

# Otorhinolaryngological (ORL) and Cervicofacial Injuries Resulting from Road Accidents within the Otorhinolaryngology (ORL) Department of the Regional Hospital of Mamou

Mamadou Mouctar Ramata Diallo<sup>1\*</sup>, Ibrahima Diallo<sup>2</sup>, Alsény Camara<sup>2</sup>, Mamadou Aliou Diallo<sup>2</sup>, Raphan Madi Kaba Keita<sup>3</sup>, Abdoulaye Sow<sup>1</sup>, Alsény Cisse<sup>4</sup>, Sory Sacko<sup>2</sup>, Mamadou Gouraïssiou Diallo<sup>2</sup>, Abdoulaye Keita<sup>2</sup>, Alpha Oumar Diallo<sup>5</sup>

<sup>1</sup>Ear, Nose, and Throat (ENT) Department, Regional Hospital Mamou, Mamou, Guinea

<sup>2</sup>Ear, Nose, and Throat (ENT) Department, National Hospital Donka, Conakry, Guinea

<sup>3</sup>Ear, Nose, and Throat (ENT) Department, Regional Hospital N'zérékoré, N'zérékoré, Guinea

<sup>4</sup>Ear, Nose, and Throat (ENT) Department, Regional Hospital Labé, Labé, Guinea

<sup>5</sup>Ear, Nose, and Throat (ENT) Department, National Hospital Ignace Deen, Conakry, Guinea

Email: \*mouctarwouro@gmail.com

**How to cite this paper:** Diallo, M.M.R., Diallo, I., Camara, A., Diallo, M.A., Keita, R.M.K., Sow, A., Cisse, A., Sacko, S., Diallo, M.G., Keita, A. and Diallo, A.O. (2024) Otorhinolaryngological (ORL) and Cervicofacial Injuries Resulting from Road Accidents within the Otorhinolaryngology (ORL) Department of the Regional Hospital of Mamou. *International Journal of Otolaryngology and Head & Neck Surgery*, 13, 16-28.

<https://doi.org/10.4236/ijohns.2024.131003>

**Received:** November 14, 2023

**Accepted:** January 8, 2024

**Published:** January 11, 2024

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## Abstract

**Introduction:** Otorhinolaryngological (ORL) and cervicofacial traumas encompass injuries affecting the neck, face, and ORL region, resulting from external influence. The objective of this study was to conduct an epidemiological and clinical analysis of ORL and cervicofacial injuries observed in victims of road accidents treated at the Otorhinolaryngology (ORL) department of the Regional Hospital of Mamou. **Materials and Methods:** This prospective and descriptive study was conducted over a period of 12 months, from January 1st to December 31st, 2021, within the Otorhinolaryngology (ORL) department of the Regional Hospital of Mamou. It included patients hospitalized for ORL and/or cervicofacial traumas resulting from road accidents during the study period. **Results:** A total of 348 cases were included, representing 36.22% of all traumas related to road accidents (AVP) within the Regional Hospital of Mamou. The average age of the patients was 26.44 years, with a sex ratio of 3.83, favoring males. The dominant socio-professional category was students, encompassing 32.47% of cases. Road accidents were mainly associated with motorcycle use (31.32% motorcycle-to-motorcycle, 24.43% motorcycle skidding, 13.51% motorcycle-pedestrian). Facial region injuries were the most common, accounting for 69.03% of cases, followed by rhinological injuries (17.28%) and otological injuries (13.69%). Associated injuries were predominantly closed head traumas (52.55%) and lower limb fractures

(20.41%). Imaging was underutilized. Regarding surgical interventions, reconstructive surgery was the most predominant, accounting for 52.51% of cases, with a management timeframe of 30 minutes to 12 hours for 99.72% of patients. **Conclusion:** Road traffic accidents remain a serious public health issue, primarily affecting young males. Emphasis should be placed on road safety measures to reduce the frequency of these accidents.

