

Landelijk netwerk  
acute zorg

# The Dutch Trauma Registry

## *facts and figures 2015*

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Symposium Trauma Systems

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Dutch Network for Acute Care

**NO CONFLICT OF INTEREST**



## Regionalisation Dutch trauma Care

**11 designated level 1 regional trauma centers  
(1999)**

Responsibilities regional trauma centers:

- care for the most severely injured (deployment Mobile Medical Team)
- set up 11 trauma networks
- monitor trauma care with trauma registry
- knowledge/expert center (guidelines etc)



## Dutch Trauma Registry (2007)



Regional Trauma registry    Dutch Trauma registry

### Inclusion criteria:

All injured patients treated at ED ( $\leq 48$ h accident) and directly admitted to the hospital (including transfers/death at ED (excl. DOA))

### Dataset

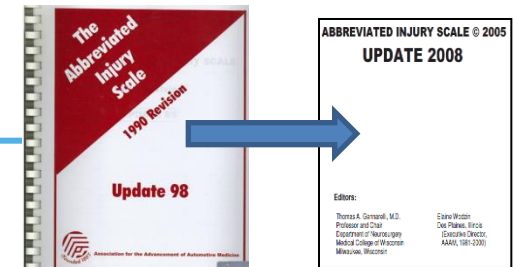
- 2007-2013: MTOS<sup>1</sup> dataset (AIS98) + prehospital data
- 2014: addition items - Utstein Template<sup>2</sup>
- 2015: implementation Abbreviated Injury Scale 2008

1. Champion HR, Copes WS, Sacco WJ et al. The Major Trauma Outcome Study: establishing national norms for trauma care. J Trauma. 1990; 30: 1356-65.

2. KG Ringdal et al. The Utstein template for uniform reporting of data following trauma: a joint revision by SCANTEM, TARN, DGU-TR and RIGT. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine. 2008; 16:3-19.

## Highlights registry data 2015

- Implementation AIS2008
- Patient characteristics and care process
- Outcome evaluation



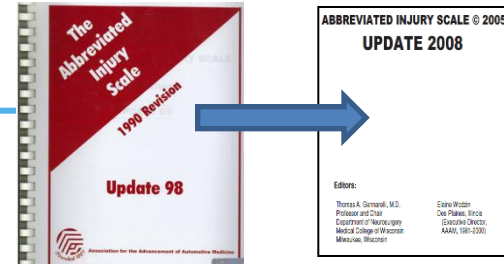
## Implementation AIS2005, update 2008 in 2015

*New codes/removed codes/severity changes of codes*

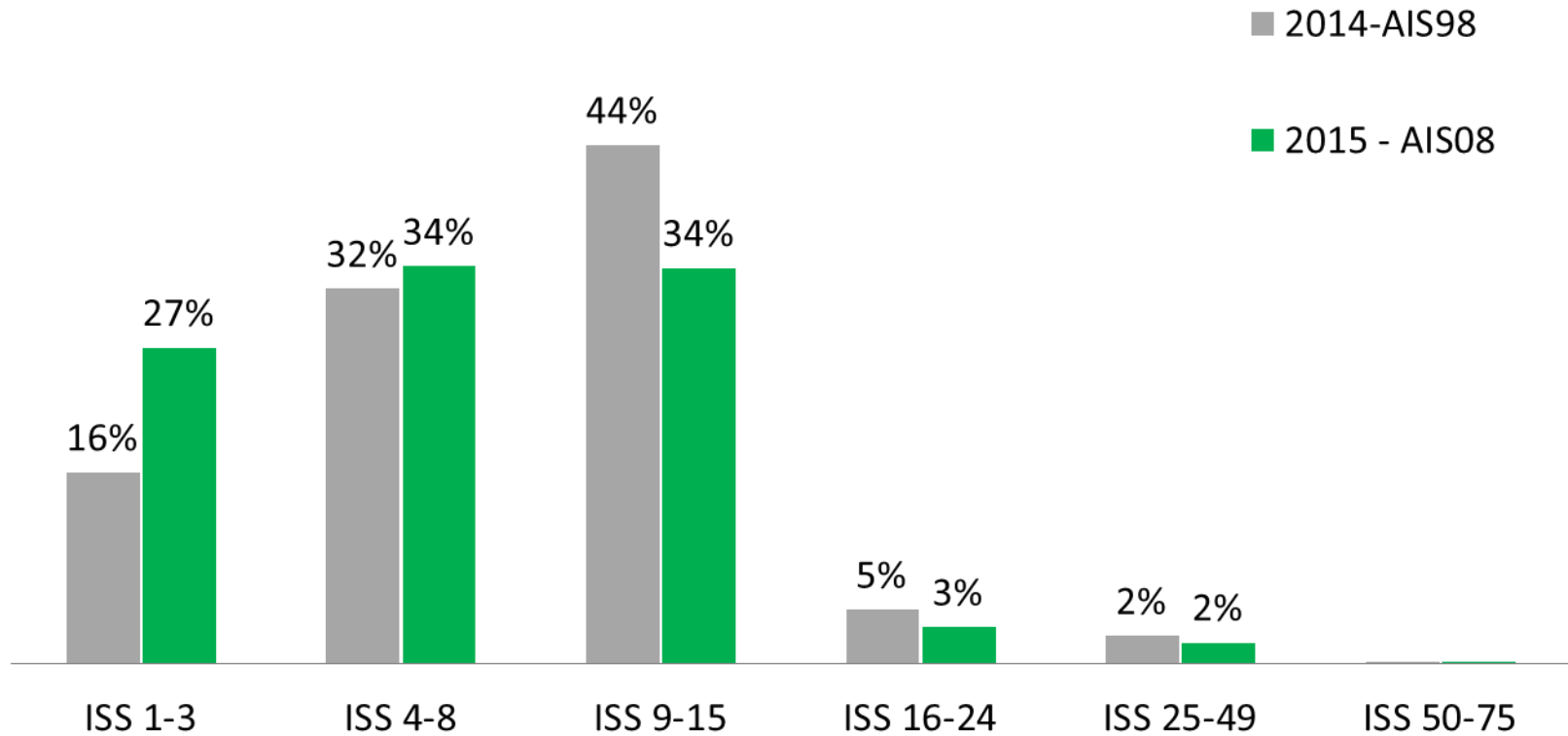
*⇒ ISS on average lower*

### ***Injury Severity Score (ISS)***

- anatomical scoring system
- based on the Abbreviated Injury Scale (AIS)
- overall score for patients with multiple injuries
  - severely injured =>  $ISS \geq 16$



## AIS 1998 - AIS 2008



## Severely injured AIS98-AIS08

	<b>2014</b>	<b>2015</b>
	<b>ISS&gt;15 (AIS98)</b>	<b>ISS&gt;15 (AIS08)</b>
	<i>n=5.882 (7%)</i>	<i>n=4.202 (5%)</i>
prehospital MMT	15%	21%
prehospital RTS≤10	23%	34%
directly to theatre	7%	12%
ICU admission	47%	56%
Hospital mortality	12%	17%

