**Appendix:**

**Table 1: Overall patient characteristics for the patient outcomes of subsequent injury within one year and different hospital subsequent injury. (OR = odds ratio, CI = confidence interval, ISS = Injury Severity Score, AIS = Abbreviated Injury Scale, CCI = Charlson Comorbidity Index)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Characteristic** | | **Total** | **Subsequent injury within one year** | | **Different hospital subsequent injury** | |
| **n (%)** | **n (%)** | **p** | **n (%)** | **p** |
| Total | | 1,008,991 | 12,474 (1.2%) |  | 4,104 (32.9%) |  |
| Injured | Non-motorcycle driver | 465,884 (46.2%) | 5,552 (1.2%) | <0.01 | 1,782 (32.1%) | <0.01 |
| Non-motorcycle passenger | 183,699 (18.2%) | 1,762 (1.0%) |  | 656 (37.2%) |  |
| Motorcyclist | 157,074 (15.6%) | 2,483 (1.6%) |  | 810 (32.6%) |  |
| Motorcycle passenger | 10,855 (1.1%) | 125 (1.2%) |  | 66 (52.8%) |  |
| Pedal cyclist | 30,164 (3.0%) | 311 (1.0%) |  | 105 (33.8%) |  |
| Pedestrian | 105,324 (10.4%) | 1,499 (1.4%) |  | 499 (33.3%) |  |
| Other/unknown | 55,990 (5.5%) | 742 (1.3%) |  | 186 (25.1%) |  |
| Age group (years) | <18 | 86,235 (8.5%) | 393 (0.5%) | <0.01 | 44 (11.2%) | <0.01 |
| 18-44 | 467,347 (46.3%) | 5,000 (1.1%) |  | 1,559 (31.2%) |  |
| 45-64 | 290,115 (28.8%) | 4,423 (1.5%) |  | 1,457 (32.9%) |  |
| ≥65 | 165,294 (16.4%) | 2,658 (1.6%) |  | 1,044 (39.3%) |  |
| Alcohol abuse | | 134,441 (13.3%) | 1,918 (1.4%) | <0.01 | 539 (28.1%) | <0.01 |
| Homeless | | 6,824 (0.7%) | 138 (2.0%) | <0.01 | 64 (46.4%) | <0.01 |
| ISS >15 | | 321,529 (31.9%) | 4,893 (1.5%) | <0.01 | 1,397 (28.6%) | <0.01 |
| Max AIS >2 | | 471,781 (46.8%) | 6,361 (1.3%) | <0.01 | 1,931 (30.4%) | <0.01 |
| CCI ≥1 | | 236,785 (23.5%) | 3,717 (1.6%) | <0.01 | 1,292 (34.8%) | <0.01 |
| Female | | 385,574 (38.2%) | 4,380 (1.1%) | <0.01 | 1,492 (34.1%) | 0.04 |
| Major operating room procedure | | 423,421 (42.0%) | 4,354 (1.0%) | <0.01 | 1,130 (26.0%) | <0.01 |
| Control/ownership of hospital | Investor-owned | 131,280 (13.0%) | 1,902 (1.4%) | <0.01 | 772 (40.6%) | <0.01 |
| Public | 207,732 (20.6%) | 2,792 (1.3%) |  | 860 (30.8%) |  |
| Not-for-profit | 669,979 (66.4%) | 7,780 (1.2%) |  | 2,472 (31.8%) |  |
| Bed size of hospital | Small | 55,529 (5.5%) | 799 (1.4%) | <0.01 | 296 (37.1%) | <0.01 |
| Medium | 187,958 (18.6%) | 2,371 (1.3%) |  | 970 (40.9%) |  |
| Large | 765,504 (75.9%) | 9,305 (1.2%) |  | 2,838 (30.5%) |  |
| Teaching status of urban hospitals | Metropolitan non-teaching | 236,559 (23.4%) | 2,872 (1.2%) | 0.22 | 1,153 (40.2%) | <0.01 |
| Metropolitan teaching | 720,018 (71.4%) | 8,983 (1.2%) |  | 2,716 (30.2%) |  |
