Trauma Care Beyond the Hospital Doors: Lessons from Stroke Center Certification

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Abstract

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CONTEXT: Discharge to skilled nursing facilities (SNF) has been associated with increased long-term mortality. Currently, discharge disposition is not evaluated in trauma center verification but is a performance measure in primary stroke center (PSC) certification.

OBJECTIVES: To determine trends in trauma and stroke patient discharges and examine the effect of PSC certification requirements on discharge disposition.

Design, Setting, and Patients: Retrospective cohort study of adult trauma and stroke patients discharged from January 2003 to December 2009. The National Trauma Data Bank and Healthcare Cost and Utilization Project Nationwide Inpatient Sample were

used to study trauma and stroke patients respectively. The Joint Commission PSC program was implemented December 2003.

MAIN OUTCOME MEASURE: Relative risk of discharge to SNFs and inpatient rehabilitation facilities (IRF), over time.

RESULTS: Over the period of the study, the proportion of trauma patients age ≥65 years increased from 23% (95% confidence interval [CI], 20.2%-25.8%) to 30% (CI, 25.6%-34.6%). In-hospital mortality decreased from 4.5% [CI, 2.0%-6.9%] in 2003, to 3.2% [CI, 2.8%-3.5%] in 2009. The majority of patients who survived hospitalization were discharged home (64.6% [CI, 61.3%-67.9%]).

On average, stroke patients were 71.9 (SD, 0.01) years old and 72.6% (CI, 72.5%-72.6%) were age ≥65 years. In-hospital mortality was 6.1% (CI, 6.0%-6.1%). Less than half (45.7% [CI, 45.7%-45.8%]) of patients who survived hospitalization were discharged home.

In 2009, trauma patients were 34% (adjusted RR 1.34 [CI, 1.15-1.57]) more likely to be discharged to SNF, compared to 2003, but 36% (adjusted RR 0.64 [CI, 0.48-0.85]) less likely to be discharged to IRF. However, stroke patients were 78% (adjusted RR 1.78 [CI, 1.74-1.82]) more likely to be discharged to IRF. The largest absolute increase (2.1% [CI, 2.1%-2.1%]) in stroke patient discharges to IRF occurred in the year following PSC implementation.

CONCLUSIONS: After adjusting for confounding factors, there was a significant increase in trauma center discharges to SNF and a decrease in discharges to IRF. However, during the same period and especially after implementation of the PSC

program, stroke patients were more likely to be discharged to IRF. Trauma centers should evaluate discharge disposition as a part of the verification process.

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The author wishes to acknowledge the American College of Surgeons Committee on Trauma for use of the National Trauma Data Bank (NTDB). The NTDB remains the full and exclusive copyrighted property of the American College of Surgeons. The American College of Surgeons is not responsible for any claims arising from works based on the original Data, Test, Tables or Figures.

INTRODUCTION

The morbidity and mortality experienced by trauma patients continue long after discharge from the hospital. While inpatient trauma mortality continues to decrease,[1] studies have shown that post-discharge mortality for trauma patients is significant and in excess of the general population.[2-4] Risk factors associated with increased long-term mortality include age and discharge to a skilled nursing facility.[2,5] While age is not a modifiable factor, decisions about discharge disposition can be made to help improve long-term outcomes.

Sequelae of surviving a traumatic event include psychological stress, long–term disability and inability to return to independent living, especially in the elderly (age ≥ 65 years).[6] Published studies have shown the majority of older trauma patients are independent pre-injury, but post-injury, require assistance with one or more activities of daily living.[7] For patients who no longer require acute care but are not ready to return to the community, the only alternative is an institutional care facility and for many trauma patients, post-acute care involves a skilled nursing facility (SNF).[2,8]

Many clinicians regard SNFs as a temporary stop on the road to recovery, but at least 30% of elderly patients discharged to nursing facilities do not return to the community.[9,10] The physical therapy services offered at SNFs differ significantly from the programs offered at inpatient rehabilitation facilities (IRF)[11] and worse outcomes associated with discharge to SNF have been observed in non-trauma patients as well.[12,13] The typical young, otherwise healthy trauma patient has been replaced by the older individual, who requires more hospital resources, and is at higher risk for complications and mortality.[14,15] While discharge to SNF may simply be an indicator of

poor individual health, most of these patients were living at home prior to injury,[11] and the type of post-acute care is important for increasing post-injury function.[11]