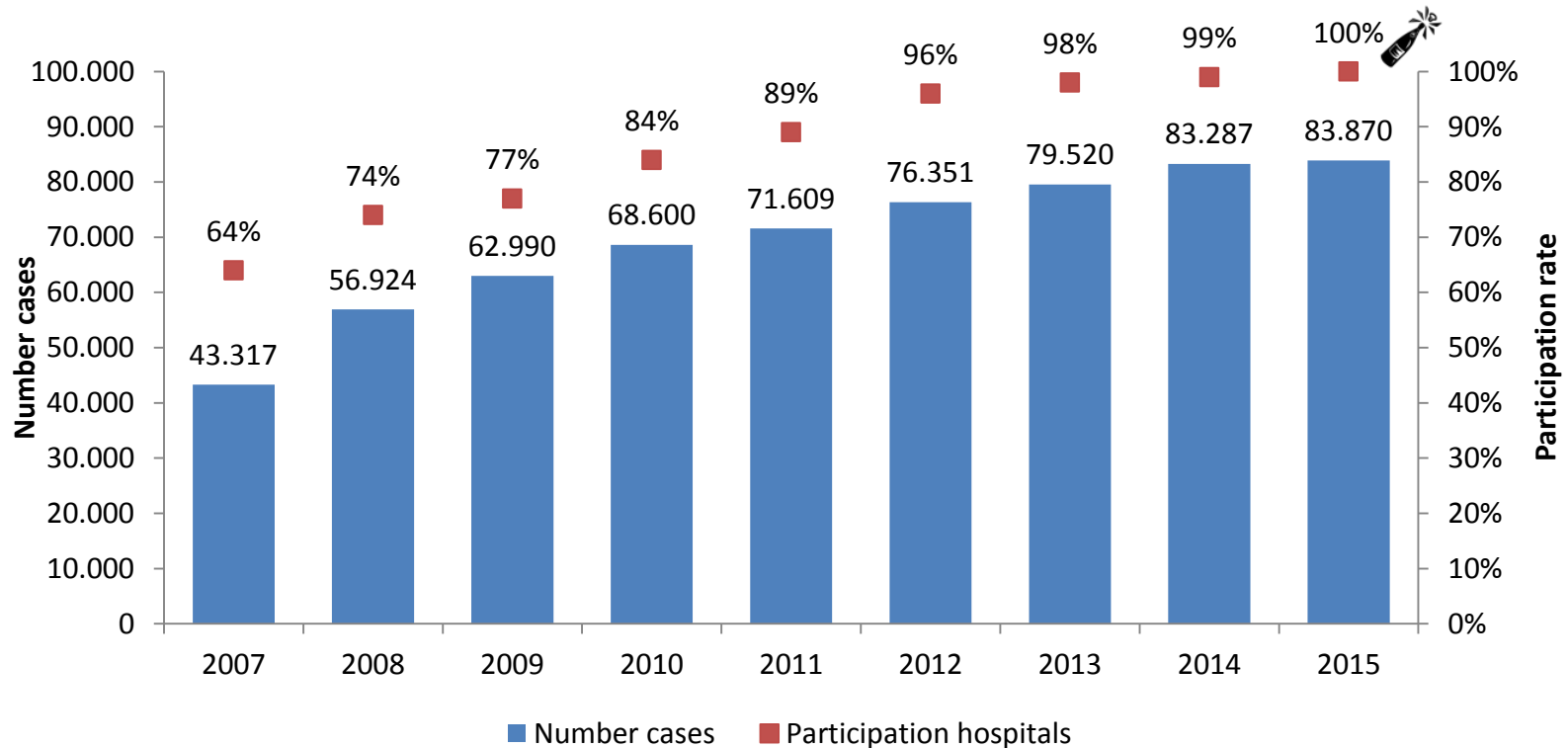
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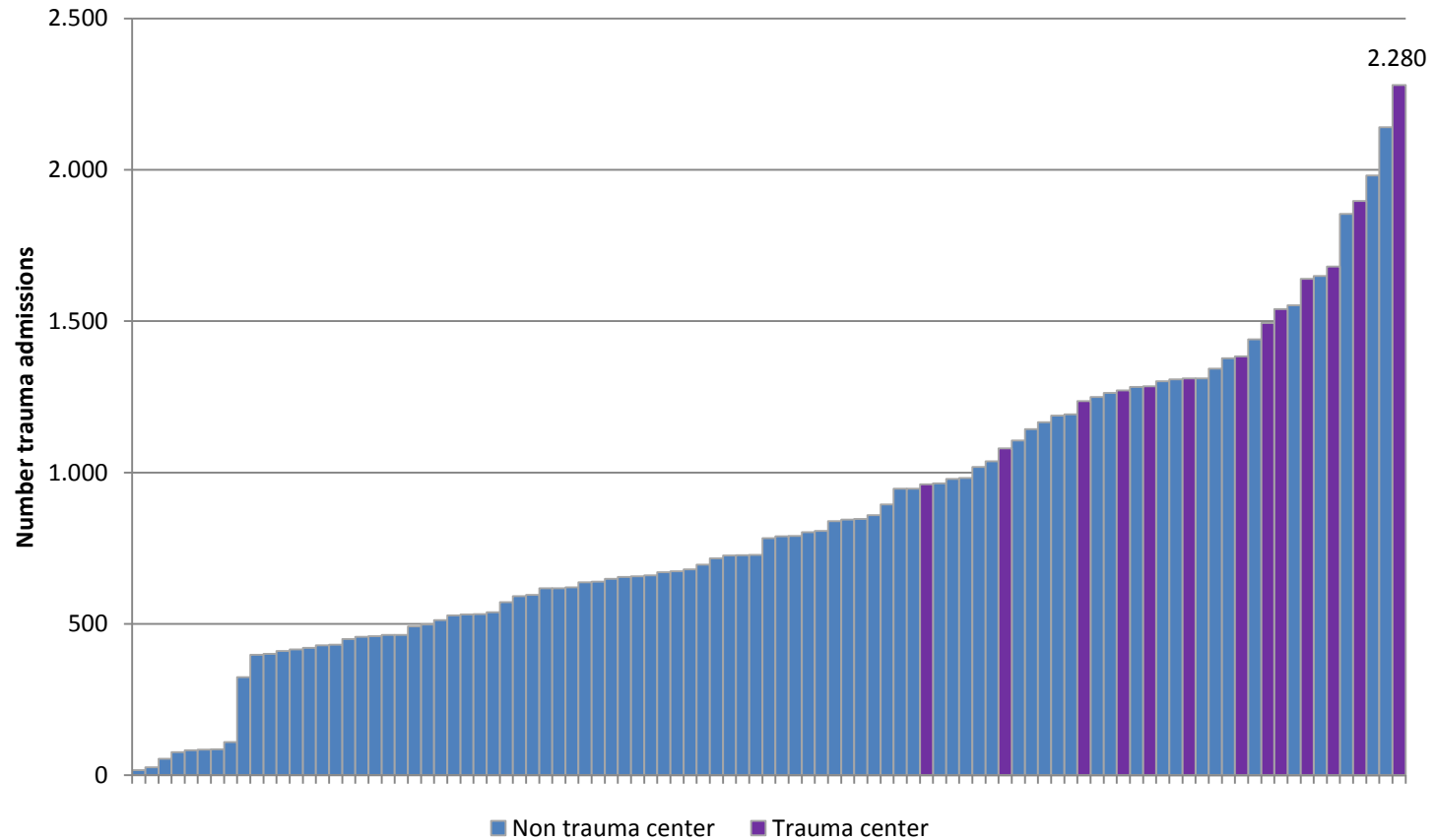
## Number of patients

