Trauma registry of acute care (TRAC) – CHUV

Annual Report 2015

Catherine Heim, Mylène Bourgeat, Fabienne Ruefli, Aleksandra Chervet

Summary

I. Introduction

This report aims at presenting an overview of the characteristics of trauma patients admitted to the Lausanne University Hospital (CHUV) from the 1st of January to the 31st of December 2015. Analysis of data is performed based on data from the institutional Traumaregistry "TRAC".

II. Methodology

1. Inclusion criteria

All trauma patients admitted to shock room were included to the Traumaregistry. For the first time, patients not admitted to shockroom but fulfilling the inclusion criteria of the Swiss Trauma Registry (STR) (ISS >15 and/or AIS head score ≥3) were also included into this report for 2015.

2. Data collection and codification

Data collection and entry is performed by a trained data-manager on the basis of patients' electronic files. Codification of patients' injuries is done following AIS/ISS 2008 international standards by a AAAM-trained nurse (Association for the Advancement of Automotive Medicine) (1).

3. Statistics

Results are expressed in percentages for frequencies. When necessary, a measure of dispersion was given using median, lower and upper interquartile ranges [IQR1,IQR3], representing respectively 25% and 75% of the headcounts. Qualitative variables were compared using Fisher exact or χ^2 test. Continuous variables were compared using Student's *t*-test if distribution is normal and there were compared using a Kruskal-Wallis if distribution is not normal. We noted *p* the significance level. A significance threshold of 0.05 was adopted for all of the statistical analyses.
Statistics and graphics were performed using Microsoft Office 2007 Excel© and R 3.3.1.

III. Results

1. Patients' characteristics

During 2015, 405 trauma patients fulfilled the inclusion criteria for the CHUV Traumaregistry [Table I]. Their median age was 45 years [24,69]. The sex-ratio (men/women) was 2.32 (69.9% / 30.1%).

Table I. Patients included into CHUV Traumaregistry in 2015.

	All patients		admitted to shockroom				not admitted to shockroom	
			All		STR criteria [1]		STR criteria [1]	
	n	%	n	%	n	%	n	%
Number of admissions	405		322	79.5	111	27.4	83	20.5
MHS criteria [2]	189	46.7	112	34.8	95	85.6	77	92.8
Number of burned patients	40	9.9	40	12.4	0	0.0	0	0
Number of pediatric cases (< 16 years)	55	13.6	55	17.1	0	0	0	0
Number of secondary admissions	90	22.2	81	25.2	30	27.0	9	10.8

[1] Patients who meets STR criteria: ISS > 15 and/or AIS head score ≥ 3 (< 16 years and burned excluded).
[2] Patients who meets MHS criteria: ISS ≥ 20 and/or AIS head score ≥ 3 (< 16 years and burned included).

Figure 1 shows the distribution of age by sex and year of healthcare. The included trauma population was significantly older in 2015 compared to 2014 (p<0.01) (significant for women: p<0.01; not significant for men: p=0.180). In 2015, included trauma women are significantly older than men (p<0.01).

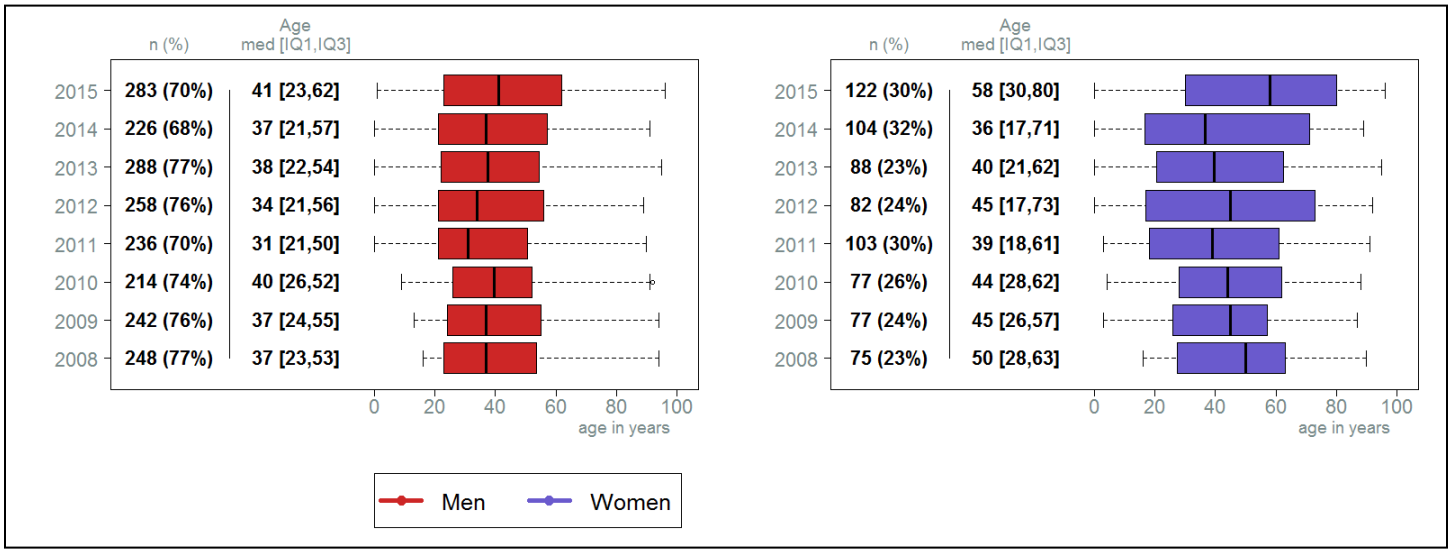


Figure 1: Characteristics of the trauma patients between 2008 and 2015.

Figure 2 shows the distribution of age for patients meeting the STR criteria (figure 3: by gender). In 2015, adult patients not admitted to shockroom but respecting STR criteria were significantly older than patients admitted to shockroom with STR criteria (p<0.01) (not significant for men: p=0.574; significant for women: p<0.01).