Trauma center verification focuses only on the availability of rehabilitation services during the acute care period, and does not evaluate resource utilization or the availability of these services post-discharge.[16] Acute care physicians, such as trauma surgeons, can no longer afford to be indifferent to post-discharge care and need to pay attention to the rehabilitation needs of their patients. Looking to other specialties for different methods of care, we examined the certification process for stroke centers. The majority of stroke patients are elderly, and many experience decreased functional ability post-stroke. Care of the stroke patient is becoming more organized, with national and state-level programs to recognize institutions that provide exceptional stroke care and hold hospitals accountable for their performance. While trauma center verification has only been shown to improve inpatient mortality,[17] the stroke center certification process has improved long-term mortality as well.[18] The Primary Stroke Center (PSC) program was implemented by the Joint Commission, in partnership with the American Heart Association/American Stroke Association in December, 2003.[19] Recognizing the fact that survivors of stroke have moderate to severe disability, one of the requirements for certification maintenance is the documentation of the assessment of rehabilitation needs for all stroke patients; assessment rate is used as a performance measure.

The purpose of this study was to compare the national trends in discharge disposition for trauma patients with that for stroke patients, and examine the impact of recently implemented PSC certification requirements on discharge disposition for the latter to inform what might be possible with trauma patients.

METHODS

We performed a retrospective cohort study of trauma admissions from the National Trauma Data Bank (NTDB) National Sample Program (NSP) from 2003 to 2009 (N=4,045,957). The NTDB NSP is a convenience sample of trauma admissions from 100 Level I and II trauma centers throughout the United States. Our cohort included all admissions, age ≥ 18 years, discharged between January 2003 and December 2009. Admissions with a concurrent diagnosis of stroke, length of stay < 2 days or resulting in a transfer to another acute care facility were excluded (N=1,081,991). We did not exclude patients with traumatic brain injury, as these patients represent an important subgroup of trauma patient who benefit from rehabilitation therapy.[20] Some strata had a single sampling unit; to calculate variance estimators, strata were collapsed across trauma center levels but within census regions.[21,22]

To identify the cohort of stroke patients, we used the Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality. The NIS is a database of hospital inpatient discharges that approximates a 20% sample of US community hospitals. Any discharges between January 2003 and December 2009, with a discharge International Classification of Disease, 9th Revision, Clinical Modification (ICD-9CM) code between 430 and 438.xx, in either primary or secondary diagnoses, was considered for inclusion in the study (N=14,104,880). Discharges with concurrent trauma ICD-9 CM codes (800-904.xx, 925-929.xx, 940-949.xx) were excluded from the cohort (N=622,309). Inclusion and exclusion criteria were the same as for the trauma cohort (age ≥ 18 years, length of stay ≥ 2 days, disposition status known and not transferred to another acute care facility). A

list of all Joint Commission PSCs and the year of first certification was obtained from the Joint Commission website.[23]

Trauma and stroke patients were assigned to the following discharge categories: home, home with services, skilled nursing facility, death, inpatient rehabilitation facility (IRF) and other (including leaving against medical advice, hospice, jail and transfer to an intermediate care facility (defined by the as a "facility providing a level of care that is less than the degree of care and treatment that a hospital or SNF is designed to provide but greater than the level of room and board")[24]). Admissions with missing values for year of discharge, age, length of stay or discharge disposition were not included in the analysis (N=202,434(5.0%) for the trauma cohort; N=1,970,776(14%) for the stroke cohort). Descriptive statistics for demographics and discharge disposition were calculated for each discharge population, by year. Two-sided tests for significance were used when analyzing differences between 2003 and 2009. A p value less than 0.05 was considered significant. Poisson regression was performed to calculate the relative risk of discharge to SNF and IRF, in each successive year, using 2003 as the baseline. We adjusted for age, sex, Injury Severity Score (in the trauma cohort) and Charlson Comorbidity Index (CCI) (in the stroke cohort). We were unable to accurately calculate CCI from the NTDB NSP, as complete information on comorbidities was not recorded. Given the older age distribution of stroke patients, a secondary analysis was performed on patients aged 65 years or older.

Institutional Review Board approval was obtained from the University of Washington.

RESULTS

Trauma

The mean (SD) age of the trauma population increased from 45.6 (0.7) years in 2003 to 49.9 (1.0) years in 2009 ($p<0.001$, Table 1). On average, 63% of the patients were male. The average Injury Severity Score did not change significantly over time (10.8 (0.7) in 2003, 10.4 (0.2) in 2009; $p=0.511$). During the study period, unintentional falls replaced motor vehicle collisions as the leading cause of injury (Table 1). The proportion of trauma patients dying during acute hospitalization declined each year from 4.5% (95% Confidence Interval [CI], 2.0%-6.9%) in 2003 to 3.2% (CI, 2.8%-3.5%) in 2009 ($p=0.277$).

