TraumaRegister DGU®
DEUTSCHE GESELLSCHAFT FÜR UNFALLCHIRURGIE

German Trauma Society (DGU)

Committee on Emergency Medicine, Intensive Care and Trauma Management (Sektion NIS)

and AUC - Academy for Trauma Surgery

TraumaRegister DGU®

Annual Report 2015

with patients admitted until end of 2014

TR-DGU

TraumaRegister DGU®

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Preface

Dear participant of TraumaRegister DGU®,

we are happy to present the **Annual Report 2015** of the TraumaRegister DGU® for your hospital. This report contains all trauma patients admitted until end of 2014, and completely documented until end of March 2015.

The TraumaRegister DGU® now exists for 22 years, and together with the British TARN it is the leading trauma registry in Europe. Last year on occasion of the 20th anniversary of the registry a supplement issue of *Injury* has been published. In this issue you will find actual scientific results as well as descriptions of methods and history of the registry. There is a continuing interest in performing scientific analyses using data from the reguistry. You will find the most recent publications in the appendix of this report (a complete list of all publications is available at our homepage: *www.traumaregister-dgu.de*).

What is new in this report 2015?

The number of actively **participating hospitals** is stable at about 600; there were only three new participants last year. The number of documented **patients** has reached a new maximum: 38.046 new cases have been added to the registry. However, not all of these patients suffered from severe injuries. The number of patients with only minor injuries (maximum AIS = 1) constantly increase; last year, every ninth patient (11%) belonged to this group. This obviously limits the comparability of results among hospitals, but also when compared over time. The TR-DGU has been designed to cover severely injured patients, but not those with minor injuries. Furthermore, documenting these patients also increases the workload in the participating hospitals.

As a new characteristic of the present report, we thus defined a '**basic patient group**' which excludes patients with minor injuries. Actually, this basic patient group consists of 82% of the total group. You will find details of this new definition on page 1 which has newly been added to the report ('Sample').

Another core aspect of the present report is **data quality**. The results on page 2 (comparison of observed and predicted mortality) has been extended to include the quality of prediction. A RISC II score could be computed based on injury pattern and age alone, however, the more data are available, the more precise the prognosis will be.

Last year we introduced a new page containing **subgroup analyses**. There was a lot of positive feed-back for this page, so that we decided to extend it to two pages this year. On Page 8.1 you will find subgroups of patients from your own hospital while page 8.2 allows the comparison with trauma centers of the same level (local, regional, supra-regional).

KJindest regards



Rolf Lefering Thomas Paffrath Ulrike Nienaber

Sektion NIS of DGU – Working Group TraumaRegister and AUC - Akademie der Unfallchirurgie GmbH

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1. Sample

Admission via the shock room and need for intensive care is the official **inclusion criterion** for documenting a patient in the TraumaRegister DGU® (TR-DGU). Patients who die before ICU admission should also be included. This pragmatic criterion was chosen to avoid complicated score calculations in the emergency room, and to limit tzhe documentation to patients with relevant injuries.

However, in recent years, the number of patients with only minor injuries continuously increased. On the one hand, this means a higher workload, but more important it limits also the comparability of findings both, between hospitals and over time. Therefore, a '**basic patient group**' was defined here, and nearly all analyses presented in this report refer to this patient group only (and not to all patients).

The severity of an injury is determined using the *Abbreviated Injury Scale* (**AIS**) which assigns a severity grade of 1 (minor) to 6 (maximal) points to each injury. Using these severity grades, more sophisticated measures like the *maximum AIS severity* (**MAIS**), the *Injury Severity Score* (**ISS**) or the *New ISS* (**NISS**) could be derived.

The following table gives an overview about the different patient groups in 2014.

	Your hospital 2014	primary admitted	transfer in	early transfer out	**TR-DGU 2014**
Total number of documented patients	**38046**	32766	2927	2353	38046
MAIS 1 The most severe injury of these patients were of AIS grade 1 (MAIS = 1). Thus they were not severely injured. Furthermore, the RISC II prognostic score has not been validated for these cases. These cases were excluded from further analysis (except page 5.3)	**4167** (11%)	4036	32	99	4167 (11%)
MAIS 2 The worst injury was of AIS grade 2	**8452** (22%)	7704	276	472	8452 (22%)
MAIS 3+ The worst injury was of AIS grade 3 or more (MAIS 3+) which recently was defined as a „serious injury" by the EU when looking for an internationally agreed definition for road traffic research.	**25427** (67%)	21026	2619	1782	25427 (67%)
Intensive care Patients who required intensive care due to their injuries (admission to ICU)	**29103** (76%)	25182	2679	1242	29103 (76%)
Deceased These patients died in the acute care hospital	**3175** (8%)	2831	344		3175 (8%)
Basic patient group This definition includes all MAIS 3+ patients. MAIS 2 patients were included only if they died or were treated on the intensive care unit. Patients also had to have valid age data.	**31024** (82%)	**26184**	**2847**	**1993**	**31024** (82%)
ISS 16+ The definition ISS ≥ 16 (or > 15) is used in many scientific papers on trauma patients.	**16843** (44%)	13530	2042	1271	16843 (44%)
Severely injured Injury severity (ISS ≥ 16) is combined with physiological consequences as done with the new 'polytrauma' definition (see p. 11, and Paffrath et al. 2014).	**9486** (25%)	7821	996	669	9486 (25%)
Polytrauma According to the new der „Berlin Definition" two body regions need to be severely affected (MAIS 3+ in each), and one or more physiological problems are present (see p. 11, and Pape et al. 2014)	**4524** (12%)	3872	379	273	4524 (12%)

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2. Observed Mortality and Prognosis

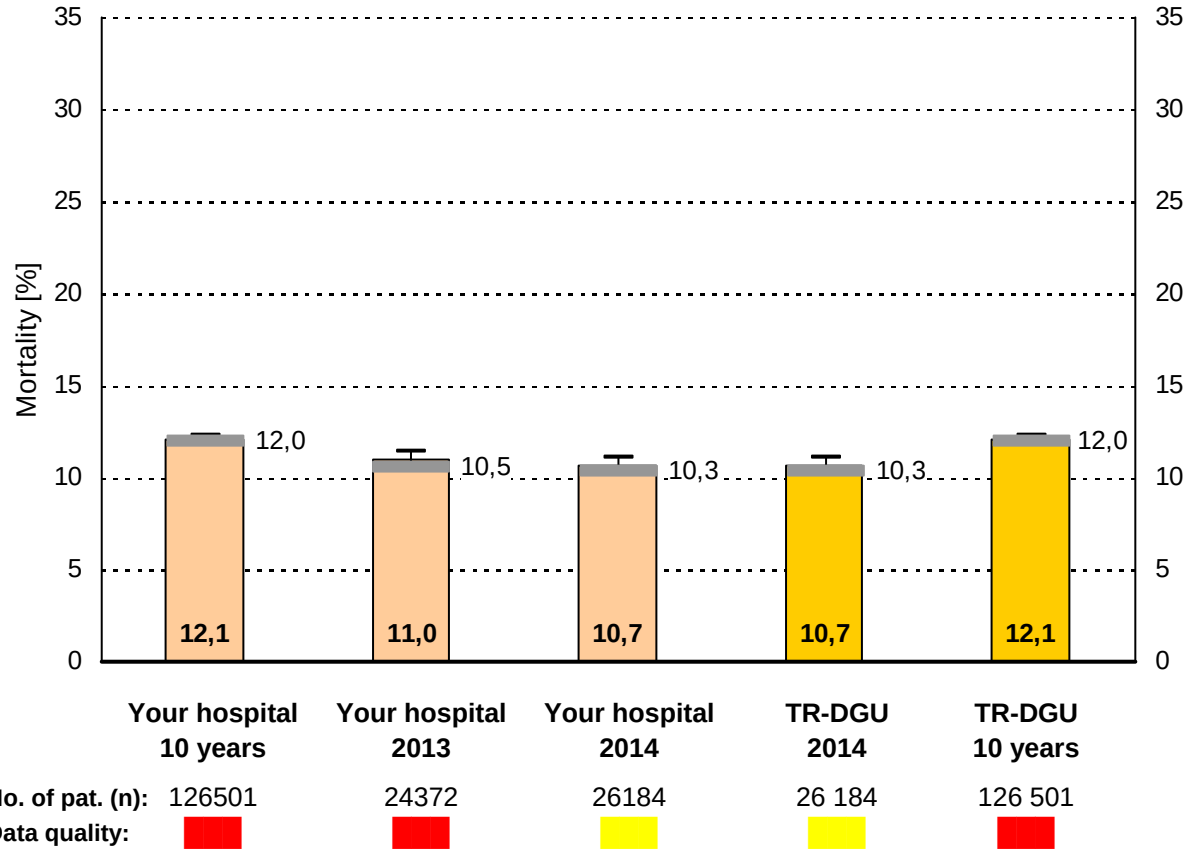
Comparing the **observed mortality** of severely injured trauma patients with their **prognosis** is a central element of quality assessment in the TraumaRegister DGU®. Here the prognosis is derived from the newly developed **RISC II** (Revised Injury Severity Classification. see Lefering et al. 2014) prognostic score. This score could be calculated for all primary admitted patients. The analysis on this page is limited to the **basic patient group** as defined on page 1.

The **total number** of patients (basic patient group) documented from your hospital is: n = **170742**
- among these, documented in the **recent 10 years** (2005-14): n = **151419**
- among these, documented in the last year (**2014**): n = **31024**
- among these **primary admitted** cases (no tranfer in; no early transfer out): n = **26184**

Comparisons of outcome and prognosis will be performed only in **primary admitted patients**. For patients **transferred in** from another hospital (n=2847 in 2014) initial measurements from primary admission were missing; patients **transferred out** early (within 48 hours after admission; n=1993 in 2014) have no final outcome.

The mean age of the 26184 patients was 50.5 years, and 70% ware males. The mean ISS was 18.0 points. Of these patients 2793 died in hospital, which was **10.7%** (95% Confidence intervall: 10.3 - 11.1). The risk of death prognosis based on RISC II **10.3%**. You find these values in the figure below. where also your hospital results from previous years are presented together with the overall result in the registry.

Details and definition of **Data quality** are given on the following page 2.2 (see also page 8).



Legend to the figure:

The bars represent the observed mortality rate; percentages are given at the bottom of each bar. The predicted mortality rate based on RISC II is given as a **grey** vertical bar. This bar turns to **green** or **red** in case that the observed mortality is significantly lower (i.e. better) or higher than expected, respectively.

The interpretation of the results has to consider that these findings depend on statistical uncertainty. Therefore, the 95% confidence interval for the observed mortality rate is given as well (***vertical line***). The confidence interval describes a range of values which cover the true value with a high probability (95%). The more patients a value is based on, the narrower is the confidence interval. In case that the expected prognosis lies outside the confidence interval, it could be interpreted as a significant deviation ($p<0.05$).

If the observed mortality rate is based on ***less than 5 cases***, the large confidence interval will not be presented.

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Data Quality

The validity of a prognosis depends on the quality and the completeness of variables required for its calculation. The **RISC II** score requires 13 different pieces of information; these data are wighted and combined into a final estimator of outcome. The only compulsory components were age and injury severity, however, every additional information about the patient improves the outcome prediction.

