

Association of Women Surgeons

Riding into the golden years: injury patterns and outcomes of advanced-age motorcycle trauma



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Abstract

BACKGROUND: Our objectives were to characterize injury, complications, and outcomes for older riders after motorcycle accidents due to the rising trend in advanced-age motorcyclists.

METHODS: From 2008 to 2013, injured motorcyclists were compared by age group: younger (0 to 54 years) vs older (≥ 55 years) in a retrospective review of the trauma databank at North Memorial Medical Center, a Level-1 trauma center.

RESULTS: Of 432 patients, the older group ($n = 100$) had more fractures (60% vs 42%), injuries per patient (2 vs 1), intensive care unit admissions (48% vs 32%), ventilator days (8 vs 5), in-hospital complications (16% vs 8%), and hospital days (5.5 vs 3) than the younger group ($n = 332$), $P < .01$. The older group was also more likely to be discharged to a destination other than home, 35% vs 18%, $P < .01$.

CONCLUSIONS: Older riders are at risk for more severe injury, longer and more complex hospitalizations, and higher care demands after discharge. Both age-specific treatment and care systems will need to evolve to accommodate the needs of the aging trauma population.

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The demographic shift in age of the US population has already begun. The year 2011 marked the first year of the baby boomer population (those born from 1946 to 1964) turning 65. The population aged 65 and older is projected to nearly double from 43.1 million in 2012 to 83.7 million in 2050.¹ This advancement in age of the country's population will have significant implications across medical specialties. Using stochastic modeling, our center has

previously highlighted this trend in trauma admissions, projecting that by 2019, half of trauma admissions will be 60 or older.²

Trauma's epidemiologic impact on the advanced age population may become more significant as patients are living longer and have more active lifestyles at an older age. A recent study revealed that the largest increases in trauma deaths were in patients in their 5th and 6th decades of life, with the largest increase in trauma deaths in those aged 54 years (118%).³ In a recent presidential address of the American Association for the Surgery of Trauma, the aging trauma population was identified as a medically underserved community.⁴ As a result, an Ad Hoc Geriatric Committee was formed to address discrepancies in trauma center access, age-related treatment biases, and barriers to care for this group.⁵

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Industry reports and recent studies have highlighted that an increasingly older population of motorcyclists parallels the national advancement in age. Owner survey data from the Motorcycle Industry Council point to an increase in the average age of motorcyclists from 27 years in 1985 to 41 years in 2003.⁶ In addition, Brown, et al⁷ demonstrated that the average age of injured motorcyclists increased from 33.9 to 39.1 years from 1996 to 2005, whereas the proportion of the over 40 age group increased from 28% to 48%.

As a result of these studies, we expect to identify a similar trend in rising age among motorcyclists on a statewide level. In an effort to understand the consequences of these changes, our study examined injured motorcyclists from the trauma registry of a metropolitan Level-1 Trauma Center. We hypothesized that injured motorcyclists greater than or equal to 55 years would have more prehospital comorbidities, longer hospitalizations, higher care requirements, and require more additional postdischarge care. This knowledge may be helpful in preventing injury, establishing advanced-age treatment protocols, prehospital triage decisions, setting appropriate expectations for postdischarge care, and distribution of resources to accommodate this growing population of trauma patients.

Methods

Institutional Review Board Approval was obtained for this study. Traumabase, the trauma databank at North Memorial Medical Center, was used to identify all injured motorcyclists who presented to this Level-1 Trauma Center from 2008 to 2013. Injured motorcyclists were categorized into 2 age groups: older age (≥ 55 years) and younger age (0 to 54 years). The prehospital comorbidities on admission were collected. Injury data were extracted using International Classification of Diseases, 9th Revision trauma codes in the range of 800 to 959.9. Glasgow Coma Score, Injury Severity Score (ISS), and in-hospital complications were analyzed. Complications included pneumonia, urinary tract infection, acute respiratory distress syndrome, deep venous thrombosis, pulmonary embolism, surgical site infection, sepsis, decubitus ulcer (including stage 2, 3, 4, or indeterminate, which includes skin breakdown with at least partial thickness loss of dermis), myocardial infarction, new-onset arrhythmia, cerebrovascular accident, unplanned intubation, unplanned return to intensive care unit (ICU), and alcohol or drug withdrawal. Hospital outcomes were compared between groups including mortality rate, hospital length of stay (LOS), ICU admission, ICU LOS, and presence and duration (days) of mechanical ventilation. Mortality rates by decade of age were also compared. Discharge destination was categorized as (1) discharge to home, jail, or against medical advice; (2) discharge to other: home with home health services, long-term care hospital (LTCH), skilled nursing facility (SNF), or rehabilitation; or (3) deceased. These categories were chosen to differentiate between discharge dispositions that

require additional health care expenditures and personnel compared with those that do not. Further subgroup analysis for consideration of clinical outcomes was performed for the “discharge to other” group and included: (1) discharge to home with home health services; (2) discharge to a rehabilitation center; and (3) discharge to an LTCH or SNF.

Minnesota statewide motorcycle accident data were collected via the Minnesota Injury Database Access System to examine statewide trends in comparison to our single-center data. Data were collected for an extended period (1998 to 2014) to allow for contextual comparison of overall age proportion trends to previously reported national data. This deidentified data set is publically available and represents approximately 95% of data for injured patients treated in Minnesota hospitals.⁸ A query was performed using “motorcyclist” mechanism under motor vehicle traffic. All injuries, gender, and outcomes were selected for patients with both Emergency Department visits and those requiring hospitalization.

Data preparation and analyses were performed using SPSS version 22 software (IBM, Armonk, NY). Data are presented as median (interquartile range) except Glasgow Coma Score, which is reported as median (range). Categorical variables were compared using bivariate analysis. Continuous variables were analyzed using Mann–Whitney U test. Statistical significance was determined at $P < .05$.

Results

Over the 6-year study period, 432 patients were admitted for motorcycle injury at North Memorial Medical Center. The median age was 43 years (29 to 54), which remained relatively consistent each year for the duration of the study period. The proportion of older patients (≥ 55 years) receiving care at this single center did not significantly increase from the start to the end of the study period, 22% vs 23% respectively. Statewide data were also examined but for an extended period of time to assess overall trends from 1998 to 2014. This revealed that the proportion and absolute number of injured motorcyclists greater than or equal to 55 years has been on the rise from 6% (47) in 1998 to 20% (286) in 2014, although with a flatter trend from 2008 to 2013 (Fig. 1).

Demographics and comorbidities are displayed in Table 1. Hypertension, diabetes, and coronary artery disease were more prevalent in the older group than those in the younger group, $P < .01$. Patients in the older group were presented with higher median ISS than the younger group, 14 (9 to 22) vs 9 (5 to 17), $P < .001$ and had a higher number of average injuries per patient, 2 (1 to 3) vs 1 (1 to 3), $P < .001$. The older patients were also more likely to sustain a rib fracture (48% vs 24%), pneumothorax (30% vs 14%), or any orthopedic fracture excluding the spine (60% vs 42%), $P < .05$ (Fig. 2).

The older group had a longer LOS than the younger group, 5.5 (2 to 10) vs 3 (1 to 6) days, $P < .001$. More older

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