Of patients who survived hospitalization, the majority was discharged home (64.6% [CI, 61.3%-67.9%]). The percentage of trauma patients discharged to SNF increased significantly from 8.9% (CI, 7.4%-10.5%) in 2003 to 15.2% (CI, 12.5%-17.9%) in 2009 ($p<0.001$, Table 1). The largest increase was seen in the 76 to 80 year-old age-group. The percentage of trauma patients discharged to IRF decreased over the same time period, from 13.9% (CI, 11.5%-16.3%) in 2003 to 10.1% (CI, 7.7%-12.4%) in 2009 ($p=0.031$). The largest decrease was seen in the age group 76 to 80, which corresponds with the observed increase in SNF discharges. Of the patients who survived to discharge, the average length of stay (LOS) decreased from 7.5 (0.2) in 2003 to 7.1 (0.2) in 2009 ($p=0.243$).

Stroke

The average (SD) age of stroke patients was 72.3 (0.03) in 2003 and 71.5 (0.03) in 2009 (Table 2). On average, 45% of patients were male. The mean (SD) Charlson

Comorbidity Score increased from 1.9 (0.002) in 2003 to 2.4 (0.003) in 2009 (p<0.001). In-hospital deaths decreased from 6.8% (CI, 6.7%-6.9%) in 2003 to 5.5% (CI, 5.4%-5.5%) in 2009 (p<0.001).

On average, less than half (45.7% [CI, 45.7%-45.8%]) of stroke patients who survived hospitalization were discharged home (Table 2). The percentage of stroke patients discharged to SNF was 23.7% [CI, 23.5%-23.8%] in 2003 and 24.6% [CI, 24.4%-24.7%] in 2009 (p<0.001, Table 2). The percentage of stroke patients discharged to an inpatient rehabilitation facility approximately doubled, from 4.3% (CI, 4.2%-4.4%) in 2003 to 8.2% (CI, 8.1%-8.3%) in 2009 (p<0.001). The largest increase in IRF discharges was observed in patients aged 65 years and younger.

Patients 65 years or older

The proportion of trauma patients aged 65 years or over increased from 23% (CI, 20.2% to 25.8%) in 2003 to 30% (CI, 25.5% to 34.6%) in 2009 (p=0.002, Table 1). There was a small decrease in the proportion of stroke patients who were in this age group (74.5% in 2003; 71.4% in 2009; p<0.001). Of the patients ≥ 65 years, 46.6% of the trauma patients and 43.1% of the stroke patients were over the age of 80.

Of the trauma patients discharged alive, the proportion discharged to a SNF increased (30.7% [CI, 26.1% to 35.3%] in 2003 to 40.8% [CI, 36.3% to 45.2%] in 2009 [p<0.001]) but decreased for those discharged to IRF (25.9% [CI, 19.8% to 32.0%] in 2003; 15.6% [CI 11.5% to 19.8%] in 2009 [p=0.006], Table 3, Figure 1). Of the stroke patients discharged alive, the percentage of patients discharged to SNF increased slightly (28.3% [CI, 28.1% to 28.5%] in 2003; 29.4% [CI, 29.2% to 29.7%] in 2009; p<0.001) but approximately doubled for patients discharged to IRF (4.2 % [CI, 3.0%,

3.1%] in 2003; 7.9% [CI, 7.8% to 8.0%] in 2009; p<0.001, Table 3). For trauma patients who survived to discharge, there was a significant decrease of one day in average LOS (7.8 (0.3) days in 2003; 6.9(0.3) days in 2009; p=0.028); for stroke patients, LOS increased, on average, by 2.4 hours (6.6 (0.02) days in 2003; 6.7 (0.02) days in 2009; p<0.001).

Risk of Discharge Disposition over Time

During our study period, the largest absolute increase in stroke discharges to IRF occurred immediately following implementation of the Primary Stroke Center Program in December 2003 (Table 2, Figure 2). Overall, trauma patients discharged alive in 2009 were 34% (RR 1.34 [CI, 1.15-1.57]) more likely to be discharged to SNF, but 36% (RR 0.64 [CI, 0.48-0.85]) less likely to be discharged to IRF, than patients discharged in 2003, after adjusting for age, sex and ISS (Figure 3). However, stroke patients discharged alive in 2009 were only 2% (RR 1.02 [CI, 1.01-1.03]) more likely to be discharged to SNF, but 78% (RR 1.78 [CI, 1.74-1.82]) more likely to be discharged to IRF, than patients discharged in 2003, after adjusting for age, sex and CCI (Figure 3). The observed trends were consistent throughout the seven years.