Therefore, we added supplementary information about the data quality of prediction. If all data required for calculating the RISC II score were present, or if only a single information was missing, then this case was considered as '**well documented**'. The poercentage of well documented cases (per hospital) is now used as a descriptor of data quality for outcome prediction. We defined three colour-coded categories:

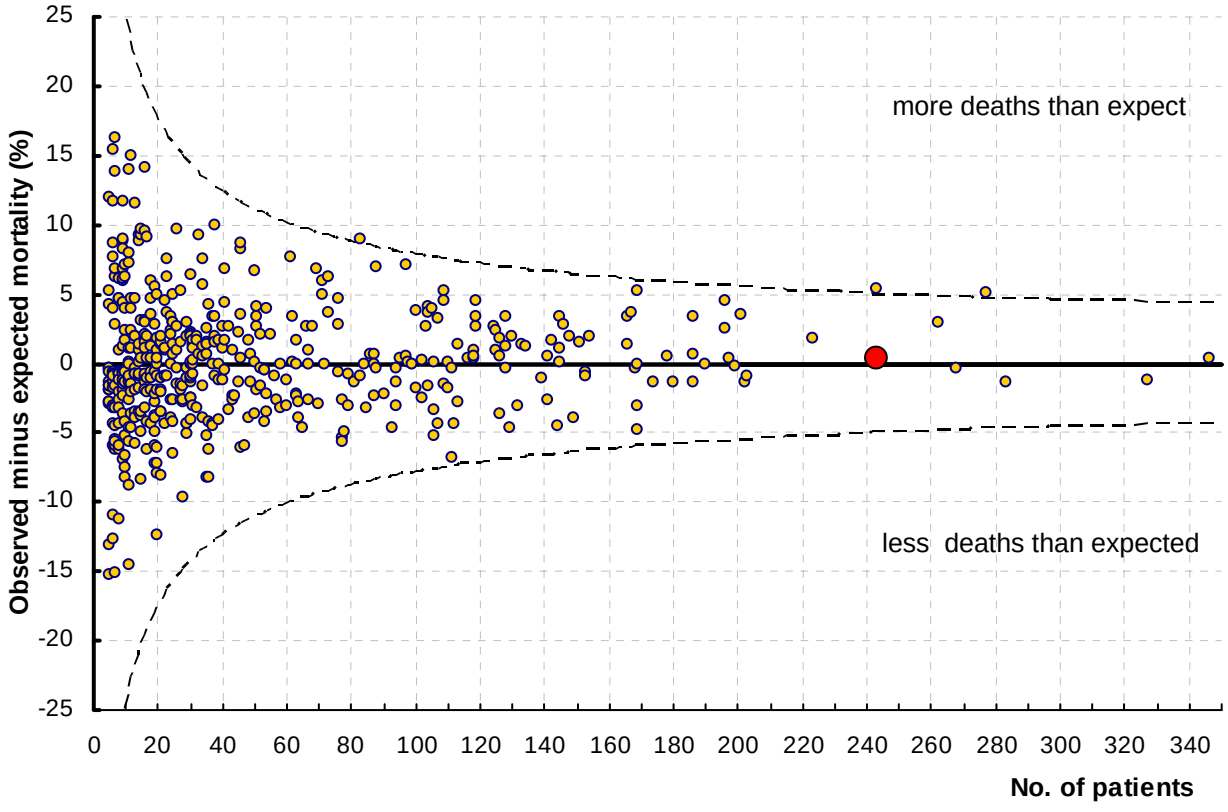
means: in **95-100%** of cases the RISC II has been 'well documented',
means: in **80-94%** of cases the RISC II has been 'well documented',
means: in **less than 80%** of cases the RISC II has been 'well documented'.

	Your hospital 10 years	Your hospital 2013	Your hospital 2014	TR-DGU 2014	TR-DGU 10 years
All cases, basic group (n)	126501	24372	26184	26 184	126 501
'well dokumented' (n)	93282	19279	21348	21 348	93 282
(%)	73.7	79.1	81.5	81.5	73.7
Data quality					
Average number of missing RISC II data per patient	1.0	0.9	0.8	0.8	1.0

Mortality *versus* prognosis

Your hospital 2014: Patients: **26184** primary admitted; basic patient group
Difference: **0.3%** (TR-DGU: +0.3%)

The following figure compares each hospital's **observed mortality rate** with the respective **RISC II prognosis in 2014.** like on page 2.1. The difference of observed and expected mortality rate is plotted against the number of patients on the horizontal axis. Negative values correspond to mortality rates which are lower than expected. The dotted lines represent the 95% confidence interval. Hospitals with **less than five patients** were **not included** in this figure, due to the large statistical uncertainty.



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3. Basic data from the last 3 years

These results again refer to the **basic patient group** only excluding patients with minor injuries (see page 1).
Attention: Results have to be interpreted with caution when the number of patients is low!

		Your hospital				TraumaRegister DGU®	
		10 years	2012	2013	**2014**	2014	10 years
Total no. of patients	[n]	151419	25383	28914	**31024**	31,024	151,419
Primary adm. & treated	[n]	126501	21185	24372	**26184**	26,184	120,010
Early transferred out	[n]	8702	1702	1793	**1993**	1,993	7,967
All primary admissions	[n]	135203	22887	26165	**28177**	28,177	127,977
From other hospital	[n]	16216	2496	2749	**2847**	2,847	14,447
Patients							
Mean age	[years]	48,6	49,1	50,3	**50,9**	50,9	48,6
60 years or older	[%]	33%	34%	36%	**37%**	37%	33%
Male patients	[%]	71%	71%	70%	**70%**	70%	71%
Trauma							
Blunt trauma	[%]	96%	95%	96%	**96%**	96%	96%
Mean ISS	[points]	20,1	19,4	18,4	**18,4**	18,4	20,1
ISS ≥ 16	[%]	60%	57%	53%	**54%**	54%	60%
Head injury (AIS head ≥ 3)	[%]	40%	38%	37%	**37%**	37%	40%
Pre-hospital Care (only primary admissions)							
Intubation	[%]	30%	27%	24%	**23%**	23%	30%
Unconscious (GCS ≤ 8)	[%]	21%	19%	18%	**17%**	17%	21%
Shock (BP ≤ 90 mmHg)	[%]	12%	11%	10%	**9%**	9%	12%
Avg. amount of volume	[ml]	789	726	652	**627**	627	789
Shock Room / ER (only primary admissions)							
Whole body CT	[%]	72%	75%	75%	**76%**	76%	72%
X-ray of thorax	[%]	46%	43%	41%	**38%**	38%	46%
Blood transfusion	[%]	12%	10%	8%	**8%**	8%	12%
Treatment in the Hospital							
Operated patients [1) 4)]	[%]	72%	70%	68%	**67%**	67%	72%
Operations per patient [1) 4)]	[n]	3,7	3,7	3,5	**3,4**	3,4	3,7
Intensive care unit	[%]	88%	87%	86%	**87%**	87%	88%
LOS on ICU [2)]	[days]	7,7	7,1	6,7	**6,7**	6,7	7,7
Intubated/ventilated [2)]	[%]	50%	46%	42%	**41%**	41%	50%
Days intubated [2)]	[days]	4,0	3,5	3,1	**3,1**	3,1	4,0
Outcome							
LOS in hospital [3)]	[days]	19,0	18,1	17,1	**16,8**	16,8	19,0
Hospital mortality [3)]	[%]	12,0%	11,7%	11,1%	**10,8%**	10,8%	12,0%
Multiple organ failure [1)3)]	[%]	23%	22%	21%	**20%**	20%	23%
Discharge to other hosp.	[%]	17%	18%	17%	**16%**	16%	17%

[1)] not available in the reduced QM dataset [2)] only ICU patients [3)] without patients transferred out early [4)] Years with incomplete documentation excluded

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4. Quality Indicators

Measurements of process of care are compared with the TR-DGU average and with previous years. The results on this page refer to primary admitted cases from the **basic patient group** only (see page 1), or subgroups thereof. This includes also patients transferred out early. For calculating the time from hospital admission until various diagnostic procedures, only patients with valid time data were considered (see also remarks below). A standard deviation (SD) is presented only if more than one value was available.

	Your hospital				**TR-DGU**	
Indicator	10 years	2012	2013	**2014**	2014	10 years
Primary admitted cases (basic patient group only)	n=135203	n=22887	n=26165	n=28177	n=28,177	n=135,203
1. Pre-hospital time from the accident until hospital admission; in patients with ISS ≥ 16 [∅ min ± SD, n]	**71** ± 53 n=66136	**70** ± 52 n=10768	**71** ± 56 n=11232	**71** ± 56 n=12106	**71** ± 56 n=12,106	**71** ± 53 n=66,136
2. Intubation rate in unconscious patients (GCS 3-8) [%, n / total]	**87%** 22191 / 25581	**85%** 3458 / 4088	**84%** 3592 / 4298	**83%** 3589 / 4300	**83%** 3,589 / 4,300	**87%** 22,191 / 25,581
3. Time from hospital admission until **first x-ray of the thorax** [∅ min ± SD, n]	**15** ± 20 n=53603	**17** ± 22 n=8971	**17** ± 21 n=9602	**17** ± 21 n=9948	**17** ± 21 n=9,948	**15** ± 20 n=53,603
4. Time from hospital admission until first **x-ray of the pelvis** [∅ min ± SD, n]	**16** ± 18 n=37167	**17** ± 20 n=6173	**17** ± 19 n=6627	**17** ± 19 n=6723	**17** ± 19 n=6,723	**16** ± 18 n=37,167
5. Time from hospital admission until **abdominal sonography** (FAST) [∅ min ± SD, n]	**7** ± 10 n=96332	**7** ± 11 n=16539	**7** ± 10 n=18987	**6** ± 10 n=21141	**6** ± 10 n=21,141	**7** ± 10 n=96,332
6. Time from hospital admission until **cranial CT** (cCT), in patients with pre-hospital GCS < 15 [∅ min ± SD, n]	**23** ± 17 n=53647	**23** ± 18 n=9246	**22** ± 17 n=9945	**22** ± 16 n=10510	**22** ± 16 n=10,510	**23** ± 17 n=53,647
7. Time from hospital admission until **whole-body CT** (WBCT) [∅ min ± SD, n]	**24** ± 18 n=87849	**24** ± 18 n=15993	**23** ± 18 n=18072	**23** ± 17 n=19908	**23** ± 17 n=19,908	**24** ± 18 n=87,849
8. Time from hospital admission until first **emergency surgery**; (for list of interventions: see remark below) [∅ min ± SD, n]	**85** ± 40 n=19078	**87** ± 39 n=3897	**89** ± 38 n=4114	**91** ± 38 n=4444	**91** ± 38 n=4,444	**85** ± 40 n=19,078

Remarks: ∅ = average
Indicator 1: Times exceeding 8 hours were disregarded.
Indicator 3-8: Times exceeding 3 hours were disregarded.
Indicator 6: If a whole-body CT was performed, it was counted as cCT well.

Indicator 8 is based on the following seven interventions: craniotomy, thoracotomy, laparotomy, revascularization, embolization, and external stabilization of the pelvis or of extremities.

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5. Individual Cases

5.1 Non-Survivor with a low risk of death (< 15% acc. to RISC II)

Here patients from the **basic patient subgroup** are listed who died in hospital although their initial prognosis (based on the RISC II score) seemed to be rather low. In total, 533 such cases were observed in the whole registry in 2014.

A low risk of death does not mean that none of these patients would die, however, this does not happen very often. Therefore, a detailed analysis of such cases may lead to **relevant problems** during the acute care of this patient. But this could only be clarified in a more detailed individual analysis of these cases.

Your hospital: Among the 26184 primary admitted cases, **21740 patients** had a risk of death < 15%. From these cases **533 patient(s) died.** They are listed in the following table (LOS = length of stay).

ID in the registry*	RISC II	ISS	Age	Sex	Date of admission	LOS
Example	11.2	11	78	M	13.05.2014	23

5.2 Survivor with a high risk of death (> 75% acc. to RISC II)

Patients who survived although their risk of death was rather high (>75%) could be indicative for a very well functioning **interdisciplinary cooperation** in acute care. Overall, 201 such cases were observed in the registry last year. Again, details could only be found after individual analysis of each case. Patients transferred into another hospital within the first two days were disregarded here, of course. Nevertheless, patients could have been transferred later and survival might not have been secured.

Your hospital: Among the 26184 primary admitted cases, **1265 patients** had a risk of death > 75%. The survivors among these patients (**n = 201**) are listed below.

ID in the registry*	RISC II	ISS	Age	Sex	Date of admission	LOS

5.3 Non-survivor with max. AIS = 1

In 2014, The RISC II score is calculated for patients with ISS ≥ 4 points only. However, in 2013 there were 3547 cases with an ISS less than 4, i.e. the most severe injury had an AIS severity grade of one. Although usually all such patients survive, we observed 28 non-survivors is this group (0,8%). These cases should be subject of a detailed internal revision, including the correctness and completeness of injury coding.

