



**Shorter length of stay is associated with decreased early mortality after hip fracture: a total cohort study in the United States**

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Shorter length of stay is associated with decreased early mortality after hip fracture: a total cohort study in the United States

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Authorship:

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- LN, SK, MS, JE contributed to the conception or design of the work;
- LN, MM, BM, JE contributed to the acquisition of data;
- LN, SK, MM, BM, JE contributed to the analysis;
- LN, SK, MS, MM, BM, JE contributed to the interpretation of data for the work;
- LN, SK, MS, MM, BM, JE contributed to drafting the work and revising it critically for important intellectual content;
- LN, SK, MS, MM, BM, JE gave final approval of the version to be published;
- LN, SK, MS, MM, BM, JE agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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3 Lucas E Nikkel and John C Elfar (lead author and senior corresponding authors, respectively)  
4 affirm that the manuscript is an honest, accurate, and transparent account of the study being  
5 reported; no important aspects of the study have been omitted; and any discrepancies from the  
6 study as planned have been explained.  
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**ABSTRACT:**

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3 Objective: To determine whether the length of stay after hip fracture is associated with risk of  
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5 mortality following discharge in the United States.  
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9 Design: Retrospective cohort study  
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12 Context: Recent Swedish registry data has suggested that increased hospital length of stay is  
13  
14 associated with a decreased 30-day mortality following discharge for hip fracture. However,  
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16 critical system differences exist in treatment of hip fracture in Europe and the United States  
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21 Setting: Population-based registry data from New York Statewide Planning and Research  
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23 Cooperative System (SPARCS) from 2000-2011.  
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27 Participants: 188 208 patients admitted with a hip fracture in New York State 50 years of age and  
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29 older between 2000 and 2011.  
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33 Interventions: Surgical and non-surgical treatment.  
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37 Main outcome measure: Mortality rate 30 days after discharge from the hospital.  
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42 Results: Compared with hospital stays of 1-5 days after hip fracture, length of stay of 11-14 days  
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44 was associated with 32% increased odds of death of mortality within 30 days of discharge (odds  
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46 ratio [OR] 1.32 (95% standard deviation 1.19 to 1.47)) which increased to 103% for patients with  
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48 length of stay >14 days (OR 2.03 (1.84 to 2.24)). Other risk factors associated with early mortality  
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50 include discharge to a hospice facility, older age, metastatic disease, and non-surgical  
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52 management. The mortality rate was 4.5% for surgically treated patients and 10.7% for non-  
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54 surgically treated patients in the first 30 days after hospital discharge.  
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Conclusions: In contrast to recent Swedish findings, decreased length of stay was associated with lower early mortality rates in a United States population following discharge from hip fracture in New York State.

What is already known on this subject:

- Shorter hospital length of stay is associated with increased odds of mortality in a Swedish population
- Increased comorbid conditions are associated with increased costs and longer hospital length of stay following hip fracture in New York State

What this paper adds:

- Hospital length of stay greater than 10 days was associated with increased odds of death after hospital discharge in a New York State population
- Nonsurgical treatment of hip fractures was associated 10.7% mortality compared with 4.5% treated surgically at 30 days after discharge
- Risk factors associated with early mortality include discharge to a hospice facility, older age, metastatic disease, and non-surgical management.

INTRODUCTION:

1 Hip fracture is common, costly and often associated with poor outcomes amongst older adults.  
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4 Mortality rates after hip fracture have changed little over the past 30 years despite surgical and  
5  
6 medical improvements.<sup>1</sup> Nonetheless, mortality rates are universally measured in registries and  
7  
8 large databases. The length of hospital stay (LOS) has fallen over time in both Europe and the  
9  
10 United States.<sup>2</sup> Recent work has suggested that a longer LOS after hip fracture is associated with  
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12 decreased mortality following discharge.<sup>3</sup>  
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19 Healthcare systems in Europe and the United States differ in both LOS and usual discharge  
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21 destination. In the United States, 90% of hip fracture patients are discharged to rehabilitation  
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23 facilities and receive much of their follow up care in these facilities.<sup>4</sup> Rehabilitation facilities in the  
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25 United States serve a transitional role and may help prevent early mortality after discharge.<sup>5</sup> In  
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27 contrast, more patients are discharged to home after hip fracture in other countries such as the  
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29 United Kingdom.<sup>6</sup>  
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37 The New York Statewide Planning and Research Cooperative System (SPARCS) database offers a  
38  
39 unique opportunity to measure postoperative mortality in a complete data set of United States  
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41 patients and has been used previously to study hip fractures.<sup>7</sup> We hypothesized that SPARCS data  
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43 would demonstrate shorter LOS is associated with lower 30-day mortality rates after hip fracture.  
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## 49 **METHODS**

### 50 **Patients:**

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52 This study used the New York Statewide Planning and Research Cooperative System (SPARCS)  
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54 database to identify 188 938 patients aged 50 years or more admitted to a New York State public  
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56 or private hospital in between January 1, 2000 and December 31, 2011 with a hip fracture.  
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1 SPARCS is a comprehensive, all-payer administrative database which collects patient-level data  
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4 from all non-federal acute-care facilities in the State of New York (233 hospitals during the study  
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6 period). The database collects information including patient demographics, diagnoses,  
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8 procedures, and charges for every inpatient hospitalization, ambulatory surgical procedure, and  
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10 emergency department admission. Individuals are assigned a unique, encrypted identification  
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12 code allowing for longitudinal analyses. Estimated reporting completeness obtained from SPARCS  
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14 inpatient annual reports during the study period from 2000-2011 ranged from 95-100% with an  
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16 average of >98%.  
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24 Patients were identified from hospital discharge records originating from non-rehabilitation  
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26 hospitals in the State of New York containing an admitting or primary diagnosis code for a hip  
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28 fracture using the ICD-9-CM classification (ICD-9-CM codes 820.00-820.03, 820.09, 820.20-  
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30 820.22, 820.8). Patients were excluded if missing the unique personal identifier (encrypted  
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32 combination of name, date of birth, social security number, hospital, and date of admission;  
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34 N=68) or for duplicate unique identifiers (N=662). The remaining 188,208 patients were included  
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36 in the analysis. Mortality data was determined using a linkage with the New York State  
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38 Department of Vital Statistics and New York City Department of Vital Statistics. Patients who died  
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40 during the hospitalization were excluded from analyses.  
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49 Surgical procedure and date were identified with ICD-9 procedure codes (81.51, 81.52, 78.55,  
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51 73.35, 79.15, 79.25, or 79.05) and associated procedure dates. Time to surgery was defined as  
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53 days between admission and procedure date. Comorbidities were defined based on the Charlson  
54  
55 Comorbidity Index using a modified version of a STATA interpretation of a SAS software program  
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obtained from the Boston College Department of Economics in its series Statistical Software Components.<sup>8</sup> The coding algorithm used to define comorbidities is shown in Table 1.

**Table 1:** Coding algorithm for comorbid conditions in patients with hip fracture in New York State

<b>Comorbidities</b>	<b>ICD-9-CM codes</b>
Myocardial infarction	410.x, 412.x 398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93,
Congestive heart failure	425.4–425.9, 428.x 093.0, 437.3, 440.x, 441.x, 443.1–443.9, 47.1,
Peripheral vascular disease	557.1, 557.9, V43.4
Cerebrovascular disease	362.34, 430.x–438.x 290.x, 331.x, 437.0x, 333.4, 292.82, 294.10, 291.2x, 292.82, 24.10, 294.11, 294.20,
Dementia	294.21 416.8, 416.9, 490.x–505.x, 506.4, 508.1, 508.8
Chronic pulmonary disease	508.8
Diabetes mellitus	250.0–250.3, 250.8, 250.9 403.01, 403.11, 403.91, 404.02, 404.03, 404.12, 404.13, 404.92, 404.93, 582.x, 583.0– 583.7, 585.x, 586.x, 588.0, V42.0, V45.1, V56.x
Renal disease	V56.x 140.x–172.x, 174.x–195.8, 200.x–208.x,
Cancer	238.6, V10.x
Metastatic disease	196.x–199.x
Diabetes with complications	250.4–250.7

### Statistical methods:

The primary analysis was designed to determine whether LOS, categorically defined as 1-5 days, 6-10 days, 11-14 days, and greater than 14 days, was associated with mortality rates at 30 days after hospital discharge. Differences between categorical groups were assessed with chi-squared analysis and between continuous variables with Student's t-test. Patients who died prior to discharge were excluded from analyses related to post-discharge mortality. Survival estimates were determined with the Kaplan-Meier method. Multivariate logistic regression analysis evaluated risk of mortality following discharge based on categorical LOS while adjusting for

1 covariates in the univariate model. To test whether the association between length of stay and  
2 odds of death after discharge was a time dependent interaction, a product interaction term was  
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4 odds of death after discharge was a time dependent interaction, a product interaction term was  
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6 created. The likelihood ratio test found the test statistic was equal to 15.4492 with 3 degrees of  
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8 freedom and a p-value of 0.00147. Therefore, the product interaction term was included in the  
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10 primary multivariate logistic regression model as a covariate.  
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16 To evaluate whether non-surgically treated patients were dying soon after discharge and  
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18 contributing to increased early mortality, three models were created: (1) all patients with a hip  
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20 fracture regardless of surgical management, where non-surgical management was included as a  
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22 covariate, (2) patients treated surgically excluding those treated non-surgically, and (3) patients  
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24 treated non-surgically, excluding those treated surgically.  
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### 31 **Subgroup and sensitivity analyses**

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33 To control for confounding factors, several additional analyses were done. To control for a  
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35 reduction in length of stay over the 12-year study period, the relationship between LOS and post-  
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37 discharge mortality was evaluated for each year separately in both adjusted and unadjusted  
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39 logistic regression models (Supplemental Tables 1A-M). To evaluate whether risk of death  
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41 increases with increasing follow-up time, adjusted logistic regression models were created to  
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43 compare the odds of death between 1 and 15 days after discharge and 16 and 30 days after  
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45 discharge.  
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54 LOS differs between patients in Sweden and in New York State. To control for a greater  
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56 proportion of early discharges in New York State patients, a sensitivity analysis was performed by  
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58 evaluating the odds of mortality between 15 and 45 days after hospital admission in all patients  
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alive at 14 days post-admission, which created a theoretical LOS of 14 days for all patients in the cohort and the model was evaluated with adjusted and unadjusted logistic regression models.

The second sensitivity analysis evaluated the odds of death between 11 and 30 days for patients alive at day 10 with a length of stay of 10 days or less while controlling for other covariates in the primary multivariate model. Odds ratios for the interaction of a 1-day incremental increase in LOS were evaluated over the study period and separately for each individual year of the study. Analyses were performed with the use of Stata statistical software (version 14.0 StataCorp, College Station, Texas).

#### RESULTS:

188 208 patients admitted with a hip fracture between 2000 and 2011 met inclusion criteria; 169,258 were treated surgically and 18 950 were treated non-surgically. The average LOS was 8.1 days (range 1-995 days; SD 8.3). During hospitalization, 7 364 patients died leaving 180 844 survivors for post-discharge analysis. During the 30-day period after discharge, 9 179 additional patients died. During the study period, the average LOS decreased from 12.9 days in 2000 to 5.6 days in 2011.

The majority of patients were hospitalized for less than 10 days (patient characteristics shown in Table 2). For surgically treated patients, the average time to surgery was 1.8 days (SD 2.1, range 0-128); a longer time to surgery was associated with longer LOS.

Table 2: Characteristics of 180 844 patients with hip fracture in New York State, 2000-2011, stratified by length of stay (excluding patients deceased during hospitalization).



