

December: Snowmobile Safety

Rice, M. R., Alvanos, L., & Kenney, B. (2000). Snowmobile injuries and deaths in children: a review of national injury data and state legislation. *Pediatrics*, 105(3 Pt 1), 615–619. <https://doi.org/10.1542/peds.105.3.615>

Background: Snowmobiling is a popular family sport, with annual expenditures over \$9 billion. The size and speed of snowmobiles make them potentially dangerous to children. Pediatric snowmobile-related trauma has not been studied in the United States.

Methods: We analyzed 291 pediatric snowmobile-related injuries and 75 deaths reported to the Consumer Product Safety Commission from 1990 to 1998. We reviewed snowmobile legislation in the states that reported at least 1 death to the Consumer Product Safety Commission during this time period.

Results: The most common sites of injury were the extremities (48.8%) and the head, neck, and face (28.2%). Head and neck injuries were the predominant cause of death (66.7%). The most common diagnosis was contusion/abrasion (30.9%), followed by laceration (22%), fracture (20.3%), and strain/sprain (14.4%). Nonfatal injuries most often involved ejection from the snowmobile (26.1%), but striking a stationary object was the most common mechanism in fatal crashes. The review of state legislation revealed that few age restrictions or helmet laws exist. Children as young as 8 years old may legally operate a snowmobile in some states. Often, restrictions do not apply to snowmobile use on private property, where 43% of pediatric snowmobile-related injuries occurred.

Conclusions: Head, neck, and face injuries are common nonfatal injuries and are the most common cause of death. State legislation often lacks age restrictions on private property, and laws requiring helmet use are rare. Legislators have not addressed the dangers of pediatric snowmobile-related injuries. Helmet laws and age restrictions similar to those enacted for motorcycle riders are necessary and appropriate.

Goldwag, J. L., Porter, E. D., Wilcox, A. R., Martin, E. D., Wolffing, A. B., Mancini, D. J., & Briggs, A. (2020). Geriatric ATV and snowmobile trauma at a rural level 1 trauma center: A blow to the chest. *Injury*, 51(9), 2040–2045. <https://doi.org/10.1016/j.injury.2020.05.043>

Introduction: As the population ages, trauma centers are seeing a significant volume of injured geriatric patients. However, there is limited data on geriatric off-roading incidents. We investigated the injury patterns, severity and outcomes of geriatric versus younger adult all-terrain vehicle (ATV) and snowmobile related trauma with the hypothesis that geriatric patients will have higher mortality and worsened outcomes.

Methods: The trauma registry at a New England Level 1 trauma center was queried by ICD 9/10 code for adult ATV and/or snowmobile-related trauma from 2011-2019. Data reviewed included demographic, admission, injury, and outcomes data including injury severity score (ISS), abbreviated injury scale (AIS) score, hospital disposition, and mortality. Patients were stratified by age into younger adults (18-64 years old) versus geriatric (65 years and older). Univariate analysis was performed to compare groups.

Results: Over the study period, we identified 390 adult ATV or snowmobile-related trauma patients, of whom 38 were geriatric. The mean ages for the younger adult vs. geriatric cohorts were 41(SD 13) and 73(SD 5), respectively. The majority of patients were male (77%). Compared to younger adults, geriatric patients were more often unhelmeted (66 v 38%, $p=0.004$) and more likely to present after ATV as opposed to snowmobile trauma (71 v 51%, $p=0.028$). Geriatric patients more often sustained both any chest trauma (68 v 41%, $p=0.003$) and severe chest trauma ($AIS \geq 3$, 55 v 31%, $p=0.022$), and more often required tube thoracostomy (26 v 12%, $p=0.042$). Geriatric patients were also more often discharged to a facility (39 v 14%, $p<0.001$) compared to younger patients. There were no differences between age cohorts regarding arrival Glasgow coma scale scores, $ISS > 15$, length of stay, ventilator days, complications, or mortality.

Conclusions: Following ATV or snowmobile-related trauma, geriatric patients were more likely to sustain severe chest trauma and to require additional care upon hospital discharge as compared to younger adults. Primary prevention should focus on encouraging helmet and chest protective clothing use in this geriatric population.

Whiting, P., Rice, C., Siy, A., Wiseley, B., Simske, N., Berg, R., Lockhart, M., Debruin, A., Polga, D., Doro, C., Goodspeed, D., & Lang, G. (2019). Orthopaedic injuries from snowmobile accidents: a multi-centre analysis of demographics, injury patterns, and outcomes. *European journal of orthopaedic surgery & traumatology : orthopedie traumatologie*, 29(8), 1617–1621. <https://doi.org/10.1007/s00590-019-02514-3>

Purpose: More than 2 million people in North America use snowmobiles, resulting in an estimated 200 fatalities and 14,000 injuries annually. The purpose of this study is to document the demographics, orthopaedic injury patterns, and short-term outcomes of patients with snowmobile-related injuries.

Materials and methods: A retrospective review was performed at two regional trauma centres in a region where snowmobile use is prevalent. Patients who sustained snowmobile-related injuries over a 12-year period were identified from the hospitals' trauma registries using E-codes (E820-E820.9). Patient demographics were recorded, as were injury characteristics including rates of substance use, open fractures, Injury Severity Score (ISS), Abbreviated Injury Score (AIS) for the extremities, and mortality. Rates of inpatient surgery, as well as hospital and ICU length of stay (LOS), were also recorded.

Results: We identified 528 patients with snowmobile-related injuries. Average age was 37 years, and 418 patients (79%) were male. Eighty-eight per cent of all patients with snowmobile injuries were admitted to the hospital with an average LOS of 5.7 days. Among those admitted to the hospital, average ISS was 12.3, and 28% of these patients had ISS > 15. A total of 261 patients (56%) suffered extremity injuries (including 163 upper and 173 lower extremity fractures) with an average extremity AIS of 2.4. There were 700 total fractures (1.5 per patient), and 9% of all fractures were open. A total of 208 patients (45%) suffered head injuries, and 132 patients (28%) sustained vertebral column fractures. A total of 201 patients (43%) required inpatient surgery, and eight patients (1.7%) sustained fatal injuries.

Conclusions: We present a detailed multi-centre analysis of orthopaedic injury patterns and outcomes resulting from snowmobile-related injuries. Patients injured while snowmobiling share similar injury patterns with patients injured in motorcycle and other high-energy motor vehicle accidents.