Trauma Network Romandie

Comparative report on year 2015

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Summary

I. Introduction

Since 2011, the management of serious injuries is linked to the Highly Specialized Medicine (MHS). This management was allocated to twelve Swiss hospitals. The committee for MHS has declared that, amongst organizational and resource requirements, each Traumacenter needs to fulfill the following requests:

- adhere to the Swiss Traumaregistry (STR) with the following inclusion criteria: ISS (Injury Severity Score) > 15 and/or AIS (Abbreviated Injury Scale) head score ≥ 3),
- receive more than 40 patients with ISS ≥ 20 and/or AIS head score ≥ 3.

Internationally used cut-offs for injury severity are ISS > 15, indicating "severe injury" and ISS > 24 ("critically injury"). The Swiss organization MHS has chosen a cut-off of ISS ≥ 20. For the purpose of international comparability, all three thresholds have been included in this analysis.

In late 2010, the hospital directors of the Lausanne University Hospital (CHUV) and the Geneva University Hospital (HUG) decided to develop within the framework of the GE-VD association a collaborative project for the treatment of severe injured patients. Sion Hospital (CHVR) was included into this collaboration. The aim was to enable the collaboration between the three French-speaking Traumacenters in Switzerland.

Under the responsibility of Dr. Heim, cheffe de clinique in anesthesiology at CHUV, Dr. Andereggen, associate physician in emergency surgery unit at HUG and Dr. Gamulin, associate physician in Orthopedics at HUG and Dr. Haller, head physician of the surgical department in Sion, the Traumanetwork Romandie has been created with a comparable Traumaregistry on each site.

This report provides a comparative analysis of the characteristics and outcome of trauma patients admitted to CHUV, to HUG and to CHVR from the 1st of January to the 31st of December 2015. Analysis is performed based on data from the institutional Traumaregistry "TRAC" for the CHUV, from the Traumaregistry HUG for the HUG and from the Traumaregistry CHVR for the Sion Hospital.

II. Methodology

1. Inclusion criteria

All adult trauma patients (≥ 16 years) admitted to shock room were included to each of the local Traumaregistries. 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. Pediatric and burn patients were excluded.

2. Data collection and codification

For all center, 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

The characteristic of the population are presented for each receiving traumacenter. 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 3.2.1.

III. Results

1. Patients' characteristics

Table I represents the numbers of patients admitted to each of the collaborating centers. The characteristics of the 319 patients included to CHUV, 252 patients to HUG and 219 patients to CHVR are shown in table II. We observe a significant difference in age between CHUV and HUG (p<0.01). There is no significant difference for the other centers (CHVR-HUG: p=0.117 ; CHVR-CHUV : p=0.114).

Table I. Trauma patients admitted to CHUV, HUG or CHVR.

	CHUV		HUG		CHVR	
	n	%	n	%	n	%
Number of admissions	408		255		252	
Number of burned patients	39	10	3	1	5	2
Number of pediatric cases	56	14	0		30	12
Number of cases qualifying for this report [1]	319	78	252	99	219	87
Number of secondarily admissions	48	15	14	6	21	10

[1] Cases qualifying for this report: adult patients (≥ 16 years), burns excluded.
Abbreviation: na = not available.

Table II. Characteristics of the included trauma patients.

	CHUV		HUG		CHVR	
	n	%	n	%	n	%
n	319		252		219	
Gender						
Male	225	71	173	69	164	75
Female	94	29	79	31	55	25
Age						
Median	53		44		50	
(IQR)	(32-74)		(30-59)		(32-64)	

2. ISS and STR criteria

The inclusion criteria for STR are ISS > 15 and/or AIS head score ≥ 3 and the inclusion criteria for MHS are ISS ≥ 20 and/or AIS head score ≥ 3. Table III represents the distribution of the headcount according to ISS and the number of patients who meets STR and MHS criteria.

Table III. ISS, STR and MHS criteria.

	CHUV		HUG		CHVR	
	n	%	n	%	n	%
Patients included in analyses	319	100	252	100	219	100
ISS						
ISS > 15	141	44	109	43	87	40
ISS ≥ 20	94	29	78	31	53	24
ISS > 24	74	23	57	23	39	18
STR criteria [2]	194	61	138	55	111	51
MHS criteria [1]	172	54	120	48	89	41

[1] Patients who meets MHS criteria: ISS ≥ 20 and/or AIS head score ≥ 3

[2] Patients who meets STR criteria: ISS > 15 and/or AIS head score ≥ 3

Abbreviation: ISS = Injury Severity Score; STR = Swiss Trauma Registry; MHS = Highly Specialized Medicine.