In 2014, the worst injury of 3,547 patients was just AIS grade 1 (MAIS 1). Although such patients usually survive, we observed 35 cases (0,8%) who died. These cases should be subject to a detailed internal revision, including the correctness and completeness of injury coding.

Your hospital: **4167 patients** had a max. AIS = 1; **35 of them died**:

ID in the registry*	ISS	Age	Sex	Date of admission	LOS

* The ID in the registry is composed of the hospital code, the year of trauma, and an individual patient code

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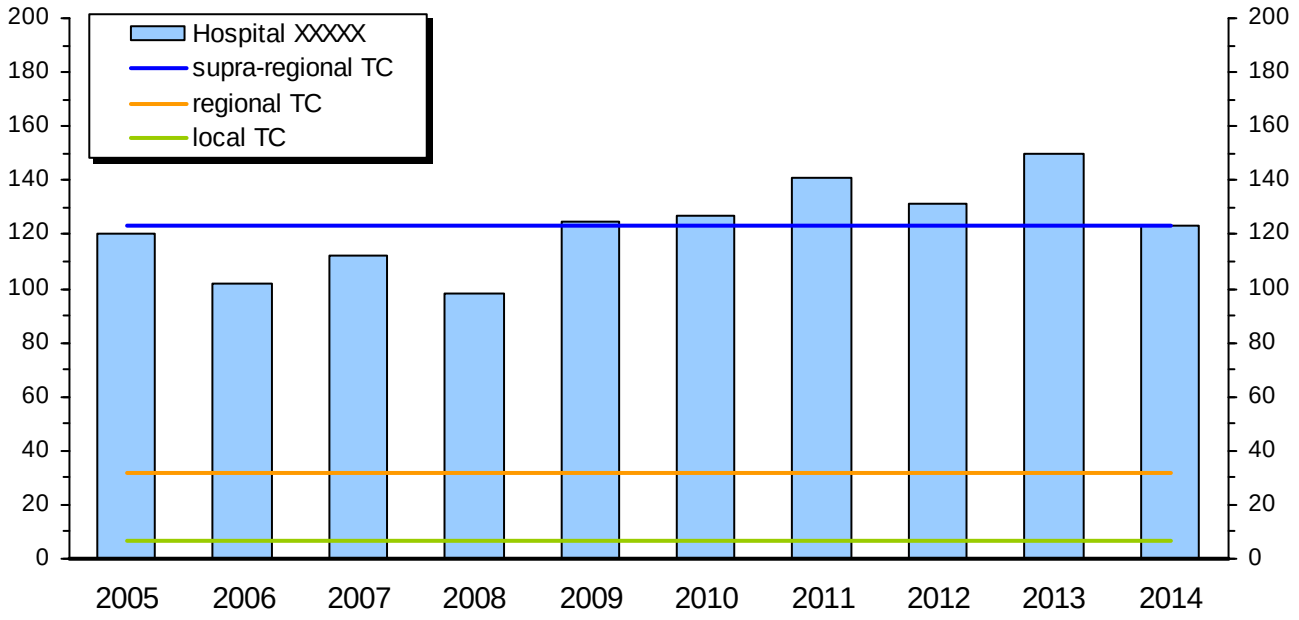
6. Graphical Comparisons

6.1 Documented patients in the last 10 years

The following figure presents the number of documented trauma patients in the last ten years. The total number of patients from your hospital documented in the registry was **198,204 cases from 22 years**. In order to improve the comparability of results only patients from the **basic patient subgroup** (see page 1) from the last 10 years will be considered here. From your hospital this were **n=151,419 of 177,814 cases** in the last ten years, and **n=31,024 of 38,046** in 2014.

In order to better interpret your annual sample size the **median number of cases** per year and hospital is also given in the figure for three levels of care: blue line for supra-regional trauma centers (n=123), and orange and green lines for regional (n=32) and local (n=7) trauma centers. These numbers are based on the recent three years where supra-regional TC with <20 cases/year and regional TC with <5 cases/year were disregarded (underreporting assumed). Your hospital has been classified as **supra-regional trauma center**.

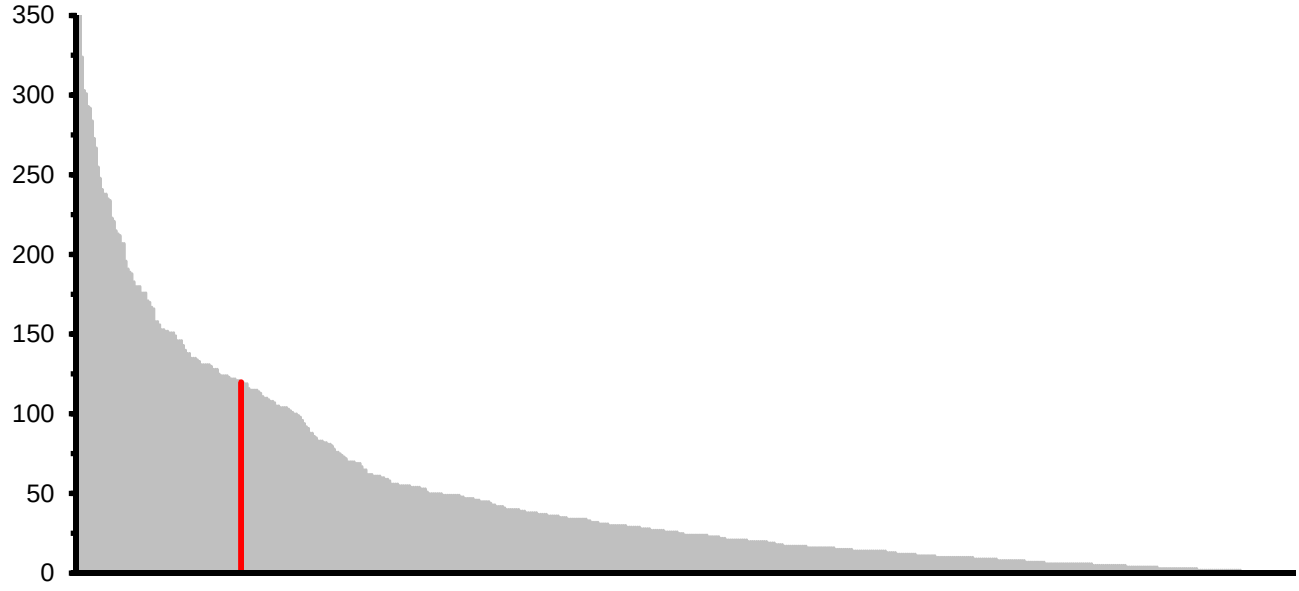
If the number of cases from your hospital lies below the average number for similar hopitals in the registry (same level of care), then an incomplete documentation of all potential patients might be considered as a reason for this.



6.2 Number of patients in 2014

Your hospital: **n = 31,024;** TR-DGU: n = 31,024

In 2014, your hospital has documneted 31024 case in the **basic patient group**; another 7022 patients outside this basic group were not considered here. The value for your hospital is highlighted in red.



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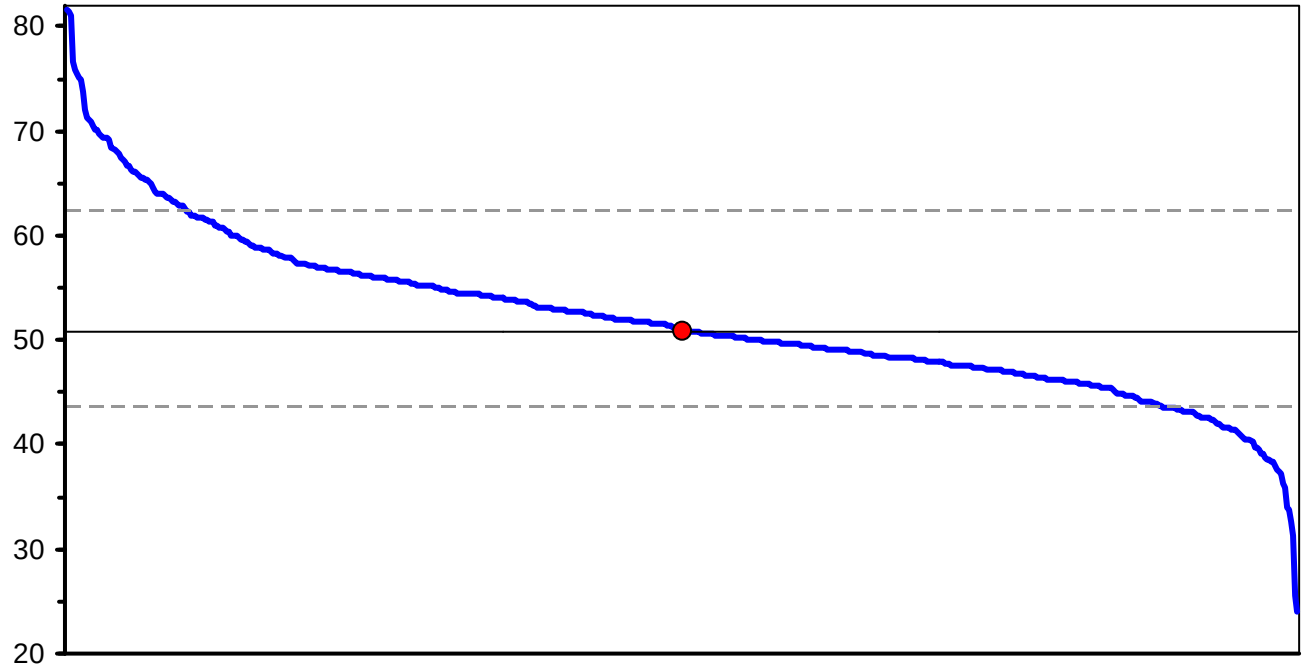
6.3 Graphical Comparisons with other Hospitals 2014

The following figures compare data of your patients (from **2014)** with the respective data from all other hospitals in the TraumaRegister DGU®. Only cases from the **basic patient group** (see page 1) were considered here. Your hospital's value is indicated as a **red dot** (●) if data from **at least 3 patients** were available. The horizontal line is the median value of all hospitals, and the broken lines are the 10% and 90% percentiles.

Mean Age

Your hospital: **50.9 years**; Median: 50.9 years

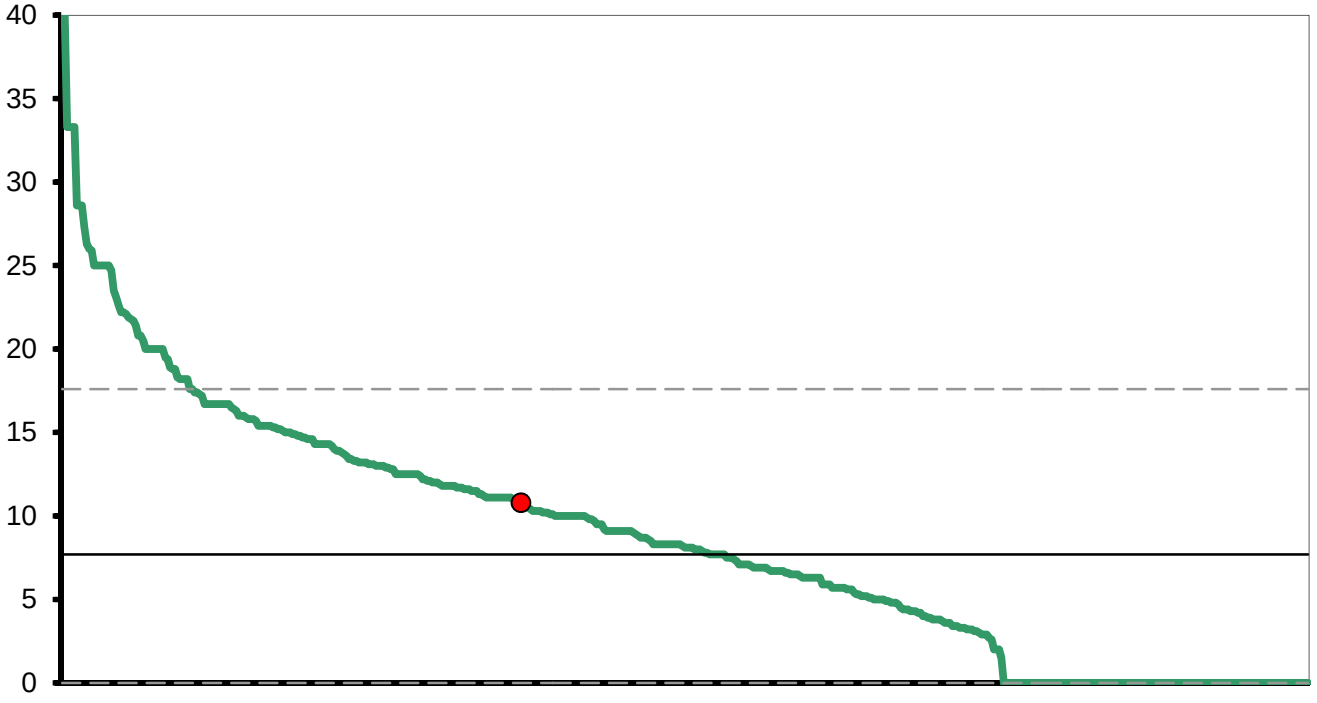
The mean value of your hospital is based on 31,024 patients from 2014.



