In this model, the Level 1 variable was associated with increased probability of hospitalization. Hospital size was not statistically significant, but public hospitals had lower probability of admitting patients for inpatient services. Patients with TBI, SSCI, fractures, and vascular injuries were all significantly more likely to be hospitalized compared to patients with non-true-trauma only injuries. In this sample, children were more likely to be hospitalized. On the other hand,

Table 2: GEE Regression Results and Marginal Effects

	ICISS = 1.00				ICISS ≥ 0.99				ICISS ≥ 0.95				ICISS ≥ 0.85			
	Est	p	ME		Est	p	ME		Est	p	ME		Est	p	ME	
N	790			2674				13133				26858				
Intercept	-1.697	.001		-1.692	<.001			-0.707	.774			5.254	<.001			
FP	2.989	.002	0.63	2.018	<.001		0.63	2.395	<.001		0.43	2.213	<.001		0.41	
Level I DTC	0.714	.224	0.11	1.049	.029		0.14	0.833	.311		0.12	0.942	.218		0.12	
Bed size	0.000	.879	0.00	0.000	.955		0.00	0.001	.211		0.00	0.000	.717		0.00	
Public	-1.350	.004	-0.16	-1.966	<.001		-0.36	-1.503	.075		-0.25	-1.487	.063		-0.23	
Female	-0.248	.045	-0.05	-0.259	.006		-0.05	-0.091	.014		-0.02	-0.106	.001		-0.02	
Child	-0.339	.340	-0.07	0.435	.005		0.08	0.387	<.001		0.07	0.402	<.001		0.07	
Elderly	0.042	.942	-0.02	0.442	.281		0.08	-0.132	.399		-0.02	-0.423	<.001		-0.06	
Black	0.084	.720	0.01	-0.038	.697		-0.01	-0.040	.588		-0.01	0.014	.768		0.00	
Hispanic	-0.078	.808	-0.01	0.080	.450		0.02	0.130	.073		0.02	0.134	.145		0.02	
Uninsured	-1.195	.032	-0.20	-0.400	.031		-0.07	-0.553	.008		-0.09	-0.566	.001		-0.09	
Out-of-state resident	0.372	.359	0.05	-0.016	.933		-0.01	0.105	.212		0.02	0.091	.276		0.01	
Injury count	0.882	<.001	0.13	0.483	<.001		0.09	0.205	.051		0.03	0.029	.695		0.00	
TBI	1.205	.001	0.22	1.121	<.001		0.22	1.804	<.001		0.29	2.139	<.001		0.34	
SSCI	1.412	.008	0.25	0.870	.001		0.17	1.672	<.001		0.27	1.677	<.001		0.26	
Fracture	1.802	<.001	0.32	1.808	<.001		0.34	2.643	<.001		0.43	2.409	<.001		0.37	
Vascular	0.000	.998	0.00	2.574	<.001		0.49	3.155	<.001		0.51	3.216	<.001		0.48	
Burn	-1.847	<.001	-0.27	-0.189	.492		-0.03	0.821	<.001		0.13	1.330	<.001		0.21	
Torso	0.000	.998	0.00	0.000	.997		0.00	4.350	<.001		0.71	2.895	<.001		0.42	
ICISS								-1.641	.497		-0.26	-7.353	<.001		-0.91	
County fixed effects	Yes			Yes				Yes				Yes				

females were less likely to be hospitalized. None of the remaining demographic variables were statistically significant.

When the sample was expanded to include moderately injured patients, the explanatory contribution of FP status declined but remained substantial. In the $ICISS \geq 0.95$ group, the ME of the FP variable was 0.43. The other hospital characteristics were not statistically significant. The injury-type variables were statistically significant. The highest change in the probability of hospitalization was associated with injuries to the thorax ($ME = 0.71$). In this group, the uninsured and females remained less likely to be hospitalized while children were more likely to be hospitalized. The remaining demographic variables were not statistically significant.

In the largest sample ($ICISS \geq 0.85$), injury severity had the highest explanatory power, followed by vascular injuries. The FP variable remained highly significant ($ME = 0.41$). None of the other hospital characteristics had significant explanatory power. All the true-trauma injury types were associated with higher probability of hospitalization compared to non-true-trauma patients. The uninsured were still less likely to be hospitalized. Demographically, children remained more likely to receive inpatient services, while the female patients and the elderly were less likely to do so.

Finally, all four equations were re-estimated but with a restriction that the $LOS = 1$. The ME associated with FP was larger, remained positive, and highly significant in each case: 0.68, 0.69, 0.45, and 0.51 in, respectively, the $ICISS = 1$, $ICISS \geq 0.99$, $ICISS \geq 0.95$, and $ICISS \geq 0.85$ equations.