There was no significant difference of distribution of ISS between the three centers (between HUG and CHUV, $p = 0.960$; between CHVR and HUG, $p = 0.203$; between CHVR and CHUV, $p = 0.195$).

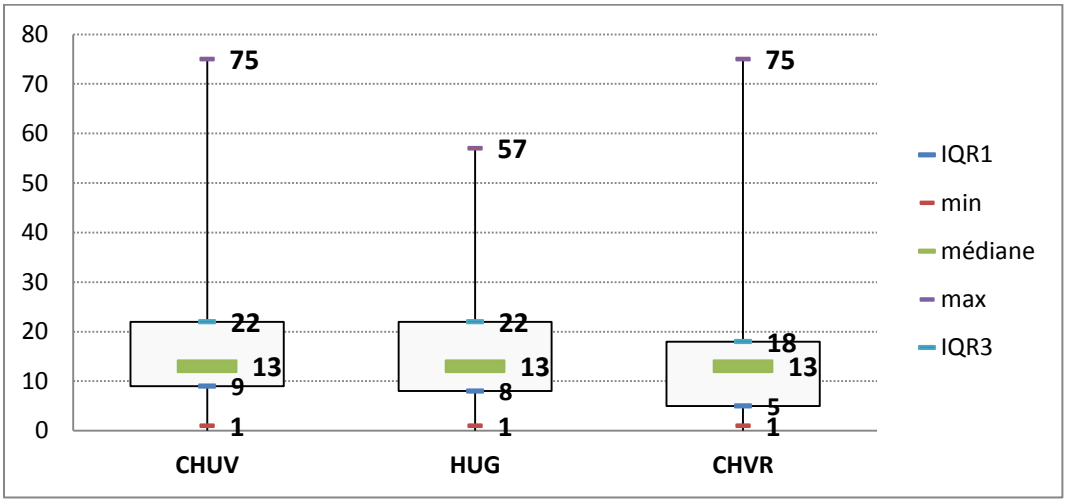

Figure 1: Distribution of ISS according by the center.

3. Type of trauma

Figure 2 represents the intention of trauma in each center. We observed significantly more accidents and less self-inflicted injury in CHVR as in comparison to CHUV and HUG (p<0.01).

Penetrating trauma represents 8%, 11% and 5% of cases to CHUV, HUG, and CHVR, respectively (p = 0.029).

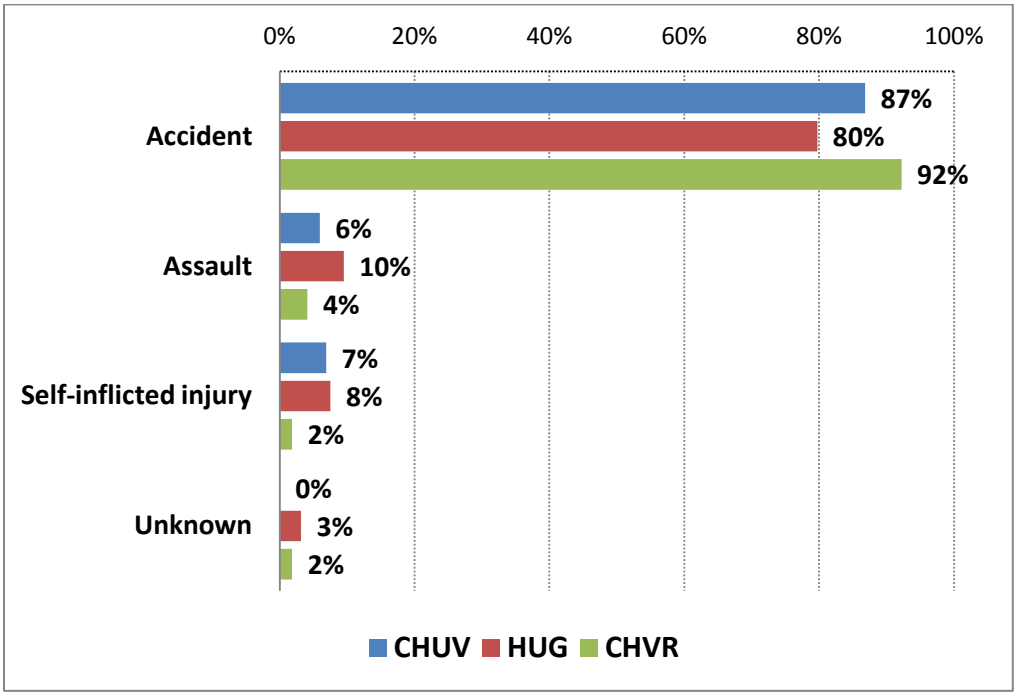

Figure 2. Intention of trauma.