	Length of hospital stay (days)			
	0-5	6-10	11-14	>14
<b>Demographics and mortality</b>				
Number of patients (%)	71 780 (39.7)	76 700 (42.4)	17 063 (9.4)	15 301 (8.5)
Female (%)	55 119 (76.8)	57 389 (74.8)	11 964 (70.1)	9 944 (65.0)
Mean age in years (StDev)	80.7 (10.3)	81.8 (9.5)	81.7 (9.6)	80.9 (10.0)
Non-surgical treatment (%)	8 609 (12.0)	3 987 (5.2)	1 725 (10.1)	2 272 (14.8)
30-day mortality if treated surgically (%)	1 864 (3.0)	2 991 (4.1)	1 033 (6.7)	1 519 (11.7)
30-day mortality if treated non-surgically (%)	910 (10.6)	446 (11.2)	171 (9.9)	245 (10.8)
<b>Main diagnosis</b>				
Femoral neck fracture (%)	21 184 (29.5)	22 023 (28.7)	4 677 (27.4)	4 090 (26.7)
Intertrochanteric fracture (%)	50 596 (70.5)	54 677 (62.3)	12 386 (72.6)	11 211 (73.3)
<b>Surgical variables</b>				
Hemiarthroplasty (%)	17 084 (23.8)	22 756 (29.7)	5 084 (29.8)	4 303 (28.1)
Total hip arthroplasty (%)	1 820 (2.5)	2,224 (2.9)	442 (2.6)	371 (2.4)
Open reduction internal fixation (%)	29 379 (40.9)	36 083 (47.0)	7 828 (42.7)	6 620 (43.3)
Other fixation (%)	14 933 (20.8)	11 679 (15.2)	1 994 (11.7)	1 742 (11.4)
Time to surgery if treated surgically (StDev)	0.9 (0.7)	1.8 (1.3)	2.9 (2.3)	4.2 (5.1)
Required transfusion (%)	22 551 (31.4)	33 326 (43.4)	7 996 (46.9)	7 384 (48.3)
<b>Comorbid conditions</b>				
Dementia (%)	16 161 (22.5)	18 120 (23.6)	4 202 (24.6)	3 698 (24.2)
Acute myocardial infarction (%)	3 810 (5.3)	5 597 (7.3)	1 862 (10.9)	2 033 (13.3)
Cerebrovascular disease (%)	3 144 (4.4)	4 531 (5.9)	1 383 (8.1)	1 350 (8.8)
Chronic obstructive pulmonary disease (%)	11 640 (16.2)	14 401 (18.8)	3 736 (21.9)	3 750 (24.5)
Diabetes mellitus (%)	11 529 (16.1)	13 942 (18.2)	3 313 (19.4)	2 817 (18.4)
Renal disease (%)	3 603 (5.0)	4 991 (6.5)	1 463 (8.6)	1 580 (10.3)
Cancer (%)	8 819(12.3)	9 672 (12.6)	2 097 (12.3)	1 944 (8.6)
Metastatic disease (%)	660 (0.9)	940 (1.2)	270 (1.6)	377 (2.5)
Diabetes with complications (%)	884 (1.2)	1,430 (1.9)	432 (2.5)	555 (3.6)
Congestive heart failure (%)	6 726 (9.4)	11 555 (15.1)	3 835 (22.5)	4 448 (29.1)
Weighted Charlson score (StDev)	0.9 (1.2)	1.1 (1.3)	1.4 (1.4)	1.6 (1.6)
<b>Disposition</b>				
Long-term care (%)	519 (0.7)	746 (1.0)	145 (0.8)	191 (1.2)
Skilled nursing facility (%)	39 691 (55.3)	47 059 (61.4)	10 485 (61.4)	9 443 (61.7)
Left against medical advice (%)	360 (0.5)	81 (0.1)	22 (0.1)	30 (0.2)
Cancer hospital (%)	6 016 (8.4)	8 013 (10.4)	1 677 (9.8)	1 197 (7.8)
Home (%)	4 921 (6.9)	4 823 (6.3)	1 456 (8.5)	1 511 (9.9)
Home health agency (%)	4 116 (5.7)	3 571 (4.7)	1 101 (6.5)	1 280 (8.4)
Hospice (%)	333 (0.5)	314 (0.4)	149 (0.9)	291 (1.9)
Inpatient hospital (%)	3 063 (4.3)	1174 (1.5)	297 (1.7)	289 (1.9)
Inpatient rehabilitation (%)	12 641 (17.6)	10 791 (14.1)	1 704 (10.0)	1 024 (6.7)

On univariate analysis multiple factors were associated with increased 30-day mortality including non-surgical treatment, male gender, Caucasian race, older age, longer time to surgery, blood transfusion, comorbid conditions and discharge to hospice (Table 3 shows risk factors for mortality). A shorter LOS (less than 5 days and less than 10 days) was also associated with decreased 30-day mortality. Mortality rates did not change between the first 6 years and the last 6 years of the study. The mortality rate for surgically treated hip fracture patients was 4.5% in the 30 days after discharge. The 30-day post-discharge mortality rate for non-surgically treated hip fracture patients was 10.7%.

**Table 3:** Variables associated with odds of 30-day mortality following discharge for femoral neck fracture, excluding patients deceased during hospitalization.

	<b>Unadjusted analysis</b>			<b>Adjusted analysis</b>			
	<u>Survived</u> N=171 665	<u>Deceased</u> N=9 179	<u>P-value</u>	<u>Odds ratio</u>	<u>95% CI</u>		<u>P-value</u>
<b>No surgery</b>	8.63	19.3	<0.001	1.95	1.8	2.12	<0.001
<b>Female</b>	74.84	64.81	<0.001	0.59	0.56	0.62	<0.001
<b><u>Race</u></b>							
<b>White</b>	86.1	88.9	<0.001	(Reference)			
<b>Black</b>	4.2	3	<0.001	0.7	0.61	0.79	<0.001
<b>Other</b>	8	7	<0.001	0.92	0.84	1.01	0.07
<b><u>Age (SD)</u></b>	81.0 (9.9)	86.0 (8.0)	<0.001				
<b>50-59 years</b>	4.3	0.7	<0.001	(Reference)			
<b>60-69 years</b>	8.7	3.2	<0.001	1.87	1.42	2.48	<0.001
<b>70-79 years</b>	23.4	14.1	<0.001	2.68	2.07	3.47	<0.001
<b>80-89 years</b>	45	46.3	0.011	4.24	3.28	5.48	<0.001
<b>&gt;90 years</b>	18.7	35.7	<0.001	7.63	5.9	9.86	<0.001
<b>Femoral neck fracture</b>	28.78	27.97	0.09	1.01	0.96	1.06	0.7
<b>Days to surgery</b>	1.7 (2.0)	2.2 (3.0)	<0.001				
<b>&gt;2 days</b>	19.1	26.9	<0.001	1.11	1.05	1.18	<0.001
<b>Received transfusion</b>	39.1	45.1	<0.001	1.19	1.14	1.25	<0.001
<b><u>Comorbidities</u></b>							
<b>Dementia</b>	22.3	41.9	<0.001	2.02	1.92	2.12	<0.001
<b>Cardiac disease (acute)</b>	7.1	12.1	<0.001	1.23	1.15	1.33	<0.001
<b>Cerebrovascular disease</b>	5.7	7.7	<0.001	1.2	1.1	1.31	<0.001
<b>COPD</b>	18.2	25.4	<0.001	1.44	1.37	1.52	<0.001
<b>Diabetes</b>	17.5	16.8	0.09	1.01	0.95	1.08	0.7
<b>Renal disease</b>	6.2	11.5	<0.001	1.43	1.33	1.55	<0.001
<b>Cancer</b>	12.2	17.0	<0.001	1.18	1.1	1.26	<0.001

1	Metastatic disease	1.1	4.4	<0.001	3.54	3.08	4.07	<0.001
2	Diabetes with complications	1.8	1.7	0.55	1.02	0.86	1.22	0.8
3	Congestive heart failure	13.9	30.2	<0.001	1.76	1.67	1.85	<0.001
4	Weighted Charlson sum	1.0 (1.3)	1.8 (1.8)	<0.001				
5	<b>Length of stay (days)</b>							
6	<b>1-5</b>	40.2	30.2	<0.001	(Reference)			
7	<b>6-10</b>	42.7	37.4	<0.001	1.06	0.98	1.15	0.1
8	<b>11-14</b>	9.2	13.1	<0.001	1.32	1.19	1.47	<0.001
9	<b>&gt;14</b>	7.9	19.2	<0.001	2.03	1.84	2.24	<0.001
10	<b>Disposition</b>							
11	<b>Skilled nursing facility</b>	58.5	67.8	<0.001	(Reference)			
12	<b>Long-term care</b>	0.9	1	0.145	1.1	0.88	1.36	0.4
13	<b>Left against medical advice</b>	0.3	0.2	0.216	0.7	0.44	1.12	0.1
14	<b>Cancer center</b>	9.6	5.5	<0.001	0.69	0.62	0.76	<0.001
15	<b>Home</b>	7.2	4.3	<0.001	0.68	0.61	0.76	<0.001
16	<b>Home health</b>	5.7	2.7	<0.001	0.5	0.43	0.57	<0.001
17	<b>Hospice</b>	0.1	9.4	<0.001	37.9	32.34	44.42	<0.001
18	<b>Inpatient hospital</b>	2.6	3.7	<0.001	1.2	1.06	1.36	0.005
19	<b>Inpatient rehabilitation</b>	15	5.3	<0.001	0.47	0.43	0.52	<0.001
20	<b>Year 2006-2011</b>	49.8	49.1	0.157	0.74	0.68	0.8	<0.001
21	<b>LOS 6-10 x Year 2006-2011</b>				1.08	0.97	1.20	0.1692
22	<b>LOS 11-14 x Year 2006-2011</b>				1.26	1.09	1.47	0.002
23	<b>LOS &gt;14 x Year 2006-2011</b>				1.25	1.09	1.43	0.001

On multivariate regression analysis, discharge to a hospice facility and age >90 years were the largest risk factors for mortality. Compared to a LOS  $\leq$  5 days, a length of stay longer than 10 days was associated with increased odds of mortality during the first 30 days after discharge.

Patients with longer LOS had lower survival rates on Kaplan-Meier analysis (Figure 1a). LOS was not associated with mortality rates for non-surgically treated patients when analyzed separately (Figure 1b). For the overall cohort of all hip fracture patients and the sub-group of surgically treated patients, increased LOS was associated with increased mortality.

### Sensitivity analyses

In the first sensitivity analysis which moved the theoretical discharge date to day 14 after admission, 9,868 patients (5.4%) died between day 15 and 45 after admission; 3.2% of the 1-5

1 day cohort, 4.3% of the 6-10 day cohort, 7.0% of the 11-14 day cohort, and 18.1% of the cohort  
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4 with LOS over 14 days. These were each significant at  $p < 0.001$  on chi-square analysis. In the  
5  
6 adjusted model, LOS of 6-10 days was associated with 24% increased odds of death (95% CI  
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8 1.154-1.35;  $p = 0.006$ ); LOS of 11-14 days was associated with 71% increased mortality odds (95%  
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10 CI 1.54-1.91;  $p < 0.001$ ) and LOS of greater than 14 days was associated with over four times  
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12 greater odds of mortality between day 15 and 45 after admission (OR 4.62; 95% CI 4.23-5.03;  
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14  $p < 0.001$ ) in patients still alive at day 14 following admission. The full results from the adjusted  
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16 model are available in Supplemental Table 2.  
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24 The second sensitivity analysis attempted to replicate the sensitivity analysis performed in the  
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26 Swedish paper.<sup>3</sup> In patients alive at day 10 with a length of stay of 10 days or less, each 1-day  
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28 increase in length of stay was associated with an 8% increased odds of death during 11-30 days  
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30 from hospital admission overall (95% confidence interval 1.07-1.10;  $p < 0.001$  for a 1-day increase  
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32 in LOS). Odds ratios for interaction variable (each 1-day incremental increase in length of stay  
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34 over 1 day) by year are shown in Supplemental Table 3.  
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### 42 **Subgroup analysis**

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44 Results of subgroup analysis are shown in Supplemental Tables 4-5. For all discharge dispositions  
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46 other than “hospice” or “against medical advice” there was a significant association between  
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48 length of stay of >14 days and higher odds of mortality. In the “skilled nursing facility” and  
49  
50 “inpatient rehabilitation” subgroups (the most common dispositions) longer length of stay was  
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52 associated with significantly higher mortality odds in the 6-10 day, 11-14 day, and >14 day  
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54 cohorts in the adjusted model when compared to a LOS of 1-5 days. Of patients discharged to  
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56 home, hospital length of stay longer than 14 days was significantly associated with higher  
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1 mortality but a significant relationship was not present for shorter lengths of stay. Hospital LOS  
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4 greater than 5 days was associated with significantly higher mortality odds in patients with  
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6 cancer; for patients with dementia, CHF, and COPD there was a significantly increased mortality  
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8 odds for LOS over 10 days but not in the 6-10 day group. In no subgroup analysis was longer  
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10 length of stay associated with decreased early mortality following discharge. Length of stays  
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12 longer than 10 days were associated with similarly elevated odds of mortality during days 1-15  
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14 and 16-30 after discharge.  
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## 21 **DISCUSSION:**

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24 In this study of New York State patients, a shorter inpatient hospital stay was associated with  
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26 increased rates of survival after hip fracture. The relationship between hospital length of stay and  
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28 mortality is important and is likely multifactorial. Prior studies and our results suggest that an  
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30 increased comorbidity burden is associated with increased hospital LOS.<sup>9,10</sup> This highlights the  
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32 relationship between a patient's pre-injury health status and LOS.  
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### 39 **Clinical implications of the results**

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41 These findings contrast sharply with the results of Nordström et al. in a recent Swedish study in  
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43 which shortened LOS was associated with increased mortality rates.<sup>3</sup> These different results  
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45 suggest different associations with mortality rates exist in these two distinct populations. The  
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47 Swedish cohort contained 116 111 patients but did not distinguish results between fractures  
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49 managed surgically and non-surgically. The prevalent standard of care for hip fracture is surgical  
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51 treatment in all patients who can tolerate surgery. Non-surgical management is chosen for those  
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53 patients medically unfit for surgery, unwilling to consent for surgery, or with a short life  
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55 expectancy where palliative measures are more appropriate. In our study, non-surgically  
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1 managed patients fared predictably poorly regardless of hospital LOS. However, exclusion of  
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4 these patients from the fracture cohort did not alter the overall improved mortality rates in  
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7 patients with shorter LOS. In the Nordström study, no analysis was performed to assess the  
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9 number of patients managed non-surgically or their outcomes with regards to mortality as a  
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11 function of LOS. Differences exist in time to management of hip fracture; standard of care in  
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13 Sweden is fracture stabilization within 24 hours. In our study of New York State patients, 19.4%  
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15 waited more than 2 days for surgery, and increased time to surgery was associated with longer  
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17 LOS. With the known relationship in the hip fracture literature between increased time to surgery  
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19 and increased mortality,<sup>11 12</sup> these findings may explain part of the differences in healthcare  
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21 systems. No discharge destination was available for the Swedish study so direct comparisons  
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23 between patients discharged to rehabilitation facilities vs. home discharge was not possible.  
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26 However, notable differences exist in hospital length of stay between the Swedish and New York  
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28 populations. In the New York population, where insurers exert pressure to discharge patients to  
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30 less costly rehabilitation facilities, nearly 40% of patients were discharged within five days and  
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32 82% discharged in 10 or fewer days. In contrast, only 18% of patients were discharged within five  
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34 days and less than half were discharged in 10 days or less in Sweden where a publicly financed  
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36 system may not have the same incentives. These major differences in financial considerations  
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38 and mean LOS after hip fracture may partly explain the contradictory results seen in the two  
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40 studies.  
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52 Other authors have attempted to determine the relationship between hospital LOS and mortality  
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54 or other outcomes in hip fracture patients. Kondo et al compared length of stay and mortality  
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56 after hip fractures between three Japanese and two United States hospitals with vastly different  
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58 LOS.<sup>13</sup> Although they found lower mortality in the Japanese hospitals with longer lengths of stay,  
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1 the small sample size make interpretation of the results challenging. Dubljanin-Respovic et al  
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4 found no effect of LOS on 1-year mortality in a consecutive series of 228 Serbian hip fracture  
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6 patients<sup>14</sup> and Heyes et al found increased readmission rate was associated with increasing LOS  
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8 after hip fracture in a Northern Ireland hospital system.<sup>15</sup> The relationship between LOS and  
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10 mortality has also been studied in non-hip fracture populations. Kaboli et al analyzed over 4  
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12 million admissions through the United States Veterans Affairs Medical System and found LOS  
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14 decreasing for all diagnoses by 1.46 days and a concomitant decrease in all cause 90-day  
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16 mortality.<sup>16</sup> In acute heart failure patients, Reynolds et al found an association between longer  
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18 initial LOS and increased all-cause mortality.<sup>17</sup> Both of these studies were in a United States  
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20 population and support the findings of an association between decreased LOS and decreased  
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22 mortality in New York hip fracture patients. The contradictory results between American studies  
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24 and that found in the Swedish hip fracture registry data highlight the challenges in interpreting  
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26 studies on length of stay across populations with different systems of care.  
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### 37 **Strengths and Limitations**

