Motorcyclist Injuries from the Florentine Traumatology Centre: a 12-months analysis

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Simone Piantini, Christian Carulli, Marco Pierini, Massimo Innocenti

I. INTRODUCTION

Powered Two-Wheeler (PTW) account for an increasing proportion of road traffic trauma around the world [1]. The most common patterns of injury are related to fractures, bruises, open wounds, concussions, and sprains [2]. Severe and fatal injuries are typically located at the head, thorax, pelvis and lower extremities [3-5] with internal organs injuries or life-threatening fractures the most frequent. Minor and moderate injuries are more often located at upper and lower extremities [6][7]. Among those, such injuries have surely a social impact in terms of health burden, and they are often associated with prolonged and costly medical treatments and disabilities [8]. This investigation consists of an injury analysis related to motorcycle crashes.

II. METHODS

Injury data drawn from the traumatology centre at Careggi University Hospital (Florence, Italy) are used for the purpose of the present paper. A 12-months analysis of PTW accidents was conducted from April 2017 to April 2018. The following inclusion criteria were applied: 1) PTW vehicles; 2) rider and/or pillion passenger injured (rider in the following), and 3) stay in the hospital for more than 24h. All the injuries were coded according to AIS2005 update 2008, and the body regions were re-coded according to the PIONEERS project definition [9].

Ninety-three (93) injured riders have been selected and a pattern of injuries in PTW crashes is described.

III. INITIAL FINDINGS

Among PTW, the L3 legal category (engine exceeding 50 cm^3 or maximum speed exceeding 50 km/h) prevailed (43%), while single PTW crashes (74%) are more frequent than PTW to opponent crashes (24%). Injured PTW users are mostly males (80%, 74/93).

The mean age is 46 years (range: 4-91 years). The number of injuries grew according to age and severity (exception for AIS1). Four groups of patients are identified related to their age: <16, 16-35, 35-50, and >51years. The “51+ years” group is the most injured, and the AIS2 injuries are two times more frequent than in the 16- 35 years age group (Fig. 1)(Fig. 3).

Ninety-three riders suffered a total of 143 injuries, with an average of 1.5 injuries per person. According to the maximum abbreviated injury scale (MAIS), most of the riders reported a low-energy slight injury (89%, MAIS≤2) (Fig. 2).

Lower (LE) and upper (UE) extremities are the most frequently injured body regions with 91 and 40 injuries, respectively. Thorax and thoracic spine and pelvis account for five and seven injuries, respectively. UE fractures are mostly located at humerus (15), radius (7), clavicle (5), metacarpi, and elbow (3) (Fig. 5). Specifically, humerus proximal, distal radius, and clavicle are the most common fractured sites. LE fractures are located at fibula (32), tibia (28), leg/foot (7), femur (5), and patella (3); other are penetrating injuries (4) (Fig. 6). Proximal and distal tibia and proximal femur are the most fractured sites, followed by fractures of the ankle (Weber A), fractures above the ankle (Weber C), and fractures through the joint (Weber B). Among the seriously injured (MAIS3+) riders (10 patients), the most common injuries are femur (5), pelvic ring (2), followed by ribs and tibia (open) fractures. Muscle lacerations with blood loss major than 20% by volume are also reported. Femoral fractures are mostly located at the neck and trochanteric or intertrochanteric area.

No head injuries were stated in the medical report.

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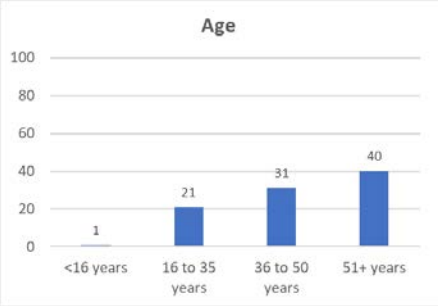