Figure 3 represents the mechanism of injury according to the center.

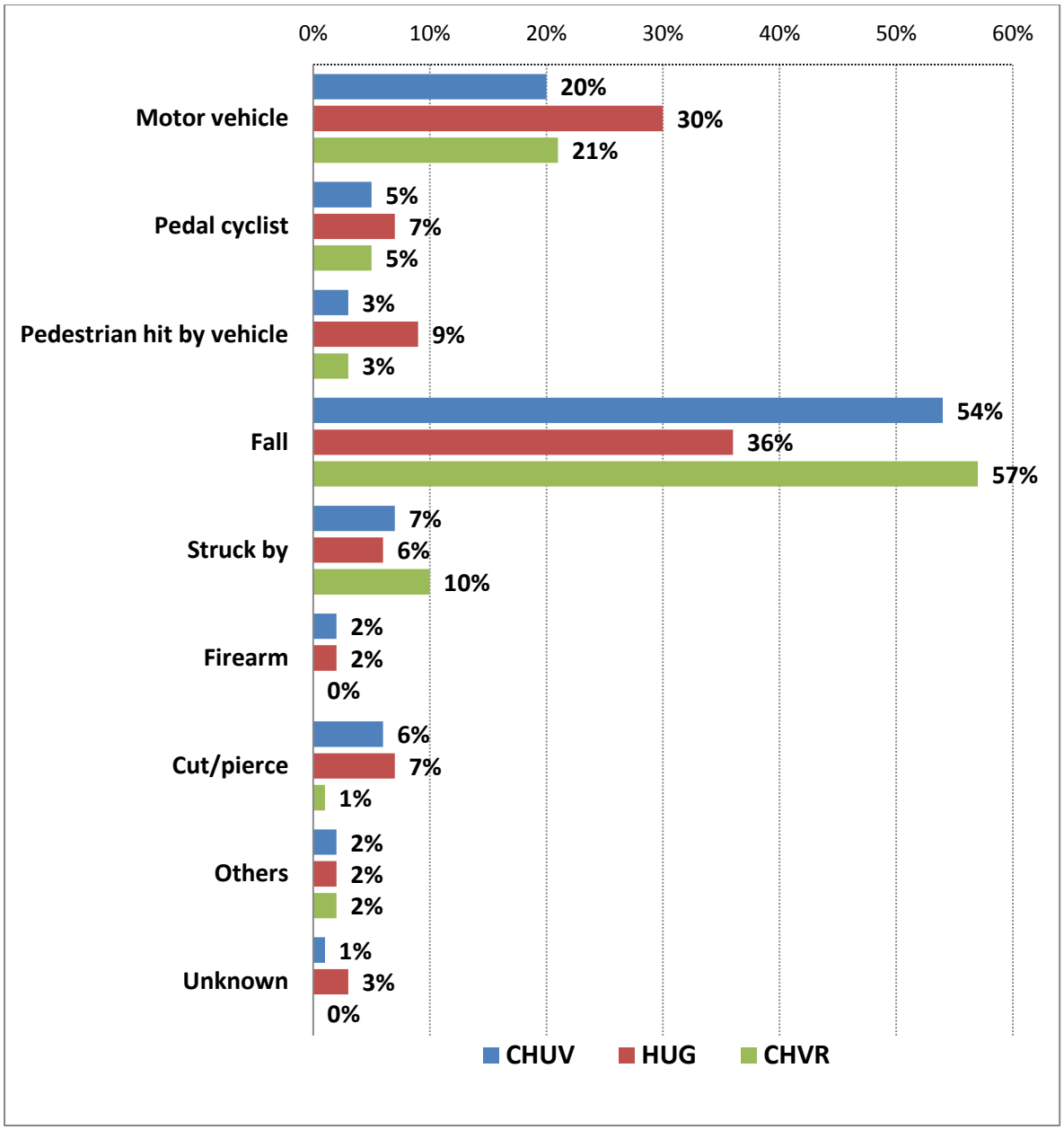

Figure 3. Mechanism of injury.