## Keywords

ENT Injuries, Road Accidents, Regional Hospital of Mamou

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## 1. Introduction

The road safety situation in the Republic of Guinea has significantly deteriorated over several years. Road accidents and the number of fatalities and injuries on the roads have been steadily increasing for years. The number of traumatic pathologies is on the rise due to various activities and lifestyle choices of populations. These pathologies result from traumas, which are local injuries caused by external forces. Thus, an ORL and cervicofacial traumatic injury manifests as anatomical and/or histological alterations in the ear, nose, pharynx, larynx, face, or neck, under the influence of an external force [1]. Craniofacial traumas associated with road accidents are undoubtedly a global public health concern [2]. Traffic accidents stand as one of the leading causes of death worldwide [3]. Many cases of these accidents could be preventable through the control of human factors involved. Motorcyclists are particularly vulnerable, and injuries can affect the entire body [4].

For many years, road traffic accidents (RTAs) have become a major public health concern both nationally and globally. According to the 2017 data from the World Health Organization (WHO), it is estimated that globally, 1.3 million people lose their lives each year in road accidents, with no fewer than 50 million people being injured. Injuries resulting from RTAs are classified as the seventh leading cause of death worldwide, and they remain the primary cause of mortality among young people aged 15 to 29, causing over 325,000 deaths annually [5].

The high frequency of road traffic accidents (RTAs), their high rates of mortality and complications, along with the lack of previous studies on this subject, were among the reasons that motivated the choice of this theme.

## 2. Methodology

### 2.1. Study Setting

The Oto-Rhino-Laryngology department of the Regional Hospital of Mamou served as the setting for this study, which is a public health institution in Guinea.

### 2.2. Study Type and Duration

This study was prospective and descriptive, spanning a period of one year from

January 1 to December 31, 2021.

**Selection Criteria:**

- **Inclusion Criteria:** All patients admitted to the Oto-Rhino-Laryngology department of the Regional Hospital of Mamou due to ORL and cervico-facial trauma resulting from a road traffic accident, and who provided consent to participate in the study, were included.
- **Exclusion Criteria:** Patients admitted to the Oto-Rhino-Laryngology department of the Regional Hospital of Mamou for ORL and cervico-facial trauma resulting from a road traffic accident who did not consent to participate in the study were excluded.

### 2.3. Data Collection and Analysis

Data were collected using clinical observation records, operative protocol registers, and consultation registers. A pre-established data collection form was utilized for this purpose. The collected data were then entered and processed using Microsoft Word and Excel software from the Office 2016 suite.

### 2.4. Study Variables

The variables considered in this study included frequency, age, gender, occupation, place of residence, accident mechanism, use of protective equipment, alcohol consumption, Glasgow Coma Scale score, severity signs, facial region injuries, otological injuries, rhinological injuries, associated injuries, time of care, type of surgical intervention, and the progress of the cases studied.

### 2.5. Medical Ethics

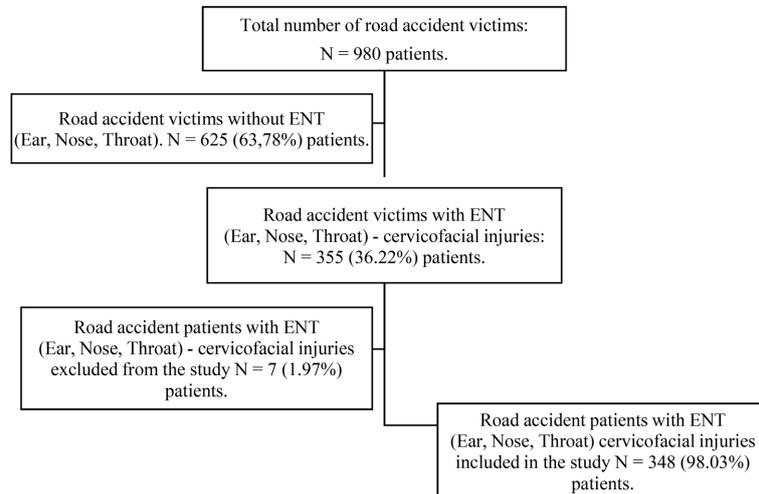
We obtained free and informed consent from all our patients. The collected data were treated confidentially, and we strictly adhered to the principles of medical ethics.