Fig. 1 Age groups frequency distribution

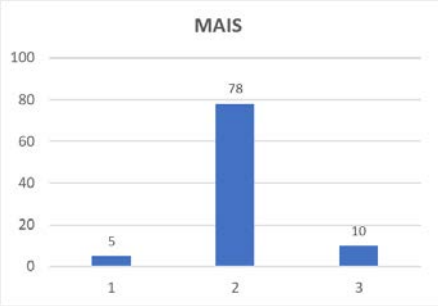

Fig. 2 MAIS frequency distribution

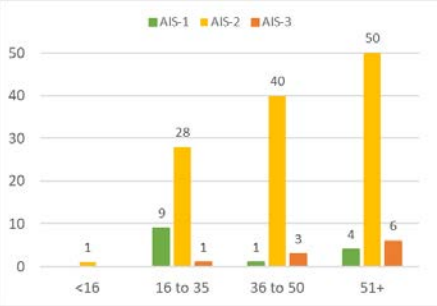

Fig. 3 Injury severity per age groups

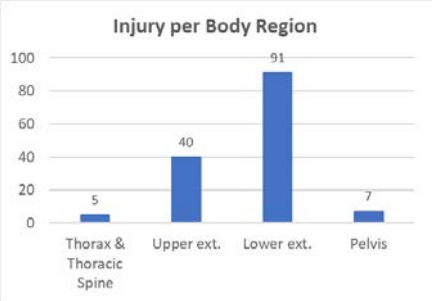

Fig. 4 Injury frequency per body region

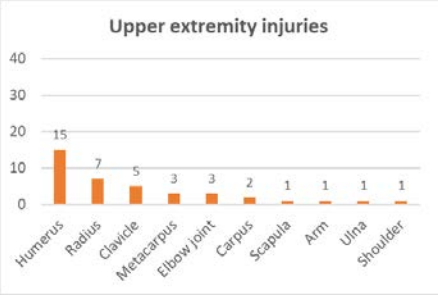

Fig. 5 Ten most freq. upper ext. injuries

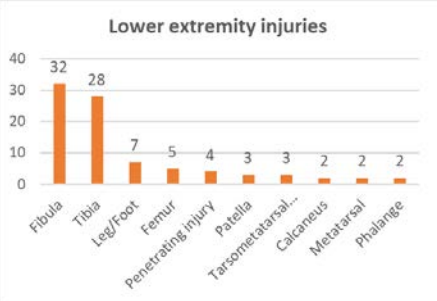

Fig. 6 Ten most feq. lower ext. injuries

IV. DISCUSSION

Preliminary results include only descriptive statistics, and no attempt is made to estimate statistical differences between and within groups. Most of the riders admitted to the traumatology centre for at least 24H presented slight injuries (MAIS≤2). The MAIS3+ injuries account only for 11%. The data clearly show a predominance of male adults and a possible relationship between age and injury severity. Older riders (>51 years) have a two-fold risk of injury with respect to the younger 16-35 years age group, and a double MAIS3+ rate than the 35-50 years age group or six times more than the 16-35 years age group.

Slightly injured riders are still subject to several UE and LE injuries. Humerus, fibula, and tibia are the most fractured bones. UE fractures are typical of anterior- or lateral directed impacts against the opponent vehicle and/or the ground. Tibia, ankle, and foot fractures are often associated with direct impacts frequently causing open fractures. Even if the healing of these injuries is usually easier, it is undoubtful that such traumas are associated to a mild to severe function loss and a high risk of post-traumatic arthritis of the involved joints, with consequent disability. Therefore, more extensive use of personal protective equipment like jackets, gloves, trousers, and boots is considered a significant benefit in the mitigation of slight injuries. Boots and trousers are strongly recommended for the protection of the lower extremities especially in case of low energy impacts. Nonetheless, also advanced on-board passive safety systems, such as airbags, can further reduce the consequences arising from direct and more severe impacts.

The absence of head injuries has not been completed unexpected. A predominance of motorcyclists slightly injured, combined with a high percentage of helmet usage and the fact that the cases came from a specific hospital ward and not from an ER, e.g., are the main reasons.

The absence or the low quality of crash data did not provide the possibility to give further conclusions. However, the paper is helpful in investigating the frequency and the injury typologies of slightly injured riders.

Future work will need to collect more detailed and robust crash data, such as crash scenario and impact configuration, opponent vehicle type and the use of motorcycle clothing.

V. REFERENCES

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