



# Maxillofacial injuries in patients with major trauma

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## Abstract

Major trauma is an important cause of mortality and morbidity worldwide. Mortality is high with rates over 10% commonly reported. We studied the epidemiology and aetiology of maxillofacial injuries in patients who presented with major trauma as recorded nationally by retrospectively analysing the database of the Trauma Audit Research Network from 2001 to 2015. All patients who had major trauma with associated maxillofacial injuries were included in the analysis. Of 104 645 patients recorded as having had major trauma during the study period, 22 148 (21.2%) had an associated maxillofacial injury. Most of them were male (74.2%), and the type of injury was usually blunt (97.5%). Road traffic collisions were the most common mechanism (44.1%), followed by falls of less than 2 m (21.6%). An associated serious head injury was more common in those who had a facial injury (81% compared with 60.6%,  $p < 0.0001$ ). Nearly all the facial injuries (94%) were minor, or moderately severe. Maxillofacial injuries commonly present with major trauma but are rarely severe. A maxillofacial injury may indicate an increased likelihood of an associated head injury.

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## Introduction

Trauma is a leading cause of morbidity and mortality worldwide.<sup>1</sup> Maxillofacial injuries are common among such admissions, although their epidemiology and aetiology can vary across various geographical areas.<sup>2–6</sup> These injuries are rarely immediately life-threatening, and so are often managed after the secondary survey. Assessment and diagnosis may also be challenging during the initial period if the patient may have a spinal injury or presents with a reduced level of consciousness.

A number of authors have previously reported on the incidence of maxillofacial injuries associated with other

trauma.<sup>2–6</sup> These studies examined all maxillofacial injuries that presented over a particular time period, many of which were isolated. There are limited data, however, about the maxillofacial injuries that present as a component of major trauma, which is an important subgroup of admissions as mortality may be as high as 10%.<sup>7</sup> In recent years, efforts to improve outcomes have included the introduction of national trauma networks and registries. Through collection of comparable data, these networks allow us to evaluate our results compared with those of others, and they have the potential to improve performance while at the same time providing a vast source of information.

We examined a UK-based trauma registry (the Trauma Audit Research Network) with the aim of further assessing maxillofacial injuries in adult patients who have presented with major trauma.

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Table 1

Personal and clinical details. Data are number (%) except where otherwise stated.

Variable	Without facial injuries (n = 82 497)	With facial injuries (n = 22 148)	Total (n = 104 645)
Age (years):			
16–25	11 944 (14.5)	4669 (21.1)	16 613 (15.9)
26–50	24 642 (29.9)	8088 (36.5)	32 730 (31.3)
51–65	13 994 (17%)	3394 (15.3)	17 388 (16.6)
66+	31 917 (38.7)	5997 (27.1)	37 914 (36.2)
Median (IQR)	55.3 (35.2–76.7)	45.8 (28.1–67.3)	53.2 (33.3–75.3)
Sex:			
Male	56 020 (67.9)	16 426 (74.2)	72 446 (69.2)
Female	26 477 (32.1)	5722 (25.8)	32 199 (30.8)
Type of injury:			
Blunt	79 769 (96.7)	21 604 (97.5)	101 373 (96.9)
Penetrating	2727 (3.3)	544 (2.5)	3271 (3.1)
Mechanism of injury:			
Road traffic collision	24 919 (30.2)	9777 (44.1)	34 696 (33.2)
Fall of 2 m or more	14 610 (17.7)	3991 (18)	18 601 (17.8)
Fall of <2 m	31 564 (38.3)	4787 (21.6)	36 351 (34.7)
Shooting/stabbing	2308 (2.8)	384 (1.7)	2692 (2.6)
Blow (s)	5353 (6.5)	2555 (11.5)	7908 (7.6)
Other	3743 (4.5)	654 (3)	4397 (4.2)
Median (IQR) ISS	22(16–25)	26 (20–30)	24 (17–26)
Median (IQR) duration of stay (days):			
In intensive care	4 (2–11)	6 (2–13)	5 (2–12)
In hospital	11 (5–23)	11 (5–26)	11 (5–23)
No. with known outcome	74 879	20 191	95 070
Outcome at 30 days:			
Alive	62 456 (83.4)	16 653 (82.5)	79 109 (83.2)
Dead	12 423 (16.6)	3538 (17.5)	15 961 (16.8)

ISS = Injury Severity Score.

Table 2

Associated injuries. Data are number (%) except where otherwise stated.

Regions of the body	Without facial injury	With facial injury	Total	p value (chi squared test)
AIS score 3+:				
Head	50 000 (60.6)	17 946 (81)	67 946 (64.9)	<0.0001
Thorax	27 417 (33.2)	7943 (35.9)	35 360 (33.8)	<0.0001
Abdomen	6531 (7.9)	1367 (6.2)	7898 (7.5)	<0.0001
Spine	8080 (9.8)	1458 (6.6)	9538 (9.1)	<0.0001
Limbs	15 334 (18.6)	4273 (19.3)	19 607 (18.7)	0.017
Other	1752 (2.1)	209 (0.9)	1961 (1.9)	<0.0001
Isolated injury	0	23 (0.1)	23 (0.1)	
Median (IQR) severity of facial injury (AIS) in all 22 148 patients	–	2 (1–2)	2 (1–2)	

AIS = Abbreviated Injury Scale.

## Material and methods

The Trauma Audit Research Network (TARN) collects data on patients admitted with trauma to participating hospitals in England and Wales. Patients' data are entered into the TARN database if the patient is admitted to hospital for more than 72 hours, requires critical care, or dies as a result of the injuries. Some specific injuries (such as fractures of the neck of femur in adults over 65) are excluded.<sup>8</sup>

Trauma is often quantified using the Injury Severity Score (ISS), with a score of 16 or more signifying major trauma and a potentially increased likelihood of death. This score is calculated using the sum of the squares of the three highest Abbreviated Injury Scale (AIS) codes for affected body

regions. The AIS uses a scale of 1–6, with 1 indicating minor injury and 6 one that will probably result in death.

We searched the TARN database for maxillofacial injuries among patients who presented with major trauma. Our retrospective analysis included all patients aged 16 years or older, who had an ISS > 15, and who were admitted to trauma centres in England and Wales between January 2001 and December 2015. They were then examined for the presence of an associated maxillofacial injury.

### Statistical analysis

We used STATA (version 14 StataCorp, College Station, Texas, US) to do a univariate analysis (chi squared test) to

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