230 trauma admissions per day

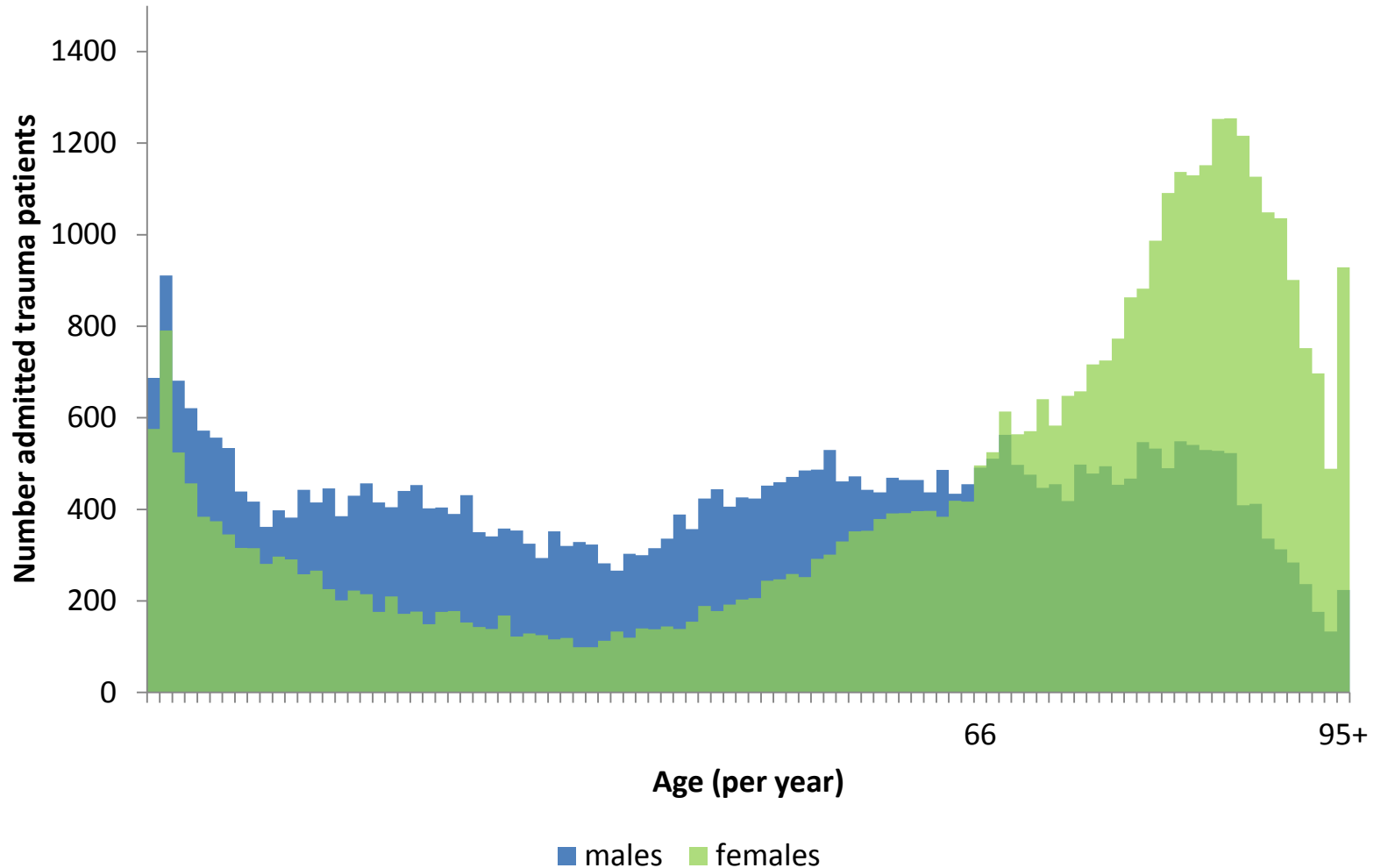


**Dutch Trauma Registry Database: 630.000 admitted trauma patients (2007-2015)**

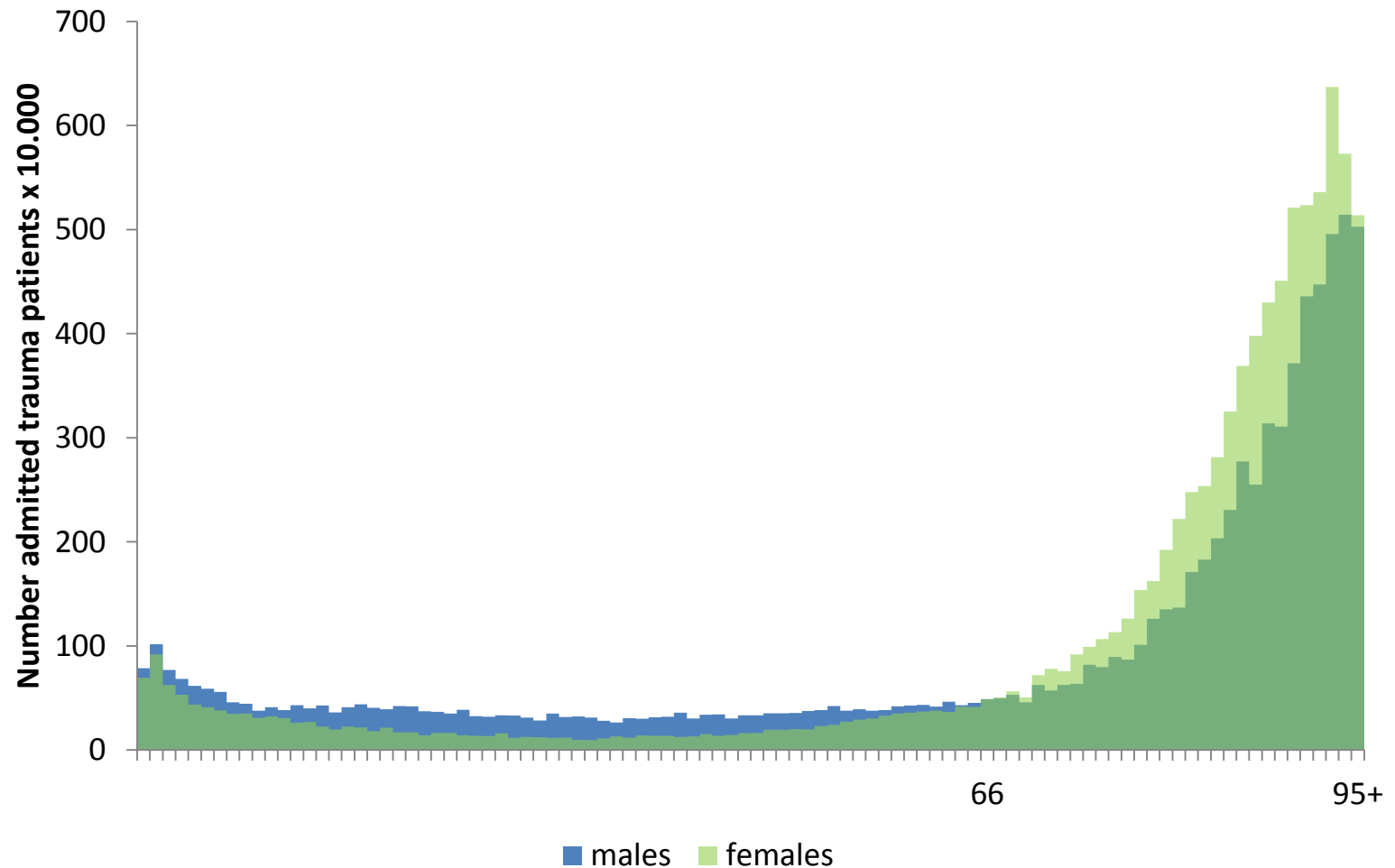
## Trauma admissions per hospital (2015)