Hospital Mortality (%)

Your hospital: **10.8%** (3,136 of 29,031); Median: 6.7%

Only primary admitted patients and those transferred in were considered here. Early transfers out (within 48 h) were excluded. If there were less than 3 cases from your hospital, then your hospital value is not included here.



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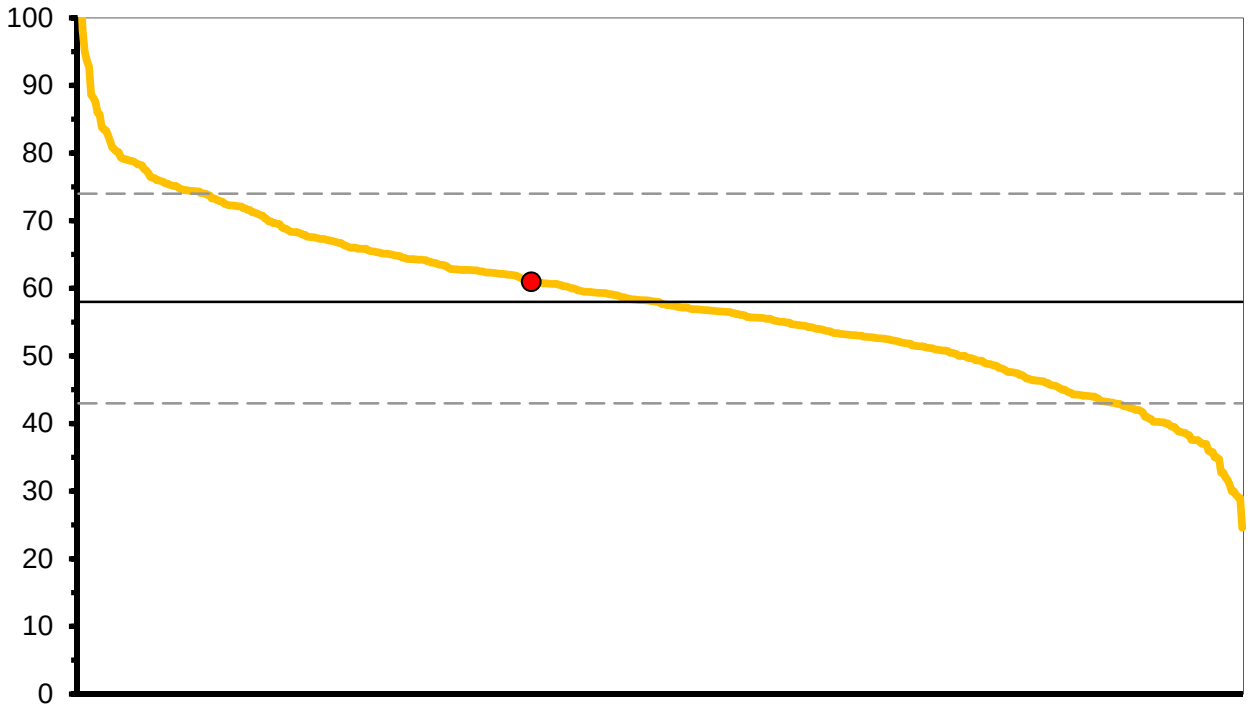
Prehospital Time (mean time in min.) Your hospital: **61.0 min.**; Median: 58.0 min.

Your hospital value is based on 22,340 of 28,177 **primary admitted patients** from the basic group who had data for both the accident and hospital admission. If there were less than 3 cases then your hospital was not included in this figure.



5.4 Length of Stay and Injury Severity

This figure describes the association of length of stay (LOS) in hospital and injury severity (ISS). The mean value was calculated for survivors from the basic patient group only. Patients transferred to another hospital (n=4,553) were also excluded here.

Hospitals with less than three valid cases were not included in this figure.

■ Your hospital 2014:

Your hospital value is based on **23,335 patients.**

LOS: **18.1** days

ISS: **16.3** points

◆ TR-DGU 2014:

Patients: 23,335

LOS: 18.1 days

ISS: 16.3 points

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7. Basic Data

On the following three pages basic data from five different areas are presented: Demographics/Accident (S); Pre-hospital Phase (A); Emergency Room (B); Intensive Care (C), and Final Assessment / Discharge (D). Your hospital data refer to the year 2014. Comparative registry data are provided from the same year (**TR-DGU 2014**) and from the last 10 years 2005-2014 (**TR-DGU 10**). Again, only cases from the **basic patient group** were considered here (see page 1).

	Your hospital 2014	TR-DGU 2014	TR-DGU 10
Total no. of patients	38046	38,046	177,841
Basic patient group	**31024**	**31,024**	**151,419**

(S) Demographics / Accident

Primary Admissions / Transfers	%	n	%	n	%	n
primary admitted	**90.8**	28177	**90.8**	28,177	**89.3**	135,203
among these transferred out within 48h	***6.4***	*1993*	***6.4***	*1,993*	***5.7***	*8,702*
transferred in within 24h after trauma	**8.3**	2567	**8.3**	2,567	**9.5**	14,439
transferred in later	**0.9**	280	**0.9**	280	**1.2**	1,777
Patient Characteristics						
Age in years (M ± SD, n)	**50.9** ± 22.5	31024	**50.9** ± 22.5	31,024	**48.6** ± 22.1	151,419
Children / adolescents (<16y.) (%, n)	**4.1**	1268	**4.1**	1,268	**4.1**	6,271
Elderly patients (age 60+) (%, n)	**37.4**	11594	**37.4**	11,594	**33.2**	50,247
Males (%, n)	**69.9**	21676	**69.9**	21,676	**70.6**	106,972
ASA 3-4 prior to trauma (since 2009) (%, n)	**16.5**	4427	**16.5**	4,427	**15.1**	16,610
Mechanism of Injury	%	n	%	n	%	n
blunt	**96.0**	28274	**96.0**	28,274	**95.6**	137,496
penetrating	**4.0**	1168	**4.0**	1,168	**4.4**	6,350
Type and Cause of Accident	%	n	%	n	%	n
Traffic – car	**21.2**	6105	**21.2**	6,105	**24.0**	33,616
Traffic – motor bike	**12.9**	3716	**12.9**	3,716	**13.5**	18,847
Traffic – bicycle	**9.8**	2823	**9.8**	2,823	**9.0**	12,608
Traffic – pedestrian	**6.5**	1866	**6.5**	1,866	**7.2**	10,086
High fall (>3m)	**17.0**	4894	**17.0**	4,894	**17.1**	24,023
Low fall	**26.0**	7463	**26.0**	7,463	**21.5**	30,126
Suicide (suspected)	**4.4**	1311	**4.4**	1,311	**4.7**	6,882
Assault (suspected)	**2.3**	701	**2.3**	701	**2.4**	3,443

(A) Pre-hospital Phase

Results only for **primary admitted** cases	**28177**		**28.177**		**135.203**	
Vital Signs	**M** ± SD	n	**M** ± SD	n	**M** ± SD	n
Systolic Blood Pressure sBP [mm Hg]	**132** ± 33	24008	**132** ± 33	24,008	**128** ± 34	118,205
Respiratory rate RR [/min]	**15.7** ± 6.3	16319	**15.7** ± 6.3	16,319	**16.0** ± 6.0	81,164
Glasgow Coma Scale (GCS)	**12.5** ± 3.9	25717	**12.5** ± 3.9	25,717	**12.1** ± 4.2	125,845
Findings	%	n	%	n	%	n
Shock (sBP ≤ 90 mmHg)	**9.5**	2269	**9.5**	2,525	**12.4**	14,686
Unconsciousness (GCS ≤ 8)	**16.9**	4339	**16.9**	4,415	**20.5**	25,808
Therapy	%	n	%	n	%	n
Cardio-pulmonary resuscitation (CPR)	**2.7**	751	**2.7**	714	**3.1**	4,038
Intubation	**22.7**	6257	**22.7**	6,154	**30.4**	40,277
Volume administration	**78.9**	21723	**78.9**	23,989	**82.5**	109,177
Analgo-sedation *	**59.6**	8028	**59.6**	8,153	**67.4**	50,872
Chest drain *	**2.8**	373	**2.8**	340	**3.7**	2,816
Catecholamines *	**7.2**	964	**7.2**	964	**7.9**	5,998
Volume Administration	**M** ± SD	n	**M** ± SD	N	**M** ± SD	n
Average amount in all patients (ml)	**627** ± 579	27545	**627** ± 579	27,545	**850** ± 724	116,820
Crystalloids (ml, if given)	**765** ± 497	21536	**765** ± 497	21,536	**802** ± 509	100,726
Colloids (ml, if given)	**590** ± 320	1187	**590** ± 320	1,187	**651** ± 358	25,425
Colloids given (%)	**6%**		**6%**		**22%**	

* not available in the reduced QM dataset

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	Your hospital 2014	TR-DGU 2014	TR-DGU 10 Jahre
Basic patient group	**31,024**	31,024	151,419