## 3. Results

Among a total sample of 980 patients involved in road traffic accidents, 355 patients, or 36.22%, presented with ENT and cervicofacial injuries. Seven patients opted not to participate in the study. After applying the selection criteria, 348 patients were selected to participate in the study (**Figure 1**).

**Table 1** depicts the distribution of patients by age group. The average age of the patients was 26.44 years with a standard deviation of  $\pm 2.53$  years, ranging from 1 to 79 years. In our series, the most affected age group was 1 to 20 years, comprising 150 cases or 43.1% of the patients, closely followed by the age group of 21 to 40 years, which accounted for 142 cases or 40.8%.

Regarding gender distribution, we observed a male predominance, with 276 patients (79%), compared to 72 female patients (21%), resulting in a sex ratio of 3.83. Among the socio-professional categories, students were the most affected, representing 113 cases or 32.47% (see **Table 2**).



**Figure 1.** Flow diagram of the 980 public road accident victims surveyed from January 1st to December 31st, 2021, admitted to Mamou Regional Hospital.

**Table 1.** Distribution by age groups of the 348 surveyed patients from January 1st to December 31st, 2021, in the ENT (Ear, Nose, and Throat) department at Mamou Regional Hospital.

Age group	Frequency	%
1 - 20 years old	150	43.1
21 - 40 years old	142	40.8
41 - 60 years old	42	12.07
61 - 80 years old	14	4.03
<b>Total</b>	<b>348</b>	<b>100</b>

**Table 2.** Distribution by profession of the 348 surveyed patients from January 1st to December 31st, 2021, in the ENT (Ear, Nose, and Throat) department at Mamou Regional Hospital.

Profession	Frequency	%
Civil servant	14	4.02
Welder	3	0.86
Student	113	32.47
Farmer	28	8.04
Housewife	20	5.75
Merchant	44	12.64
Driver	31	8.92
Workers	21	6.03
Motorcycle taxi driver	38	10.92
No profession	15	4.32
Other professions	21	6.03
<b>Total</b>	<b>348</b>	<b>100</b>

The majority of our patients, 209 of them (60.06%), came from urban areas, while 39.95% originated from rural areas.

The most frequent accident mechanism was motorcycle-to-motorcycle collision, accounting for 31.32%, followed by motorcycle skidding, at 24.43% (refer to **Table 3**).

Practically all our patients, 331 out of 348 (95.11%), did not wear any protective gear, except for only 17 patients (4.88%) who did. In our series, we also observed that 38 patients, or 10.92%, had consumed alcohol. **Table 4** presents the distribution of our patients based on the Glasgow Coma Scale (GCS) score upon admission.

Among the signs of severity, the most frequently observed were bleeding, headaches, and vomiting, with 88 cases (24.36%), 74 cases (21.32%), and 41 cases (11.82%), respectively (see **Table 5**).

During our study period, we observed a strong predominance of facial and mandibular injuries, with 731 cases, accounting for 69.03% of the total injuries. Rhinological injuries represented the second most frequent category, with 183 cases (17.28%), and otological injuries were the third category in terms of frequency, with 145 cases (13.69%).

Regarding injuries to the face and mandible, frontal wounds were the most frequent, totaling 217 cases, which accounts for 29.69%, followed by cheek wounds with 131 cases, representing 17.92% (see **Table 6**).

Among the associated injuries observed in our series, closed head injury was the most frequent, followed by lower limb fracture and upper limb fracture, representing 52.55%, 20.41%, and 14.29%, respectively (**Table 7**).

The majority of patients, 347 out of 348 (99.72%), were treated within a time-frame ranging from 30 minutes to 12 hours.