## Age x gender admitted trauma patients (2015)



## Age x gender admitted trauma patients (incidence rate x 10.000) (2015)



## Injury cause admitted trauma patients (2015)

All

Severely injured (ISS>15)



64%

44%



12%

18%

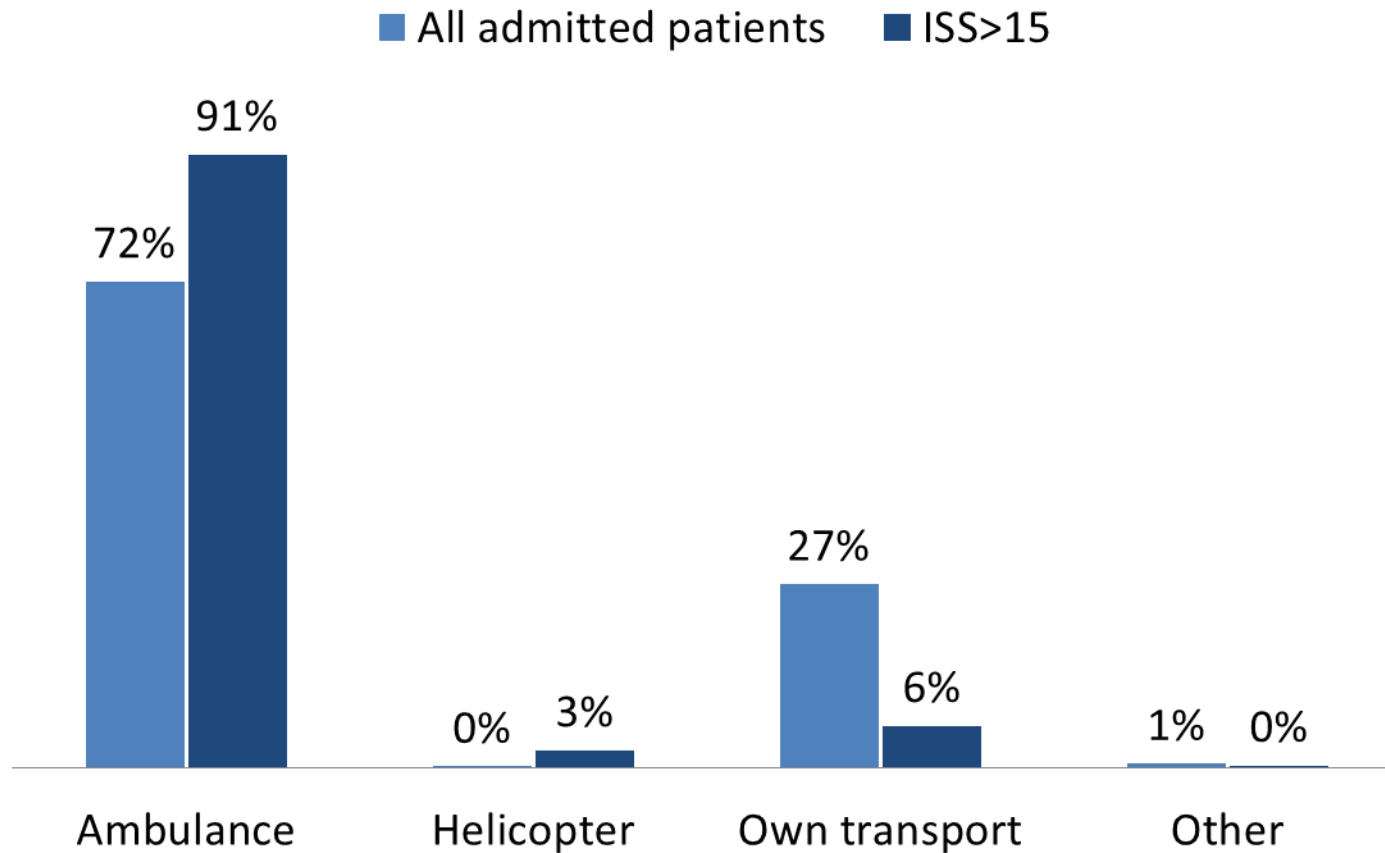


4%