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39 There are several potential limitations to this study. The population of New York State patients  
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41 studied may vary from other statewide populations in the United States, and our findings may  
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43 not be generalizable to populations in other states or countries. Administrative claims data may  
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45 be incomplete or contain inaccurate coding of diagnoses and comorbid conditions, and different  
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47 administrative databases may contain different rates of comorbid conditions<sup>18</sup>. However,  
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49 comorbidities that would impact reimbursement and acuity indices would likely have been  
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51 included. The SPARCS dataset does not contain laboratory values or permit assessment of the  
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53 severity of comorbid illness, and it does not include the American Society of Anesthesiologists  
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55 (ASA) classification. The fracture date was not recorded in relation to admission date. Some  
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1 patients sustain a hip fracture while hospitalized for another condition, biasing these patient's  
2 records toward longer LOS. To control for this effect, we purposefully included only patients  
3 whose admission or primary diagnosis was for hip fracture. Patient socioeconomic status may  
4 affect access to care in New York State more than in single-nation European populations<sup>4</sup> but is  
5 not included in the database and therefore could not be assessed as a covariate. Finally, specific  
6 cause of death was not available as few autopsies are performed in this population. Strengths of  
7 this study include its similarity to the Swedish dataset in terms of patient numbers, its use of  
8 unique patient identifiers to allow linkage to statewide death registries, and its high  
9 completeness in capturing a single population with a different system of care.  
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### 27 **Conclusion**

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29 The relationship between LOS and mortality after hip fracture in New York State differs  
30 significantly from that seen in a Swedish population. Earlier discharge in New York is associated  
31 with improved survival and longer LOS likely represents a surrogate for medical comorbidities or  
32 complications occurring in the hospital that delayed a safe, early discharge. This critical  
33 difference suggests prolonging hospitalization would not improve mortality outcomes in a New  
34 York population. Caution should be used in extrapolating results of population-based studies  
35 when healthcare systems are dissimilar.  
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**TABLE AND FIGURE LEGEND:**

Table 1: Coding algorithm for comorbid conditions in patients with hip fracture in New York State

Table 2: Characteristics of 180 844 patients with hip fracture in New York State, 2000-2011, stratified by length of stay (excluding patients deceased during hospitalization).

Table 3: Variables associated with odds of 30-day mortality following discharge for femoral neck fracture, excluding patients deceased during hospitalization.

Figure 1: 30-day Kaplan-Meier survival graphs after hip fracture discharge for (A) all patients and (B) non-surgically treated patients. Shorter LOS was associated with higher survival rates in the all patients group but was not associated with survival rates in non-surgically treated patients.

Figure 2: Adjusted odds ratios for mortality after controlling for comorbid characteristics, injury, and demographics each year from 2000-2011 demonstrating consistent trend in every study year of increased mortality associated with increasing hospital length of stay.

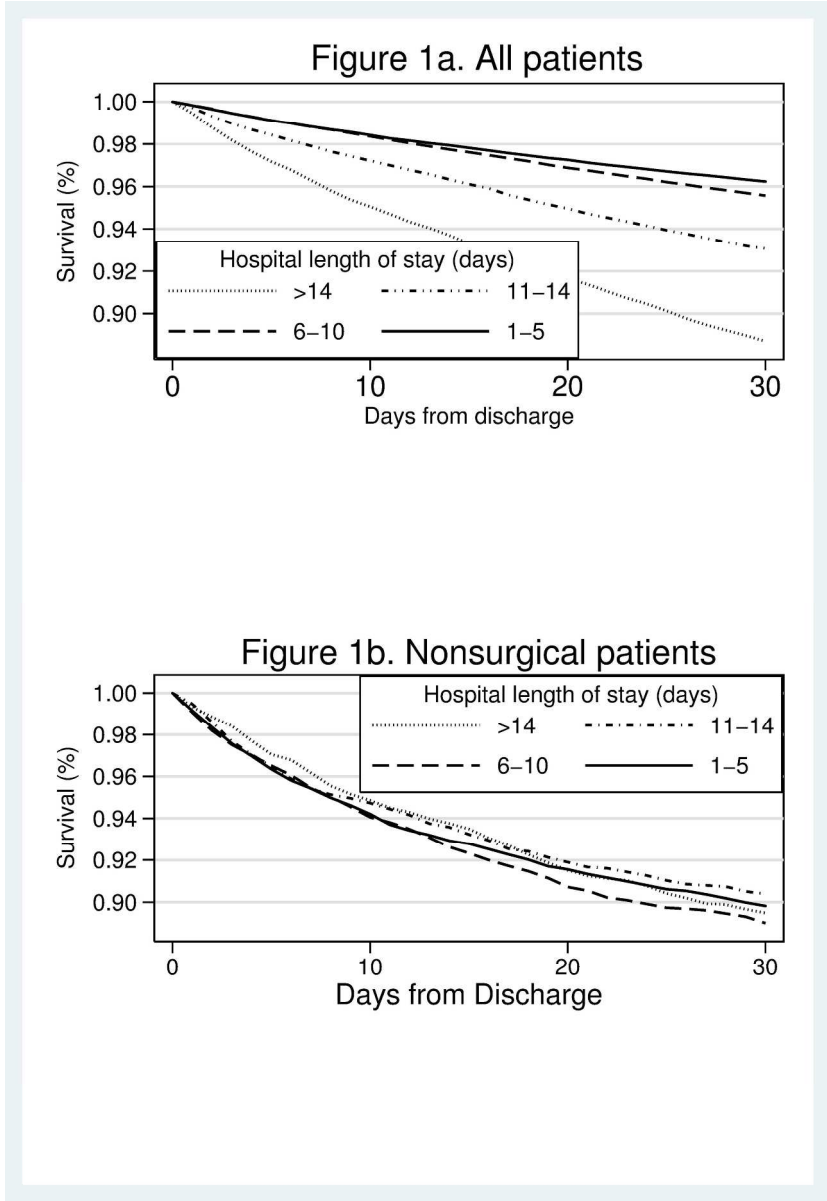
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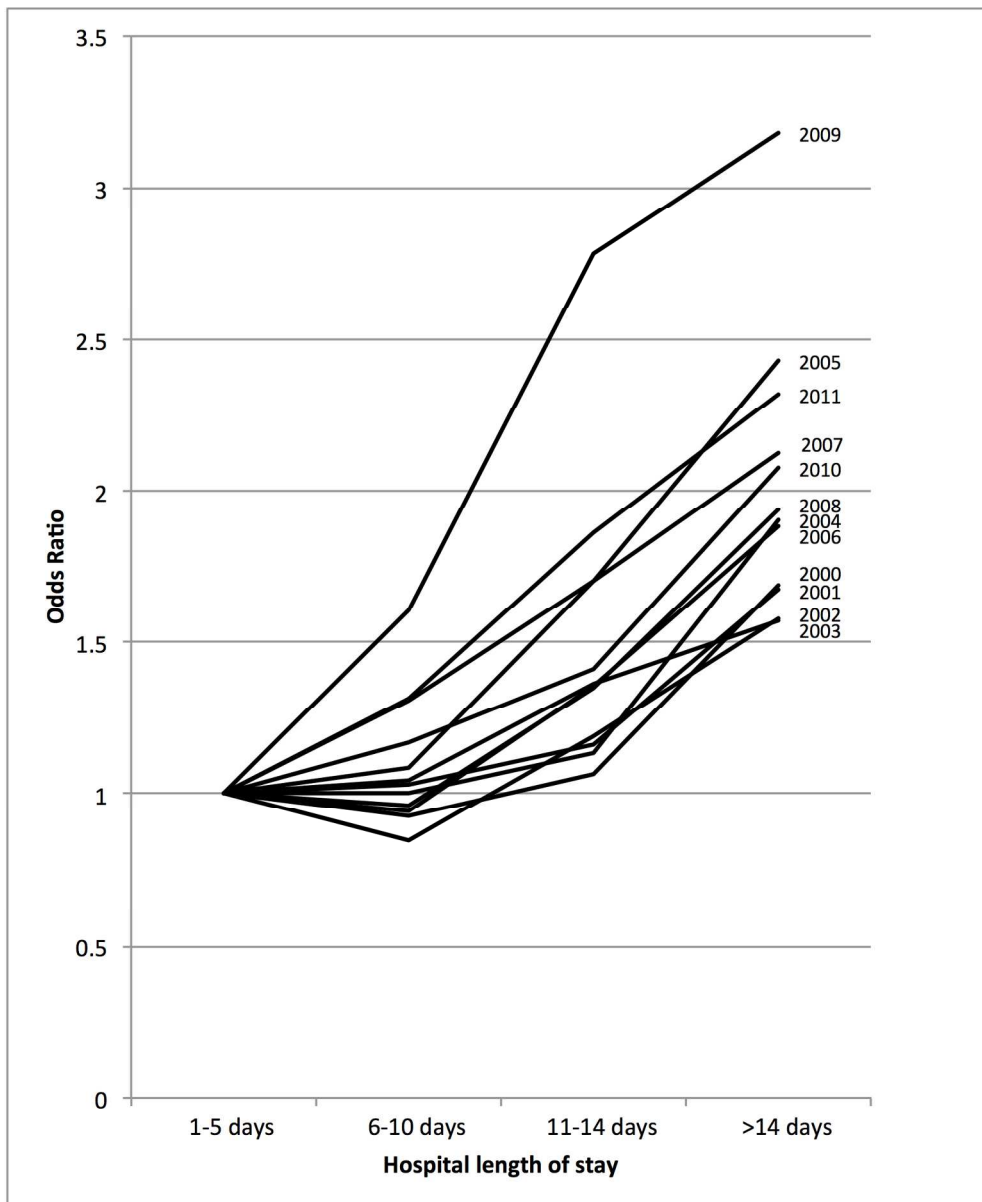
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5 Supplemental Table Legend  
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8 Supplemental Table 1: Mortality rate and adjusted risk factors for mortality after hip  
9 fracture in New York State 2000-2011 – subgroup analysis by year of fracture  
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12 Supplemental Table 2: Adjusted risk factors for mortality between 15 and 45 days after  
13 hospital admission for hip fracture in New York State for patients still living at day 14  
14 after admission  
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17 Supplemental Table 3: Sensitivity analysis evaluating adjusted odds ratios for mortality  
18 between 11 and 30 days for patients alive at day 10 with a hospital length of stay of 10  
19 days or less while controlling for other covariates in the primary regression model.  
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22 Supplemental Table 4: Adjusted odds ratios for mortality after hip fracture in New York  
23 State 2000-2011 – subgroup analysis based on patient disposition  
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26 Supplemental Table 5: Adjusted risk factors for mortality after hip fracture in New York  
27 State 2000-2011 – subgroup analysis based on comorbid conditions  
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Table 1A: Adjusted risk factors for mortality after hip fracture in New York State – 2000

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.714	1.275	2.305	<0.001
Female	0.615	0.516	0.732	<0.001
Black	0.623	0.379	1.023	0.061
Other	0.822	0.614	1.101	0.188
Age 60-69	1.095	0.414	2.895	0.855
Age 70-79	2.188	0.922	5.193	0.076
Age 80-89	3.350	1.424	7.878	0.006
age >90	5.848	2.470	13.845	<0.001
Femoral Neck Fracture	0.953	0.801	1.133	0.582
Days to Surgery >2 Days	1.054	0.842	1.320	0.646
Received Transfusion	1.275	1.079	1.508	0.004
Dementia	1.779	1.493	2.118	<0.001
Cardiac Disease	1.367	1.032	1.813	0.029
Cerebrovascular Disease	1.366	1.024	1.822	0.034
COPD	1.310	1.077	1.593	0.007
Diabetes	1.103	0.886	1.373	0.379
Renal Disease	1.864	1.140	3.046	0.013
Cancer	1.215	0.962	1.534	0.102
Metastatic Disease	3.983	2.471	6.423	<0.001
Diabetes with Complications	1.094	0.523	2.287	0.812
Congestive Heart Failure	1.650	1.365	1.994	<0.001
LOS 6-10	0.925	0.756	1.133	0.452
LOS 11-14	1.053	0.795	1.396	0.718
LOS >14	1.745	1.365	2.231	<0.001
Against medical advice	0.610	0.134	2.766	0.521
Hospice	48.424	17.396	134.792	<0.001
Long-term care	1.153	0.682	1.948	0.595
Home	0.535	0.391	0.733	<0.001
Home healthcare	0.561	0.366	0.860	0.008
Cancer center	0.589	0.474	0.730	<0.001
Inpatient hospital	0.892	0.619	1.284	0.538
Inpatient rehab	1.163	0.155	8.736	0.884