COMMENTS

Many survivors of traumatic injury suffer from long-term disability and require physical therapy to recover pre-injury function. The results of this study show that there has been a decrease in trauma discharges to inpatient rehabilitation facilities and a significant increase in discharges to skilled nursing facilities. This trend was most notable in the elderly, of whom 40% discharged alive were discharged to SNF in 2009. Patients who had a stroke, a disease that predominantly affects the elderly, had an opposite trend, with increased discharges over time to IRF. The large increase in stroke discharges to IRF during the 1st year of the PSC certification program seems to indicate that this difference was associated with the emphasis placed on meeting the rehabilitation needs of stroke survivors.

Our results also showed a trend towards shorter hospitalizations for trauma patients; in the elderly, length of stay significantly decreased by one day from 2003 to 2009. Current reimbursement structures incentivize shorter hospital stays, without regard to discharge disposition. Placement in a skilled nursing facility is often easier and faster than admission to an IRF, and discharge to SNF has become the more prevalent disposition. Given the worse outcomes observed in trauma patients who become residents of skilled nursing facilities, cost savings from earlier discharges are probably illusory.

While it is not possible to directly compare stroke and elderly trauma patients, important lessons can be learned by examining each group. The elderly comprise a large proportion of stroke patients and stroke results in moderate to severe long-term disability in survivors. The PSC certification program only requires assessment of

patients for rehabilitation potential, but has had the effect of increasing rehabilitation placement following discharge. It is unknown whether the trauma patients in our study were ever evaluated for IRF placement. However, if they were evaluated, this would imply that an increasing proportion of trauma patients were not candidates for intensive rehabilitation. The increase in patient-discharges to SNF may simply represent an older population who are not able to partake in the required three hours of therapy daily. Yet, when we restricted the comparative analysis to patients aged 65 years or older, the same trends were observed, indicating that elderly stroke patients are discharged to IRF at greater rates than elderly trauma patients.

There are several limitations of our study. Discharge disposition was missing from 6% of the NTDB data and 15% of the NIS data. Particularly in the NIS database, most of the missing data for discharge disposition were from the western United States. However, we do not know of any studies indicating regional variation in discharge disposition for either trauma or stroke patients and do not believe that this factor would change our results. We were unable to calculate Charlson Comorbidity Index scores for the trauma cohort, as there was not enough information recorded in the NTDB NSP. We did not use the NIS database to select the trauma cohort as our goal was to focus on discharge disposition trends in designated trauma centers, and the NIS does not indicate trauma center status of the facility. One possible explanation for the increased SNF discharges in the trauma cohort would be an increase in comorbidities leading to an increase in overall disability. However, an increase in the CCI was seen in the stroke patients, and their discharges to IRF still increased. Therefore, if a similar increase existed for the trauma patients, it would not sufficiently explain the decline in discharge

to IRF. Lastly, we suspect that some of the discharges to skilled nursing facilities, for both trauma and stroke patients, were simply a return of patients to their usual place of residence. Studies suggest this is true for only a small percentage of the trauma population[15], and in order to explain the increasing trend over the years, an increasing percentage of patients would have to be living at SNFs pre-injury. Unfortunately, the NTDB does not provide admission source data, and for the majority of observations in the NIS, such data are missing.

The purpose of this study was to use the Primary Stroke Center certification program as an example of changes that can be affected when rehabilitation needs are highlighted. Incorporation of similar performance measure requirements is feasible within the trauma center verification process. As of 2006, Level 1 Trauma Centers are required to offer alcohol screening and interventions as part of usual care, as they are effective in decreasing injury recidivism and reducing costs.[16,25] This recent addition to the guidelines should be the beginning of a shift in focus; a shift towards improving post-discharge outcomes. The change in demographics of trauma patients is accompanied by an increasing trend of discharges to SNF and the subsequent poor outcomes.[2] As the trauma population continues to age, trauma center verification processes need to focus more on discharge disposition, quality of life after discharge and long-term outcomes of the injured patient.