In the other type of trauma group, we find accidents of agricultural equipment, hangings, snow avalanche.

4. Outcome

Figure 4 shows the transfer destination after shock room care: the number of patients having undergone an emergency intervention (defined as an immediate transfer to the operating room or the angiographic facility), the number of patients directly admitted to the Intensive Care Unit (ICU) and the number of patients transferred to the mortuary.

We observed significantly more emergency interventions and more admissions to the ICU in HUG as in comparison to CHUV and CHVR ($p < 0.01$).

We observed significantly more interventions within 24 hours in CHUV as in comparison to HUG ($p = 0.041$) and CHVR ($p < 0.01$). We observed significantly more interventions within 24 hours in HUG as in comparison to CHVR ($p < 0.01$).

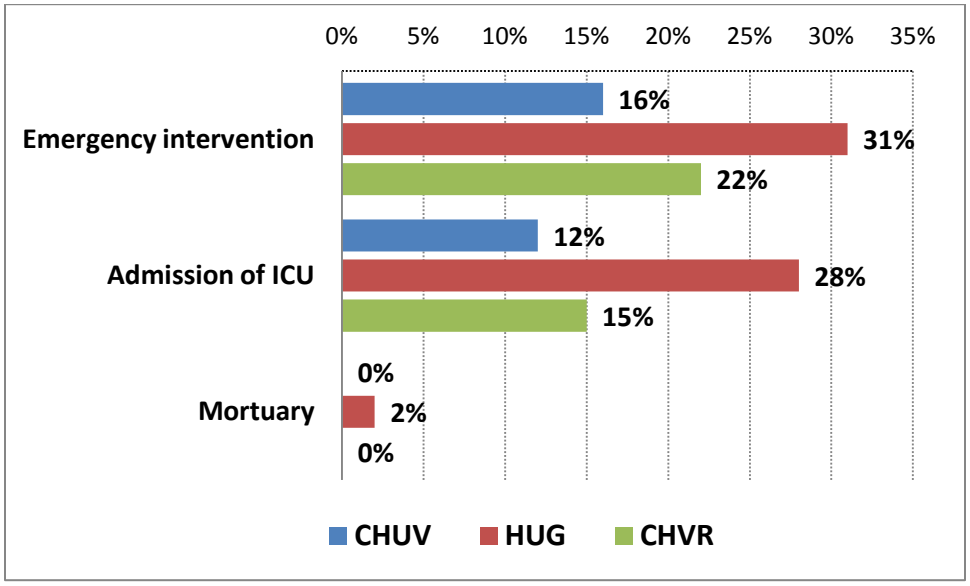

Figure 4. Medical support after shock room care.

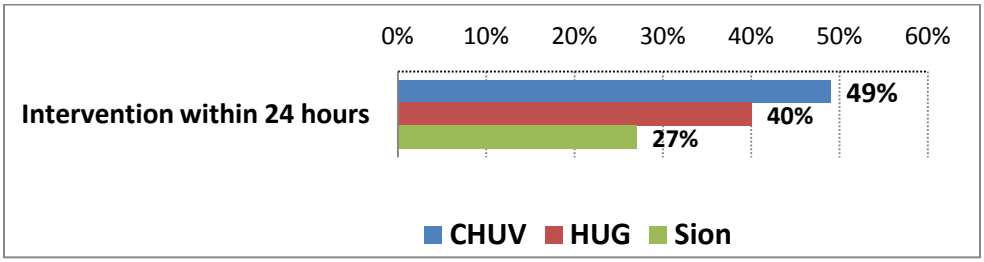

Figure 5. Intervention within 24 hours.

Table IV shows the number of patients admitted to ICU during hospital stay and the length of stay in ICU.

Table IV. Admission to the ICU during hospital stay.

	CHUV		HUG		CHVR	
	n	%	n	%	n	%
Patients included	319	100	252	100	219	100
Admission to ICU	79	25	121	48	70	32
LOS in ICU						
median	3		3		3	
(IQR)	(2-10)		(2-8)		(2-4)	

Abbreviations: ICU = Intensive Care Unit; LOS = Length of Stay.

Figure 6 shows mortality rates according to ISS group for each center.

