



A field evaluation of real-life motor vehicle accidents: Presence of unrestrained objects and their association with distribution and severity of patient injuries

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ABSTRACT

Moving objects may pose an added threat to car occupants in motor vehicle accidents (MVAs). However, to our knowledge, there have only been two case studies published on the subject. For the present study, accident reports and photo documentation from MVAs were collected on-scene by dedicated paramedics. Emergency medical service personnel on-scene were interviewed as necessary. Potentially harmful unrestrained objects in the involved motor vehicles (MVs) were identified and categorised by type, weight and hardness. Seatback offset by unrestrained objects was noted. The patient injury distribution (Abbreviated Injury Scale (AIS) body regions) and severity (AIS severity scores and New Injury Severity Score (NISS) scores) were retrospectively determined from hospital and autopsy records, and their potential relationship to unrestrained objects was explored. A total of 190 accidents involving 338 MVs and 618 individuals were included. In total, 327 individuals (53%) were injured, and 61 (10%) died. 37 of 61 were not autopsied. The mean NISS was 17 (median 8, interquartile range (IQR) 1–27). Unrestrained objects were reported for 133 motor vehicles (39%) involving 293 individuals. 35% of the unrestrained objects found in the passenger compartment weighed >2 kg. In the boot, 32% of objects weighed >20 kg. Seatback offset associated with unrestrained objects was found for 45 individuals (15%). Unrestrained objects originally located in the boot (heavy luggage, groceries and tyres were the most frequently reported) had moved into the passenger compartment on impact in 27 cases, 24 of which were associated with seatback offset. An in-depth analysis was performed on 24 patients whose injuries were highly likely to be associated with unrestrained objects, as indicated by accident reports and medical documentation. Nineteen (79%) were involved in frontal collisions, and 12 (50%) died on-scene. The mean NISS was 51.7 (median 51, IQR 27–75) in the 17 (71%) patients with seatback offset and 37.2 (median 41, IQR 22.5–50) in the 7 (29%) without seatback offset. Seatback offset was associated with more severe head and thoracic injuries and an increased incidence of abdominal and pelvic injuries. Patients injured by unrestrained objects while sitting in unharmed car seats predominantly suffered head, cervical spine and thoracic injuries. Our results indicate a need for public information campaigns. The development of car backseats that can better sustain hits from heavy objects in the cargo boot is an important area for the motor vehicle production industry to explore.

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1. Background

Every year, 1.3 million people die and 20–50 million people sustain non-fatal injuries from motor vehicle accidents (MVAs). MVA is the leading cause of death globally for the age group of 5–44 years (World Health Organization, 2004). Although Trunkey reported in 1983 a trimodal time distribution of trauma deaths, including ‘immediate’ (<1 h), ‘early’ (<4 h) and ‘late’ deaths (<5 weeks after the accident) (Trunkey, 1983), recent publications have indicated that this distribution is not universal geographically or over time (Evans et al., 2010; Soreide, 2010). Recent findings in populations

Abbreviations: AIS, Abbreviated Injury Scale; ANEC, The European Association for the Co-ordination of Consumer Representation in Standardisation; EMS, emergency medical service; ELR, emergency locking seatbelt retractor; IQR, interquartile range; MVA, motor vehicle accident; MV, motor vehicle; NISS, New Injury Severity Score.

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