Table 1. Characteristics of Trauma Patients, all ages

	% of Trauma Patients[a]						
	2003 (N=297,027)	2004 (N=288,643)	2005 (N=323,458)	2006 (N=331,093)	2007 (N=411,259)	2008 (N=433,309)	2009 (N=428,854)
AGE							
Age, mean (SD), in yrs	45.6 (0.6)	47.1 (1.1)	47.0 (0.8)	47.5 (0.9)	47.9 (1.1)	49.6 (1.1)	49.9 (1.0)
Patients ≥65yrs	23.0	25.4	25.2	27.3	26.6	30.1	30.0
Patients ≥81yrs	9.7	11.6	11.6	13.2	12.3	14.7	14.1
SEX							
Male	64.6	63.5	63.7	63.3	63.8	62.2	62.3
INJURY SEVERITY SCORE (ISS), mean (SD)	10.8 (0.7)	11.4 (0.4)	11.3 (0.3)	10.9 (0.5)	10.3 (0.3)	10.6 (0.3)	10.4 (0.2)
ISS < 16 (mild to moderate)	74.6	71.7	73.2	74.3	69.4	70.1	69.6
ISS 16-24 (severe)	14.3	15.1	15.2	14.5	16.3	17.4	17.7
ISS ≥ 25 (very severe)	9.1	9.5	9.8	9.1	5.9	6.0	5.7
MECHANISM							
Fall	30.0	35.0	33.7	34.8	37.6	40.7	40.5
Motor Vehicle Collision	40.0	39.2	38.5	37.5	37.7	35.4	34.0
Penetrating	9.4	8.5	8.7	8.5	8.9	8.5	8.9
Other	20.6	17.3	19.1	19.2	15.7	15.5	16.6
LENGTH OF STAY, mean (SD), in dys	7.7 (0.2)	7.7 (0.3)	7.7 (0.3)	7.6 (0.3)	7.8 (0.5)	7.5 (0.2)	7.2 (0.2)
INSURANCE STATUS							
Commercial	28.2	28.2	27.0	23.3	27.3	31.4	30.3
Medicaid/Other Gov't/Military	8.9	6.4	6.1	7.4	7.3	8.7	9.5
Medicare	15.0	17.3	18.0	18.7	19.7	23.5	22.7
Uninsured	16.6	13.0	16.9	17.8	15.8	14.9	15.8
Other[b]	28.4	30.8	20.5	10.5	6.6	7.0	6.8
INHOSPITAL MORTALITY	4.5	4.2	3.1	3.2	3.3	3.2	3.2
DISCHARGE DISPOSITION[c]							
Home	66.9	63.5	62.1	64.3	66.8	63.1	65.2
Home with Services	4.2	4.5	6.6	5.7	5.6	6.0	5.6
Skilled Nursing Facility	8.9	9.8	10.6	13.8	12.9	14.6	15.2
Inpatient Rehabilitation Facility	13.9	15.5	14.3	13.0	9.6	12.1	10.1
Other	6.1	6.6	6.3	3.2	5.0	4.1	4.0

a – percentages may not total 100% due to rounding and missingness of data

b – other insurance category includes worker's compensation, organ donor subsidy, no charge, not billed, pending and private charity.

c – percentage of patients discharged alive

Table 2. Characteristics of Stroke Patients, all ages

	% of Stroke Patients[a]						
	2003 (N=1,297,741)	2004 (N=1,323,017)	2005 (N=1,227,192)	2006 (N=1,315,919)	2007 (N=1,295,705)	2008 (N=1,443,098)	2009 (N=1,484,032)
AGE							
Age, mean (SD), in yrs	72.3 (0.03)	71.9 (0.03)	72.2 (0.03)	71.8 (0.03)	71.7 (0.03)	71.7 (0.03)	71.5 (0.03)
Patients ≥65yrs	74.5	73.2	73.6	72.2	71.7	71.7	71.4
Patients ≥81yrs	31.5	30.9	32.3	31.2	31.2	31.5	31.0
SEX							
Male	44.6	45.0	45.2	45.7	45.7	45.8	46.6
CHARLSON COMORBIDITY INDEX SCORE, mean (SD)	1.9 (0.002)	1.9 (0.002)	2.0 (0.003)	2.1 (0.003)	2.2 (0.003)	2.3 (0.003)	2.4 (0.003)
LENGTH OF STAY, mean (SD), in dys	7.0 (0.02)	7.1 (0.02)	7.0 (0.02)	7.1 (0.02)	7.1 (0.02)	7.1 (0.02)	7.1 (0.02)
INSURANCE STATUS							
Commercial	15.6	16.4	15.4	16.1	16.7	17.3	16.5
Medicaid/Other Gov't/Military	5.8	6.1	5.9	6.1	6.1	6.3	6.6
Medicare	74.8	72.8	74.2	72.9	71.7	71.3	71.6
Uninsured	2.1	2.7	2.7	2.8	2.9	2.7	3.1
Other[b]	1.6	2.0	1.8	2.0	2.3	2.3	2.1
INHOSPITAL MORTALITY	6.8	6.2	6.3	6.1	5.7	5.9	5.5
DISCHARGE DISPOSITION[c]							
Home	52.3	46.5	46.2	45.7	44.6	42.9	42.8
Home with Services	13.7	15.6	15.8	15.8	16.1	16.4	16.3
Skilled Nursing Facility	23.7	25.3	24.4	24.5	24.9	24.4	24.6
Inpatient Rehabilitation Facility	4.3	6.5	7.0	7.3	7.3	8.2	8.2
Other	6.0	6.1	6.6	6.6	7.2	8.0	8.1