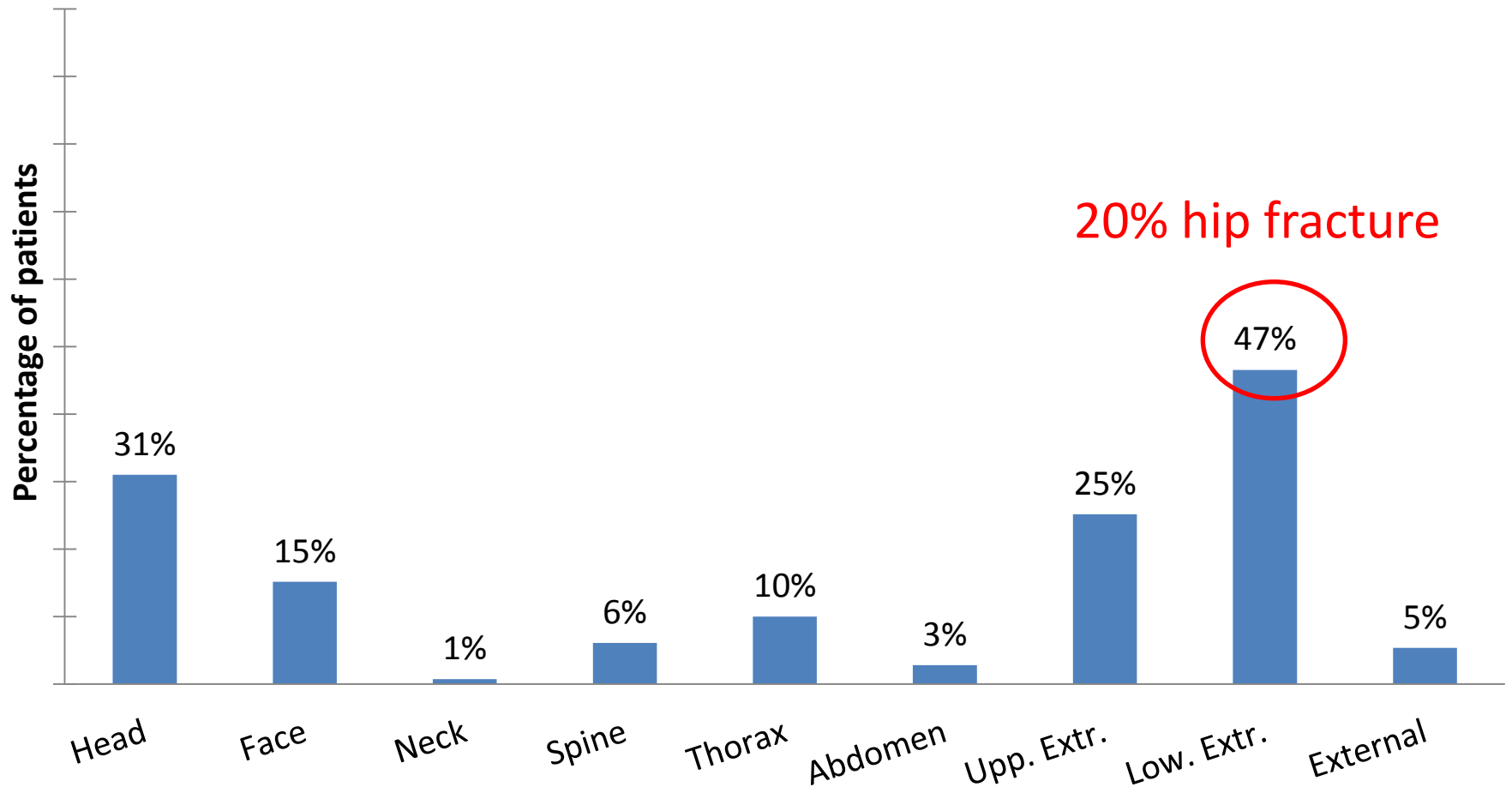
11%



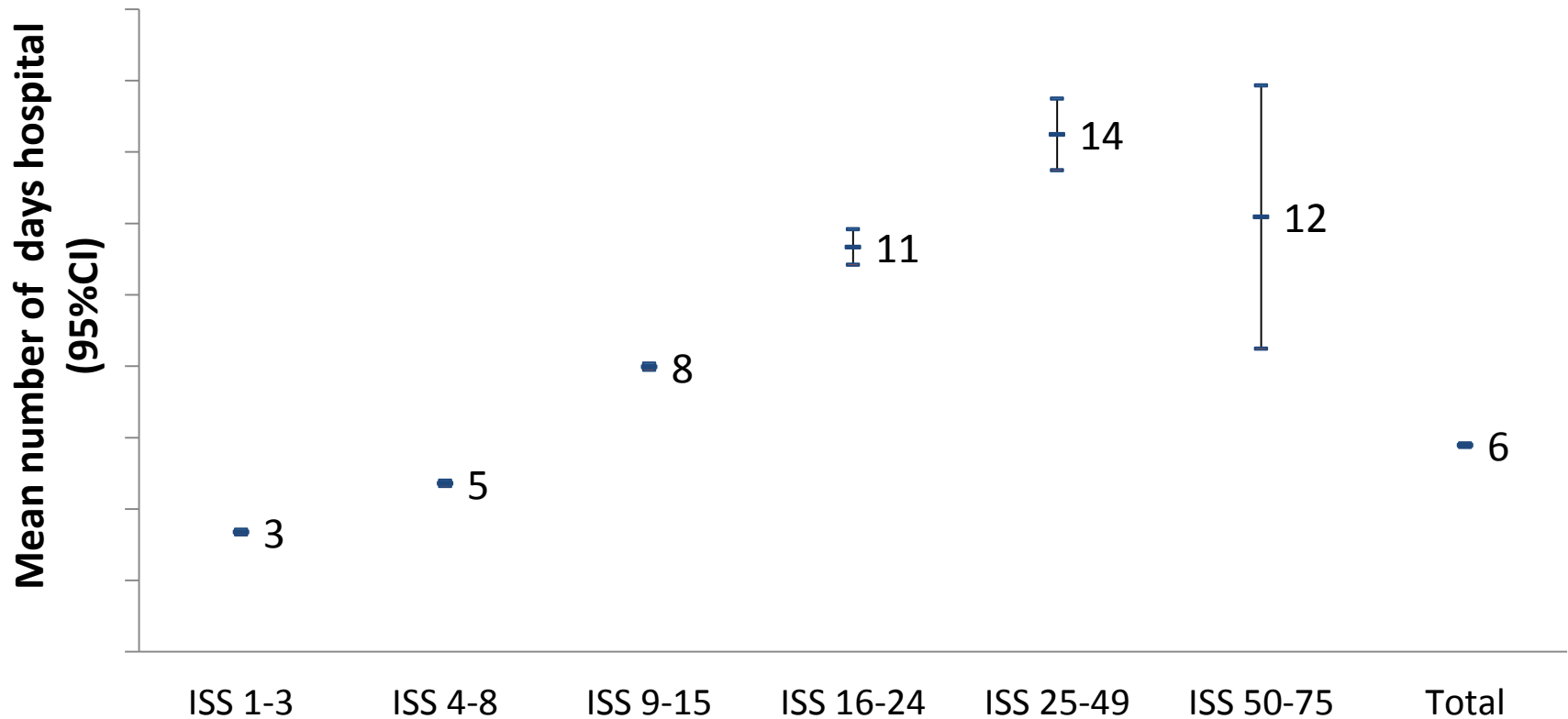
## Transport admitted trauma patients (2015)



## Injury distribution admitted trauma patients (2015)



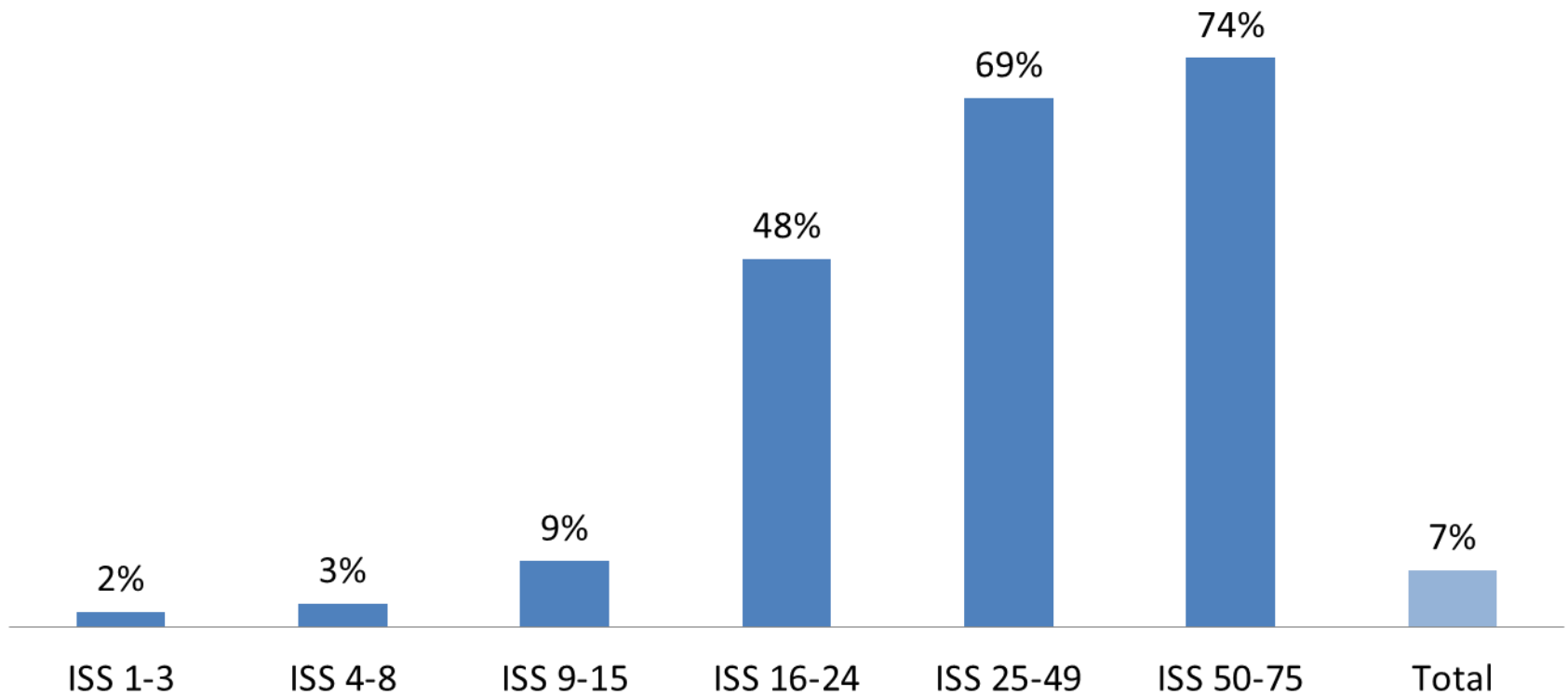
## Hospital stay – admitted\* trauma patients (2015)