(B) Emergency Room

Results for **primary admitted** cases only	**n = 28,177**		**n = 28,177**		**n = 135,203**	
Transportation to hospital	**%**	n	**%**	n	**%**	n
with helicopter	**19.2%**	5419	**19.2%**	5,419	**22.9%**	30,965
Patients in shock	**%**	n	**%**	n	**%**	n
syst. blood pressure ≤ 90 mmHg	**8.0%**	2050	**8.0%**	2,050	**9.7%**	11,916
Glasgow Coma Scale (GCS)	**M** ± SD	n	**M** ± SD	n	**M** ± SD	n
if intubated on admission	**3.2** ± 1.3	3434	**3.2** ± 1.3	3,434	**3.2** ± 1.3	25,305
if not intubated	**13.8** ± 2.4	9182	**13.8** ± 2.4	9,182	**14.0** ± 3.0	44,373
Initial diagnostics	**%**	n	**%**	n	**%**	n
Sonography (FAST)	**80.7%**	22731	**80.7%**	22,731	**79.6%**	107,558
X-ray of thorax	**37.7%**	10624	**37.7%**	10,624	**45.2%**	61,045
Cranial CT (isolated or WBCT)	**88.5%**	24939	**88.5%**	24,939	**87.5%**	118,271
Whole-body CT	**74.8%**	21074	**74.8%**	21,074	**70.7%**	95,546
ER diagnostic not completed *	**1.7%**	241	**1.7%**	241	**2.4%**	1,890
Treatment in the ER	**M** ± SD	n	**M** ± SD	n	**M** ± SD	n
if diagnostics not completed [min] *	**56** ± 47	378	**56** ± 47	378	**44** ± 38	2,466
if send to the operation room [min] *	**69** ± 45	3367	**69** ± 45	3,367	**70** ± 45	20,859
if transferred to the ICU [min] *	**68** ± 46	6250	**68** ± 46	6,250	**70** ± 46	31,229
Therapie im SR	**%**	n	**%**	n	**%**	n
Ccardio-pulmonary resuscitation (CPR) *	**2.2%**	304	**2.2%**	304	**3.2%**	2,516
Chest drain *	**9.2%**	1282	**9.2%**	1,282	**12.8%**	9,960
External fracture stabilisation *	**9.6%**	1327	**9.6%**	1,327	**7.8%**	6,079
Blood transfusion	**7.8%**	2196	**7.8%**	2,196	**11.7%**	15,792
Hemostasis treatment *	**6.9%**	1840	**6.9%**	1,840	**9.9%**	7,467
Initial laboratory values	**M** ± SD	n	**M** ± SD	n	**M** ± SD	n
Base excess [mmol/l]	**- 1.8** ± 4.6	20532	**- 1.8** ± 4.6	20,532	**- 2.2** ± 4.7	84,760
Hemoglobine [g/dl]	**13.2** ± 2.2	26746	**13.2** ± 2.2	26,746	**12.8** ± 2.4	126,213
Quick's value - PT [%]	**87** ± 21	25225	**87** ± 21	25,225	**85** ± 22	117,890
Int. Normalized Ratio - INR **	**1.18** ± 0.56	25555	**1.18** ± 0.56	25,555	**1.20** ± 0.60	119,761
Partial Thromboplastin Time - PTT [sec] *	**30** ± 14	11721	**30** ± 14	11,721	**32** ± 17	63,526
Temperature [°C] *	**36.2** ± 1.2	7091	**36.2** ± 1.2	7,091	**36.1** ± 1.2	34,055

(C) Intensive Care Unit

Patients with **intensive care therapy**	**n = 27,050 (87.2%)**		**n = 27,050 (87.2%)**		**132,634 (87.6%)**	
Severity	**M** ± SD	n	**M** ± SD	n	**M** ± SD	n
SAPS II score on ICU admission *	**26.0** ± 17.0	7881	**26.0** ± 17.0	7,881	**26.0** ± 17.0	47,021
Treatment*	**%**	n	**%**	n	**%**	n
Hämostatic drugs *	**9.3%**	2405	**9.3%**	2,405	**13.4%**	10,275
Dialysis / hemofiltration *	**2.3%**	286	**2.3%**	286	**2.5%**	1,835
Blood transfusion * within the first 48 h after admission	**21.1%**	2989	**21.1%**	2,989	**19.4%**	15,627
Mechan. ventilation / intubated	**40.8%**	11033	**40.8%**	11,033	**50.1%**	66,391
Complications *	**%**	n	**%**	n	**%**	n
Organ failure (OF) *	**35.3%**	4652/13177	**35.3%**	4,652	**38.9%**	28,914
Multiple organ failure (MOV) *	**20.1%**	2646/13177	**20.1%**	2,646	**23.4%**	17,389
Sepsis *	**5.4%**	672/12335	**5.4%**	672	**6.7%**	4,877
Length of stay and ventilation	**M** ± SD	n	**M** ± SD	n	**M** ± SD	n
Length of intubation [days]	**3.1** ± 7.7	26870	**3.1** ± 7.7	26,870	**4.0** ± 9.0	131,486
LOS on ICU [days]	**6.7** ± 10.4	27050	**6.7** ± 10.4	27,050	**8.0** ± 11.0	132,606

* not available in the reduced TR-QM dataset ** approximated from Quick's value (PT) if not documented
ICU = Intensiv Care Unit ER = Emergency Room LOS = Length of Stay CT = Computed Tomography
M ± SD = mean and standard deviation

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	Your hospital 2014	TR-DGU 2014	TR-DGU 10
Basic patient group	**31024**	31,024	151,419

(D) Discharge / Outcome

Diagnoses	**M**	n	**M**	n	**M**	n
Number of injuries per patient	**4.4**	31024	**4.4**	31,024	**5.0**	151,419
Patients with one injury only (%, n)	**10.7%**	3311	**10.7**	3,311	**9.5%**	14,422
Operations*	**%**	n	**%**	n	**%**	n
Patients with surgery *	**67.1%**	10568	**67.1%**	10,568	**72.2%**	60,858
No. of procedures if operated * [Mean]	**3.4**		**3.4**		**3.7**	
Thrombo-embolic Events (MI; pulmonary embolism; DVT; stroke; etc.)	**%**	n	**%**	n	**%**	n
Patients with at least one event *	**2.3%**	332	**2.3**	332	**2.7**	2,092
Outcome (without early transfers out)	**%**	n	**%**	n	**%**	n
Survivor	**89.2%**	25895	**89.2%**	25,895	**88.0%**	125,540
Hospital mortality	**10.8%**	3136	**10.8%**	3,136	**12.0%**	17,177
Died within 30 days	**10.4%**	3015	**10.4%**	3,015	**11.6%**	16,493
Died within 24 hours	**4.8%**	1395	**4.8%**	1,395	**5.9%**	8,409
Died in the ER/OP (no ICU)	**1.6%**	455	**1.6%**	455	**2.1%**	3,012
Transfer / Discharge (all patients)	**%**	n	**%**	n	**%**	n
Survivor who were discharged and …	**100%**	27888	**100%**	27,888	**100%**	134,120
transferred into another hospital	**16.3%**	4553	**16.3%**	4,553	**16.2%**	23,069
among them early discharges (<48h)	**7.1%**	1993	**7.1%**	1,993	**6.2%**	8,702
transferred into a rehabilitation center	**19.2%**	5348	**19.2%**	5,348	**24.2%**	32,393
other discharges	**3.8%**	1067	**3.8%**	1,067	**3.3%**	4,435
sent home	**60.7%**	16920	**60.7%**	16,920	**55.3%**	74,223
Condition at the time of discharge (Glasgow Outcome Scale; GOS) (without early transfers out)	**%**	n	**%**	n	**%**	n
Patients with valid GOS		27658		27,658		135,786
Surviving patients	**100%**	24522	**100%**	24,522	**100%**	118,609
– good recovery	**67.4%**	16528	**67.4%**	16,528	**64.0%**	75,906
– moderate disability	**23.4%**	5745	**23.4%**	5,745	**25.3%**	29,952
– severe disability	**7.8%**	1901	**7.8%**	1,901	**9.0%**	10,686
– persistant vegetative state	**1.4%**	348	**1.4%**	348	**1.7%**	2,065
Length of stay in hospital (all patients)	**M** ± SD	n	**M** ± SD	n	**M** ± SD	n
All patients, mean	**15.8** ± 18.2	31024	**15.8** ± 18.2	31,024	**18.0** ± 20.3	151,378
median	**11**		**11**		**12**	
Only non-survivors	**16.8** ± 18.5	27888	**16.8** ± 18.5	27,888	**19.3** ± 20.6	134,204
Only survivors, …	**7.4** ± 12.2	3136	**7.4** ± 12.2	3,136	**7.2** ± 12.8	17,174
median survivors / non-survivors	**12 / 3**		**12 / 3**		**14 / 3**	
Survivors transferred into a rehab. center	**29.6** ± 22.0	5348	**29.6** ± 22.0	5,348	**31.3** ± 23.2	32,389
Survivors transferred into another hospital	**10.2** ± 14.8	4553	**10.2** ± 14.8	4,553	**11.7** ± 16.4	23,065
Survivors sent home	**14.2** ± 15.1	16920	**14.2** ± 15.1	16,920	**16.3** ± 17.9	74,208
Costs of treatment (without early transfers out; see footnote)	**€**	n	**€**	n	**€**	n
Average costs per patient						
… all patients	**14,314**	30844	**14,314**	30,844	**16.729**	150,218
… only non-survivors	**11,050**	3112	**11,050**	3,112	**11.550**	16,983
… non-survivors	**14,680**	27732	**14,680**	27,732	**17.390**	133,235
… only patients with ISS ≥ 16	**18,672**	16684	**18,672**	16,684	**23.156**	89,595
Sum of all costs	441,496,711 €		441,496,711 €		2,513,060,289 €	
Sum of all days in hospital	491,378 Tage		491,378 Tage		2,718,583 Tage	
Average costs per day	**898.49 €**		**898.49 €**		**924.40 €**	

* not available in the reduced TR-QM dataset M = mean

Costs: The estimated treatment costs are based on data of 1002 German TR-DGU patients treated in 2007 and 2008. For these patients a detailed cost analysis was available (for details, see the TR-DGU annual report 2011).

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8. Subgroup Analyses

Summary results might not be helpful when looking for potential causes. Therfore, subgroup results of your hospital are presented on this page. Besides descriptive data about the patients and the process of care also hospital outcome and prognosis are presented here for each subgroup.

In order to reduce the statistical uncertainty involved in subgroup analyses, patients from the **last three years** (2012-2014) were pooled together. Again, only patients from the **basic patient group** (see page 1) were considered here.

8.1 Subgroups within your hospital

All results in the following table refer to primary admitted cases from the basic patient group. Patients transferred in as well as those transferred out early (within 48h) are not considered here.

Theere were a total of **71,741 patients** from your hospital in the last three years.

		All patients	Subgroups					
			No TBI	Combined trauma	Isolated TBI	Shock	Severe injury	Elderly
Definition of subgroup		Basic group	AIS head ≤ 1	head and body AIS ≥ 2	AIS head ≥ 3 and AIS elsew. ≤ 1	syst. BP ≤ 90 on admission	ISS ≥ 16 & at least one problem*	age 70 years or more
No. of patients (basic group)	n	71741	35852	26929	8960	5692	22009	17020
	%	100%	50%	38%	13%	8%	31%	24%
Patients								
Age	[years]	49,8	47,7	49,9	58,2	49,8	57,0	79,5
Male gender	%	70%	72%	70%	65%	71%	68%	54%
ASA 3-4	%	13%	10%	13%	23%	15%	21%	37%
Injuries								
ISS	[points]	18,3	14,8	23,0	18,3	28,0	29,1	18,8
Head injury (AIS≥3)	%	34%	---	57%	100%	46%	63%	45%
Thoracic injury (AIS≥3)	%	38%	43%	43%	---	57%	53%	34%
Abdominal injury (AIS≥3)	%	10%	13%	8%	---	24%	24%	5%
Pre-hospital care								
Pre-hospital time	min.	62	61	62	63	66	66	63
Intubation	%	25%	14%	36%	35%	67%	54%	23%
Volume given	[ml]	669	672	723	495	1044	828	535
Emergency room								
Blood transfusion	%	9%	9%	11%	3%	38%	21%	8%
Whole-body CT	%	75%	75%	80%	53%	76%	78%	64%
CPR	%	1%	1%	2%	1%	10%	4%	2%
Physiological problems*								
Age ≥ 70	%	24%	19%	25%	41%	25%	43%	100%
Shock (sBP ≤ 90)	%	14%	7%	10%	6%	100%	34%	8%
Acidosis (BE<-6)	%	9%	7%	12%	9%	35%	24%	9%
Coagulopathie	%	12%	9%	15%	14%	33%	28%	20%
Unconsciousness (GCS 3-8)	%	17%	5%	27%	35%	45%	45%	18%
Length of stay								
Treated on ICU	n	63441	30537	24975	7929	4833	19941	14624
- Intubation (ICU)	[days]	3.1	1.8	4.5	4.0	7.7	6.9	3.5
- Days on ICU	[days]	6.8	5.2	8.5	7.4	12.6	11.7	7.3
Days in hospital	[days]	16.9	17.3	17.4	13.7	21.1	20.8	17.4
Outcome and prognosis								
Non-survivor	n	7960	1729	3936	2295	2129	6698	4098
Hospital mortality	%	11.1%	4.8%	14.6%	25.6%	37.4%	30.4%	24.1%
RISC II prognosis	%	10.7%	4.8%	14.5%	23.1%	38.0%	29.1%	22.5%

* according to the definition of severely injured patients from Paffrath et al. (*Injury* 2014); see also pages 1 and 11.3

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8.2 Hospital level of care

The following table allows a comparison of your hospital results with hospitals of the same level of care. There are three levels of care (supra-regional, regional, and local trauma center), and also the results of the whole registry (TR-DGU) are presented.