a – percentages may not total 100% due to rounding and missingness of data

b – Other insurance category includes worker's compensation, organ donor subsidy, no charge, not billed, pending and private charity.

c – percentage of patients discharged alive

Table 3. Patient Characteristics, age ≥65 yrs

	% of Trauma Patients[a]						
	2003 (N=68,219)	2004 (N=73,225)	2005 (N=81,635)	2006 (N=90,422)	2007 (N=109,395)	2008 (N=130,224)	2009 (N=128,794)
AGE							
Age, mean (SD), in yrs	77.1 (0.2)	77.4 (0.2)	77.6 (0.2)	77.7 (0.2)	77.5 (0.2)	77.7 (0.2)	77.6 (0.2)
Patients ≥81yrs	42.1	45.6	46.0	48.5	46.1	48.8	46.9
SEX							
Male	39.2	38.7	38.7	39.6	39.9	38.7	40.1
INJURY SEVERITY SCORE (ISS), mean (SD)	10.3 (0.4)	10.5(0.3)	10.7 (0.2)	10.2 (0.4)	10.2 (0.4)	10.1 (0.3)	10.2 (0.3)
ISS < 16 (mild to moderate)	77.3	77.6	76.4	78.3	70.7	74.1	71.8
ISS 16-24 (severe)	12.6	12.5	15.0	13.3	17.4	18.2	19.7
ISS ≥ 25 (very severe)	7.3	7.0	7.4	6.3	4.4	3.6	4.1
LENGTH OF STAY, mean (SD), in dys	8.1 (0.3)	7.8 (0.3)	8.0 (0.4)	7.6 (0.3)	8.4 (0.8)	7.5 (0.2)	7.1 (0.3)
INHOSPITAL MORTALITY	10.5	8.5	6.4	6.2	6.6	5.8	5.9
DISCHARGE DISPOSITION[b]							
Home	34.6	30.9	28.7	30.0	29.9	27.8	31.4
Home with Services	4.6	5.3	7.4	7.5	7.1	7.3	7.1
Skilled Nursing Facility	30.7	30.0	32.6	40.2	39.0	40.0	40.8
Inpatient Rehabilitation Facility	25.9	28.7	25.7	20.3	15.7	19.6	15.6
Other	4.3	5.1	5.6	2.0	8.2	5.3	5.1
	% of Stroke Patients[a]						
	2003 (N=966,929)	2004 (N=967,829)	2005 (N=903,186)	2006 (N=949,577)	2007 (N=928,559)	2008 (N=1,035,098)	2009 (N=1,058,883)
AGE							
Age, mean (SD), in yrs	78.7 (0.02)	78.7 (0.02)	79.0 (0.02)	78.9 (0.02)	78.9 (0.02)	78.9 (0.02)	78.8 (0.02)
Patients ≥81yrs	42.3	42.2	43.8	43.3	43.6	43.9	43.4
SEX							
Male	42.4	42.8	43.0	43.3	43.4	43.4	44.3
CHARLSON COMORBIDITY INDEX SCORE, mean (SD)	2.0 (0.003)	2.0 (0.003)	2.0 (0.003)	2.1 (0.003)	2.3 (0.004)	2.3 (0.003)	2.5 (0.003)
LENGTH OF STAY, mean (SD), in dys	6.8 (0.02)	7.0 (0.02)	6.9 (0.02)	6.8 (0.02)	6.8 (0.02)	6.8 (0.02)	6.9 (0.02)
INHOSPITAL MORTALITY	7.2	6.7	6.7	6.4	6.1	6.4	5.8
DISCHARGE DISPOSITION[b]							
Home	50.0	39.7	39.3	38.8	37.4	36.0	36.0
Home with Services	14.8	16.9	17.2	17.2	17.5	17.8	17.8
Skilled Nursing Facility	28.3	30.2	29.2	29.5	30.2	29.3	29.4
Inpatient Rehabilitation Facility	4.2	6.3	6.8	7.1	6.9	7.9	7.9
Other	6.8	6.9	7.5	7.4	8.0	9.0	8.9