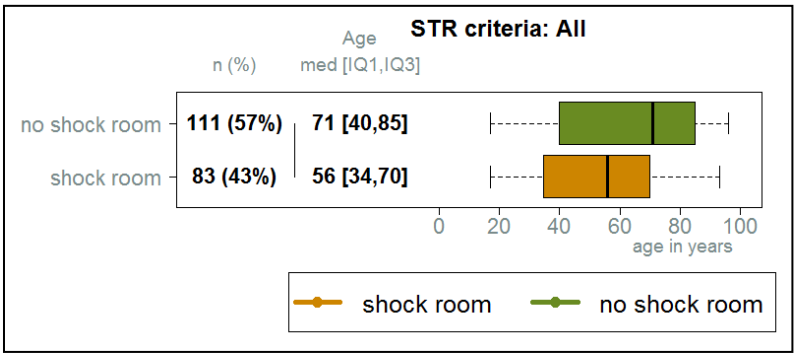


Figure 2: Characteristics of the trauma patients with STR criteria in 2015.

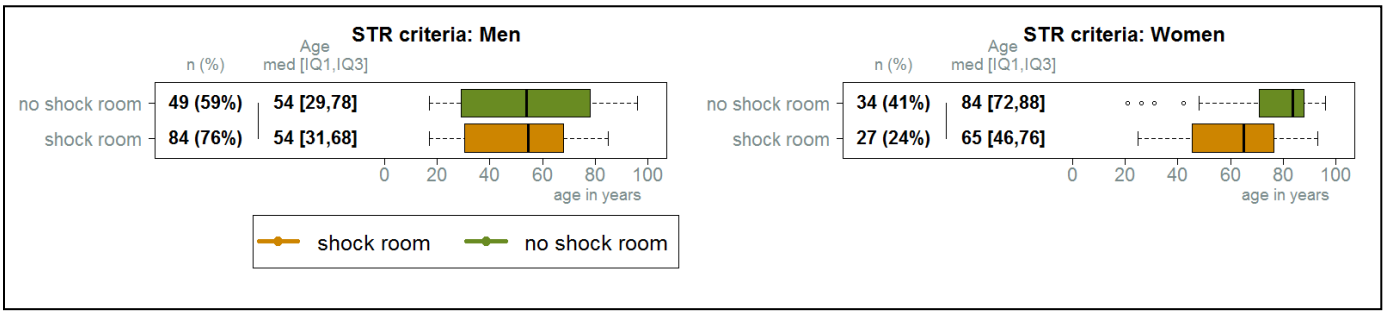


Figure 3: Characteristics by gender of the trauma patients with STR criteria in 2015.

2. Inter-hospital transfers

22.2% of all included patients were initially treated in a different hospital and secondarily transferred to CHUV (24.5% in 2014; *p*=0.483) [**Table II, Figure 4**]. 39 (20.1%) of these fulfilled the STR criteria.
20 (22.2%) of the secondarily transferred in patients were burn patients. Of all admitted burn patients, 50% were secondarily transferred in.
26 (28.8%) of the secondarily transferred in patients were pediatric patients. Of all pediatric trauma patients included, 47.3% were secondarily transferred in.

Table II. Inter-hospital transfers.

	All patients		admitted to shockroom				not admitted to shockroom	
			All		STR criteria		STR criteria	
	n	%	n	%	n	%	N	%
2014 (n=330)	81	24.5	81	24.5	28	22.6	Na	
2015 (n=404)	90	22.2	81	25.2	30	27.0	9	10.8