Most of our patients underwent reconstructive surgery, accounting for 52.51%, while 30% underwent facial debridement (refer to **Table 8**).

**Table 3.** Distribution according to the mechanism of the accident among the 348 surveyed patients between January 1st and December 31st, 2021, in the ENT service of the Regional Hospital of Mamou.

Mechanisms of occurrence of Road Traffic Accidents (RTA)	Frequency	%
Motorcycle collision	109	31.32
Motorcycle skidding	85	24.43
Motorcycle-pedestrian	47	13.51
Car skid	46	13.51
Car-motorcycle	33	9.48
Car-car	18	5.17
Car-pedestrian	6	1.72
Motorcycle-bicycle	3	0.86
<b>Total</b>	<b>348</b>	<b>100</b>

**Table 4.** Distribution by Glasgow Coma Scale score upon admission of the 348 surveyed patients from January 1st to December 31st, 2021, in the ENT (Ear, Nose, and Throat) department at Mamou Regional Hospital.

Glasgow Coma Scale score	Frequency	%
3 - 8	33	9.48
9 - 12	35	10.06
13 - 15	280	80.46
<b>Total</b>	<b>348</b>	<b>100</b>

**Table 5.** Distribution by severity signs upon admission of the 348 surveyed patients from January 1st to December 31st, 2021, in the ENT (Ear, Nose, and Throat) department at Mamou Regional Hospital.

The signs of severity	signs	Frequency	%
Glasgow Coma Scale	3 - 8	33	9.51
Signs of hemorrhagic shock	Hemorrhage	88	25.36
	Polypnea	21	6.05
	Dyspnea	27	7.78
	Tachycardia	39	11.24
Signs of intracranial hypertension	Vomiting	41	11.82
	Dizziness	24	6.92
	Headaches	74	21.32
<b>Total</b>		<b>347</b>	<b>100</b>

**Table 6.** Distribution of facial and mandibular injuries among the 348 patients studied between January 1st and December 31st, 2021, in the ENT department of the regional hospital of Mamou.

Facial and Mandibular Injuries	Frequency	%	
Face	Facial paralysis (peripheral)	1	0.14
	Orbital wound	81	11.08
	Palpebral edema	55	7.52
	Peri-orbital hematoma	9	1.23
	Frontal wound	217	29.69
	Cheek wound	131	17.92
	Upper lip wound	73	9.99
	Lower lip wound	77	10.53
	Maxillary fracture	2	0.27
	Zygomatic fracture	2	0.27
Mandibule	Chin wound	58	7.93
	Mandibular fracture	25	3.43
<b>Total</b>	<b>731</b>	<b>100</b>	

**Table 7.** Distribution according to associated injuries among the 348 patients surveyed from January 1 to December 31, 2021, in the ENT department at the Regional Hospital of Mamou.

Injuries	Frequency	%
Closed head injury	103	52.55
Lower limb fracture	40	20.41
Upper limb fracture	28	14.29
Cranio-encephalic trauma	16	8.16
Clavicle fracture	5	2.55
Open head injury	1	0.51
Eye injury	1	0.51
Retromastoid hematoma	1	0.51
Rib fracture	1	0.51
<b>Total</b>	<b>196</b>	<b>100</b>

**Table 8.** Distribution based on the type of surgical intervention among the 348 patients studied between January 1 and December 31, 2021, in the ENT department of the Regional Hospital of Mamou.

Surgical intervention type	Frequency	%
Reconstructive surgery	324	52.51
Facial debridement	183	30
Neck debridement	2	0.33
Emergency tracheotomy	1	0.16
Other treatments	101	17
<b>Total</b>	<b>611</b>	<b>100</b>

Following the treatment, we observed recovery in the vast majority of patients, with 315 of them (90.51%). Nine patients, representing 2.59%, were referred to the University Teaching Hospital (CHU) in Conakry. Unfortunately, we recorded 24 deaths, accounting for 6.9% of the cases.