Table 1B: Adjusted risk factors for mortality after hip fracture in New York State - 2001

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.888	1.437	2.481	<0.001
Female	0.566	0.479	0.669	<0.001
Black	0.867	0.560	1.341	0.521
Other	1.126	0.861	1.472	0.387
Age 60-69	2.559	0.980	6.687	0.055
Age 70-79	2.767	1.113	6.876	0.028
Age 80-89	4.357	1.769	10.731	0.001
age >90	7.935	3.203	19.658	<0.001
Femoral Neck Fracture	0.935	0.789	1.108	0.439
Days to Surgery >2 Days	1.196	0.974	1.469	0.088
Received Transfusion	1.419	1.210	1.664	<0.001
Dementia	2.117	1.795	2.498	<0.001
Cardiac Disease	1.376	1.059	1.789	0.017
Cerebrovascular Disease	1.077	0.809	1.435	0.611
COPD	1.573	1.309	1.890	<0.001
Diabetes	0.959	0.769	1.197	0.712
Renal Disease	1.938	1.239	3.031	0.004
Cancer	1.049	0.833	1.319	0.685
Metastatic Disease	5.469	3.506	8.530	<0.001
Diabetes with Complications	1.709	1.053	2.775	0.03
Congestive Heart Failure	1.817	1.521	2.171	<0.001
LOS 6-10	1.063	0.871	1.297	0.548
LOS 11-14	1.206	0.921	1.579	0.173
LOS >14	1.910	1.493	2.445	<0.001
Against medical advice	0.590	0.138	2.525	0.476
Hospice	19.825	9.707	40.490	<0.001
Long-term care	0.721	0.377	1.381	0.324
Home	0.633	0.470	0.854	0.003
Home healthcare	0.535	0.345	0.829	0.005
Cancer center	0.580	0.473	0.712	<0.001
Inpatient hospital	1.021	0.692	1.507	0.915
Inpatient rehab	0.279	0.038	2.039	0.208



Table 1C: Adjusted risk factors for mortality after hip fracture in New York State – 2002

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.781	1.365	2.323	<0.001
Female	0.565	0.480	0.664	<0.001
Black	0.765	0.510	1.148	0.196
Other	0.906	0.689	1.192	0.482
Age 60-69	4.697	1.408	15.672	0.012
Age 70-79	4.372	1.355	14.107	0.014
Age 80-89	8.221	2.569	26.306	<0.001
age >90	16.209	5.043	52.096	<0.001
Femoral Neck Fracture	1.151	0.980	1.353	0.087
Days to Surgery >2 Days	1.134	0.924	1.393	0.228
Received Transfusion	1.198	1.023	1.402	0.025
Dementia	1.989	1.695	2.334	<0.001
Cardiac Disease	1.414	1.099	1.820	0.007
Cerebrovascular Disease	1.328	1.015	1.736	0.038
COPD	1.421	1.190	1.696	<0.001
Diabetes	1.006	0.818	1.239	0.952
Renal Disease	1.555	0.932	2.594	0.091
Cancer	1.396	1.135	1.718	0.002
Metastatic Disease	2.831	1.794	4.469	<0.001
Diabetes with Complications	1.111	0.615	2.007	0.728
Congestive Heart Failure	1.770	1.486	2.108	<0.001
LOS 6-10	0.867	0.720	1.045	0.134
LOS 11-14	1.195	0.928	1.539	0.168
LOS >14	1.647	1.296	2.094	<0.001
Against medical advice	1.378	0.475	3.998	0.556
Hospice	22.629	11.898	43.040	<0.001
Long-term care	0.908	0.450	1.832	0.787
Home	0.624	0.458	0.851	0.003
Home healthcare	0.665	0.433	1.022	0.063
Cancer center	0.637	0.507	0.802	<0.001
Inpatient hospital	1.120	0.738	1.701	0.594
Inpatient rehab	0.614	0.430	0.876	0.007

Table 1D: Adjusted risk factors for mortality after hip fracture in New York State - 2003

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.865	1.429	2.434	<0.001
Female	0.503	0.429	0.589	<0.001
Black	0.893	0.608	1.312	0.565
Other	1.000	0.773	1.293	1
Age 60-69	4.321	1.013	18.431	0.048
Age 70-79	6.617	1.623	26.973	0.008
Age 80-89	11.938	2.948	48.344	0.001
age >90	21.764	5.357	88.428	<0.001
Femoral Neck Fracture	1.103	0.940	1.293	0.229
Days to Surgery >2 Days	1.213	0.995	1.478	0.056
Received Transfusion	1.240	1.062	1.448	0.007
Dementia	2.054	1.757	2.402	<0.001
Cardiac Disease	0.976	0.753	1.264	0.853
Cerebrovascular Disease	1.033	0.764	1.397	0.832
COPD	1.457	1.224	1.735	<0.001
Diabetes	1.056	0.865	1.290	0.593
Renal Disease	1.544	0.961	2.481	0.073
Cancer	1.201	0.975	1.480	0.085
Metastatic Disease	3.469	2.100	5.730	<0.001
Diabetes with Complications	1.576	0.935	2.657	0.088
Congestive Heart Failure	1.960	1.657	2.320	<0.001
LOS 6-10	1.076	0.895	1.293	0.434
LOS 11-14	1.383	1.069	1.789	0.014
LOS >14	1.813	1.416	2.322	<0.001
Against medical advice	0.608	0.142	2.607	0.503
Hospice	56.754	25.555	126.045	<0.001
Long-term care	0.555	0.269	1.148	0.112
Home	0.637	0.464	0.873	0.005
Home healthcare	0.523	0.324	0.846	0.008
Cancer center	0.769	0.594	0.996	0.046
Inpatient hospital	1.514	1.013	2.263	0.043
Inpatient rehab	0.537	0.393	0.735	<0.001

Table 1E: Adjusted risk factors for mortality after hip fracture in New York State - 2004

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.837	1.401	2.408	<0.001
Female	0.627	0.530	0.742	<0.001
Black	0.795	0.523	1.211	0.286
Other	1.098	0.810	1.488	0.548
Age 60-69	1.332	0.485	3.655	0.578
Age 70-79	2.875	1.156	7.152	0.023
Age 80-89	4.051	1.642	9.998	0.002
age >90	6.293	2.534	15.624	<0.001
Femoral Neck Fracture	1.006	0.847	1.196	0.944
Days to Surgery >2 Days	1.200	0.979	1.471	0.08
Received Transfusion	1.379	1.170	1.625	<0.001
Dementia	1.886	1.599	2.225	<0.001
Cardiac Disease	1.640	1.302	2.065	<0.001
Cerebrovascular Disease	1.407	1.059	1.868	0.018
COPD	1.419	1.186	1.699	<0.001
Diabetes	0.971	0.786	1.199	0.784
Renal Disease	1.148	0.629	2.094	0.653
Cancer	1.269	1.024	1.571	0.029
Metastatic Disease	3.283	2.086	5.165	<0.001
Diabetes with Complications	0.944	0.508	1.753	0.855
Congestive Heart Failure	1.959	1.643	2.335	<0.001
LOS 6-10	1.016	0.836	1.233	0.876
LOS 11-14	1.177	0.888	1.559	0.256
LOS >14	2.030	1.579	2.608	<0.001
Against medical advice	0.379	0.050	2.848	0.346
Hospice	36.934	20.890	65.301	<0.001
Long-term care	0.396	0.096	1.629	0.199
Home	0.732	0.506	1.060	0.099
Home healthcare	0.547	0.356	0.841	0.006
Cancer center	0.696	0.459	1.056	0.088
Inpatient hospital	1.791	1.196	2.683	0.005
Inpatient rehab	0.427	0.309	0.590	<0.001

Table 1F: Adjusted risk factors for mortality after hip fracture in New York State - 2005

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.992	1.481	2.680	<0.001
Female	0.553	0.468	0.655	<0.001
Black	0.745	0.469	1.182	0.211
Other	1.043	0.781	1.393	0.776
Age 60-69	4.504	1.433	14.155	0.01
Age 70-79	3.887	1.289	11.717	0.016
Age 80-89	7.327	2.461	21.808	<0.001
age >90	13.384	4.476	40.023	<0.001
Femoral Neck Fracture	0.919	0.769	1.098	0.352
Days to Surgery >2 Days	0.847	0.687	1.044	0.12
Received Transfusion	1.131	0.960	1.333	0.141
Dementia	1.933	1.638	2.281	<0.001
Cardiac Disease	1.152	0.898	1.479	0.265
Cerebrovascular Disease	1.057	0.778	1.437	0.724
COPD	1.643	1.374	1.964	<0.001
Diabetes	1.069	0.873	1.309	0.517
Renal Disease	1.415	0.913	2.192	0.121
Cancer	1.134	0.911	1.412	0.259
Metastatic Disease	2.895	1.693	4.950	<0.001
Diabetes with Complications	0.575	0.254	1.304	0.185
Congestive Heart Failure	1.861	1.558	2.224	<0.001
LOS 6-10	1.341	1.103	1.629	0.003
LOS 11-14	1.842	1.396	2.429	<0.001
LOS >14	2.934	2.251	3.824	<0.001
Against medical advice	0.516	0.067	3.978	0.525
Hospice	29.432	15.953	54.300	<0.001
Long-term care	1.350	0.470	3.880	0.577
Home	0.603	0.386	0.943	0.027
Home healthcare	0.362	0.218	0.602	<0.001
Cancer center	0.464	0.252	0.855	0.014
Inpatient hospital	1.107	0.668	1.836	0.693
Inpatient rehab	0.460	0.346	0.611	<0.001

Table 1G: Adjusted risk factors for mortality after hip fracture in New York State - 2006

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.617	1.225	2.134	0.001
Female	0.577	0.490	0.679	<0.001
Black	0.961	0.654	1.413	0.841
Other	0.875	0.638	1.200	0.407
Age 60-69	0.922	0.441	1.926	0.828
Age 70-79	1.610	0.849	3.051	0.145
Age 80-89	2.150	1.150	4.021	0.017
age >90	4.055	2.151	7.642	<0.001
Femoral Neck Fracture	1.038	0.877	1.229	0.661
Days to Surgery >2 Days	1.159	0.951	1.413	0.143
Received Transfusion	1.045	0.889	1.229	0.591
Dementia	1.853	1.575	2.181	<0.001
Cardiac Disease	1.245	0.978	1.584	0.075
Cerebrovascular Disease	1.165	0.874	1.553	0.298
COPD	1.501	1.259	1.789	<0.001
Diabetes	1.049	0.863	1.276	0.631
Renal Disease	1.444	1.137	1.834	0.003
Cancer	1.543	1.266	1.880	<0.001
Metastatic Disease	2.390	1.461	3.910	0.001
Diabetes with Complications	0.987	0.573	1.700	0.961
Congestive Heart Failure	1.948	1.639	2.315	<0.001
LOS 6-10	0.953	0.788	1.152	0.616
LOS 11-14	1.352	1.033	1.770	0.028
LOS >14	2.186	1.692	2.823	<0.001
Against medical advice	0.726	0.169	3.118	0.667
Hospice	26.531	15.853	44.400	<0.001
Long-term care	0.307	0.042	2.254	0.246
Home	0.633	0.422	0.947	0.026
Home healthcare	0.483	0.311	0.751	0.001
Cancer center	0.643	0.364	1.138	0.13
Inpatient hospital	0.969	0.593	1.584	0.899
Inpatient rehab	0.579	0.450	0.744	<0.001

Table 1H: Adjusted risk factors for mortality after hip fracture in New York State - 2007

	Odds ratio	2.5%	97.5%	p-value
No Surgery	2.059	1.545	2.744	<0.001
Female	0.678	0.567	0.811	<0.001
Black	0.493	0.286	0.849	0.011
Other	0.863	0.633	1.177	0.352
Age 60-69	3.056	0.978	9.552	0.055
Age 70-79	4.121	1.400	12.128	0.01
Age 80-89	6.745	2.319	19.616	<0.001
age >90	11.131	3.803	32.585	<0.001
Femoral Neck Fracture	1.097	0.916	1.314	0.315
Days to Surgery >2 Days	1.143	0.922	1.416	0.222
Received Transfusion	1.124	0.944	1.337	0.189
Dementia	1.797	1.512	2.135	<0.001
Cardiac Disease	1.122	0.871	1.444	0.372
Cerebrovascular Disease	1.046	0.742	1.474	0.798
COPD	1.396	1.153	1.690	0.001
Diabetes	1.051	0.851	1.297	0.646
Renal Disease	1.430	1.135	1.802	0.002
Cancer	0.913	0.608	1.372	0.662
Metastatic Disease	2.994	1.721	5.209	<0.001
Diabetes with Complications	0.593	0.269	1.306	0.195
Congestive Heart Failure	1.711	1.415	2.068	<0.001
LOS 6-10	1.122	0.913	1.379	0.273
LOS 11-14	1.757	1.327	2.325	<0.001
LOS >14	2.462	1.877	3.230	<0.001
Against medical advice	1.000	.	.	.
Hospice	46.305	27.382	78.308	<0.001
Long-term care	2.359	0.988	5.632	0.053
Home	0.884	0.586	1.334	0.558
Home healthcare	0.364	0.219	0.605	<0.001
Cancer center	0.952	0.512	1.769	0.877
Inpatient hospital	1.022	0.607	1.719	0.936
Inpatient rehab	0.426	0.310	0.586	<0.001

Table 11: Adjusted risk factors for mortality after hip fracture in New York State - 2008