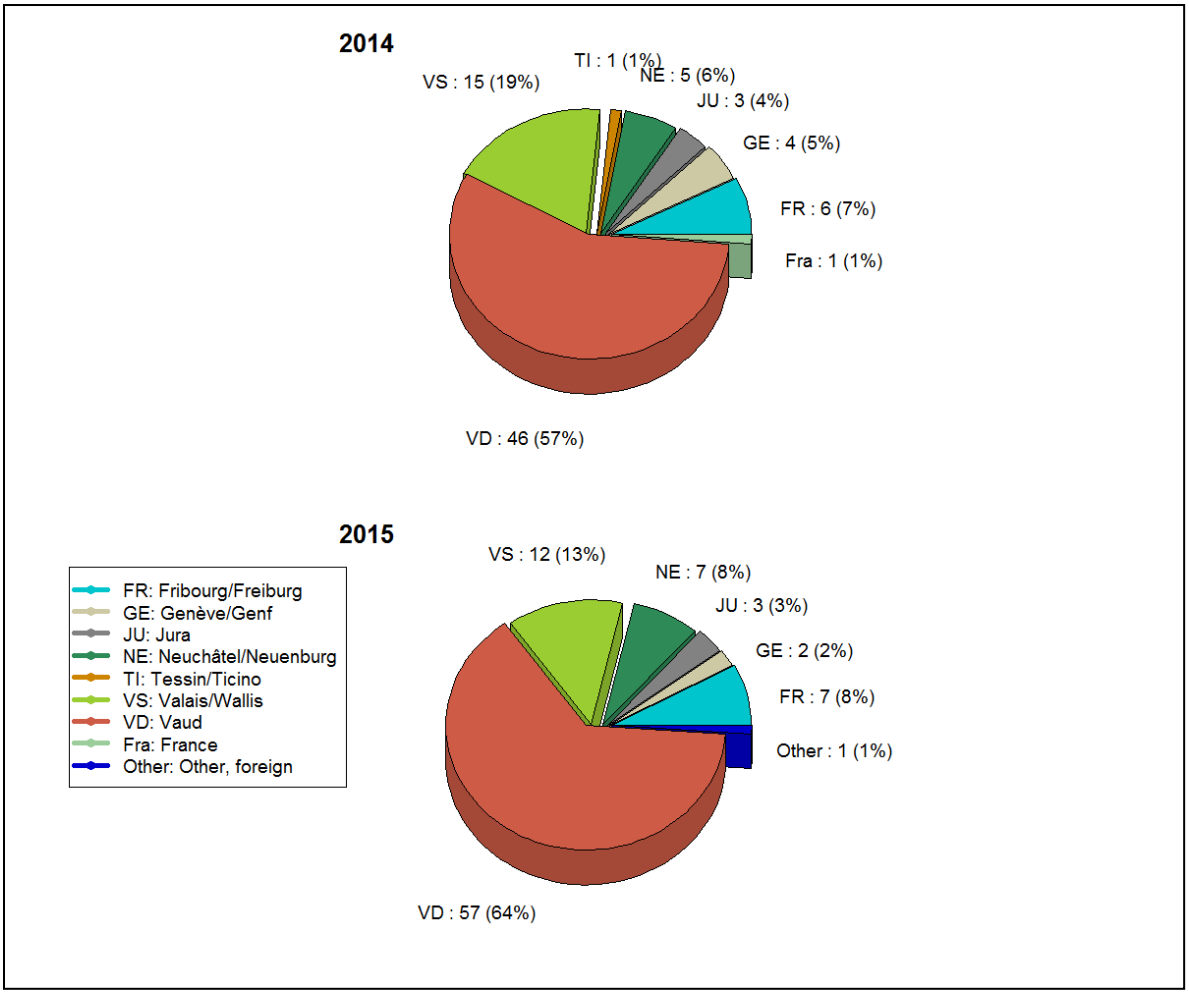


Figure 4: Origin of secondarily transferred-in patients in 2014 and 2015.

3. Injury severity score (ISS)

Figure 5 shows numbers of included patients – overall and considering ISS – over the last eight years.
Over tis time period, we observed a significant increase in the number of included patient (p<0.01) and a significant increase of patients with ISS>15 (p=0.026). The number of patients with ISS≥20 and ISS>24 has been steady.
In 2015, median injury of severity score (ISS) was 10 [5,20] [Figure 6]. Severely injured patients, defined as an ISS>15 accounted for 39% (157) and 20% (80) presented with critical injuries (ISS > 24).

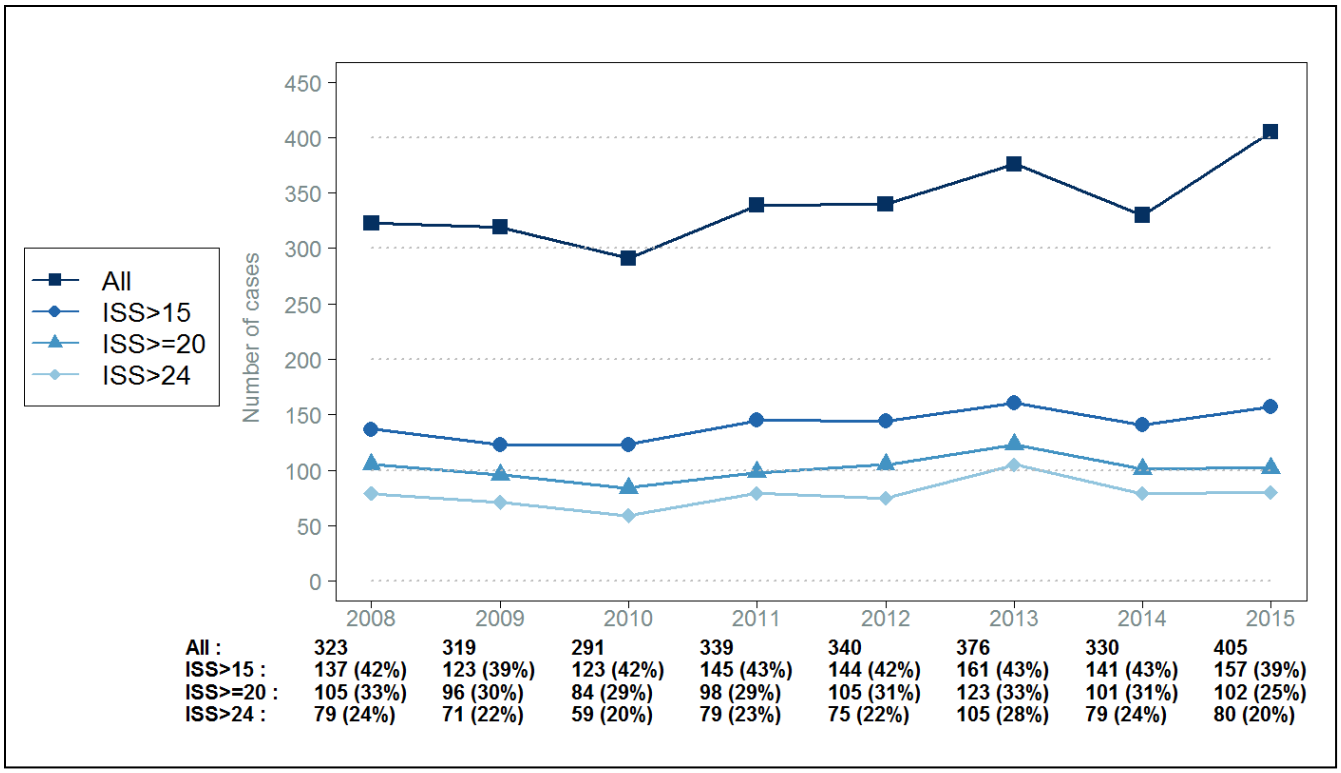


Figure 5: Included patients between 2008 and 2015.

Figure 6 shows the distribution of ISS of included patients by year of healthcare. There is no significant difference for ISS between 2014 and 2015 (all: p=0.359; men: p=0.969; women: p=0.112).