#### 4. Discussion

Road traffic accidents (RTAs) constitute a major public health issue on a global scale. Each year, millions of lives are lost, and countless others are injured, resulting in enduring physical and psychological trauma. We conducted a prospective descriptive study over a one-year period, spanning from January 1 to December 31, 2021, within the Otolaryngology (ENT) department of the Regional Hospital of Mamou.

The objective of our study was to epidemiologically and clinically analyze ENT and cervicofacial injuries resulting from road traffic accidents and examine

their therapeutic management within the Otolaryngology (ENT) department of the Regional Hospital of Mamou. During our study period, the total number of individuals involved in road traffic accidents was 980 patients, among whom 355 cases of ENT and cervicofacial trauma were identified, representing 36.22% of all the patients studied. In 2014, a similar study conducted in Ivory Coast by Assouan. C *et al.* [6] reported a similar proportion, accounting for 34.05% of cases, which is consistent with our results. In our study, the average age of patients was 26.44 years, with extremes ranging from 1 to 79 years. However, studies conducted in Burkina Faso by Diallo M [2] and in Ethiopia by Arena. M. G [7] obtained relatively similar results, with an average age of 31.18 years and 28.4 years, respectively. It is worth noting that the studied population is predominantly composed of young individuals.

The analysis we conducted revealed a male predominance, with a sex ratio of 3.83. In our study, a majority of the participants were unmarried, accounting for 58.05% of cases, and over half, specifically 60.06%, resided in the urban municipality. This observation could be explained by the fact that students constitute a significant portion of the young population that frequently uses public roads and two-wheeled vehicles in this area to commute to their respective institutions.

In our analysis, the main causes of road traffic accidents were primarily related to motorcycle collisions, representing 31.32% of cases, followed by motorcycle skidding incidents, with a percentage of 24.43%. Thus, authors in India, Guinea, and Benin have reported higher proportions, respectively 60.2%, 67.5%, and 80% of cases related to road traffic accidents involving motorcycles [8] [9] [10]. This trend could be explained not only by risky behaviors when riding motorcycles without a license but also by the increasing proliferation of these two-wheeled vehicles in this area in recent years.

In our study, participants presented a variety of anatomico-pathological lesions observed at different levels. Regarding otology, otorrhea was the dominant manifestation, accounting for 58.62%, followed by scratches on the pinna at 13.79% and pinna wounds at 13.10%. A study conducted by Moussa M. *et al.* [11] reported a frequency of 16.10% for pinna wounds. These results could be explained by the anatomical location of the ear at the temporal bone level, which is exposed in case of trauma resulting from a direct impact.

Regarding rhinoscopy, isolated post-traumatic epistaxis was more common, with a significant incidence of 34.42%, followed by fractures of the nasal bones without displacement, at 30.60%, and nasal contusion, representing 19.13%. Moreover, similar studies conducted by researchers in Madagascar [12] reported 59.6% epistaxis, while in France [13], a frequency of 61.8% for nasal fractures was observed. Regarding lesions in the pharynx, larynx, and oral cavity, the majority were represented by dental avulsions at 52%, followed by dental fractures at 28%, and tongue lacerations at 12%. However, similar studies conducted in Niger and India reported 13.10% dental avulsions and 2.60% dental fractures, respectively [9] [11]. Regarding facial and mandibular injuries, the majority were represented by frontal wounds at 29.69%, followed by orbital wounds at 11.08%,

lower lip wounds at 10.53%, chin wounds at 7.93%, and palpebral edema at 7.52%. The study conducted by Moussa *et al.* in Niger reported higher results, with 80.30% frontal wounds, 50.40% lip wounds, and 22.60% chin wounds [11]. This could be explained by the fact that in the case of road traffic accidents, the driver or passenger may be exposed to windshield debris on the face. On the other hand, for riders of two-wheeled vehicles, in case of no head protection during the impact, the face is also more exposed.