| Non-metropolitan | 52,414 (5.2%) | 619 (1.2%) |  | 235 (38.0%) |  |
| Primary expected payer | Private insurance | 537,261 (53.2%) | 6,468 (1.2%) | <0.01 | 2,035 (31.5%) | <0.01 |
| Medicare | 101,803 (10.1%) | 1,830 (1.8%) |  | 735 (40.2%) |  |
| Medicaid | 129,497 (12.8%) | 1,560 (1.2%) |  | 496 (31.8%) |  |
| Self-pay | 133,963 (13.3%) | 1,492 (1.1%) |  | 521 (34.9%) |  |
| No charge/Other | 106,467 (10.6%) | 1,123 (1.1%) |  | 317 (28.2%) |  |
| Median household income quartile | 1st | 319,890 (31.7%) | 4,203 (1.3%) | <0.01 | 1,438 (34.2%) | <0.01 |
| 2nd | 257,802 (25.6%) | 3,025 (1.2%) |  | 957 (31.6%) |  |
| 3rd | 232,175 (23.0%) | 2,780 (1.2%) |  | 875 (31.5%) |  |
| 4th | 180,112 (17.9%) | 2,206 (1.2%) |  | 772 (35.0%) |  |
| Unknown | 19,012 (1.9%) | 259 (1.4%) |  | 62 (23.9%) |  |
| Disposition of patient | Routine | 746,852 (74.0%) | 8,041 (1.1%) | <0.01 | 2,699 (33.6%) | <0.01 |
| Skilled nursing/other facility | 152,988 (15.2%) | 2,437 (1.6%) |  | 736 (30.2%) |  |
| Home health care | 96,277 (9.5%) | 1,433 (1.5%) |  | 468 (32.7%) |  |
| Against medical advice | 12,875 (1.3%) | 563 (4.4%) |  | 201 (35.7%) |  |

**Table 2: Results of multivariable logistic regression for the patient outcomes of subsequent injury within one year and different hospital subsequent injury. (OR = odds ratio, CI = confidence interval, ISS = Injury Severity Score, AIS = Abbreviated Injury Scale, CCI = Charlson Comorbidity Index, \* = Not significant on univariable analysis)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Characteristic** | | **Subsequent injury within one year** | | **Different hospital subsequent injury** | |
| **p** | **OR [95% CI]** | **p** | **OR [95% CI]** |
| Injured | Non-motorcycle Driver | Reference | | Reference | |
| Non-motorcycle Passenger | <0.01 | 0.93 [0.88-0.98] | <0.01 | 1.31 [1.16-1.47] |
| Motorcyclist | <0.01 | 1.39 [1.32-1.46] | 0.06 | 1.11 [1.00-1.24] |
| Motorcycle passenger | 0.37 | 1.09 [0.91-1.30] | <0.01 | 2.49 [1.73-3.59] |
| Pedal cyclist | 0.48 | 0.96 [0.85-1.08] | 0.27 | 1.15 [0.90-1.49] |
| Pedestrian | <0.01 | 1.28 [1.20-1.35] | 0.08 | 1.12 [0.99-1.28] |
| Other/unknown | 0.02 | 1.10 [1.01-1.19] | <0.01 | 0.61 [0.51-0.74] |
| Age group (years) | <18 | Reference | | Reference | |
| 18-44 | <0.01 | 2.23 [2.00-2.48] | <0.01 | 4.02 [2.90-5.57] |
| 45-64 | <0.01 | 2.83 [2.54-3.15] | <0.01 | 4.21 [3.03-5.86] |
| ≥65 | <0.01 | 2.76 [2.46-3.10] | <0.01 | 4.93 [3.51-6.93] |
| Alcohol abuse | | <0.01 | 1.12 [1.07-1.18] | <0.01 | 0.72 [0.64-0.80] |
| Homeless | | 0.03 | 1.22 [1.02-1.45] | <0.01 | 2.06 [1.44-2.96] |
| ISS >15 | | <0.01 | 1.53 [1.44-1.62] | <0.01 | 0.78 [0.68-0.88] |