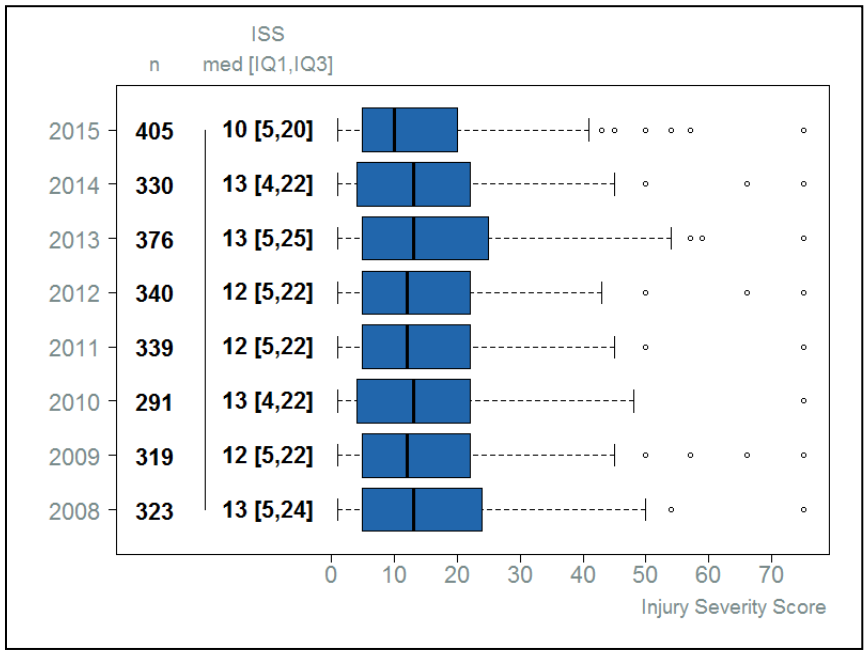


Figure 6: Injury Severity Score between 2008 and 2015.

4. Trauma characteristics

a. Type of trauma

The rate of penetrating trauma during 2015 was 6.4% (n=26) as compared to 5.2% (n=17) in 2014 [Figure 7]. In 2015, all patients with penetrating trauma had been admitted to shockroom.

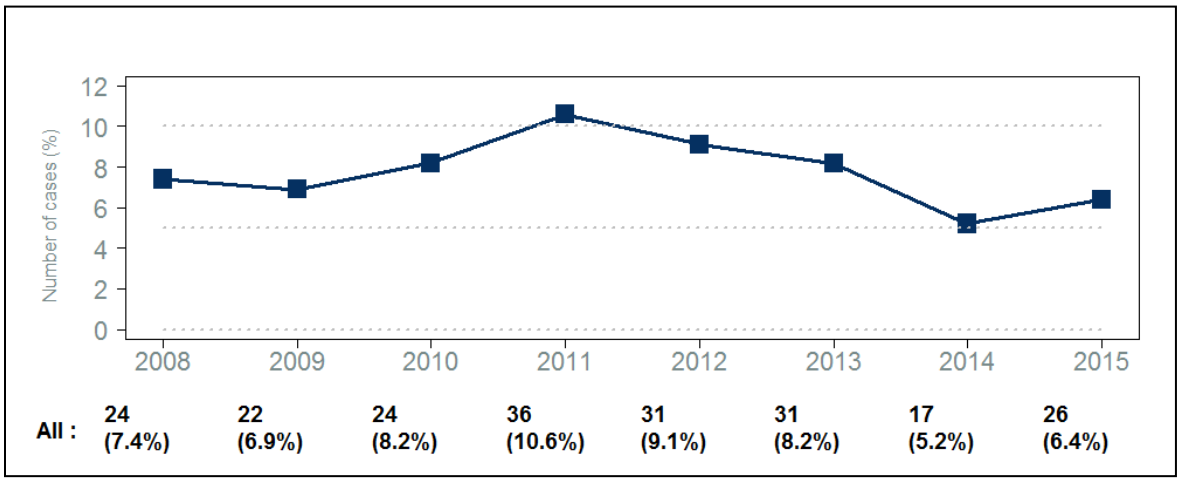


Figure 7: The rate of penetrating trauma between 2008 and 2015.

b. Injury intent (as based on clinical judgment)

Figure 8 shows the distribution of injury intent over the last two years. There is no significant difference of distribution of injury intent between 2014 and 2015 (p=0.911).

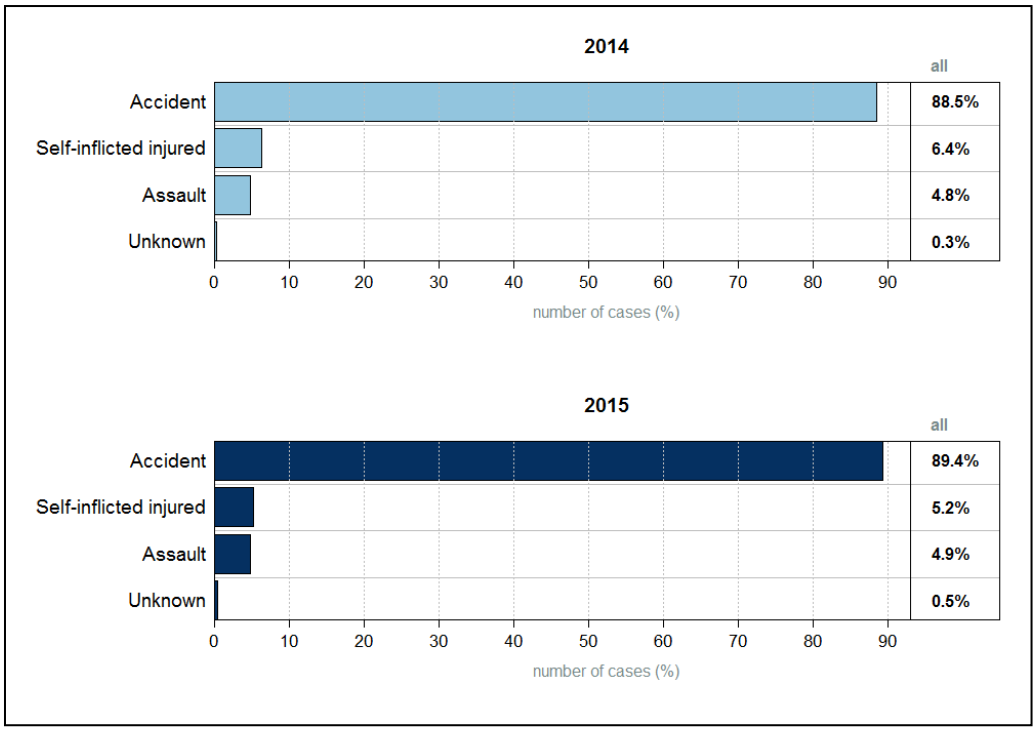


Figure 8: Injury intent.