CONCLUSIONS AND IMPLICATIONS

This study examined whether evidence exists of systematic increased likelihood of hospitalization of mildly and/or moderately injured patients by FP hospitals. The model was estimated for four, successively increased, groups of patients based on severity of injury. In the first two groups, indicating lowest severity, FP status was, by far, the most important factor associated with hospitalization after treatment in the ED. In the moderate-severity models, injury type played a more important role, but FP status continued to significantly explain the probability of hospitalization. The decline in the relative explanatory power of for-profit status in the higher severity equations is likely explained by the level of discretion in treatment options associated with any particular injury episode.

One puzzling finding is that the percentage of trauma alerted patients who are hospitalized declined from the lowest severity sample ($ICISS = 1$) to

the mild-severity samples ($\text{ICISS} \geq 0.99$ and $\text{ICISS} \geq 0.95$). The hospitalization percentage increases again in the moderate-severity sample ($\text{ICISS} \geq 0.85$). A likely explanation for this seemingly contradictory observation concerns the proportion of patients with non-true-trauma injuries only. As it falls and rises in the successive samples, the proportion of patients who are hospitalized increases and decreases.

In a related matter, the uninsured were significantly less likely to receive inpatient services. The uninsured tend to use more discretion in utilizing services as they would bear the full burden of any additional care. Therefore, to the extent patients can influence hospitalization decisions, this behavioral response will, at least partially, offset potential SID. Furthermore, providers may also be responsible for the observed effect of insurance status as they may conduct fewer tests. Providers may also be less likely to admit uninsured patients while being more likely to transfer the patient to another facility (Kovner and Knickman 2011).

It is noteworthy that hospitalization of mildly injured patients is not necessarily inappropriate. There are various reasons, not observed in the data, why a brief stay could be beneficial. For example, in the case of concussion, hospitalization could occur even if a patient had normal findings during the clinical assessment but the patient had lost consciousness at the time of injury or was taking an anticoagulant or antiplatelet medication. These unobserved reasons could explain the observed difference between FP and NFP centers only if the distribution of such circumstances was biased toward one particular type of hospital, which is unlikely as unpreventable random events are typically the cause of such circumstances.

A potential alternative explanation for relatively high admission rates associated with FP status is the time since designation as a trauma center. Four of the seven FP hospitals became DTCs only one year before the first year of the analysis, calling into question whether their higher admission rates are part of a “learning curve.” To examine whether the recent designation of these trauma centers could explain the observed effect, a hospital-level subanalysis was performed to examine the admitting behavior of the more established FP centers. Two had been certified as DTC for more than a decade. While the more established FP centers had slightly lower admission rates compared to the newer FP centers, their hospitalization rates significantly exceeded that of all but one of their NFP counterparts. Therefore, the recent designation of a few of the FP centers appears unlikely to explain the observed effect.

It should be noted that a bias problem may arise in the case of rare diagnoses. This concern relates to the definition of low severity, which is

based on the mortality associated with individual diagnoses of the 20 years preceding the analysis. Accuracy of the estimation depends on having sufficient observations. An analysis of the ICD-9-CM codes revealed that only 2 percent occurred fewer than 10 times during the period used to calculate the probability of mortality, while 9 percent occurred fewer than 30 times. The low incidence of infrequent diagnoses in the data suggests that any associated bias is unlikely to significantly affect the results and conclusions of the analysis.

Finally, another limitation of this study is its reliance on an administrative dataset that was not constructed specifically to test the hypothesized questions using clinical data. This limitation may help explain the observation that the hospitalization percentage falls in the $ICISS \geq 0.95$ subset compared to the $ICISS = 1$ sample. More accurate modeling of the probability of hospitalization would, for example, benefit from various physiologic measures which were not included in the data. Nonetheless, the present findings are consonant with a large body of literature that has focused on the ownership status of hospitals (Rotarius et al. 2005, 2006).

Despite the above discussed limitations, this analysis provides strong and robust evidence that patients presenting to FP DTCs with mild and/or moderate injuries were significantly more likely to be hospitalized compared to their counterparts who received treatment at NFP DTCs. In conclusion, considerable differences exist between FP and NFP centers concerning the utilization of inpatient services in a population with mild or moderate injuries among patients who were initially deemed a trauma alert. This may be the result of uncertainty about the necessity for inpatient services in treating the injured population, or it may suggest SID. The latter explanation becomes more likely given that the hospitalizations studied here were likely to have been initiated from the supply side by the hospital's medical staff instead of from the demand side by the patients themselves.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.