In our analysis, neck injuries were dominated by superficial lesions, particularly scratches, at 92.59%. Moreover, a study conducted in 2015 by authors in Côte d'Ivoire reported a lower rate, at 24.74% [14]. The most frequently observed associated injuries in our study were mainly closed head trauma, accounting for 52.55%, followed by lower limb fracture at 20.41%, and upper limb fracture at 14.29%. Similar surveys conducted by authors such as DIAKITE A. K *et al.* [15] reported 48.55% of cases of head trauma related to road accidents. Additionally, Jha N *et al.* [16] asserted frequencies of 43.4% for lower limb fracture and 19% for upper limb fracture.

In our study, the most requested complementary examinations were those of biology, representing 27.53%, while imaging was dominated by standard radiography, with a frequency of 19.07%. CT scans were not performed due to its absence in our hospital. In contrast, studies conducted by Bissa H. *et al.* [17] and Camille Lorzil [18] recorded high proportions of imaging, at 65.78% and 66%, respectively.

The most frequently performed types of surgical operations were mainly reconstructive surgery, accounting for 52.51%, followed by facial debridement at 30%, and other treatments at 17%. Most patients in our series were managed within a time frame of 30 minutes to 12 hours, representing 99.72% of cases. Camille L [18] reported a slightly lower result than ours, with 71% of cases having a time frame for management between 30 minutes and 12 hours. In our study, a mortality rate of 6.90% was recorded.

#### **Study Limitations and Challenges**

- Some patients showed reluctance to participate in the study.
- Limitations in terms of technical and material resources.
- Challenges related to the coordination of multidisciplinary care for certain patients.

## **5. Conclusion**

Road traffic accidents continue to claim lives and inflict suffering on numerous individuals. However, with increased awareness, effective preventive measures, and the cooperation of society as a whole, we can hope to reduce the number of these accidents and create safer roads for everyone. Road safety must remain a priority for governments, organizations, and individuals.

## **Conflicts of Interest**

The authors declare no conflicts of interest regarding the publication of this paper.

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## Data Collection Form. N° / .../

### I - Sociodemographic characteristics of the patient

Last name and First name(s).....

Gender: Male/.../ Female/.../; Age/.../; Marital status: Married/.../, Divorced/.../, Single/.../, Widow(er)/.../; Place of residence/.../; Educational level: Primary/.../, Junior high school/.../, High school/.../, University/...../

Occupations: Government employees/.../, Welders/.../, Students/.../, Farmers/.../, Homemakers/.../, Gold miners/.../, Sportspeople/.../, Merchants/.../, Drivers/.../, Laborers/.../, Motorcycle taxi/.../, Other professions/.../

### II - Previous medical history:

1) Medical history: Asthma/.../, Sickle cell disease/.../, Diabetes/.../, Hypertension/.../, Psychiatric/.../, Other medical history/.../

2) Surgical history: Tympanoplasty/.../, Rhinoplasty/.../, Neck surgery/.../, Facial surgery/.../, Other surgical history/.../

### III - Mechanism of occurrence of the Road Traffic Accident

Automobile skid/.../, Automobile-to-automobile collision/.../, Automobile – Motorcyclist/.../, Automobile-Bicycle/.../, Moto skid/.../, Motorcycle-to-motorcycle/.../, Motorcycle-Bicycle/.../, Motorcycle-pedestrian/.../, Automobile -pedestrian/.../, Bicycle-to-bicycle/.../, Bicycle – Pedestrian/.../

IV - Notion of alcohol intake: Yes /.../, Non/.../

### V - Clinical status of patients upon admission

Level of consciousness: normal/.../, Altered consciousness (Glasgow Coma Scale < 7)/.../, Signs of hemorrhagic shock: Tachycardia/.../, Polypnea/.../, Hemorrhage/.../, Dyspnea/.../, Signs of increased intracranial pressure: Vomiting/.../, Dizziness/.../, Headaches/.../