Table III. Injury intent for trauma patients admitted to CHUV in 2015

	All patients		admitted to shockroom				not admitted to shockroom	
			All		STR criteria		STR criteria	
	n	%	n	%	n	%	N	%
All	405		322		111		83	
Accident	362	89.4	286	88.8	97	87.4	76	91.6
Self-inflicted injured	21	5.2	20	6.2	10	9.0	1	2.4
Assault	20	4.9	15	4.7	3	2.7	5	6.0
Unknown	2	0.5	1	0.3	1	0.9	1	0

c. Mechanism of injury

Figure 9 displays the distribution of mechanism of injury over the last two years without showing any significant differences between 2014 and 2015.

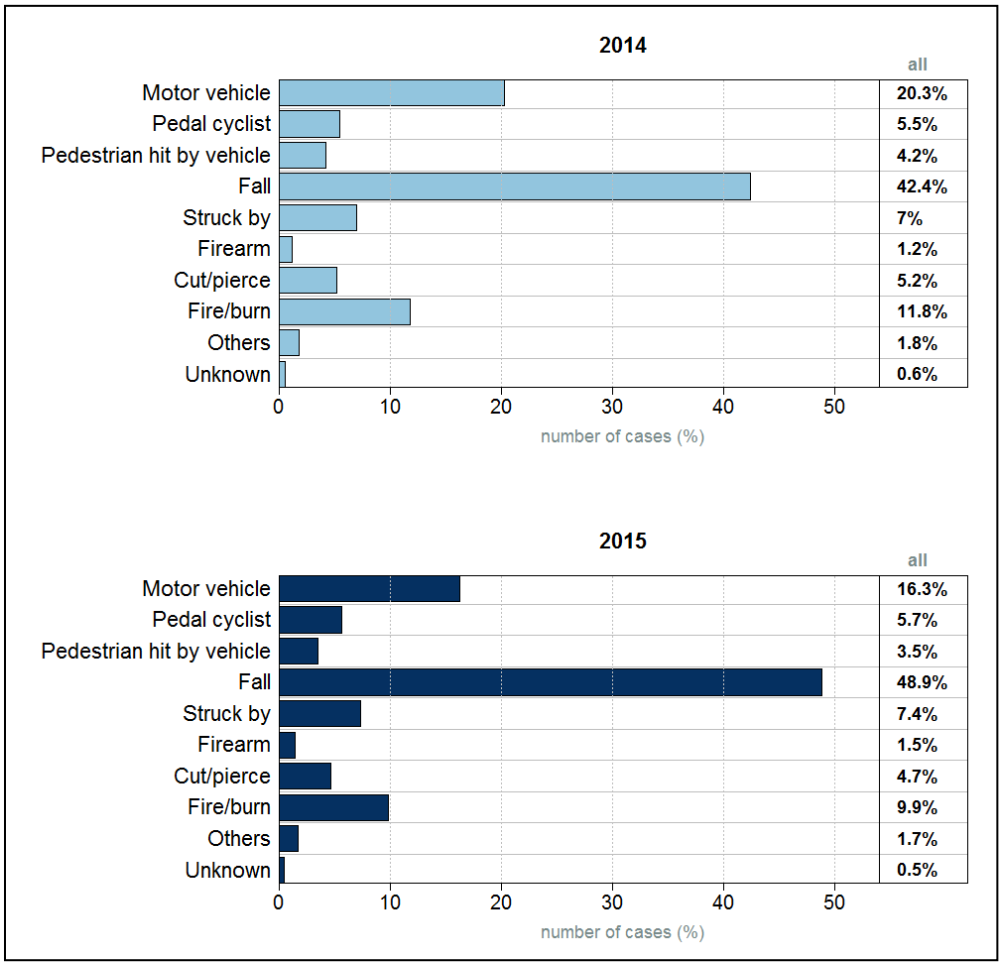


Figure 9: Mechanism of injury.

Table IV. Mechanism of injury

	All patients		admitted to shockroom				not admitted to shockroom	
			All		STR criteria		STR criteria	
	n	%	n	%	n	%	N	%
All	405		322		111		83	
Motor vehicle	66	16.3%	60	18.6%	25	22.5%	6	7.2%
Pedal cyclist	23	5.7%	19	5.9%	8	7.2 %	4	4.8%
Pedestrian hit by vehicle	14	3.5%	13	4.0%	3	2.7%	1	1.2%
Fall	198	48.9%	137	42.5%	59	53.2%	61	73.5%
Struck by	30	7.4%	21	6.5%	6	5.4%	9	10.8%
Firearm	6	1.5%	6	1.9%	6	5.4%	0	0%
Cut/pierce	19	4.7%	19	5.9%	1	0%	0	0%
Fire/burn	40	9.9%	40	12.4%	0	0%	0	0%
Others	7	1.7%	6	1.9%	2	1.8%	1	1.2%
Unknown	2	0.5%	1	0.3%	1	0.9%	1	1.2%

d. <u>Injured body regions</u>

Incidence of injuries per body region for patients admitted in 2014 and 2015, grouped by low severity (AIS <3) and serious severity (AIS ≥3), are shown in figure 10.
We observed significantly more serious head and neck injuries in 2015 as compared to 2014 ($p<0.01$).