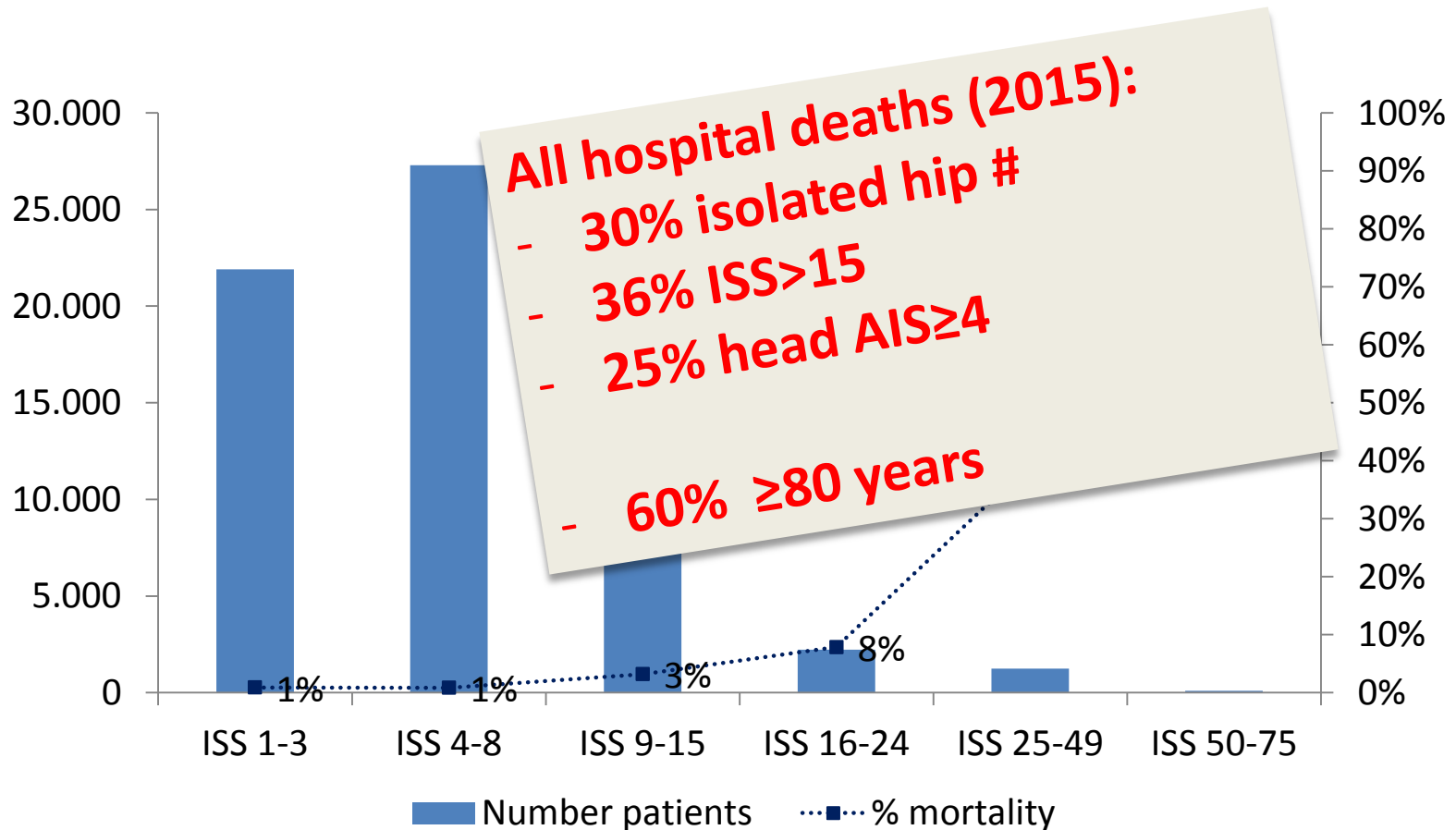
\* Excluding transfers out



## ICU – admitted trauma patients (2015)



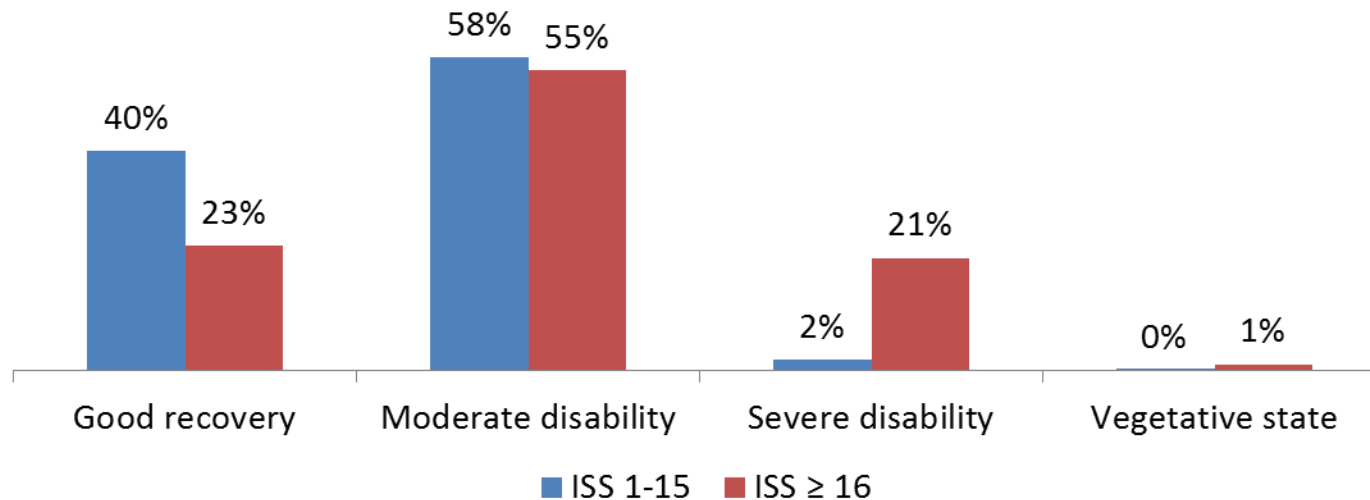
## Hospital mortality\* (2015) (2.5%)