### VI - Clinical examinations

1) Otoscopic examination: Section of the right ear auricle /.../, Section of the left ear auricle/.../, Loss of substance of the right ear auricle/.../, Loss of substance of the left ear auricle/.../, Injury to the right ear auricle/.../, Injury to the left ear auricle/.../, Injury to the right ear tragus/.../, Injury to the left ear tragus/.../, Right ear othematoma/.../, Left ear othematoma/.../, Right perichondritis/.../, Right external auditory canal injury/.../, Left external auditory canal injury/.../, Right tympanic perforation/.../, Left tympanic perforation/.../

2) Rhinological examination: Nasal contusions/.../, Torn nasal turbinates/.../, Septal hematoma/.../, Fracture of the nasal bones: /.../ With displacement/.../, Without displacement/.../, Obstructive fracture/.../, Epistaxis: Associated with a fracture of the nasal bones/.../, Isolated post-traumatic/.../, Injury to the nasal pyramid/.../

3) Examination of the pharynx, larynx, and oral cavity

Oral: Fracture of the teeth/.../, Pharyngo/laryngeal: Hoarseness/.../ and breathing difficulties/.../

4) Examination of the face and mandible: Right peripheral facial paralysis/.../, Left peripheral facial paralysis/.../, Right orbital wound/.../, Left orbital

wound/.../, Frontal wound/.../, Chin wound/.../, Right cheek wound/.../, Left cheek wound/.../, Upper lip wound/.../, Lower lip wound/.../, Fracture of the mandible/.../, Fracture of the right zygomatic bone/.../, Fracture of the left zygomatic bone/.../, Fracture of the right maxilla/.../, Fracture of the left maxilla/.../, Fracture of the right orbital floor/.../, Fracture of the left orbital floor/.../, Palpebral edema/.../, Peri-orbital hematoma/.../

5) Neck examination: Lesions of Zone I/.../, Lesions of Zone II/.../, Lesions of Zone III/.../

6) Type of anatomic-clinical lesions of the neck: Subcutaneous emphysema/.../, Superficial wounds: Scratches/.../, Skin lacerations/.../, Penetrating wounds of the neck: /.../, Section of the internal jugular vein/.../, Section of the sternocleidomastoid muscle/.../

7) Clinical signs of cervical lesions:

Functional signs: Dyspnea/.../, Cervical emphysema/.../, Cervical hemorrhage/.../

Physical signs: Cervical hematoma with disruption of the platysma/.../, Section of the sternocleidomastoid muscle/.../

#### **VII - Other associated lesions**

Fracture of the right upper limb/.../, Fracture of the left upper limb/.../, Fracture of the right clavicle/.../, Fracture of the left clavicle/.../, Fracture of the right lower limb/.../, Fracture of the left lower limb/.../, Open head injury/.../, Closed head injury/.../, Abdominal wound/.../, Injury to the right eye/.../, Injury to the left eye/.../, Hematosinus: Maxillary sinus/.../, Hematosinus: Right maxillary sinus/.../, Hematosinus: Left maxillary sinus/.../, Hematosinus: Other sinuses/.../, Chest wound/.../, Traumatic brain injury/.../, Fracture of the right temporal bone/.../, Fracture of the left temporal bone/.../

#### **VIII - Additional examinations**

Hemoglobin level; Blood typing Rh factor; Tonal audiometry; X-ray of the nasal bones; Skull X-ray; Other examinations.

#### **IX - Type of surgical operation performed**

Facial lacerations: Facial debridement, Suturing, Repositioning

Cervical lesions: Exploratory cervicotomy/.../, Emergency tracheotomy/.../, Cervical debridement/.../, Other treatments/.../, Reduction and fixation of both jaws: Mandible/.../

#### **X - Time of management**

From 30 minutes to 12 hours/.../, From 13 hours to 24 hours/.../, From 25 hours to 48 hours/.../, From 49 hours to 72 hours/.../

#### **XI - Progression/evolution**

Recovery/.../, Referral/.../, Deceased/.../