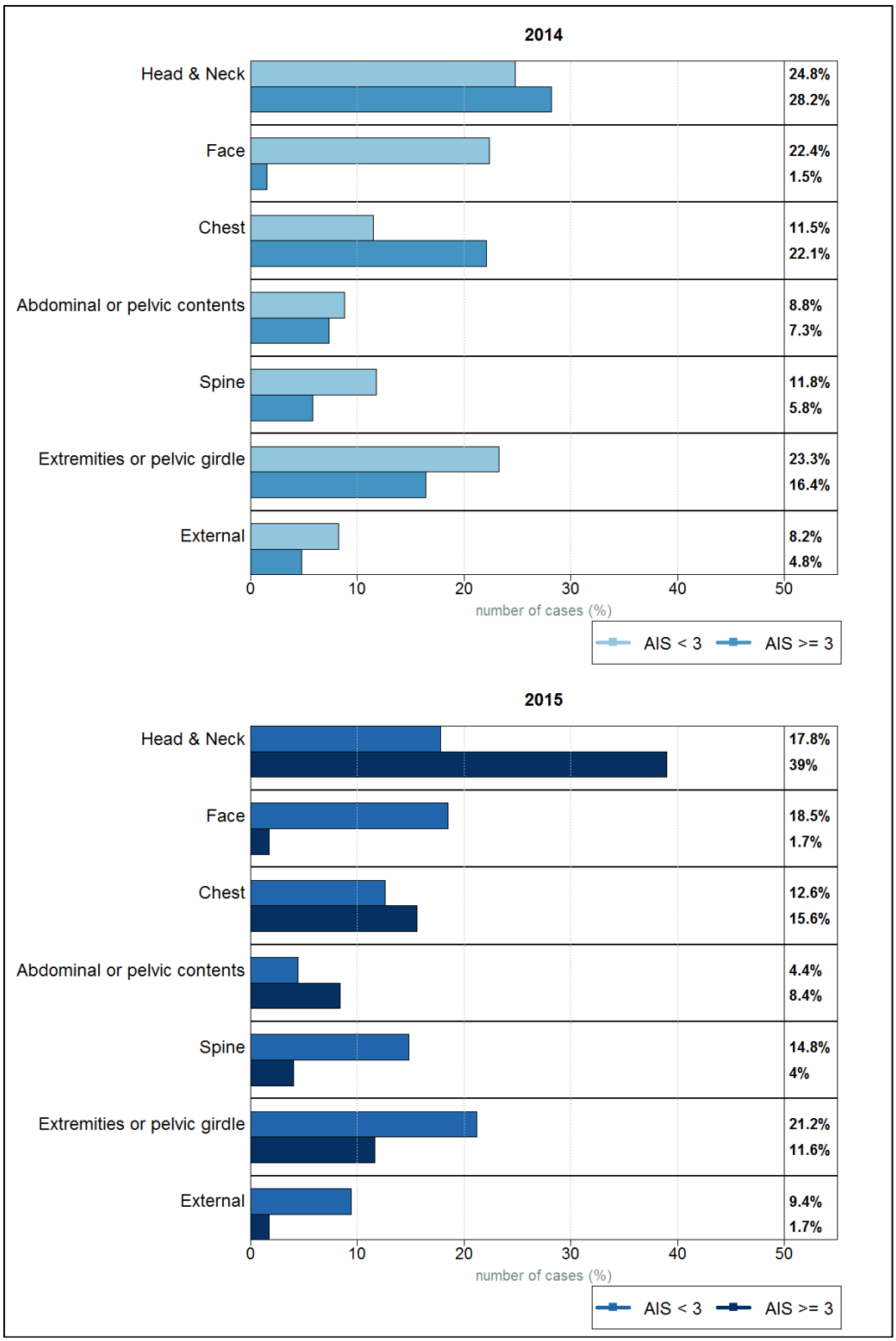


Figure 10: Injured body regions.

5. Medical support after shock room care

a. Transfer destination from shock room

Only patients admitted to shockroom are included into this analysis (n=330 in 2014, n=322 in 2015).