\* Excluding transfers out

## Glasgow Outcome Score at discharge - survivors (2015)

*Preliminary results (31% missing)*



## Highlights registry data 2015

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- Patient characteristics and care process
- Outcome evaluation

## Outcome evaluation

(a) right patient, right place, right time

(b) observed versus expected mortality

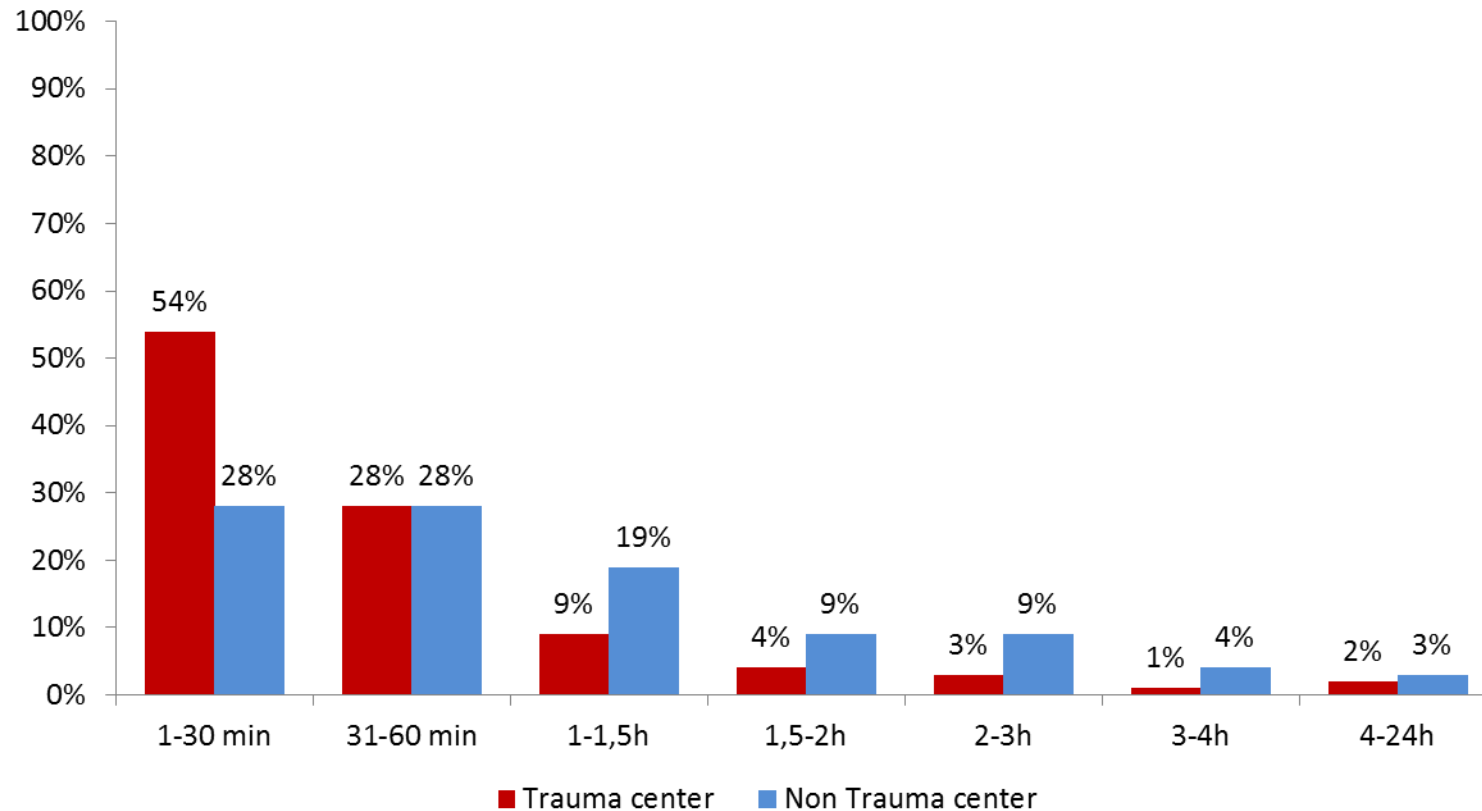


## Right patient, right place, right time

### In general:

- Less severe injuries (ISS 1-15) → nearby hospital
- Severely injured (ISS>15) → 11 level 1 regional trauma centers