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.488	1.102	2.009	0.01
Female	0.590	0.498	0.698	<0.001
Black	0.695	0.459	1.052	0.085
Other	0.583	0.397	0.854	0.006
Age 60-69	1.083	0.430	2.728	0.865
Age 70-79	2.211	0.974	5.017	0.058
Age 80-89	3.256	1.457	7.275	0.004
age >90	6.358	2.832	14.274	<0.001
Femoral Neck Fracture	0.998	0.836	1.193	0.985
Days to Surgery >2 Days	1.083	0.880	1.332	0.454
Received Transfusion	0.975	0.825	1.152	0.766
Dementia	2.410	2.045	2.839	<0.001
Cardiac Disease	1.302	1.027	1.649	0.029
Cerebrovascular Disease	1.275	0.947	1.717	0.109
COPD	1.387	1.152	1.669	0.001
Diabetes	0.996	0.811	1.222	0.967
Renal Disease	1.663	1.356	2.039	<0.001
Cancer	1.455	1.031	2.053	0.033
Metastatic Disease	3.374	2.068	5.505	<0.001
Diabetes with Complications	0.606	0.301	1.221	0.161
Congestive Heart Failure	1.471	1.218	1.776	<0.001
LOS 6-10	0.981	0.808	1.190	0.844
LOS 11-14	1.419	1.073	1.878	0.014
LOS >14	2.344	1.804	3.046	<0.001
Against medical advice	0.858	0.111	6.638	0.884
Hospice	46.988	28.841	76.553	<0.001
Long-term care	2.635	1.233	5.633	0.012
Home	0.681	0.421	1.100	0.116
Home healthcare	0.531	0.341	0.827	0.005
Cancer center	1.624	0.771	3.418	0.202
Inpatient hospital	1.301	0.806	2.101	0.282
Inpatient rehab	0.514	0.388	0.682	<0.001

Table 1J: Adjusted risk factors for mortality after hip fracture in New York State - 2009

	Odds ratio	2.5%	97.5%	p-value
No Surgery	3.010	2.249	4.029	<0.001
Female	0.554	0.464	0.662	<0.001
Black	0.422	0.252	0.707	0.001
Other	0.801	0.564	1.138	0.215
Age 60-69	1.592	0.583	4.343	0.364
Age 70-79	2.457	0.971	6.217	0.058
Age 80-89	4.418	1.779	10.972	0.001
age >90	8.031	3.215	20.063	<0.001
Femoral Neck Fracture	0.949	0.784	1.149	0.592
Days to Surgery >2 Days	1.034	0.832	1.284	0.765
Received Transfusion	1.085	0.909	1.294	0.366
Dementia	2.189	1.841	2.604	<0.001
Cardiac Disease	1.310	1.020	1.683	0.034
Cerebrovascular Disease	1.203	0.871	1.660	0.262
COPD	1.418	1.164	1.726	0.001
Diabetes	1.055	0.852	1.307	0.623
Renal Disease	1.352	1.092	1.674	0.006
Cancer	1.004	0.794	1.268	0.977
Metastatic Disease	4.570	2.842	7.348	<0.001
Diabetes with Complications	1.153	0.633	2.102	0.641
Congestive Heart Failure	1.481	1.216	1.803	<0.001
LOS 6-10	1.672	1.354	2.064	<0.001
LOS 11-14	2.874	2.165	3.815	<0.001
LOS >14	3.770	2.848	4.991	<0.001
Against medical advice	1.000	.	.	.
Hospice	39.224	25.356	60.676	<0.001
Long-term care	1.393	0.571	3.399	0.466
Home	1.014	0.656	1.569	0.95
Home healthcare	0.396	0.233	0.671	0.001
Cancer center	1.375	0.483	3.916	0.551
Inpatient hospital	1.262	0.794	2.008	0.325
Inpatient rehab	0.385	0.273	0.544	<0.001



Table 1K: Adjusted risk factors for mortality after hip fracture in New York State - 2010

	Odds ratio	2.5%	97.5%	p-value
No Surgery	2.395	1.787	3.209	<0.001
Female	0.536	0.451	0.636	<0.001
Black	0.276	0.142	0.536	<0.001
Other	0.749	0.514	1.092	0.133
Age 60-69	1.193	0.496	2.867	0.693
Age 70-79	2.400	1.096	5.255	0.029
Age 80-89	2.982	1.382	6.433	0.005
age >90	6.054	2.791	13.133	<0.001
Femoral Neck Fracture	0.946	0.782	1.143	0.565
Days to Surgery >2 Days	1.192	0.957	1.484	0.116
Received Transfusion	1.250	1.049	1.490	0.013
Dementia	1.819	1.535	2.155	<0.001
Cardiac Disease	1.078	0.835	1.393	0.563
Cerebrovascular Disease	1.498	1.111	2.021	0.008
COPD	1.348	1.113	1.633	0.002
Diabetes	0.889	0.715	1.106	0.292
Renal Disease	1.303	1.062	1.598	0.011
Cancer	1.132	0.908	1.412	0.27
Metastatic Disease	4.223	2.643	6.746	<0.001
Diabetes with Complications	1.120	0.647	1.937	0.685
Congestive Heart Failure	1.566	1.296	1.893	<0.001
LOS 6-10	1.210	0.993	1.474	0.058
LOS 11-14	1.432	1.065	1.928	0.018
LOS >14	2.564	1.932	3.403	<0.001
Against medical advice	1.417	0.414	4.851	0.579
Hospice	45.061	28.526	71.180	<0.001
Long-term care	1.867	0.931	3.747	0.079
Home	0.536	0.303	0.949	0.032
Home healthcare	0.415	0.247	0.698	0.001
Cancer center	3.193	1.398	7.294	0.006
Inpatient hospital	1.245	0.805	1.926	0.325
Inpatient rehab	0.397	0.285	0.553	<0.001

Table 1L: Adjusted risk factors for mortality after hip fracture in New York State - 2011

	Odds ratio	2.5%	97.5%	p-value
No Surgery	2.211	1.626	3.006	<0.001
Female	0.737	0.613	0.887	0.001
Black	0.819	0.529	1.270	0.373
Other	1.058	0.772	1.448	0.727
Age 60-69	2.292	0.894	5.879	0.084
Age 70-79	2.605	1.073	6.326	0.034
Age 80-89	4.272	1.795	10.167	0.001
age >90	6.723	2.808	16.099	<0.001
Femoral Neck Fracture	0.915	0.749	1.118	0.386
Days to Surgery >2 Days	1.105	0.876	1.393	0.399
Received Transfusion	1.247	1.041	1.495	0.017
Dementia	2.573	2.160	3.065	<0.001
Cardiac Disease	0.989	0.751	1.304	0.94
Cerebrovascular Disease	0.935	0.666	1.312	0.696
COPD	1.373	1.123	1.678	0.002
Diabetes	0.933	0.746	1.166	0.541
Renal Disease	1.780	1.453	2.180	<0.001
Cancer	0.926	0.732	1.172	0.523
Metastatic Disease	3.940	2.264	6.857	<0.001
Diabetes with Complications	0.655	0.319	1.349	0.251
Congestive Heart Failure	1.863	1.537	2.258	<0.001
LOS 6-10	1.272	1.036	1.563	0.022
LOS 11-14	2.022	1.494	2.735	<0.001
LOS >14	2.886	2.146	3.881	<0.001
Against medical advice	1.542	0.201	11.818	0.677
Hospice	55.037	33.894	89.370	<0.001
Long-term care	1.814	0.990	3.323	0.054
Home	1.418	0.934	2.154	0.102
Home healthcare	0.654	0.393	1.088	0.102
Cancer center	2.177	0.631	7.502	0.218
Inpatient hospital	1.484	0.951	2.315	0.082
Inpatient rehab	0.529	0.385	0.726	<0.001

Table 1M: Unadjusted odds ratios for mortality with LOS after hip fracture in New York State – 2000-2011.

	Mortality (%)	Odds ratio	2.5%	97.5%	p-value
<b>2000</b>					
LOS 1-5 days	4.0	1.000	.	.	.
LOS 6-10 days	3.7	0.934	0.771	1.131	0.483
LOS 11-14 days	4.6	1.166	0.897	1.515	0.251
LOS >14 days	7.9	2.315	1.863	2.876	<0.001
<b>2001</b>					
LOS 1-5 days	4.0	1.000	.	.	.
LOS 6-10 days	4.5	1.130	0.939	1.360	0.196
LOS 11-14 days	6.3	1.603	1.253	2.049	<0.001
LOS >14 days	9.4	2.882	2.325	3.573	<0.001
<b>2002</b>					
LOS 1-5 days	5.0	1.000	.	.	.
LOS 6-10 days	4.3	0.862	0.725	1.024	0.092
LOS 11-14 days	7.2	1.468	1.169	1.842	0.001
LOS >14 days	9.5	2.326	1.892	2.859	<0.001
<b>2003</b>					
LOS 1-5 days	4.2	1.000	.	.	.
LOS 6-10 days	4.7	1.112	0.939	1.317	0.22
LOS 11-14 days	7.6	1.834	1.464	2.297	<0.001
LOS >14 days	9.7	2.784	2.264	3.424	<0.001
<b>2004</b>					
LOS 1-5 days	4.1	1.000	.	.	.
LOS 6-10 days	4.4	1.096	0.918	1.307	0.311
LOS 11-14 days	6.5	1.636	1.278	2.094	<0.001
LOS >14 days	10.2	3.118	2.523	3.853	<0.001
<b>2005</b>					
LOS 1-5 days	3.5	1.000	.	.	.
LOS 6-10 days	4.8	1.385	1.159	1.656	<0.001
LOS 11-14 days	7.4	2.215	1.735	2.828	<0.001
LOS >14 days	10.1	3.628	2.897	4.544	<0.001
<b>2006</b>					
LOS 1-5 days	4.3	1.000	.	.	.
LOS 6-10 days	4.6	1.057	0.891	1.254	0.524
LOS 11-14 days	8.0	1.914	1.518	2.414	<0.001
LOS >14 days	11.5	3.315	2.686	4.091	<0.001
<b>2007</b>					
LOS 1-5 days	3.4	1.000	.	.	.
LOS 6-10 days	4.2	1.266	1.052	1.524	0.013
LOS 11-14 days	7.6	2.357	1.847	3.006	<0.001
LOS >14 days	10.4	3.709	2.959	4.649	<0.001
<b>2008</b>					
LOS 1-5 days	4.1	1.000	.	.	.
LOS 6-10 days	4.5	1.104	0.929	1.312	0.263
LOS 11-14 days	7.5	1.898	1.491	2.415	<0.001
LOS >14 days	11.3	3.441	2.782	4.256	<0.001

	<b>2009</b>					
	LOS 1-5 days	3.1	1.000	.	.	.
	LOS 6-10 days	4.7	1.573	1.311	1.888	<0.001
	LOS 11-14 days	8.7	3.029	2.375	3.863	<0.001
	LOS >14 days	11.4	4.716	3.755	5.924	<0.001
	<b>2010</b>					
	LOS 1-5 days	4.0	1.000	.	.	.
	LOS 6-10 days	4.8	1.216	1.027	1.441	0.024
	LOS 11-14 days	7.0	1.819	1.413	2.343	<0.001
	LOS >14 days	11.7	3.659	2.925	4.577	<0.001
	<b>2011</b>					
	LOS 1-5 days	3.3	1.000	.	.	.
	LOS 6-10 days	4.6	1.430	1.197	1.710	<0.001
	LOS 11-14 days	7.7	2.493	1.931	3.218	<0.001
	LOS >14 days	12.0	4.681	3.694	5.932	<0.001

Supplemental Table 2: Adjusted risk factors for mortality between 15 and 45 days after hospital admission for hip fracture in New York State for patients still living at day 14 after admission.

	Odds ratio	2.5%	97.5%	p-value
No Surgery	1.571	1.453	1.697	<0.001
Female	0.639	0.610	0.669	<0.001
Black	0.742	0.660	0.833	<0.001
Other	0.912	0.839	0.991	0.03
Age 60-69	1.731	1.348	2.221	<0.001
Age 70-79	2.428	1.926	3.061	<0.001
Age 80-89	3.603	2.868	4.526	<0.001
age >90	5.845	4.643	7.357	<0.001
Femoral Neck Fracture	1.028	0.980	1.078	0.266
Days to Surgery >2 Days	1.034	0.979	1.092	0.233
Received Transfusion	1.189	1.137	1.244	<0.001
Dementia	1.755	1.676	1.838	<0.001
Cardiac Disease	1.234	1.154	1.319	<0.001
Cerebrovascular Disease	1.136	1.047	1.233	0.002
COPD	1.401	1.332	1.473	<0.001
Diabetes	0.963	0.909	1.021	0.205
Renal Disease	1.368	1.271	1.473	<0.001
Cancer	1.221	1.147	1.300	<0.001
Metastatic Disease	3.510	3.088	3.989	<0.001
Diabetes with Complications	0.993	0.848	1.163	0.927
Congestive Heart Failure	1.684	1.603	1.769	<0.001
LOS 6-10	1.243	1.147	1.347	<0.001
LOS 11-14	1.715	1.542	1.909	<0.001
LOS >14	4.616	4.233	5.034	<0.001
Against medical advice	0.723	0.445	1.173	0.189
Hospice	4.426	3.861	5.074	<0.001
Long-term care	0.718	0.566	0.910	0.006
Home	0.440	0.391	0.495	<0.001
Home healthcare	0.393	0.344	0.450	<0.001
Cancer center	0.519	0.470	0.573	<0.001
Inpatient hospital	0.875	0.761	1.006	0.061
Inpatient rehab	0.445	0.405	0.488	<0.001
Year 2006-2011	0.794	0.728	0.866	<0.001
LOS 6-10 × Year 2006-2011	1.003	0.897	1.121	0.964
LOS 11-14 × Year 2006-2011	1.157	0.997	1.342	0.055
LOS >14 × Year 2006-2011	1.160	1.029	1.306	0.015

Supplemental Table 3: Sensitivity analysis evaluating adjusted odds ratios for mortality between 11 and 30 days for patients alive at day 10 with a hospital length of stay of 10 days or less while controlling for other covariates in the primary regression model.