| Max AIS >2 | | <0.01 | 0.92 [0.87-0.98] | 0.16 | 1.09 [0.97-1.23] |
| CCI ≥1 | | <0.01 | 1.15 [1.10-1.20] | 0.97 | 1.00 [0.92-1.10] |
| Female | | <0.01 | 0.94 [0.90-0.98] | 0.89 | 0.99 [0.91-1.09] |
| Major operating room procedure | | <0.01 | 0.67 [0.64-0.70] | <0.01 | 0.67 [0.62-0.74] |
| Control/ownership of hospital | Investor-owned | Reference | | Reference | |
| Public | 0.28 | 0.97 [0.91-1.03] | 0.09 | 0.89 [0.78-1.02] |
| Not-for-profit | <0.01 | 0.83 [0.79-0.88] | <0.01 | 0.84 [0.75-0.94] |
| Bed size of hospital | Small | Reference | | Reference | |
| Medium | <0.01 | 0.87 [0.80-0.94] | 0.03 | 1.21 [1.02-1.43] |
| Large | <0.01 | 0.87 [0.80-0.93] | <0.01 | 0.77 [0.66-0.90] |
| Teaching status of urban hospitals | Metropolitan non-teaching | \* | | Reference | |
| Metropolitan teaching | <0.01 | 0.69 [0.62-0.76] |
| Non-metropolitan | 0.21 | 0.89 [0.74-1.07] |
| Primary expected payer | Private insurance | Reference | | Reference | |
| Medicare | <0.01 | 1.18 [1.11-1.25] | <0.01 | 1.33 [1.18-1.50] |
| Medicaid | <0.01 | 1.13 [1.06-1.20] | 0.02 | 1.17 [1.03-1.32] |
| Self-pay | <0.01 | 0.90 [0.85-0.96] | 0.03 | 1.15 [1.02-1.31] |
| No charge/Other | <0.01 | 0.87 [0.81-0.92] | <0.01 | 0.82 [0.71-0.95] |
| Median household income quartile | 1st | Reference | | Reference | |
| 2nd | <0.01 | 0.88 [0.84-0.92] | 0.02 | 0.89 [0.80-0.98] |
| 3rd | <0.01 | 0.90 [0.85-0.94] | 0.01 | 0.87 [0.78-0.97] |
| 4th | <0.01 | 0.90 [0.86-0.95] | 0.97 | 1.00 [0.89-1.13] |
| Unknown | 0.66 | 0.97 [0.86-1.10] | <0.01 | 0.63 [0.46-0.85] |
| Disposition of patient | Routine | Reference | | Reference | |
| Skilled nursing/other facility | <0.01 | 1.30 [1.23-1.37] | 0.02 | 0.88 [0.78-0.98] |
| Home health care | <0.01 | 1.34 [1.26-1.42] | 0.58 | 0.97 [0.85-1.10] |
| Against medical advice | <0.01 | 3.60 [3.29-3.93] | 0.79 | 0.98 [0.81-1.17] |

**Table 3: Overall patient characteristics for the patient outcomes of subsequent injury LOS longer, subsequent injury ISS higher, and in-hospital mortality after subsequent injury. (LOS = length of stay, ISS = Injury Severity Score, OR = odds ratio, CI = confidence interval, AIS = Abbreviated Injury Scale, CCI = Charlson Comorbidity Index, \*\* = n < 11 redacted according to according to Healthcare Utilization Project Data Use Agreement)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Characteristic** | | **Total** | **Subsequent injury LOS longer** | | **Subsequent injury ISS higher** | | **Died after subsequent injury** | |
| **n (%)** | **n (%)** | **p** | **n (%)** | **p** | **n (%)** | **p** |
| Total | | 12,474 | 2,760 (22.1%) |  | 6,100 (48.9%) |  | 132 (1.1%) |  |