In order to reduce the statistical uncertainty, patients from the **last three years** were pooled together (available from your hospital: 3 years). Again only cases from the **basic patient group** were considered here.

	Your hospital	Trauma center			
		local	regional	supra-regional	TR-DGU
Level of care / trauma center	**supra-regional**			▼	
Number of hospitals		252	246	119	617
Percentage of patients in TR-DGU		8.9%	32.7%	58.3%	100%
Patients per year in the basic group n	**123** /year	**7** /year	**32** /year	**123** /year	
All patients (3 years)	n=85,321	n=7,627	n=27,889	n=49,702	n=85,321
Primary admitted and treated n,%	71,741 84%	75%	85%	85%	84%
Primary admitted; early transferred out n,%	5,488 6%	23%	11%	1%	6%
Transferred in from other hospital n,%	8,092 9%	2%	4%	13%	9%
Patients					
Average age [years]	50.2	53.7	51.0	49.1	50.2
Elderly patients aged 70+ years %	25%	31%	26%	23%	25%
Male gender %	70%	67%	70%	71%	70%
ASA 3-4 %	13%	16%	16%	12%	13%
Injuries					
Injury Severity Score, ISS [points]	18.7	15.0	17.4	20.0	18.7
ISS ≥ 16 %	55%	40%	51%	59%	55%
Polytrauma* %	15%	8%	13%	18%	15%
Pat. with head injury (AIS≥3) %	37%	23%	31%	43%	37%
Pat. with thoracic injury (AIS≥3) %	37%	35%	38%	37%	37%
Pat. with abdominal injury (AIS≥3) %	10%	9%	10%	10%	10%
Pre-hospital care (only primary admissions)	n=77,229	n=7,485	n=26,643	n=43,029	n=77,229
Time (from accident to hospital) [min]	61	56	58	64	61
Volume administration [ml]	665	539	660	689	665
Intubation %	24%	7%	17%	32%	24%
Unconsciousness (GCS 3-8) %	17%	7%	12%	21%	17%
Emergency room (all patients)					
Blood transfusionen %	9%	5%	6%	10%	9%
Whole-body CT %	70%	51%	73%	72%	70%
CPR %	1%	0%	0%	2%	1%
Shock / hypotension %	8%	5%	6%	9%	8%
Coagulopathy %	12%	9%	10%	13%	12%
Length of stay (withot early transfers out)					
Intubation on ICU [days]	3.3	0.9	2.4	4.1	3.3
LOS on ICU [days]	7.1	4.0	6.0	8.0	7.1
LOS in hospital [days]	17.3	13.0	15.9	18.5	17.3
Outcome and Prognosis (without tranfrs in and early transfers out)					
Patients n	71,741	7,672	27,889	49,702	71,741
Non-survivor n	7,960	376	2,246	5,338	7,960
Hospital mortality %	11.1%	6.5%	9.5%	12.6%	11.1%
RISC II prognosis %	10.7%	6.6%	9.0%	12.2%	10.7%

ICU = intensive care unit; GCS = Glasgow Coma Scale; AIS = Abbreviated Injury Scale, ISS = Injury Severity Score, CPR = cardio-pulmonary resuscitation; LOS = length of stay; CT = computed tomography
* Polytrauma according to Berlin definition (Pape et al., 2014)

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9. Data Quality and Completeness

Registries and audit reports could only be as good as the data they are based on. If a lot of patients have missing data in important variables then these patients have to be excluded from analysis, and results might be biased or even wrong. The following table describes the **completeness rates (%)** of several important variables, together with the **number of patients with missing data (∅)**. The list of variables specifically contains the prognostic variables needed for the RISC II.

Good completeness rates are indicated in green color (96% or better), variables with moderate completeness are marked in yellow (90-95%), and insufficient completeness (below 90%) is indicated in red. The categories for completeness are thresholds defined by the TraumaRegister DGU®. They are not derived from the data.

The completeness rates of your hospital **in 2014** are compared with your hospital's data from the previous years (**since 2005**) and with actual overall data from the whole registry (**TR-DGU 2014**). Besides the rates also the number of patients with missing data is given, marked with the ∅ sign, including also cases with implausible data. As on the previous pages, only patients from the **basic group** were considered here.

Variable	Importance	Category (%)			Your hospital 2014	Your hospital 2005-2013	TR-DGU 2014
Pre-hospital data (A)							
	only primary admitted cases				n=28,177	n=107,026	n=28,177
GCS	RISC II requires the motor component; two quality indicators use GCS for the definition of cases	96+	90-95	<90	**91%** ∅ 2,460	**94%** ∅ 6,898	**91%** ∅ 2,460
Pupils	Pupil size and reactivity are relevant for prognosis (RISC II); will be required for all patients in future	96+	90-95	<90	**44%** ∅ 15,692	**55%** ∅ 47,806	**44%** ∅ 15,692
CPR	Cardio-pulmonary resuscitation is seldom (3-4%) but highly predictive for outcome; required for RISC II	96+	90-95	<90	**92%** ∅ 2,178	**93%** ∅ 7,348	**92%** ∅ 2.178
Emergency room (B)							
	only primary admitted cases				n=28,177	n=107,026	n=28,177
Time of admission	Required to calculate the time until diagnostics were performed	96+	90-95	<90	**99%** ∅ 275	**98%** ∅ 2,017	**99%** ∅ 275
Blood pressure	BP on admission is used by RISC II as a prognostic variable; also needed for definition of shock	96+	90-95	<90	**91%** ∅ 2,603	**91%** ∅ 10,081	**91%** ∅ 2,603
Base excess	Base excess is part of the RISC II and an independent prognostic factor	96+	90-95	<90	**73%** ∅ 7,658	**60%** ∅ 42,867	**73%** ∅ 7,658
Coagulation	The INR (or Quick's value) is needed for the RISC II as coagulation marker	96+	90-95	<90	**91%** ∅ 2,622	**88%** ∅ 12,820	**91%** ∅ 2,622
Hemoglobin	Is part of the RISC II score as an indirect sign of relevant bleeding	96+	90-95	<90	**95%** ∅ 1,431	**93%** ∅ 7,559	**95%** ∅ 1,431
Patients and Outcome							
	alle Patienten				n=31,024	n=12,0395	n=31,024
ASA	Prior diseases are relevant for outcome prediction (RISC II); doc. since 2009	96+	90-95	<90	**86%** ∅ 4,230	**83%** ∅ 17,443	**86%** ∅ 4,230
Surgical treatment	A low rate of surgical patients could be based on incomplete documentation (only standard dataset; not QM)	70+	50-69	<50	**66%** 10568/15974	**68%** 50290/4455	**66%** 10568/15974
GOS	The Glasgow Outcome Scale (GOS) describes the patient's condition at discharge or transfer	96+	90-95	<90	**94%** ∅ 2,029	**93%** ∅ 7,916	**94%** ∅ 2,029
Documentation							
	all patients				n=31,024	n=120,395	n=31,024
Time point	A timely documentation of cases is able to improve data quality	months from accident to start of documentation			**3.8** mon.	**5.0** mon.	**3.8** mon.
	Months from discharge until completion of documentation	<3	3-4	5+	**4.8**	**5.8**	**4.8**
Low sample size	Only <u>supra-regional & regional trauma centers:</u> Low sample size compared to the average amount could be indicative for an incomplete documentation	60+	40-59	<40	**123%** n=31,024		

100% refer to
n=123 for SRTC and
n= 32 for RTC (see. 6.1)

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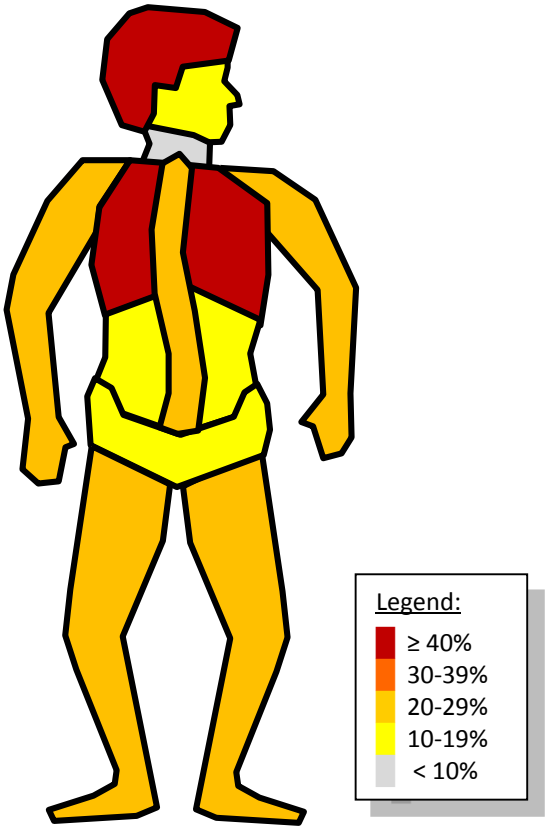
10. Pattern of Injury

The figure below shows the average injury pattern of your patients compared with the TraumaRegister DGU®. For these data all cases from the **basic patient group** were considered. In order to reduce the statistical uncertainty, all patients from the last three years **(2012-2014)** were pooled. In these three years. a total of **85321 patients** from your hospital have been documented in the registry (TR-DGU: 85.321).

Data are presented for each of the nine body regions according to the **Abbreviated Injury Scale (AIS).** The rates refer to injuries with an injury severity of **at least two points** (including, for example, radius fractures, spine fractures, lung contusions, etc.). The colour-coded figure refers to injury distribution from the whole registry.

Head	Your hospital	**48.2%**	(n = 41,142)
	TR-DGU	48.2%	(n = 41,142)
Face	Your hospital	**11.2%**	(n = 9,583)
	TR-DGU	11.2%	(n = 9,583)
Neck	Your hospital	**1.3%**	(n = 1,071)
	TR-DGU	1.3%	(n = 1,071)
Thorax	Your hospital	**45.3%**	(n = 38,677)
	TR-DGU	45.3%	(n = 38,677)
Abdomen	Your hospital	**14.9%**	(n = 12,721)
	TR-DGU	14.9%	(n = 12,721)
Spine	Your hospital	**27.9%**	(n = 23,830)
	TR-DGU	27.9%	(n = 23,830)
Arma	Your hospital	**28.5%**	(n = 24,315)
	TR-DGU	28.5%	(n = 24,315)
Pelvis	Your hospital	**13.6%**	(n = 11,632)
	TR-DGU	13.6%	(n = 11,632)
Legs	Your hospital	**27.7%**	(n = 23,669)
	TR-DGU	27.7%	(n = 23,669)



Serious Injuries (AIS 3+)

Injuries with a severity of 3 points or more are considered as ‘serious‘. The prevalence of serious injuries in four different body regions (head; thorax; abdomen; extremities) is given below. The body regions considered here refer to the respective regions of the *Injury Severity Score*.

In contrast to the figure above, only patients with **at least one relevant injury** (MAIS 3+; see page 1) are considered here. In the last three years, there were **70,093** such **patients** from your hospital. They constitute **82.2%** within the **basic patient group** (TR-DGU: 82.2%).

Serious injury (AIS ≥ 3)	**Your hospital** n = 70,093	**TR-DGU** n = 70,093
… of the **head**	**45.4%** (n=31,816)	45.4% (n=31,816)
… of the **thorax**	**45.2%** (n=31,692)	45.2% (n=31,692)
… of the **abdomen**	**12.0%** (n=8,410)	12.0% (n= 8,410)
… of the **extremities**	**30.1%** (n=21,103)	30.1% (n=21,103)
Patients with **more than one** seriously injured body region	**30.7%** (n=21,484)	30.7% (n=21,484)

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11. General Results

Some results of the actual analysis of 2014 data from the TraumaRegister DGU® are of general interest. They will be presented here without reference to individual hospitals' results.