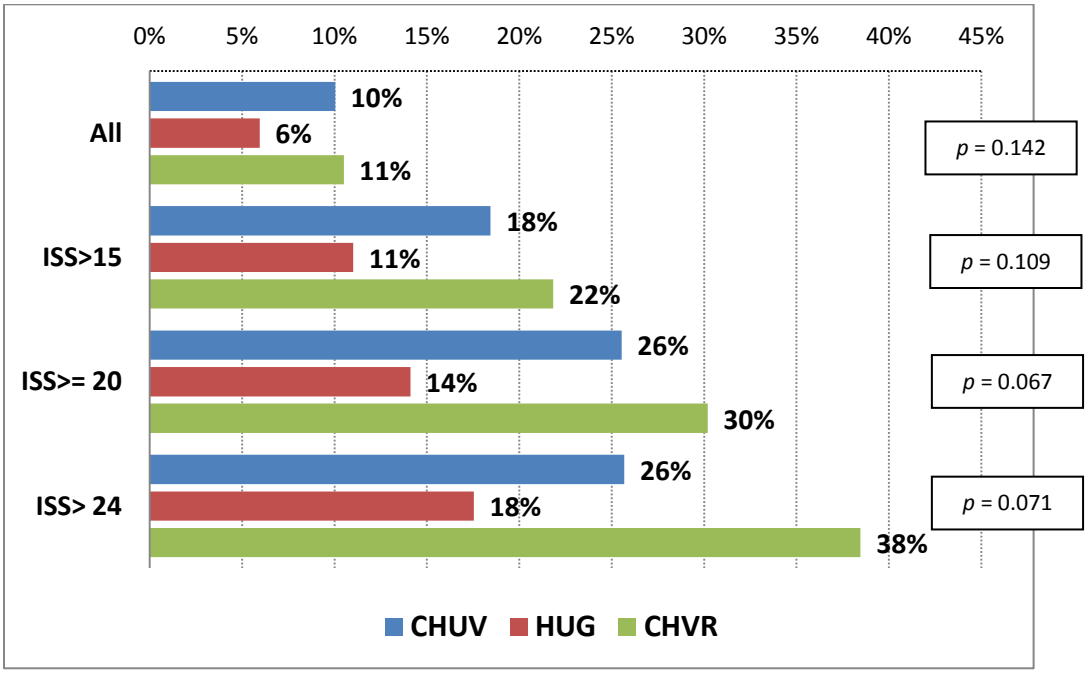

Figure 6. Mortality

IV. Conclusion

In 2015, the number of adult trauma patients with potentially severe injuries (burn patients excluded) treated within the TraumaNetwork Romandie was 319 in CHUV, 252 in HUG and 219 in CHVR. In comparison, in 2014, the three institutions treated 241 (CHUV), 254 (HUG) and 293 (CHVR) adult trauma patients with potentially severe injuries It must be mentioned that CHUV has adapted it is inclusion criteria for the local registry to the needs of the Swiss national Registry. Since 1 January 2015, CHUV screens all trauma patients arriving to the emergency department on fulfilling the STR-inclusion criteria. This explains the increased number of patients as compared to 2014. HUG and CHVR had proceeded to this adaption already in 2014.

Unlike 2014, we observed no significant difference for injury severity score of patients admitted in the three trauma centers.

As in 2014, accidents are significantly more common in CHVR compared to CHUV and HUG, while CHVR has significantly less self-inflicted injuries as the partner centers.

HUG sees more emergency interventions than CHUV and CHVR. This might be due to several factors. The most likely reason might be a difference in organization of the emergency department. In TNR, “emergency operation” is defined as an operative intervention undertaken immediately following the acute multidisciplinary traumacall period, defined as “shockroom period”. While as CHUV and CHVR make a clear distinction between “shockroom period” and treatment in emergency department by transferring patients into a different location, in HUG, patients remain at the same place even after the shockroom period has ended. Therefore, in CHUV and CHVR, patients who are transferred to OR even little time after the end of the multidisciplinary shockroom period, won’t be caught in this analysis. Another reason might be differences in resource availability.

For this, we have included an analysis indication all operations within the first 24h after admission as seen in Figure 5. However, even such might still be subject of clinical judgment and resource availability.

Overall mortality showed no significant difference between the centers and no significant difference in the mortality rate for each ISS subgroup.

V. Acknowledgments

We would like to thank all participating staff and departments that contributed to the data-collection within the three registries. A special thank goes to hospital directors as well as to the participating departments in each center.

VI. 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

VII. 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