	Odds Ratio	95% Confidence Interval		P-value
<b>Overall</b>	1.08	1.07	1.10	<0.0001
<b>2000</b>	1.05	0.99	1.11	0.09
<b>2001</b>	1.07	1.01	1.13	0.02
<b>2002</b>	1.02	0.96	1.08	0.5
<b>2003</b>	1.09	1.03	1.15	0.002
<b>2004</b>	1.06	1.00	1.12	0.05
<b>2005</b>	1.11	1.05	1.18	0.000
<b>2006</b>	0.99	0.94	1.05	0.7
<b>2007</b>	1.09	1.03	1.16	0.004
<b>2008</b>	1.03	0.97	1.09	0.4
<b>2009</b>	1.20	1.13	1.27	<0.0001
<b>2010</b>	1.14	1.08	1.21	<0.0001
<b>2011</b>	1.11	1.05	1.18	0.0005

Table 4A: Multivariate logistic regression for disposition = skilled nursing facility, with and without interaction term of LOS and “year after 2005.” To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 9.9918 with 3 degrees of freedom, and p-value is 0.018636

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	2.2074	2.0072	2.4276	<0.0001	2.2124	2.0117	2.4331	<0.0001
Female	0.5758	0.5437	0.6097	<0.0001	0.5756	0.5436	0.6095	<0.0001
Black	0.6315	0.5391	0.7397	<0.0001	0.6292	0.5371	0.7371	<0.0001
Other	0.8815	0.7924	0.9807	0.0204	0.88	0.7911	0.979	0.0188
Age 60-69	2.041	1.3432	3.1014	0.0008	2.0453	1.3459	3.1081	0.0008
Age 70-79	2.6148	1.7605	3.8835	<0.0001	2.6246	1.7671	3.8982	<0.0001
Age 80-89	4.0191	2.7171	5.945	<0.0001	4.036	2.7284	5.9702	<0.0001
age >90	7.1473	4.8257	10.5857	<0.0001	7.1797	4.8473	10.6342	<0.0001
Femoral Neck Fracture	1.0176	0.9594	1.0793	0.5624	1.0171	0.9589	1.0788	0.5731
Days to Surgery >2 Days	1.0937	1.0197	1.1731	0.0122	1.0923	1.0184	1.1717	0.0135
Received Transfusion	1.1252	1.0648	1.1891	<0.0001	1.1239	1.0635	1.1876	<0.0001
Dementia	1.9906	1.8859	2.101	<0.0001	1.9869	1.8825	2.0972	<0.0001
Cardiac Disease	1.2183	1.1191	1.3263	<0.0001	1.2154	1.1164	1.3232	<0.0001
Cerebrovascular Disease	1.1238	1.0153	1.244	0.0243	1.123	1.0145	1.243	0.0252
COPD	1.3985	1.314	1.4884	<0.0001	1.3995	1.3149	1.4895	<0.0001
Diabetes	1.0032	0.9352	1.0763	0.9281	1.0041	0.936	1.0772	0.9086
Renal Disease	1.3633	1.2451	1.4926	<0.0001	1.3555	1.2378	1.4844	<0.0001
Cancer	1.1824	1.0939	1.2781	<0.0001	1.1832	1.0947	1.2789	<0.0001
Metastatic Disease	3.1201	2.6144	3.7238	<0.0001	3.1129	2.6082	3.7153	<0.0001
Disbetes with Complications	0.9544	0.7696	1.1835	0.6707	0.9547	0.7698	1.184	0.6729
Congestive Heart Failure	1.6845	1.5856	1.7895	<0.0001	1.6819	1.5832	1.7868	<0.0001
LOS 6-10	1.0943	1.0251	1.1681	0.0069	1.0383	0.947	1.1384	0.4234
LOS 11-14	1.4948	1.3627	1.6396	<0.0001	1.3683	1.2057	1.553	<0.0001
LOS >14	2.2379	2.0503	2.4425	<0.0001	1.9916	1.7734	2.2366	<0.0001
Year 2006-2011	0.7974	0.7548	0.8425	<0.0001	0.7203	0.6541	0.7932	<0.0001
LOS 6-10 × Year 2006-2011					1.1035	0.9724	1.2524	0.127
LOS 11-14 × Year 2006-2011					1.1901	0.9996	1.4169	0.0506
LOS >14 × Year 2006-2011					1.2773	1.0879	1.4997	0.0028

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Table 4B: Multivariate logistic regression for disposition = long-term care, with and without interaction term of LOS and “year after 2005.” To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 2.2342 with 3 degrees of freedom, and p-value is 0.525245

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	2.1482	0.9493	4.8609	0.0665	2.0566	0.9006	4.6963	0.087
Female	0.8524	0.5109	1.4224	0.5411	0.858	0.5128	1.4358	0.5599
Black	0.077	0.0078	0.7578	0.028	0.0782	0.0078	0.7809	0.03
Other	0.7623	0.3262	1.7814	0.5308	0.7735	0.329	1.8186	0.556
Femoral Neck Fracture	1.2084	0.7282	2.0052	0.4638	1.2025	0.7235	1.9986	0.4769
Days to Surgery >2 Days	1.056	0.5723	1.9484	0.8617	1.0828	0.5869	1.9976	0.7991
Received Transfusion	1.4746	0.9004	2.4149	0.1228	1.4542	0.8848	2.39	0.1396
Dementia	3.9708	2.4403	6.4612	<0.0001	3.9807	2.4411	6.4915	<0.0001
Cardiac Disease	1.6995	0.757	3.8153	0.1987	1.6682	0.7436	3.7423	0.2145
Cerebrovascular Disease	0.6616	0.2447	1.7885	0.4156	0.6672	0.2464	1.8068	0.426
COPD	0.9561	0.5446	1.6782	0.8756	0.9655	0.549	1.6979	0.903
Diabetes	1.2312	0.6857	2.2107	0.4861	1.221	0.6789	2.1959	0.5049
Renal Disease	1.3725	0.5878	3.2045	0.4643	1.3829	0.5857	3.2652	0.4595
Cancer	1.7092	0.9261	3.1544	0.0864	1.6788	0.9063	3.1098	0.0995
Metastatic Disease	19.4831	7.4788	50.7558	<0.0001	19.98	7.6114	52.4482	<0.0001
Congestive Heart Failure	2.4956	1.4211	4.3826	0.0015	2.5784	1.4629	4.5445	0.0011
LOS 6-10	1.2178	0.6748	2.1978	0.513	1.8023	0.7396	4.3919	0.1949
LOS 11-14	1.0871	0.4362	2.7095	0.8577	1.8826	0.5576	6.3566	0.3082
LOS >14	2.958	1.4848	5.8928	0.002	3.8165	1.4174	10.2765	0.008
Year 2006-2011	1.4351	0.8671	2.3753	0.16	2.3727	0.9059	6.2149	0.0786
LOS 6-10 × Year 2006-2011					0.4808	0.1468	1.5749	0.2264
LOS 11-14 × Year 2006-2011					0.3215	0.0518	1.9968	0.2233
LOS >14 × Year 2006-2011					0.6692	0.1688	2.653	0.5676



Table 4C: Multivariate logistic regression for disposition = Left against medical advice, with and without interaction term of LOS and “year after 2005.” To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 6.5723 with 3 degrees of freedom, and p-value is 0.086854

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	1.5391	0.1453	16.2982	0.7203	1.2463	0.0791	19.6431	0.8757
Female	0.4543	0.1486	1.3889	0.1664	0.3663	0.116	1.1567	0.0869
Black	0.8781	0.1372	5.619	0.8908	1.1857	0.175	8.0332	0.8615
Other	1.6194	0.3483	7.5297	0.5387	1.5559	0.3176	7.6214	0.5855
Age 60-69	0.4544	0.0117	17.7083	0.673	0.3108	0.0044	21.8351	0.5901
Age 70-79	3.1374	0.2052	47.9735	0.4112	8.9125	0.3075	258.279	0.2028
Age 80-89	5.2008	0.3877	69.7637	0.2132	16.5186	0.5769	473.005	0.1013
age >90	13.8882	0.941	204.9781	0.0554	62.6643	1.8138	2165.0009	0.0221
Femoral Neck Fracture	0.8182	0.2603	2.5721	0.7313	0.7233	0.2092	2.5008	0.6087
Days to Surgery >2 Days	2.5333	0.1437	44.6706	0.5255	5.1829	0.1428	188.065	0.3692
Received Transfusion	2.7859	0.5257	14.7622	0.2285	2.5733	0.4485	14.7658	0.289
Dementia	1.7352	0.3811	7.9007	0.4761	1.8781	0.3968	8.8895	0.4269
Cardiac Disease	6.9372	0.9202	52.2956	0.0602	5.33	0.6246	45.4855	0.1261
Cerebrovascular Disease	0.6382	0.0709	5.742	0.6887	1.1229	0.1208	10.4414	0.9188
COPD	0.6429	0.1053	3.9255	0.6323	0.4809	0.0666	3.4704	0.4678
Diabetes	4.1577	1.224	14.1224	0.0224	5.039	1.3871	18.3052	0.014
Renal Disease	9.9052	1.3546	72.4304	0.0239	8.0622	0.9855	65.9518	0.0516
Cancer	0.7536	0.1076	5.2785	0.7758	0.84	0.1231	5.7335	0.8587
Metastatic Disease	27.7768	0.4143	1862.458	0.1213	1410.85	5.809	342655.9852	0.0097
Congestive Heart Failure	0.6575	0.1203	3.5929	0.6285	0.6069	0.1012	3.639	0.5847
LOS 6-10	0.226	0.0132	3.8798	0.3052	0	0	Inf	0.9894
LOS 11-14	4.4221	0.3304	59.1872	0.2613	5.6122	0.3022	104.212	0.2472
LOS >14	4.0622	0.3872	42.6168	0.2425	2.7416	0.1361	55.2322	0.5104
Year 2006-2011	0.3496	0.0817	1.4952	0.1564	0.2175	0.0407	1.1628	0.0745
LOS 6-10 × Year 2006-2011					12853527729	0	Inf	0.9889
LOS 11-14 × Year 2006-2011					0.3653	0.0017	76.6999	0.712
LOS >14 × Year 2006-2011					9.2782	0.1306	659.189	0.3058

Table 4D: Multivariate logistic regression for disposition = cancer center, with and without interaction term of LOS and “year after 2005.” To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 1.5861 with 3 degrees of freedom, and p-value is 0.662541.

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	1.3833	0.9305	2.0567	0.1088	1.3827	0.9291	2.0578	0.1102
Female	0.5461	0.4488	0.6643	<0.0001	0.5466	0.4493	0.665	<0.0001
Black	0.4983	0.2603	0.954	0.0355	0.4921	0.2561	0.9456	0.0333
Other	1.2029	0.8932	1.6199	0.2238	1.2005	0.8914	1.6168	0.2289
Age 60-69	1.7528	0.6532	4.7033	0.2651	1.7367	0.6471	4.661	0.2731
Age 70-79	2.6663	1.0708	6.639	0.0351	2.6436	1.0615	6.5836	0.0368
Age 80-89	4.7375	1.9253	11.6574	0.0007	4.7099	1.9139	11.5909	0.0007
age >90	8.9622	3.6017	22.3009	<0.0001	8.922	3.5853	22.2028	<0.0001
Femoral Neck Fracture	1.0388	0.8512	1.2676	0.7081	1.0426	0.8542	1.2725	0.6816
Days to Surgery >2 Days	1.3319	1.0524	1.6857	0.0171	1.3342	1.0539	1.6891	0.0166
Received Transfusion	1.3597	1.1252	1.6431	0.0015	1.3638	1.1285	1.6482	0.0013
Dementia	2.2243	1.7741	2.7886	<0.0001	2.2222	1.7721	2.7865	<0.0001
Cardiac Disease	1.0424	0.7371	1.474	0.8144	1.0472	0.7403	1.4811	0.7945
Cerebrovascular Disease	1.3649	0.9539	1.9528	0.0888	1.3637	0.9529	1.9516	0.0898
COPD	1.6576	1.3324	2.0622	<0.0001	1.6583	1.3327	2.0635	<0.0001
Diabetes	1.0606	0.8231	1.3665	0.6494	1.0612	0.8235	1.3676	0.646
Renal Disease	2.725	1.7351	4.2798	<0.0001	2.7232	1.7294	4.2883	<0.0001
Cancer	1.2115	0.9363	1.5676	0.1445	1.211	0.9359	1.5668	0.1453
Metastatic Disease	6.9302	4.4127	10.884	<0.0001	6.8989	4.3919	10.8371	<0.0001
Disbetes with Complications	1.0764	0.5449	2.1263	0.8321	1.0791	0.5463	2.1317	0.8265
Congestive Heart Failure	1.752	1.3937	2.2023	<0.0001	1.7556	1.3963	2.2072	<0.0001
LOS 6-10	0.8283	0.6599	1.0398	0.1045	0.8404	0.6631	1.0652	0.1505
LOS 11-14	1.1226	0.817	1.5427	0.4756	1.1173	0.8031	1.5543	0.5104
LOS >14	1.685	1.2304	2.3077	0.0011	1.6245	1.1702	2.2551	0.0037
Year 2006-2011	1.2777	0.9159	1.7823	0.1491	1.2793	0.7478	2.1886	0.3686
LOS 6-10 × Year 2006-2011					0.8173	0.3757	1.7778	0.6109
LOS 11-14 × Year 2006-2011					1.0432	0.3662	2.9721	0.9368
LOS >14 × Year 2006-2011					1.5415	0.5916	4.0164	0.3758

Table 4E: Multivariate logistic regression for disposition = home, with and without interaction term of LOS and “year after 2005.” To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 3.3251 with 3 degrees of freedom, and p-value is 0.344161.