| Subsequent injury to a different hospital | | 4,104 (32.9%) | 1,122 (27.3%) | <0.01 | 2,312 (56.3%) | <0.01 | 49 (1.2%) | 0.27 |
| Injured | Non-motorcycle driver | 5,552 (44.5%) | 1,231 (22.2%) | <0.01 | 2,763 (49.8%) | <0.01 | 71 (1.3%) | <0.01 |
| Non-motorcycle passenger | 1,762 (14.1%) | 325 (18.4%) |  | 908 (51.5%) |  | <11\*\* |  |
| Motorcyclist | 2,483 (19.9%) | 555 (22.4%) |  | 1,100 (44.3%) |  | 26 (1.1%) |  |
| Motorcycle passenger | 125 (1.0%) | 33 (26.4%) |  | 46 (36.8%) |  | <11\*\* |  |
| Pedal cyclist | 311 (2.5%) | 76 (24.4%) |  | 148 (47.6%) |  | <11\*\* |  |
| Pedestrian | 1,499 (12.0%) | 328 (21.9%) |  | 780 (52.0%) |  | 12 (0.8%) |  |
| Other/unknown | 742 (6.0%) | 213 (28.7%) |  | 355 (47.8%) |  | <11\*\* |  |
| Age group (years) | <18 | 393 (3.2%) | 77 (19.6%) | <0.01 | 193 (49.1%) | <0.01 | <11\*\* | <0.01 |
| 18-44 | 5,000 (40.1%) | 1,006 (20.1%) |  | 2,288 (45.8%) |  | 19 (0.4%) |  |
| 45-64 | 4,423 (35.5%) | 988 (22.3%) |  | 2,161 (48.9%) |  | 49 (1.1%) |  |
| ≥65 | 2,658 (21.3%) | 689 (25.9%) |  | 1,458 (54.9%) |  | 60 (2.3%) |  |
| Alcohol abuse | | 1,918 (15.4%) | 477 (24.9%) | <0.01 | 829 (43.2%) | <0.01 | 31 (1.6%) | <0.01 |
| Homeless | | 138 (1.1%) | 42 (30.4%) | 0.02 | 58 (42.0%) | 0.10 | <11\*\* | 0.19 |
| ISS >15 | | 4,893 (39.2%) | 338 (6.9%) | <0.01 | 1,880 (38.4%) | <0.01 | 54 (1.1%) | 0.64 |
| Max AIS >2 | | 6,361 (51.0%) | 727 (11.4%) | <0.01 | 2,662 (41.9%) | <0.01 | 91 (1.4%) | <0.01 |
| CCI ≥1 | | 3,717 (29.8%) | 832 (22.4%) | 0.65 | 1,866 (50.2%) | 0.06 | 40 (1.1%) | 0.90 |
| Female | | 4,380 (35.1%) | 871 (19.9%) | <0.01 | 2,125 (48.5%) | 0.53 | 39 (0.9%) | 0.20 |
| Major operating room procedure | | 4,354 (34.9%) | 537 (12.3%) | <0.01 | 1,531 (35.2%) | <0.01 | 38 (0.9%) | 0.16 |
| Control/ownership of hospital | Investor-owned | 1,902 (15.3%) | 445 (23.4%) | <0.01 | 917 (48.2%) | <0.01 | 21 (1.1%) | 0.76 |
| Public | 2,792 (22.4%) | 533 (19.1%) |  | 1,289 (46.2%) |  | 26 (0.9%) |  |
| Not-for-profit | 7,780 (62.4%) | 1,782 (22.9%) |  | 3,894 (50.1%) |  | 85 (1.1%) |  |
| Bed size of hospital | Small | 799 (6.4%) | 209 (26.2%) | <0.01 | 413 (51.7%) | 0.26 | <11\*\* | 0.10 |
| Medium | 2,371 (19.0%) | 574 (24.2%) |  | 1,153 (48.6%) |  | 34 (1.4%) |  |
| Large | 9,305 (74.6%) | 1,977 (21.3%) |  | 4,534 (48.7%) |  | 88 (1.0%) |  |
| Teaching status of urban hospitals | Metropolitan non-teaching | 2,872 (23.0%) | 802 (27.9%) | <0.01 | 1,479 (51.5%) | <0.01 | 31 (1.1%) | 0.82 |
| Metropolitan teaching | 8,983 (72.0%) | 1,759 (19.6%) |  | 4,247 (47.3%) |  | 96 (1.1%) |  |
| Non-metropolitan | 619 (5.0%) | 199 (32.2%) |  | 374 (60.4%) |  | <11\*\* |  |