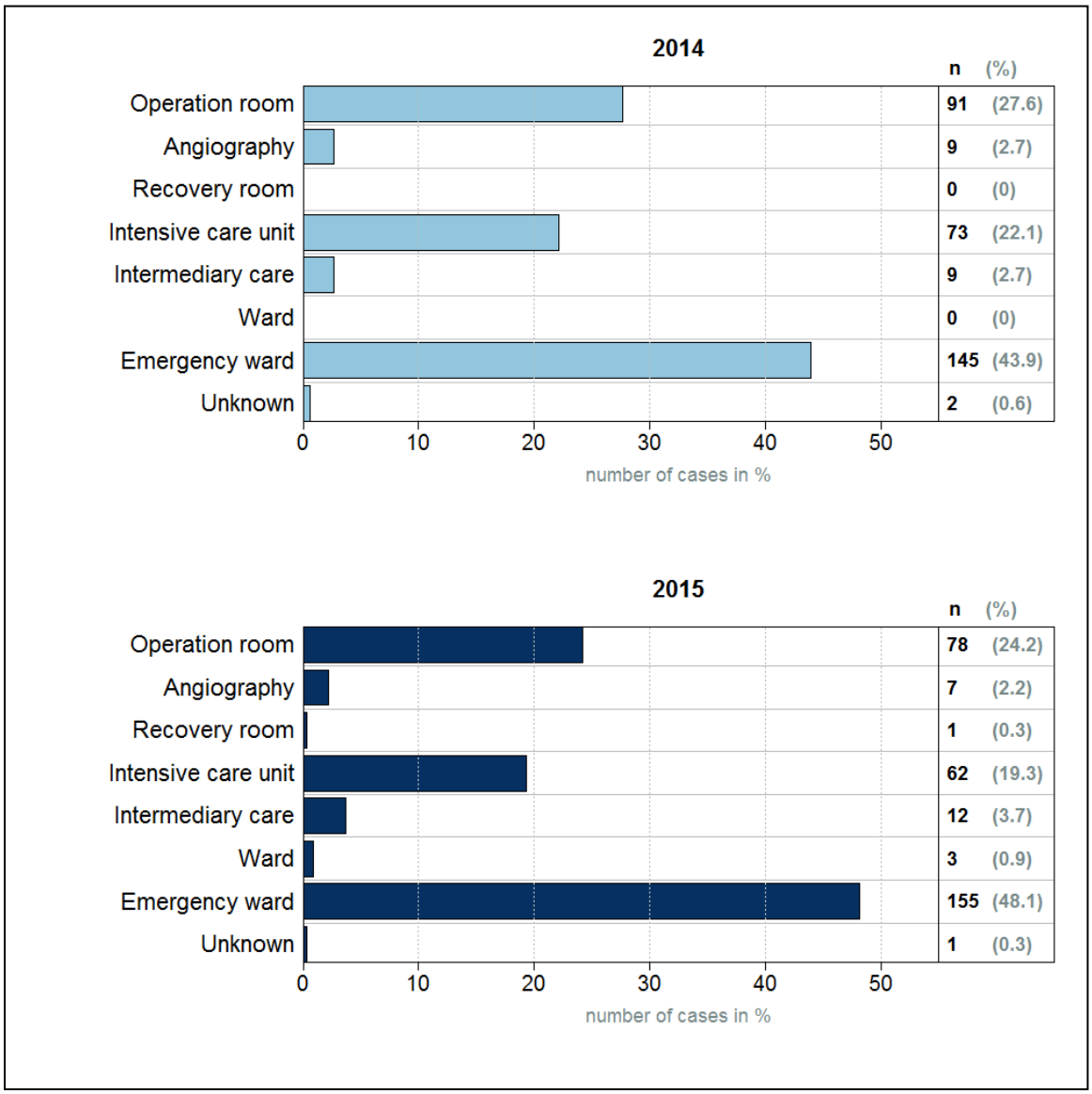


Figure 11: Transfer destination from shock room.

b. Hospital and intensive care unit length of stay

In 2015, the median hospital length of stay (Hospital LOS) for the included population was 6 [2,13] days [Table V]. There is no significant difference to Hospital LOS in 2014. The median Hospital LOS for patients with STR criteria not admitted to shockroom is significantly shorter than patients admitted to shockroom (p<0.01).

Table V. Hospital length of stay (in days).

	All patients		admitted to shockroom				not admitted to shockroom	
			All		STR criteria		STR criteria	
	med	[IQ1,IQ3]	Med	[IQ1,IQ3]	med	[IQ1,IQ3]	med	[IQ1,IQ3]
2014: Hospital LOS	6	[1,16]	6	[1,16]	9	[3,26]	na	
2015: Hospital LOS	6	[2,13]	6	[2,15]	9	[4,19]	5	[2,10]

31.7% of patients were admitted to the intensive care unit (ICU) at a given time within their hospital stay (47.8% in 2014). Of patients with STR criteria not admitted to shockroom 3.6% were admitted to the ICU during their in hospital stay.
Overall significantly fewer patients were admitted to ICU in 2015 as compared to 2014 (all: p<0.01).
Length of stay in ICU however was not significantly different between 2014 and 2015 (all: p=0.914; ISS > 15: p=0.612).

Table VI. Intensive Care Unit length of stay (ICU LOS) (in days).

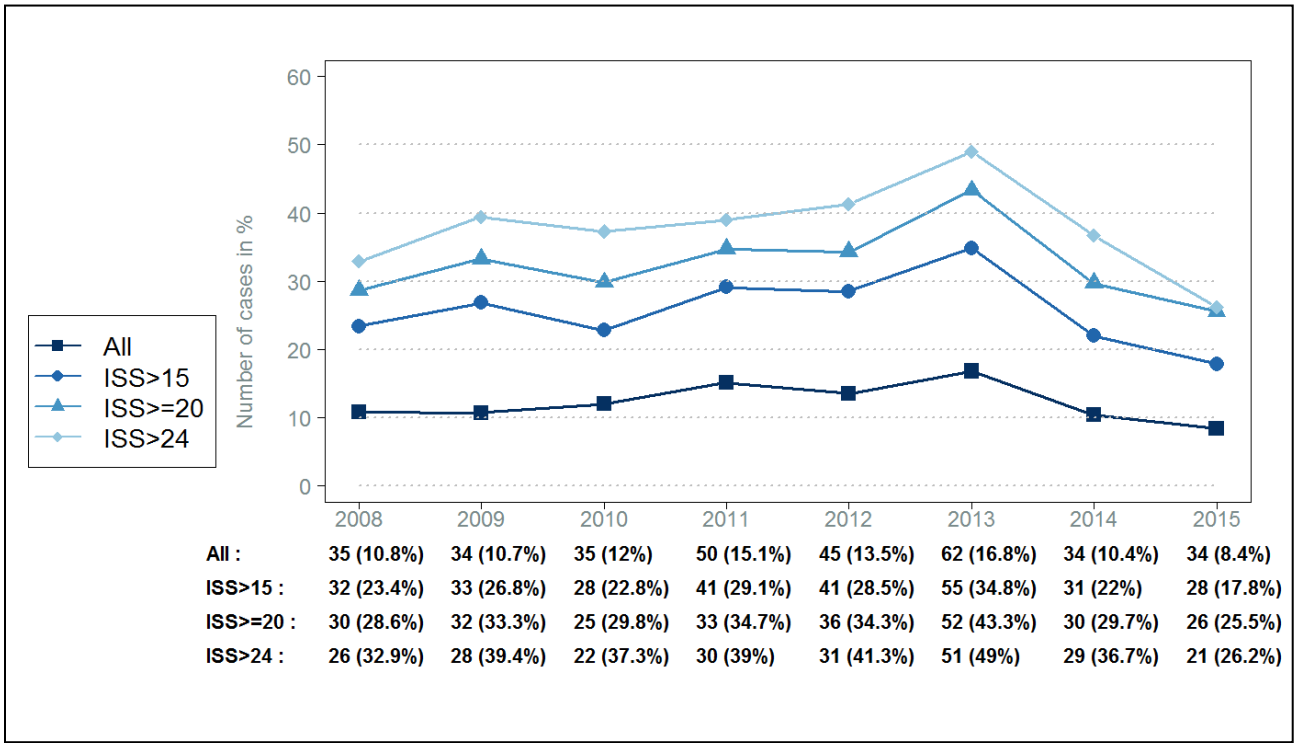
		All patients		admitted to shockroom				not admitted to shockroom	
				All		STR criteria		STR criteria	
2014	ICU admission (n (%))	156	47.8	156	47.8	86	69.4		
	ICU LOS (med [IQ1,IQ3])	4	[2,9]	4	[2,9]	3	[2,9]	na	
2015	ICU admission (n (%))	128	31.7	125	38.9	62	55.9	3	3.6
	ICU LOS (med [IQ1,IQ3])	4	[2,10]	4	[2,10]	4	[2,11]	4	[3,14]