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	1.2152	0.8702	1.6969	0.2526	1.217	0.8706	1.7011	0.2505
Female	0.6516	0.5203	0.8162	0.0002	0.6503	0.5191	0.8147	0.0002
Black	1.005	0.6609	1.5283	0.9815	1.0066	0.662	1.5306	0.9753
Other	0.9894	0.7132	1.3724	0.949	0.9854	0.7103	1.3671	0.9301
Age 60-69	2.5211	1.0003	6.3537	0.0499	2.5223	1.0005	6.3585	0.0499
Age 70-79	4.4877	1.9182	10.4993	0.0005	4.474	1.9121	10.4683	0.0006
Age 80-89	9.6043	4.1912	22.0089	<0.0001	9.6204	4.1973	22.0503	<0.0001
age >90	20.9468	9.0501	48.4823	<0.0001	20.9126	9.0334	48.4133	<0.0001
Femoral Neck Fracture	0.8463	0.6614	1.0828	0.1845	0.8418	0.6577	1.0773	0.1711
Days to Surgery >2 Days	1.1475	0.8629	1.5258	0.3442	1.1498	0.8643	1.5296	0.3377
Received Transfusion	1.3532	1.0738	1.7052	0.0104	1.3502	1.0711	1.7019	0.011
Dementia	1.8344	1.4491	2.3221	<0.0001	1.8454	1.4576	2.3365	<0.0001
Cardiac Disease	1.2127	0.8275	1.7772	0.3228	1.2078	0.8238	1.7708	0.3336
Cerebrovascular Disease	1.4048	0.9309	2.12	0.1055	1.4104	0.9344	2.1288	0.1016
COPD	1.5854	1.2315	2.041	0.0003	1.584	1.2303	2.0395	0.0004
Diabetes	1.0746	0.8072	1.4305	0.6221	1.079	0.8104	1.4365	0.6028
Renal Disease	1.7251	1.1408	2.6087	0.0098	1.7421	1.1515	2.6357	0.0086
Cancer	1.5399	1.1452	2.0706	0.0043	1.5367	1.1426	2.0667	0.0045
Metastatic Disease	5.848	3.4607	9.882	<0.0001	5.9249	3.5036	10.0196	<0.0001
Disbetes with Complications	1.7472	0.8458	3.6094	0.1317	1.7543	0.8487	3.626	0.1292
Congestive Heart Failure	1.8844	1.4539	2.4425	<0.0001	1.8935	1.4608	2.4544	<0.0001
LOS 6-10	0.8367	0.6393	1.0949	0.1938	0.8303	0.5896	1.1694	0.2871
LOS 11-14	0.8736	0.6028	1.266	0.4753	0.7134	0.4513	1.1277	0.1483
LOS >14	1.6491	1.1994	2.2673	0.0021	1.5803	1.0884	2.2944	0.0162
Year 2006-2011	0.988	0.7827	1.2471	0.9191	0.9048	0.6169	1.327	0.6087
LOS 6-10 × Year 2006-2011					0.9904	0.5826	1.6837	0.9715
LOS 11-14 × Year 2006-2011					1.8908	0.9143	3.9104	0.0857
LOS >14 × Year 2006-2011					1.0868	0.5671	2.0827	0.802

Table 4F: Multivariate logistic regression for disposition = home health, with and without interaction term of LOS and “year after 2005.” To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 7.3952 with 3 degrees of freedom, and p-value is 0.060313

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	1.1832	0.7922	1.7673	0.4111	1.1826	0.7912	1.7677	0.4134
Female	0.9241	0.6861	1.2445	0.6031	0.9183	0.6816	1.2373	0.5753
Black	1.3917	0.8075	2.3987	0.234	1.3733	0.7959	2.3695	0.2544
Other	1.0889	0.7153	1.6577	0.6912	1.0838	0.7113	1.6512	0.7081
Age 60-69	1.4436	0.6459	3.2268	0.371	1.449	0.6472	3.2441	0.3671
Age 70-79	1.3994	0.6568	2.9817	0.384	1.4041	0.6578	2.9969	0.3803
Age 80-89	2.7622	1.3472	5.6637	0.0055	2.7631	1.3453	5.6751	0.0056
age >90	5.0747	2.426	10.6151	<0.0001	5.1376	2.4515	10.7668	<0.0001
Femoral Neck Fracture	1.1171	0.8299	1.5038	0.4651	1.1199	0.8318	1.5076	0.4556
Days to Surgery >2 Days	1.5437	1.0849	2.1964	0.0158	1.5691	1.1018	2.2347	0.0125
Received Transfusion	1.4422	1.0759	1.9331	0.0143	1.4611	1.0902	1.9583	0.0112
Dementia	2.6613	1.9812	3.5747	<0.0001	2.676	1.9918	3.5953	<0.0001
Cardiac Disease	1.0353	0.6582	1.6285	0.8807	1.0414	0.6618	1.6386	0.8609
Cerebrovascular Disease	1.6676	1.0617	2.6191	0.0264	1.6733	1.0649	2.6294	0.0256
COPD	1.7052	1.2509	2.3245	0.0007	1.6897	1.2393	2.3038	0.0009
Diabetes	0.9709	0.6716	1.4036	0.8753	0.9683	0.6697	1.3999	0.8639
Renal Disease	2.0422	1.3182	3.1638	0.0014	2.1166	1.3648	3.2827	0.0008
Cancer	1.6753	1.1551	2.4299	0.0065	1.6621	1.1449	2.4128	0.0075
Metastatic Disease	4.4612	2.4278	8.1975	<0.0001	4.5601	2.4759	8.3988	<0.0001
Disbetes with Complications	1.3994	0.5745	3.4084	0.4594	1.4112	0.5797	3.4355	0.448
Congestive Heart Failure	2.2767	1.666	3.1112	<0.0001	2.2773	1.6661	3.1127	<0.0001
LOS 6-10	1.8143	1.2133	2.7132	0.0037	3.3575	1.733	6.5048	0.0003
LOS 11-14	1.9918	1.2365	3.2083	0.0046	3.0743	1.4251	6.6319	0.0042
LOS >14	2.651	1.7072	4.1167	<0.0001	4.3768	2.1775	8.7974	<0.0001
Year 2006-2011	0.735	0.5558	0.972	0.0308	1.617	0.7889	3.3143	0.1894
LOS 6-10 × Year 2006-2011					0.325	0.1398	0.7556	0.009
LOS 11-14 × Year 2006-2011					0.493	0.1878	1.2938	0.1508
LOS >14 × Year 2006-2011					0.4268	0.1773	1.0277	0.0576

Table 4G: Multivariate logistic regression for disposition = hospice, with and without interaction term of LOS and “year after 2005.” To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 0.7033 with 3 degrees of freedom, and p-value is 0.872416.

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	1.9587	1.1611	3.3042	0.0117	1.9602	1.1602	3.3117	0.0119
Female	0.5861	0.4129	0.8319	0.0028	0.5873	0.4135	0.834	0.0029
Black	4.7644	0.6178	36.7417	0.1342	4.6768	0.6077	35.9898	0.1384
Other	0.7959	0.4206	1.506	0.4829	0.7909	0.417	1.4998	0.4724
Age 60-69	1.3722	0.3573	5.2697	0.6449	1.4009	0.3621	5.4195	0.6253
Age 70-79	1.6313	0.4779	5.5682	0.4346	1.6452	0.4795	5.6456	0.4287
Age 80-89	2.0409	0.605	6.8851	0.2502	2.0794	0.6128	7.056	0.2402
age >90	1.8597	0.5393	6.4126	0.3259	1.9176	0.5518	6.6643	0.3056
Femoral Neck Fracture	1.0419	0.7419	1.4634	0.8126	1.0417	0.7413	1.4639	0.8137
Days to Surgery >2 Days	0.882	0.5562	1.3988	0.5937	0.89	0.5595	1.4155	0.6224
Received Transfusion	1.382	0.9714	1.9661	0.0721	1.3809	0.9699	1.966	0.0734
Dementia	1.0045	0.7142	1.4128	0.9794	0.9969	0.7081	1.4034	0.9858
Cardiac Disease	1.2919	0.7969	2.0942	0.2988	1.2785	0.788	2.0742	0.3197
Cerebrovascular Disease	2.7609	1.347	5.659	0.0055	2.7921	1.3612	5.7271	0.0051
COPD	0.9265	0.6554	1.3098	0.6656	0.9277	0.6555	1.313	0.6722
Diabetes	0.9568	0.6083	1.5049	0.8484	0.9558	0.6073	1.5044	0.8452
Renal Disease	0.8483	0.5418	1.3283	0.4721	0.8451	0.5392	1.3244	0.4627
Cancer	0.6721	0.456	0.9906	0.0447	0.6708	0.455	0.9888	0.0437
Metastatic Disease	1.1257	0.6752	1.8768	0.6498	1.1263	0.6754	1.8781	0.6485
Diabetes with Complications	1.1789	0.3778	3.6789	0.7768	1.1796	0.3773	3.6881	0.7764
Congestive Heart Failure	1.6023	1.1039	2.3257	0.0131	1.6084	1.1077	2.3353	0.0125
LOS 6-10	1.0431	0.6968	1.5614	0.8376	0.9252	0.4528	1.8907	0.8312
LOS 11-14	1.6172	0.9187	2.847	0.0957	1.2162	0.5113	2.8931	0.658
LOS >14	1.4842	0.921	2.3918	0.1048	1.3163	0.6138	2.8231	0.4802
Year 2006-2011	1.1398	0.8092	1.6053	0.4541	0.9735	0.5367	1.7659	0.9296
LOS 6-10 × Year 2006-2011					1.1938	0.5166	2.7586	0.6785
LOS 11-14 × Year 2006-2011					1.5871	0.5322	4.7326	0.4073
LOS >14 × Year 2006-2011					1.19151	0.4945	2.8884	0.6922

Table 4H: Multivariate logistic regression for disposition = inpatient hospital, with and without interaction term of LOS and "year after 2005." To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 7.0498 with 3 degrees of freedom, and p-value is 0.070328

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	2.2353	1.3412	3.7253	0.002	2.2095	1.3242	3.6867	0.0024
Female	0.5965	0.4687	0.7591	<0.0001	0.5953	0.4676	0.7578	<0.0001
Black	0.7221	0.3813	1.3676	0.3177	0.7115	0.3756	1.3477	0.2963
Other	0.8639	0.5407	1.3801	0.5404	0.8432	0.5267	1.3499	0.4775
Age 60-69	1.927	0.6382	5.8181	0.2446	1.9886	0.6562	6.0271	0.2243
Age 70-79	2.8733	1.022	8.0781	0.0454	3.0244	1.0712	8.5393	0.0366
Age 80-89	3.8977	1.4015	10.8398	0.0091	4.093	1.4663	11.4254	0.0071
age >90	6.1832	2.1824	17.5183	0.0006	6.5612	2.3048	18.6781	0.0004
Femoral Neck Fracture	0.9071	0.6913	1.1902	0.4818	0.902	0.6871	1.1841	0.4574
Days to Surgery >2 Days	0.8166	0.499	1.3363	0.4201	0.817	0.4979	1.3407	0.4239
Received Transfusion	1.795	1.3506	2.3855	0.0001	1.7592	1.3215	2.3418	0.0001
Dementia	1.9518	1.4482	2.6306	<0.0001	1.9603	1.4525	2.6456	<0.0001
Cardiac Disease	1.6063	1.1874	2.1731	0.0021	1.5767	1.1638	2.1361	0.0033
Cerebrovascular Disease	1.2658	0.8014	1.9992	0.3122	1.2545	0.7929	1.9847	0.3327
COPD	1.7085	1.3066	2.2341	0.0001	1.7099	1.3065	2.2379	0.0001
Diabetes	0.8152	0.589	1.1282	0.2179	0.8269	0.5973	1.1447	0.2519
Renal Disease	1.8	1.2211	2.6535	0.003	1.7636	1.1941	2.6048	0.0044
Cancer	0.9753	0.6819	1.3949	0.891	0.9861	0.689	1.4114	0.9391
Metastatic Disease	3.4947	1.5747	7.7554	0.0021	3.57	1.6075	7.9282	0.0018
Disbetes with Complications	1.0186	0.481	2.157	0.9615	1.0353	0.4891	2.1913	0.9277
Congestive Heart Failure	2.4426	1.8818	3.1706	<0.0001	2.4277	1.869	3.1533	<0.0001
LOS 6-10	0.9657	0.6865	1.3584	0.8411	0.7615	0.4994	1.1611	0.2055
LOS 11-14	1.0622	0.6262	1.8019	0.8229	0.7381	0.3749	1.4531	0.3796
LOS >14	2.4889	1.6579	3.7365	<0.0001	2.0081	1.2365	3.2612	0.0048
Year 2006-2011	0.7546	0.5859	0.9718	0.0291	0.6037	0.4449	0.8192	0.0012
LOS 6-10 × Year 2006-2011					1.7867	0.9696	3.2922	0.0627
LOS 11-14 × Year 2006-2011					2.6127	0.9569	7.1339	0.0609
LOS >14 × Year 2006-2011					1.8107	0.8325	3.9382	0.1343

Table 4I: Multivariate logistic regression for disposition = inpatient rehabilitation, with and without interaction term of LOS and “year after 2005.” To test whether to include the interaction term, a likelihood ratio test with test statistic equal to 4.0709 with 3 degrees of freedom, and p-value is 0.253907