| Primary expected payer | Private insurance | 6,468 (51.9%) | 1,351 (20.9%) | <0.01 | 3,082 (47.7%) | <0.01 | 43 (0.7%) | <0.01 |
| Medicare | 1,830 (14.7%) | 476 (26.0%) |  | 996 (54.4%) |  | 44 (2.4%) |  |
| Medicaid | 1,560 (12.5%) | 293 (18.8%) |  | 723 (46.4%) |  | <11\*\* |  |
| Self-pay | 1,492 (12.0%) | 368 (24.7%) |  | 738 (49.5%) |  | 35 (2.4%) |  |
| No charge/Other | 1,123 (9.0%) | 272 (24.2%) |  | 560 (49.9%) |  | <11\*\* |  |
| Median household income quartile | 1st | 4,203 (33.7%) | 905 (21.5%) | 0.35 | 2,140 (50.9%) | <0.01 | 65 (1.6%) | <0.01 |
| 2nd | 3,025 (24.3%) | 673 (22.3%) |  | 1,472 (48.7%) |  | 23 (0.8%) |  |
| 3rd | 2,780 (22.3%) | 652 (23.5%) |  | 1,269 (45.7%) |  | 22 (0.8%) |  |
| 4th | 2,206 (17.7%) | 477 (21.6%) |  | 1,092 (49.5%) |  | 20 (0.9%) |  |
| Unknown | 259 (2.1%) | 53 (20.5%) |  | 126 (48.7%) |  | <11\*\* |  |
| Disposition of patient | Routine | 8,041 (64.5%) | 2,067 (25.7%) | <0.01 | 4,343 (54.0%) | <0.01 | 62 (0.8%) | <0.01 |
| Skilled nursing/other facility | 2,437 (19.5%) | 294 (12.1%) |  | 873 (35.8%) |  | 50 (2.1%) |  |
| Home health care | 1,433 (11.5%) | 237 (16.5%) |  | 560 (39.1%) |  | 18 (1.3%) |  |
| Against medical advice | 563 (4.5%) | 161 (28.6%) |  | 324 (57.6%) |  | <11\*\* |  |

**Table 4. Results of multivariable logistic regression for the patient outcomes of subsequent injury LOS longer, subsequent injury ISS higher, and in-hospital mortality after subsequent injury. (LOS = length of stay, ISS = Injury Severity Score, OR = odds ratio, CI = confidence interval, AIS = Abbreviated Injury Scale, CCI = Charlson Comorbidity Index, \* = Not significant on univariable analysis)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Characteristic** | | **Subsequent injury LOS longer** | | **Subsequent injury ISS higher** | | **Died after subsequent injury** | |
| **p** | **OR [95% CI]** | **p** | **OR [95% CI]** | **p** | **OR [95% CI]** |
| Subsequent injury to a different hospital | | <0.01 | 1.32 [1.20-1.45] | <0.01 | 1.38 [1.27-1.49] | \* | |
| Injured | Non-motorcycle driver | Reference | | Reference | | Reference | |
| Non-motorcycle passenger | <0.01 | 0.73 [0.63-0.85] | 0.94 | 1.00 [0.89-1.12] | 0.02 | 0.44 [0.22-0.89] |
| Motorcyclist | 0.02 | 1.17 [1.03-1.34] | <0.01 | 0.87 [0.79-0.97] | 0.92 | 1.02 [0.64-1.65] |
| Motorcycle passenger | 0.18 | 1.35 [0.88-2.09] | <0.01 | 0.51 [0.35-0.75] | <0.01 | 5.99 [2.18-16.48] |
| Pedal cyclist | 0.53 | 0.91 [0.68-1.22] | 0.07 | 0.80 [0.63-1.02] | \* | |
| Pedestrian | 0.14 | 0.89 [0.76-1.04] | 0.09 | 1.11 [0.99-1.26] | 0.09 | 0.58 [0.30-1.09] |
| Other/unknown | 0.04 | 1.21 [1.01-1.46] | <0.01 | 0.78 [0.67-0.92] | 0.71 | 1.14 [0.57-2.28] |