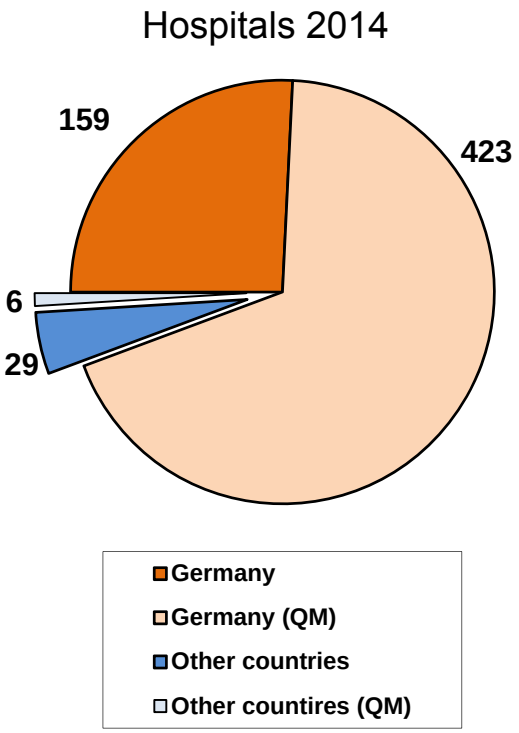
11.1 Hospitals and Patients

Hospitals

In 2014 data of **38.046 patients** from **617 activly participating hospitals** were documented in the TraumaRegister DGU®. The total number of cases documented since 1993 thus increased to **198,204** patients. However, not all of these cases were severely injured. Details are given on the next page 11.2.

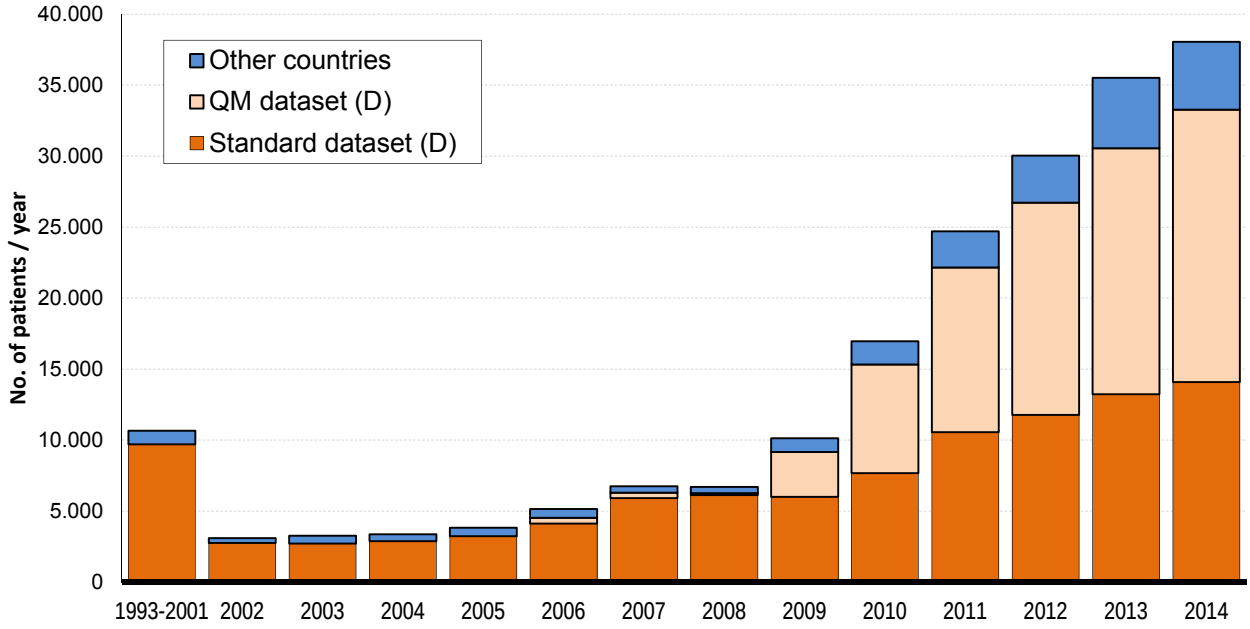
Among the total number of 617 hospitals there were 35 hospitals from outside Germany: Austria 18, The Netherlands 4, Belgium 4, Switzerland 3, Luxemburg 3, Slowenia 1, Finland 1, and United Arab Emirates 1. The number of German participants was 582 last year.

The figure on the right shows the distribution of hospitals regarding their location (German vs. non-German) and the use of the standard dataset or the reduced QM dataset, respectively. The reduced version of the dataset is mainly used in Germany by local (89%) and regional (77%) trauma centers. The majority of level one trauma centers are using the standard documentation sheet (79%).



Patients

The figure below demonstrates the continuous increase of registered patients over time. The percentage of non-German patients actually is 11.4%. Only 5.5% of patients have been documented before 2002 when the online documentation was introduced. Last year, about half of all patients (48%) have been documented with the standard dataset.



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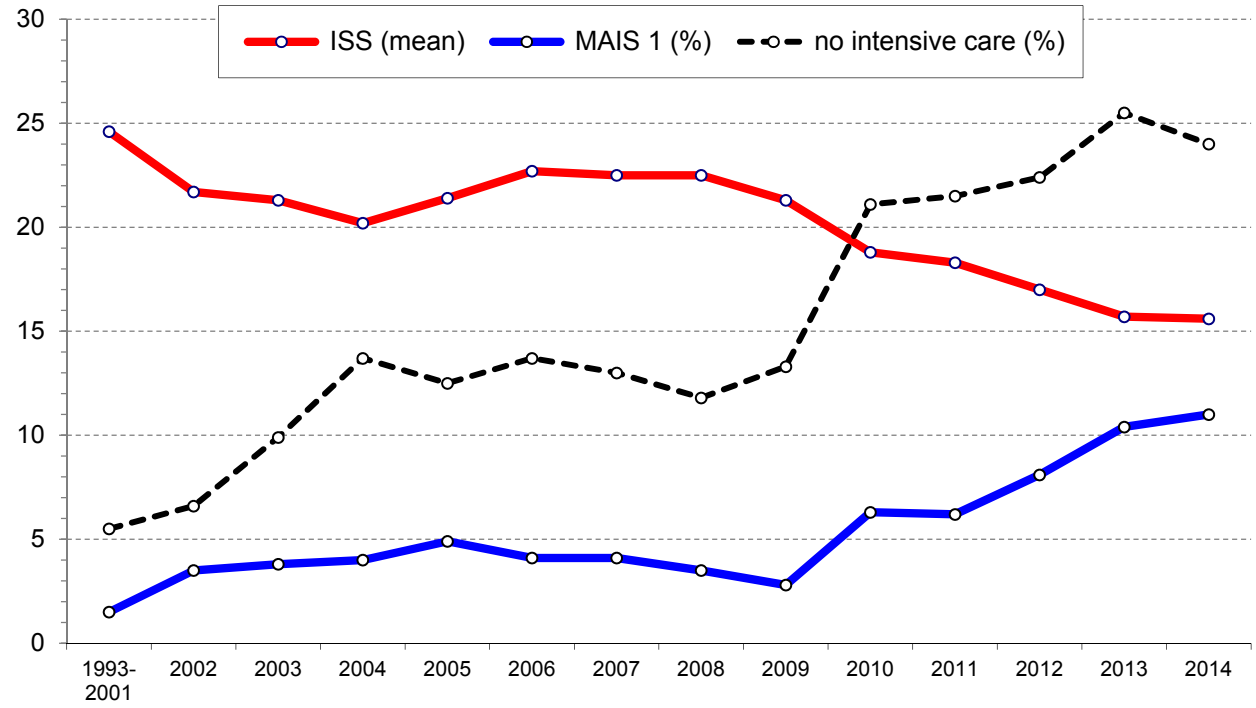
11.2 Severity of Injuries

The TraumaRegister DGU® is designed to document and analyze **severely injured patients**. These patients are specifically suitable for the evaluation of interdisciplinary cooperation in trauma care within a hospital. It also reduces the workload for documentation considerably if not all but only severely injured patients are registred.

However, there are different approaches to define a 'severely injured' patient. The TR-DGU uses the need for intensive care as a pragmatic and easy to determine inclusion criterion. In 2014, 76.5% of all documented patients were treated on ICU. In the scientific literature the *Injury Severity Score (ISS)* is frequently used to define severe trauma, for example, ISS ≥ 16 (in 2014 this refres to 44,3% of all documented patients).

The concept of 'polytrauma' hs recently been reconsiderd, and a new definition known as Berlin Definition has been published: at least two body regions have to be seriously injured (AIS≥3) and, in addition, there have to be one or more physiological problems (see Pape et al., *J. Trauma* 2014). In the TR-DGU this refers to 11,9% of patients last year).

Over the last years, there is an obvious trend of documenting more and more **patiernts with minor injuries** only. The figure showa that the ISS is decreasing to 15,6 points in 2014. In the 1990s the mean ISS was abot 25 points. One reason for this is that the number of documented patients with marginal injuries (MAIS 1 = the worst injury is of AIS grade 1). In 2014 there were 4167 such patients, or 11% of the total number. Especially small hospitals (local trauma centers) tend to document patients with only minor injuries (23% MAIS 1 patients in 2014).



When the patient group changes over time, then it becomes difficult to interpret observed trends in trauma care. This is less important for mortality data since the RISC-II prognosis is able to adjust for a varying level of severity. Other trends (like the reduced number of blood transfusions) could not be compared over time. Furthermore, the RISC II score is not validated for MAIS 1 patients, which is another argument against their documentation.

Therefore, for the first time, we did not report about all patients in this annual report but defined a **basic patient group** which excluded the MAIS 1 patients and also surviving trauma patients (worst injury AIS 2) withou the need for intensive care. This basic patient group actually (2014) constitutes 82% of all documented patients. Nearly all results presented in this report refer to this patient group.

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11.3 Severe Injuries and Polytrauma

More recent definitions of severity of injuries do not only rely on the anatomic injury severity (like the *Injury Severity Score*, ISS) but also add physiological findings. Paffrath et al., for example, defined their severely injured patients by ISS ≥ 16 plus at least one physiological problem ('NIS definition', Paffrath et al.: How to define severely injured patients? An Injury Severity Score (ISS) based approach alone is not sufficient. *Injury* 2014, 45: S64-69). Also the new definition of a 'polytrauma' as published by Pape et al. (the Berlin-Definition, Pape et al., *J. Trauma Acute Care Surg*. 2014, 77:780-786) uses this concept. A polytrauma case requires relevant injuries (AIS ≥ 3) in at least two body regions plus at least one physiological problem.

Both definitions use five different 'physiological problems' (see table). The criteria for a physiological problem were chosen according to the increase in mortality. Each of the conditions showed a mortality rate which was twice as high as in the whole patient group (18.7%; n=28,211).