a – percentages may not total 100% due to rounding and missingness of data

b – percentage of patients discharged alive

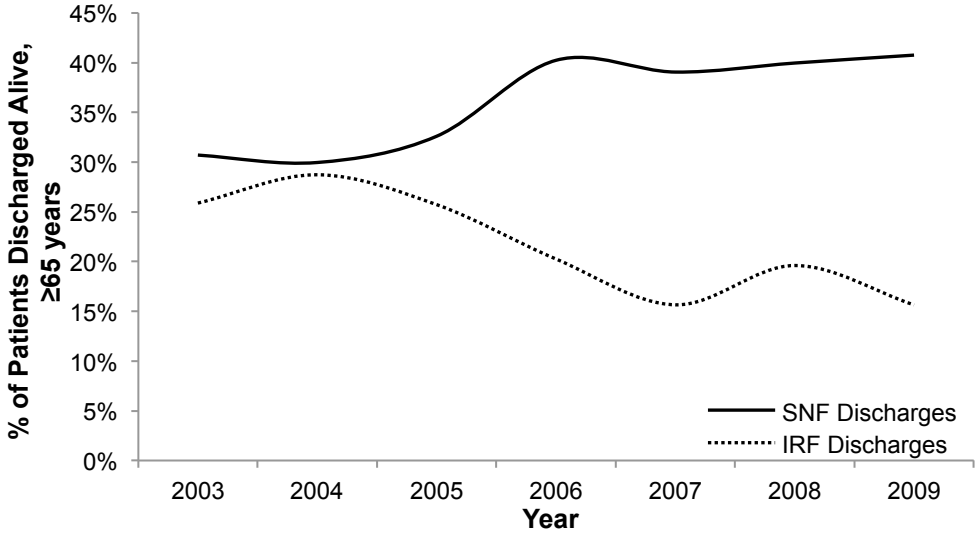


Figure 1. Discharge Disposition, Trauma Patients ≥65 years, 2003-2009

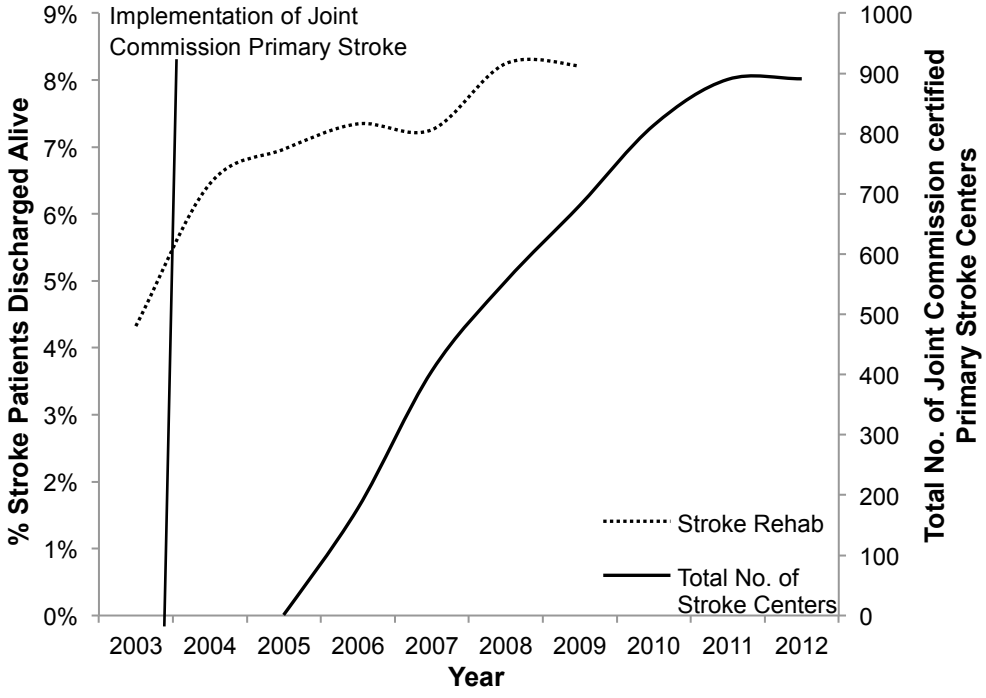
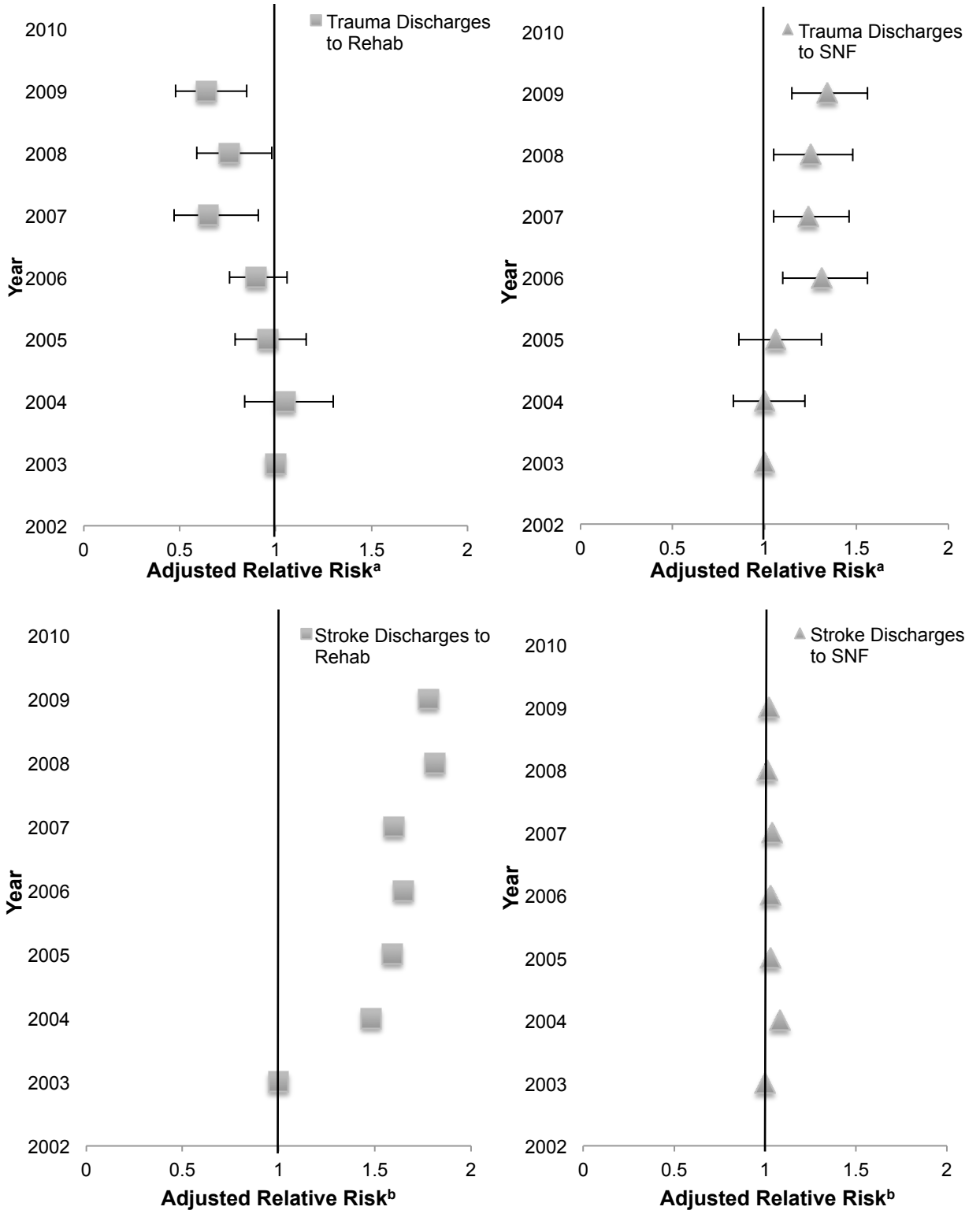


Figure 2. Discharge Disposition, Stroke Patients, all ages, 2003-2009



a. Adjusted for age, sex and Injury Severity Score
b. Adjusted for age, sex and Charlson Comorbidity Score

Figure 3. Relative Risk of Discharge to SNF and Rehab in Trauma and Stroke patients, using 2003 as the reference year

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