| Age group (years) | <18 | Reference | | Reference | | Reference | |
| 18-44 | 0.04 | 0.74 [0.56-0.99] | 0.20 | 0.87 [0.70-1.08] | <0.01 | 0.13 [0.04-0.42] |
| 45-64 | 0.37 | 0.88 [0.66-1.17] | 0.81 | 1.03 [0.82-1.29] | 0.12 | 0.41 [0.13-1.27] |
| ≥65 | 0.32 | 1.17 [0.86-1.58] | 0.04 | 1.29 [1.01-1.63] | 0.97 | 1.03 [0.32-3.27] |
| Alcohol abuse | | <0.01 | 1.31 [1.15-1.50] | <0.01 | 0.74 [0.66-0.82] | <0.01 | 2.71 [1.73-4.25] |
| Homeless | | 0.16 | 1.35 [0.89-2.04] | \* | | \* | |
| ISS >15 | | <0.01 | 0.23 [0.20-0.27] | <0.01 | 0.64 [0.57-0.73] | \* | |
| Max AIS >2 | | <0.01 | 0.72 [0.63-0.82] | 0.12 | 0.91 [0.81-1.03] | <0.01 | 2.00 [1.36-2.94] |
| CCI ≥1 | | \* | | \* | | \* | |
| Female | | <0.01 | 0.81 [0.72-0.90] | \* | | \* | |
| Major operating room procedure | | <0.01 | 0.51 [0.46-0.57] | <0.01 | 0.56 [0.51-0.61] | \* | |
| Control/ownership of hospital | Investor-owned | Reference | | Reference | | \* | |
| Public | 0.37 | 1.08 [0.91-1.27] | 0.48 | 1.05 [0.92-1.19] |
| Not-for-profit | <0.01 | 1.20 [1.05-1.38] | <0.01 | 1.17 [1.05-1.30] |
| Bed size of hospital | Small | Reference | | \* | | \* | |
| Medium | 0.77 | 0.97 [0.80-1.18] |
| Large | 0.75 | 0.97 [0.81-1.16] |
| Teaching status of urban hospitals | Metropolitan non-teaching | Reference | | Reference | | \* | |
| Metropolitan teaching | <0.01 | 0.79 [0.71-0.89] | 0.62 | 0.98 [0.89-1.07] |
| Non-metropolitan | 0.21 | 1.14 [0.93-1.40] | 0.02 | 1.26 [1.04-1.52] |
| Primary expected payer | Private insurance | Reference | | Reference | | Reference | |
| Medicare | 0.03 | 1.17 [1.02-1.35] | <0.01 | 1.19 [1.06-1.34] | <0.01 | 2.05 [1.30-3.23] |
| Medicaid | 0.27 | 0.92 [0.78-1.07] | 0.89 | 0.99 [0.88-1.12] | 0.19 | 0.48 [0.16-1.43] |
| Self-pay | 0.04 | 1.17 [1.01-1.36] | 0.75 | 1.02 [0.90-1.15] | <0.01 | 6.18 [3.73-10.24] |
| No charge/Other | 0.70 | 1.03 [0.88-1.21] | 0.70 | 1.03 [0.90-1.17] | 0.98 | 0.99 [0.41-2.36] |
| Median household income quartile | 1st | \* | | Reference | | Reference | |
| 2nd | 0.52 | 0.97 [0.88-1.07] | 0.01 | 0.53 [0.33-0.86] |
| 3rd | <0.01 | 0.80 [0.72-0.88] | 0.01 | 0.53 [0.32-0.87] |
| 4th | 0.13 | 0.92 [0.82-1.03] | 0.04 | 0.57 [0.34-0.96] |
| Unknown | 0.97 | 1.01 [0.77-1.31] | 0.15 | 0.30 [0.06-1.55] |
| Disposition of patient | Routine | Reference | | Reference | | Reference | |
| Skilled nursing/other facility | <0.01 | 0.53 [0.45-0.61] | <0.01 | 0.49 [0.44-0.55] | <0.01 | 1.88 [1.23-2.89] |
| Home health care | <0.01 | 0.62 [0.53-0.73] | <0.01 | 0.53 [0.47-0.60] | 0.24 | 1.39 [0.80-2.42] |
| Against medical advice | 0.27 | 0.89 [0.73-1.10] | 0.33 | 1.10 [0.91-1.31] | 0.20 | 0.42 [0.11-1.58] |