Condition	Defined as	*Prevalence*	Mortality
Unconscious-ness	GCS ≤ 8 (alternative: GCS Motor 1-4)	*34.6%*	38.3%
Hypotension	Syst. BP ≤ 90 mmHg, pre-clinical or on admission	*32.4%*	35.3%
Acidosis	BE ≤ -6.0 (alternative: Lactate ≥ 4)	*24.9%*	38.8%
Coagulopathy	PTT ≥ 40 sec. or INR ≥ 1.4 (alternative: Quick ≤ 60)	*27.0%*	37.8%
Old age	≥ 70 years	*13.0%*	38.0%

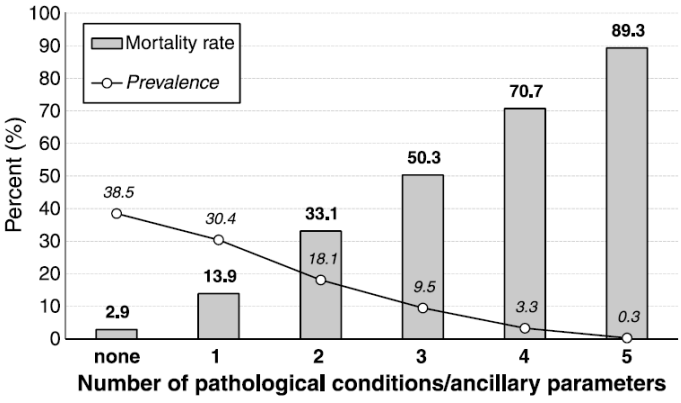
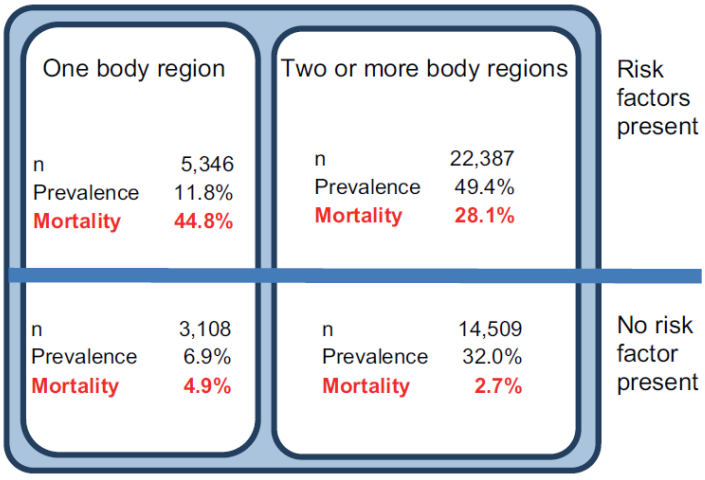


Figure 2 and Table 3 from Pape et al. 2014. Results are based on 28,211 patients with relevant injuries (AIS≥3) in at least 2 body regions

This concept of defining ‚life-threatening' injuries via physiological problems could easily been applied to all trauma patients, including those with isolated injuries. These patients showed a considerable mortality in case of one or more physiological problems, as demonstrated by Paffrath et al. (*Injury* 2014, see above). Patients with physiological problems showed about ten-fold higher mortality rates when compared to patients without such problems, in both subgroups. Interestingly, the absolute mortality is higher in isolated trauma (see figure) because of many severe head injuries in that subgroup.



The figure on the left shows that the presence of one or more risk factors (i.e. the physiologhical problems) causes a dramatical increase in mortality both in isolated and multiple trauam patients

However, a ten-fold increase is not caused by a single risk factor. Severely injured patients often show several problems. Figure 2 above (from Pape et al.) shows how the number of physiological conditions affects the mortality rates.

On the other hand, if none of the described conditions is present, the risk of death is considerably low (2.7% and 4.9% in patients with multiple and isolated injuries, respectively).

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11.4 Actual Revision of the Dateset

The TR-DGU dataset has been adapted to the actual needs in the past, and it will be revised also in the future in regular intervalls. During such a revision, each variable will be checked for completeness, its use in scientific analyses, and the documentation effort is weighted against its benefit.

It is also evaluated whether the actual dataset is able to answer questions in controversial discussions, for example, the treatment of coagulopathy. In this relation it might also be necessary to extend the existing variables. Furthermore, patients documented with the reduced QM dataset have to be exluded because key data were missing, for example, whether a certain injury was treated surgically, or not. But the overall workload should not be extended.

The revision presented here has repeatedly been discussed by the AK TraumaRegister of the Sektion NIS. It will be implemented in autumn 2015.

The following variables will be **deleted**:

Form	Area	Variable	Remark
A	Pupils	right/left for size and reactivity	differentiation not necessary
B	Course	Diagnostic evaluation interrupted / completed before ICU admission	unsufficient description of work flow
B+C	Lab values	Lactate	many missing values; base excess preferred
C	SAPS II	SAPS II	time consuming; seldom used
D	Costs	DRG-No.; ICU points	only used in Germany; hardly used

The following variables will be **changed**:

Form	Area	Variable	Remark
A + B	Intubation	alternate methods (O_2 mask, ...)	increasingly used
B + C	Hemostasis treatment	Factor VIIa replaced by Factor XIII, additional: Tranexamsäure, Calcium	Adaptation to actual treatments
C	Length of stay	Intermediate care is not considered as intensive care	

Folgende Variablen sind **neu**:

Form	Area	Variable	Remark
S	Gender	Pregnancy	in females
S	Prior diseases	pre-existing coagulopathy*	important especially in elderly patients
A	Vital signs	Capnometry*	for quality assessment in intubated patients
A+B	Interventions	Pelvic binder	evaluation of benefit
A+B	Pupils	Size* / light reaction* (3 level each)	now for all patients; highly predictive
B	Lab values	Alcohol (if measured)	prevalence; potential predictive
B+C	Lab values	Fibrinogen; Ca^{++}	evaluation of coagulation management
B	Therapy	Time point of first blood transfusion*; start of coagulation therapy	time sequence of coagulation therapy
B	Diagnostics	new: MRT sono: positive finding in FAST	increasingly used FAST positiv is highly predictive (TASH Score)
B	Diagnostics	ROTEM findings	details, not just yes/no
B	Diagnostics	use of tele-radiology*	evaluation of frequency and benefit
B	Emergency surgery	New: Laminectomy multiple interventions could be selected* each one with time point (cut)*	allows to generate a sequence of inter-ventions in the emergency room; time to first intervention is a quality indicator
B	Course	dies in the ER*; direct transfer from ER to another hospital*	better description of work flow in the ER
C	Sepsis	if yes: what is the source	prevalence; outcome
C	Therapy	Extra-corporal lung support (ECMO)	important for intensive care
D	Diagnoses/OP	OP: yes/no* (also in QM dataset)	surgical treatment is an important descriptor
D	Outcome	cause of death*	only in deceased patients
D	Outcome	DoNot Resuscitate order*	excluded in outcome analyses

* relevant for the reduced QM documentation sheet

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(Chairmen: Thomas Paffrath, MD and Rolf Lefering, PhD)
and AUC – Academy of Trauma Surgery (Akademie der Unfallchirurgie GmbH)

Each publication or other public use of data from the TraumaRegister DGU® requires a prior approval by the Sektion NIS / AUC. Applications have to be sent to AUC (email: traumaregister@auc-online.de).

Publications with data from the own hospital only do not fall under this publication guideline. Also data presented in the annual reports could be used for own publications, under the condition that the reference is mentioned.

Scientific analyses and publications with data from the TraumaRegister DGU® have to follow the publication guideline of the TraumaRegister DGU®. You will find this guideline on www.traumaregister-dgu.de. The term **TraumaRegister DGU®** is a reserved name.

Imprint

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Financial Disclosure:

The **TraumaRegister DGU®** receives fees from the participating hospitals collected by the **AUC GmbH**. The AUC GmbH, a 100% affiliate of the DGU (Deutsche Gesellschaft für Unfallchirurgie), also hosts the registry and is owner of the database. Hospitals certified as members of a German trauma network (TraumaNetzwerk DGU®) are obliged to participate in the TraumaRegister DGU®, all other hospitals participate voluntary.

In the past the registry received financial or other support from the following organizations and companies:

- Private University Witten/Herdecke gGmbH and Cologne-Merheim Medical Center (2005-2013)
- Novo Nordisk A/S, Bagsværd, Denmark (2003-2009)
- Sanofi Aventis Deutschland GmbH (2008)
- German Research Foundation - DFG (1996-2003)
- Hauptverband der Berufsgenossenschaften - HVBG (2004)

Publikations from the TraumaRegister DGU®

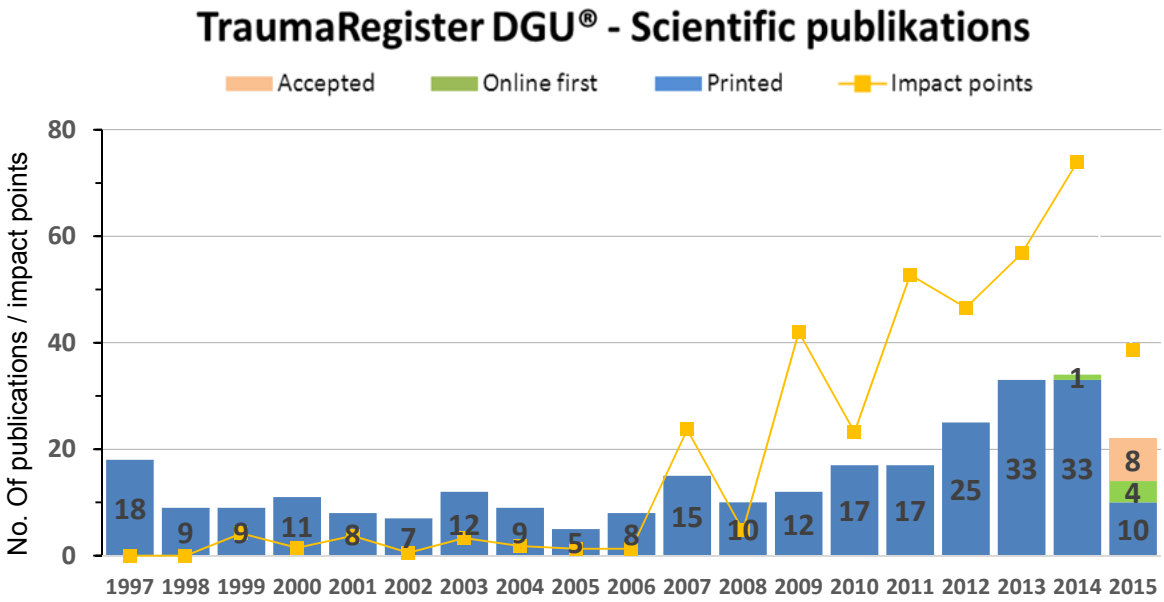
Publications from the last three years (2013-2015), no abstracts; last update: August 2015

An extended list of publications from the TraumaRegister DGU® including also papers published before 2011 is available on **www.traumaregister.de**.

[PDF] / [PDFprov] = this paper is available in PDF format / provisional PDF format.

The articles indicated with **[PDF]** could be provided to interested users on request if there is no direct access to the respective journal. In this case, please send an email to: traumaregister@auc-online.de .

The following figure presents the **number** of publications from the TraumaRegister DGU® since 1997 as well as the sum of **impact points** reached with these papers.



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List of abbreviations used in the report

Abbreviations

AIS	Abbreviated Injury Scale
ASA	American Society of Anaesthesiologists
AUC	AUC – Academy of Trauma Surgery (Akademie der Unfallchieurgie GmbH)
BE	Base Excess
CT	Computed tomography
CCT	Cranial computed tomography
DGU	German Trauma Society (Deutsche Gesellschaft für Unfallchirurgie)
EK	Unit of packed red blood cells (pRBC)
FFP	Fresh Frozen Plasma
GCS	Glasgow Coma Scale
GOS	Glasgow Outcome Scale
h	Hour
Hb	Hemoglobin
INR	International Normalized Ratio
ISS	Injury Severity Score
min	Minute
ml	Milliliter
MOF	Multiple Organ Failure
NACA	National Advisory Committee for Aeronautics
NIS	Committee on Emergency Medicine, Intensive Care and Trauma Management of the German Trauma Society (Sektion NIS)
NISS	New Injury Severity Score
OP	Operation
OF	Organ Failure
PDF	Portable Document Format
PTT	Partial thromboplastin time (in sec)
QM	Quality management
RISC	Revised Injury Severity Score (prognostic score)
sBP	Systolic blood pressure
RTS	Revised Trauma Score
SAPS	Simplified Acute Physiology Score
sec	Second
SD	Standard deviation
TBI	Traumatic brain injury
SMR	Standardized Mortality Ratio
SOFA	Sequential Organ Failure Assessment
TPZ	Thromboplastin timet; Quick's value
TR-DGU	TraumaRegister DGU®
TRISS	Trauma and Injury Severity Score (prognostic score)

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