6. Mortality

a. Mortality rates between 2008 and 2015

Figure 12 shows mortality of included patients – overall and considering ISS – over the last eight years.

Over the last three years, we observed a significant decrease in deaths of trauma patients treated in CHUV (p<0.01). Also, the number of deaths with ISS>15, ISS≥20 and ISS>24 has decreased significantly (p<0.01, p=0.028, p=0.015, respectively) .

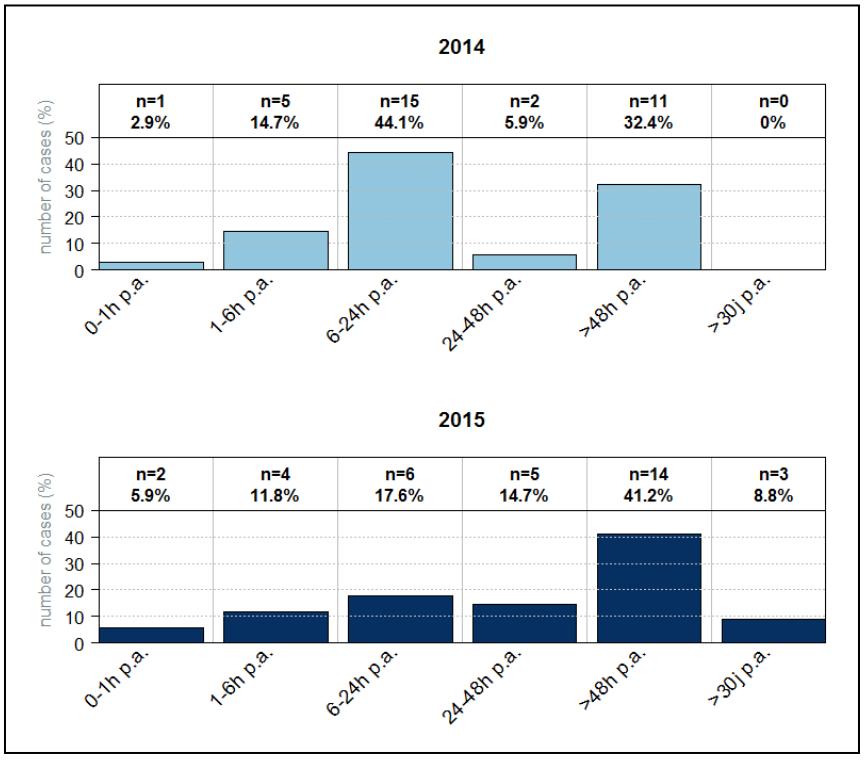


	2008	2009	2010	2011	2012	2013	2014	2015
All :	35 (10.8%)	34 (10.7%)	35 (12%)	50 (15.1%)	45 (13.5%)	62 (16.8%)	34 (10.4%)	34 (8.4%)
ISS>15 :	32 (23.4%)	33 (26.8%)	28 (22.8%)	41 (29.1%)	41 (28.5%)	55 (34.8%)	31 (22%)	28 (17.8%)
ISS>=20 :	30 (28.6%)	32 (33.3%)	25 (29.8%)	33 (34.7%)	36 (34.3%)	52 (43.3%)	30 (29.7%)	26 (25.5%)
ISS>24 :	26 (32.9%)	28 (39.4%)	22 (37.3%)	30 (39%)	31 (41.3%)	51 (49%)	29 (36.7%)	21 (26.2%)

Figure 12: Mortality in hospital.

b. Timing of death

Figure 13 shows the timing of in-hospital death.
We observed a significant decrease in deaths in the period of 6-24 hours after admission for 2015 as compared to 2014.



Abbreviation: p.a.: post-admission

Figure 13: Mortality in hospital

IV. Acknowledgments

We would like to thank all participating staff and departments that contributed to data-collection within TRAC. A special thank goes to the departments of Anaesthesiology, Emergency Medicine, Intensive care, Orthopaedic surgery, Visceral Surgery as members of the steering committee of the "Filière Trauma" and to Prof. J.-B. Wasserfallen, medical director of CHUV.

V. References

(1) Committee on Medical Aspects of Automotive Safety. Rating the severity of tissue damage. I. The abbreviated scale. JAMA. 1971; 215(2):277-80. doi:10.1001/jama.1971.03180150059012

VI. Abbreviations

AIS	Abbreviated Injury Scale
CHUV	Lausanne University Hospital (Centre Hospitalier Universitaire Vaudois)
CHVR	Sion Hospital (Centre Hospitalier du Valais Romand)
HUG	Geneva University Hospital (Hôpitaux Universitaires de Genève)
ICU	Intensive Care Unit
ISS	Injury Severity Score
LOS	Length Of Stay
MHS	Highly Specialized Medicine
STR	Switzerland Trauma Registry