	Without Interaction				With Interaction			
	Odds Ratio	2.5%	97.5%	p-value	Odds Ratio	2.5%	97.5%	p-value
No Surgery	2.0305	1.325	3.1117	0.0011	2.0163	1.3154	3.0908	0.0013
Female	0.5945	0.4891	0.7226	<0.0001	0.5956	0.49	0.724	<0.0001
Black	0.7948	0.4876	1.2955	0.3568	0.7923	0.486	1.2918	0.3506
Other	0.8956	0.6254	1.2826	0.5475	0.8942	0.6243	1.2807	0.5417
Age 60-69	0.8614	0.3522	2.1067	0.7437	0.8649	0.3536	2.1156	0.7505
Age 70-79	1.8122	0.8327	3.9438	0.134	1.8306	0.841	3.9846	0.1276
Age 80-89	2.7899	1.3024	5.9764	0.0083	2.8053	1.3093	6.0106	0.008
age >90	5.7415	2.6518	12.4311	<0.0001	5.7616	2.6605	12.4772	<0.0001
Femoral Neck Fracture	0.9011	0.7285	1.1144	0.3367	0.9011	0.7285	1.1146	0.337
Days to Surgery >2 Days	1.0283	0.8162	1.2955	0.813	1.0339	0.8205	1.3027	0.7775
Received Transfusion	1.2429	1.027	1.5042	0.0255	1.243	1.027	1.5043	0.0255
Dementia	1.9572	1.5584	2.458	<0.0001	1.9554	1.5568	2.4561	<0.0001
Cardiac Disease	1.2827	0.964	1.707	0.0876	1.2854	0.9658	1.7106	0.0852
Cerebrovascular Disease	1.2586	0.8761	1.8081	0.2133	1.2564	0.8745	1.8051	0.2169
COPD	1.7512	1.4232	2.1549	<0.0001	1.7556	1.4265	2.1606	<0.0001
Diabetes	1.0126	0.7941	1.2911	0.9196	1.0154	0.7963	1.2948	0.902
Renal Disease	1.6348	1.2277	2.177	0.0008	1.6375	1.2289	2.1819	0.0008
Cancer	1.0346	0.7898	1.3552	0.8051	1.0289	0.7854	1.3478	0.8363
Metastatic Disease	3.9647	2.3192	6.7778	<0.0001	3.9957	2.3371	6.8313	<0.0001
Disbetes with Complications	0.9369	0.4874	1.8012	0.8451	0.9443	0.491	1.8159	0.8636
Congestive Heart Failure	1.8495	1.4855	2.3026	<0.0001	1.8511	1.4868	2.3047	<0.0001
LOS 6-10	1.5047	1.1998	1.887	0.0004	1.8389	1.271	2.6606	0.0012
LOS 11-14	2.2984	1.6452	3.2109	<0.0001	1.9737	1.1204	3.477	0.0186
LOS >14	3.7028	2.6336	5.206	<0.0001	3.9866	2.3512	6.7598	<0.0001
Year 2006-2011	0.7494	0.6157	0.912	0.004	0.8594	0.5975	1.236	0.4137
LOS 6-10 × Year 2006-2011					0.724	0.4598	1.1401	0.1633
LOS 11-14 × Year 2006-2011					1.2647	0.6496	2.4623	0.4896
LOS >14 × Year 2006-2011					0.8937	0.4694	1.7015	0.7322



Table 5A: Multivariate logistic regression of risk factors for 30-day mortality after discharge in patients in New York State admitted with hip fracture 2000-2011 who have cancer.

	Odds Ratio	2.5%	97.5%	p-value
No surgery	2.105	1.726	2.566	<0.001
Female	0.719	0.641	0.807	<0.001
Black	0.814	0.597	1.109	0.193
Other race	1.109	0.901	1.365	0.330
Age 60-69	1.098	0.668	1.806	0.712
Age 70-79	1.085	0.684	1.721	0.730
Age 80-89	1.477	0.938	2.326	0.092
Age >90	2.303	1.448	3.662	<0.001
Femoral Neck Fracture	1.152	1.020	1.302	0.023
Days to Surgery > 2 days	1.087	0.935	1.265	0.277
Received transfusion	1.195	1.062	1.346	0.003
Dementia	1.792	1.579	2.034	<0.001
Cardiac disease	1.177	0.972	1.426	0.095
Cerebrovascular disease	1.117	0.886	1.407	0.350
COPD	1.510	1.330	1.715	<0.001
Diabetes	1.093	0.944	1.266	0.235
Renal Disease	1.204	0.975	1.487	0.085
Metastatic disease	3.101	2.657	3.619	<0.001
Diabetes with complications	1.269	0.816	1.973	0.291
Congestive heart failure	1.571	1.366	1.806	<0.001
LOS 6-10 days	1.206	1.048	1.387	0.009
LOS 11-14 days	1.771	1.460	2.147	<0.001
LOS >14 days	2.108	1.746	2.545	<0.001
Against medical advice	1.050	0.302	3.650	0.939
Hospice	20.465	15.545	26.943	<0.001
Long-term care	1.621	1.023	2.568	0.040
Home	0.786	0.609	1.013	0.063
Home healthcare	0.557	0.413	0.752	<0.001
Cancer center	0.715	0.573	0.892	0.003
Inpatient hospital	0.930	0.671	1.288	0.661
Inpatient rehab	0.404	0.317	0.515	<0.001
Year 2006-2011	0.839	0.743	0.946	0.004



Table 5B: Multivariate logistic regression of risk factors for 30-day mortality after discharge in patients in New York State admitted with hip fracture 2000-2011 who have dementia.

	Odds Ratio	2.5%	97.5%	p-value
No surgery	2.438	2.145	2.771	<0.001
Female	0.494	0.458	0.534	<0.001
Black	0.576	0.470	0.705	<0.001
Other race	0.838	0.730	0.962	0.012
Age 60-69	2.639	0.802	8.686	0.11
Age 70-79	3.090	0.972	9.820	0.056
Age 80-89	4.554	1.438	14.420	0.01
Age >90	7.751	2.446	24.556	0.001
Femoral Neck Fracture	1.033	0.955	1.117	0.416
Days to Surgery > 2 days	1.034	0.936	1.142	0.509
Received transfusion	1.134	1.052	1.222	0.001
Cardiac disease	1.173	1.036	1.328	0.012
Cerebrovascular disease	0.969	0.845	1.111	0.648
COPD	1.261	1.152	1.380	<0.001
Diabetes	1.031	0.936	1.136	0.531
Renal Disease	1.182	1.034	1.352	0.014
Cancer	1.066	0.953	1.192	0.266
Metastatic disease	2.098	1.529	2.879	<0.001
Diabetes with complications	1.026	0.700	1.504	0.896
Congestive heart failure	1.555	1.428	1.694	<0.001
LOS 6-10 days	1.041	0.957	1.133	0.35
LOS 11-14 days	1.285	1.134	1.457	<0.001
LOS >14 days	1.753	1.553	1.980	<0.001
Against medical advice	0.478	0.168	1.361	0.167
Hospice	29.139	23.005	36.908	<0.001
Long-term care	1.397	1.004	1.944	0.047
Home	0.721	0.594	0.876	0.001
Home healthcare	0.627	0.504	0.779	<0.001
Cancer center	0.751	0.615	0.917	0.005
Inpatient hospital	0.941	0.722	1.225	0.649
Inpatient rehab	0.469	0.384	0.573	<0.001
Year 2006-2011	0.861	0.799	0.927	<0.001

Table 5C: Multivariate logistic regression of risk factors for 30-day mortality after discharge in patients in New York State admitted with hip fracture 2000-2011 who have diabetes mellitus.

	Odds Ratio	2.5%	97.5%	p-value
No surgery	1.695	1.397492	2.055023	<0.001
Female	0.587	0.5236833	0.6584195	<0.001
Black	0.570	0.4335714	0.7488916	<0.001
Other race	0.881	0.724537	1.072425	0.207
Age 60-69	2.342	1.248342	4.393402	0.008
Age 70-79	2.581	1.413876	4.710824	0.002
Age 80-89	4.222	2.326082	7.662235	<0.001
Age >90	7.196	3.935563	13.15826	<0.001
Femoral Neck Fracture	0.990	0.8752904	1.120753	0.879
Days to Surgery > 2 days	1.219	1.05788	1.405061	0.006
Received transfusion	1.132	1.008885	1.269851	0.035
Dementia	2.081	1.851294	2.338946	<0.001
Cardiac disease	1.263	1.077116	1.481223	0.004
Cerebrovascular disease	1.179	0.9763312	1.423544	0.087
COPD	1.268	1.109929	1.448885	<0.001
Renal Disease	1.340	1.129739	1.59031	0.001
Cancer	1.262	1.078302	1.475913	0.004
Metastatic disease	3.766	2.697554	5.256449	<0.001
Congestive heart failure	1.680	1.488217	1.896849	<0.001
LOS 6-10 days	0.964	0.8417896	1.104693	0.600
LOS 11-14 days	1.181	0.9727737	1.434413	0.093
LOS >14 days	1.883	1.569672	2.258203	<0.001
Against medical advice	1.828	0.8123371	4.114542	0.145
Hospice	37.581	24.39271	57.89998	<0.001
Long-term care	1.399	0.860191	2.276419	0.176
Home	0.710	0.5435217	0.9264083	0.012
Home healthcare	0.506	0.3613782	0.709297	<0.001
Cancer center	0.697	0.5465074	0.8882359	0.004
Inpatient hospital	1.048	0.7681781	1.430345	0.767
Inpatient rehab	0.471	0.375186	0.5908186	<0.001
Year 2006-2011	0.799	0.7100675	0.8988183	<0.001

Table 5D: Multivariate logistic regression of risk factors for 30-day mortality after discharge in patients in New York State admitted with hip fracture 2000-2011 who have chronic obstructive pulmonary disease (COPD).

	Odds Ratio	2.5%	97.5%	p-value
No surgery	2.271	1.944	2.655	<0.001
Female	0.624	0.567	0.685	<0.001
Black	0.713	0.536	0.950	0.021
Other race	1.106	0.929	1.318	0.256
Age 60-69	2.256	1.303	3.907	0.004
Age 70-79	2.959	1.752	4.995	<0.001
Age 80-89	4.391	2.611	7.383	<0.001
Age >90	7.402	4.380	12.512	<0.001
Femoral Neck Fracture	0.987	0.892	1.092	0.797
Days to Surgery > 2 days	1.101	0.977	1.240	0.114
Received transfusion	1.200	1.090	1.321	<0.001
Dementia	1.726	1.560	1.910	<0.001
Cardiac disease	1.190	1.034	1.370	0.015
Cerebrovascular disease	1.056	0.879	1.269	0.558
Diabetes	0.884	0.778	1.003	0.056
Renal Disease	1.283	1.099	1.499	0.002
Cancer	1.266	1.116	1.436	<0.001
Metastatic disease	2.696	2.054	3.538	<0.001
Diabetes with complications	0.951	0.664	1.360	0.781
Congestive heart failure	1.715	1.555	1.892	<0.001
LOS 6-10 days	1.037	0.923	1.164	0.543
LOS 11-14 days	1.399	1.197	1.635	<0.001
LOS >14 days	1.951	1.685	2.259	<0.001
Against medical advice	0.368	0.088	1.535	0.17
Hospice	29.119	21.787	38.920	<0.001
Long-term care	0.805	0.504	1.285	0.362
Home	0.651	0.519	0.817	<0.001
Home healthcare	0.533	0.409	0.694	<0.001
Cancer center	0.714	0.586	0.870	0.001
Inpatient hospital	1.256	0.985	1.600	0.066
Inpatient rehab	0.533	0.445	0.639	<0.001
Year 2006-2011	0.814	0.739	0.898	<0.001

Table 5E: Multivariate logistic regression of risk factors for 30-day mortality after discharge in patients in New York State admitted with hip fracture 2000-2011 who have congestive heart failure.

	Odds Ratio	2.5%	97.5%	p-value
No surgery	2.071	1.793	2.393	<0.001
Female	0.626	0.572	0.686	<0.001
Black	0.753	0.590	0.961	0.023
Other race	0.913	0.769	1.085	0.3
Age 60-69	1.439	0.680	3.046	0.342
Age 70-79	2.267	1.123	4.577	0.022
Age 80-89	3.228	1.607	6.483	0.001
Age >90	5.651	2.808	11.373	<0.001
Femoral Neck Fracture	1.006	0.915	1.105	0.903
Days to Surgery > 2 days	1.110	1.000	1.232	0.051
Received transfusion	1.141	1.044	1.247	0.004
Dementia	1.613	1.471	1.769	<0.001
Cardiac disease	1.072	0.957	1.200	0.228
Cerebrovascular disease	1.152	0.978	1.357	0.091
COPD	1.331	1.214	1.460	<0.001
Diabetes	0.924	0.829	1.030	0.152
Renal Disease	1.269	1.118	1.441	<0.001
Cancer	1.063	0.932	1.212	0.366
Metastatic disease	1.843	1.281	2.652	0.001
Diabetes with complications	0.994	0.750	1.319	0.968
LOS 6-10 days	1.021	0.909	1.146	0.731
LOS 11-14 days	1.268	1.093	1.471	0.002
LOS >14 days	2.027	1.772	2.319	<0.001
Against medical advice	0.501	0.153	1.641	0.254
Hospice	39.012	28.690	53.048	<0.001
Long-term care	1.094	0.694	1.726	0.698
Home	0.762	0.610	0.952	0.017
Home healthcare	0.651	0.505	0.838	0.001
Cancer center	0.688	0.566	0.837	<0.001
Inpatient hospital	1.445	1.159	1.802	0.001
Inpatient rehab	0.549	0.457	0.659	<0.001
Year 2006-2011	0.797	0.727	0.874	<0.001