## Time required to first CT ISS $\geq$ 16 (2015)





## *“getting the patient to the right hospital?”*

**ISS 1-15**

**21% trauma centers**

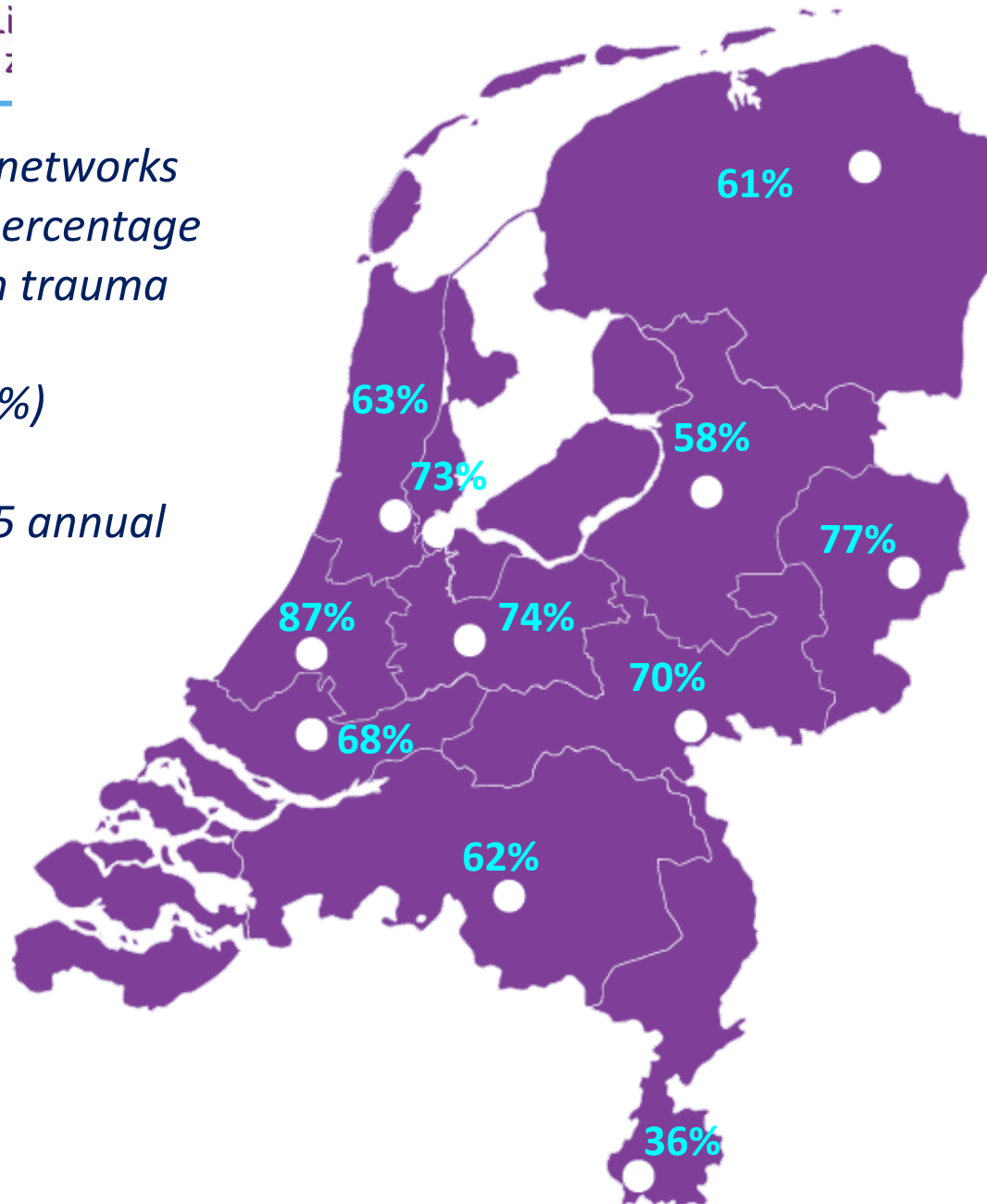
**ISS  $\geq$  16**

**67% trauma centers**



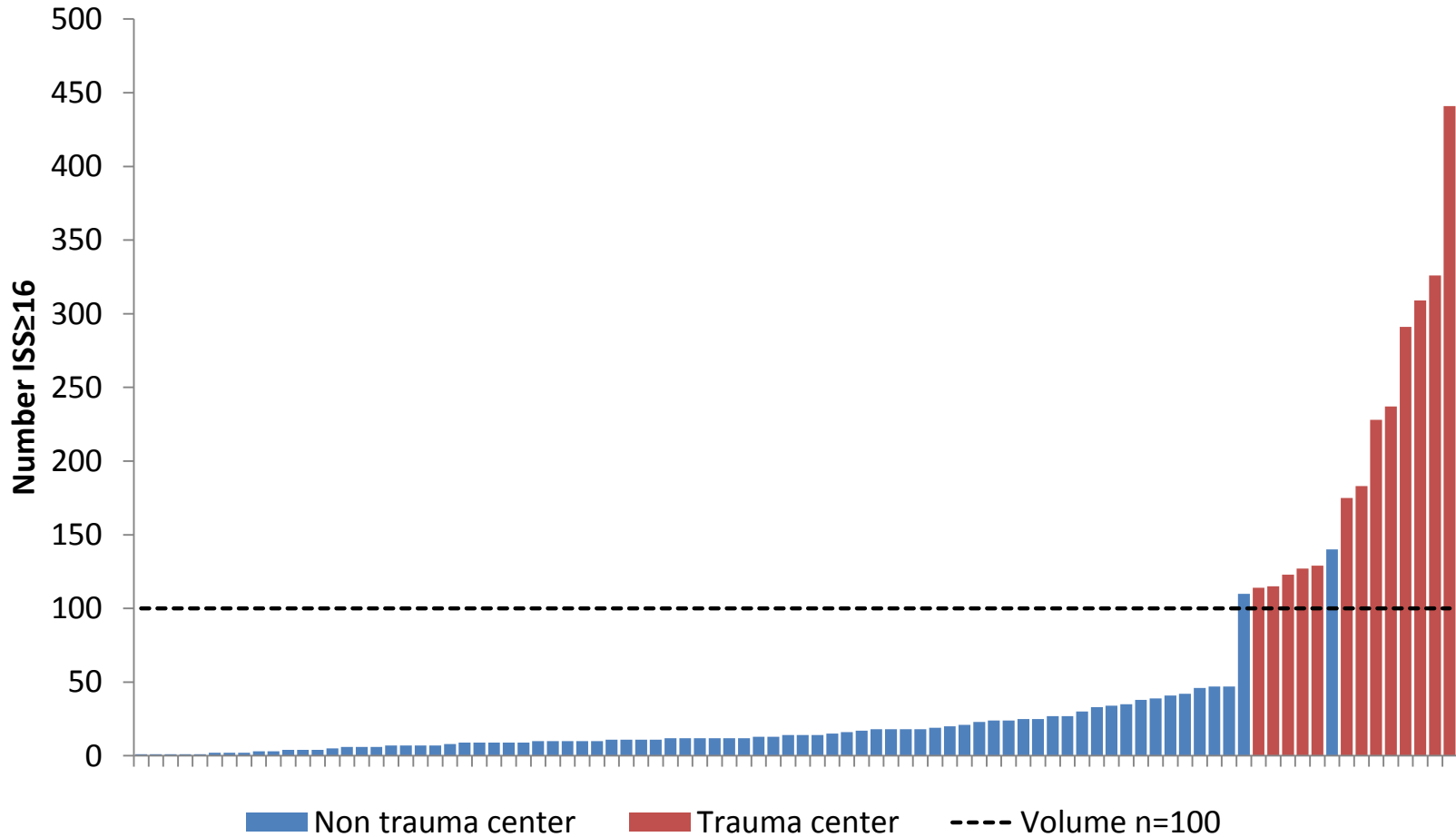
*Trauma networks  
overall percentage  
ISS>15 in trauma  
centers  
(36%-87%)*

*Figure 45 annual  
report*



## Volume per hospital ISS $\geq$ 16 (2015)

Figure 44  
annual report



## Performance

- Hospital mortality
- Expected versus observed

=> expected = TRISS (psurvival) (1987)

- US MTOS coefficients (1982-1987, update 1995)
- US NTDB coefficients (2002-2006)

$$P_s = 1/(1 + e^{-b})$$
$$b = b_0 + b_1(RTS) + b_2(ISS) + b_3(AGE)$$

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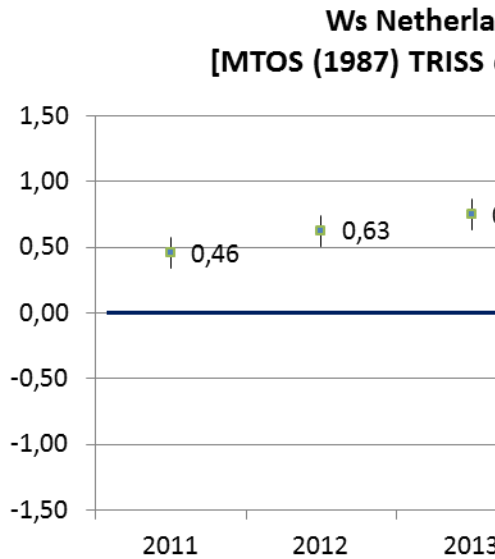
MTOS coefficients = Champion HR et al. Injury Severity Scoring Again. Journal of Trauma 1995; 38: 94-95.

NTDB coefficients = Schluter et al. Trauma and Injury Severity Score (TRISS) Coefficients 2009 Revision. Journal of Trauma 2010.

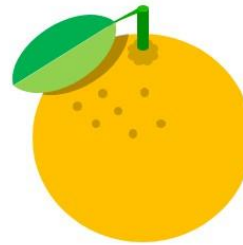
Missing RTS = max value ; Ws = Hollis S. et al. Standardized comparison of performance indicators in trauma: a new approach to case-mix variation. J Trauma 1995; 38: 763-766

## Netherlands versus US

‘standardised excess survival rate’ : Ws = direct comparison  
(standardised US national case-mix)



### Comparison Mismatch Apple vs Oranges



**AIS 98**



**AIS 08**

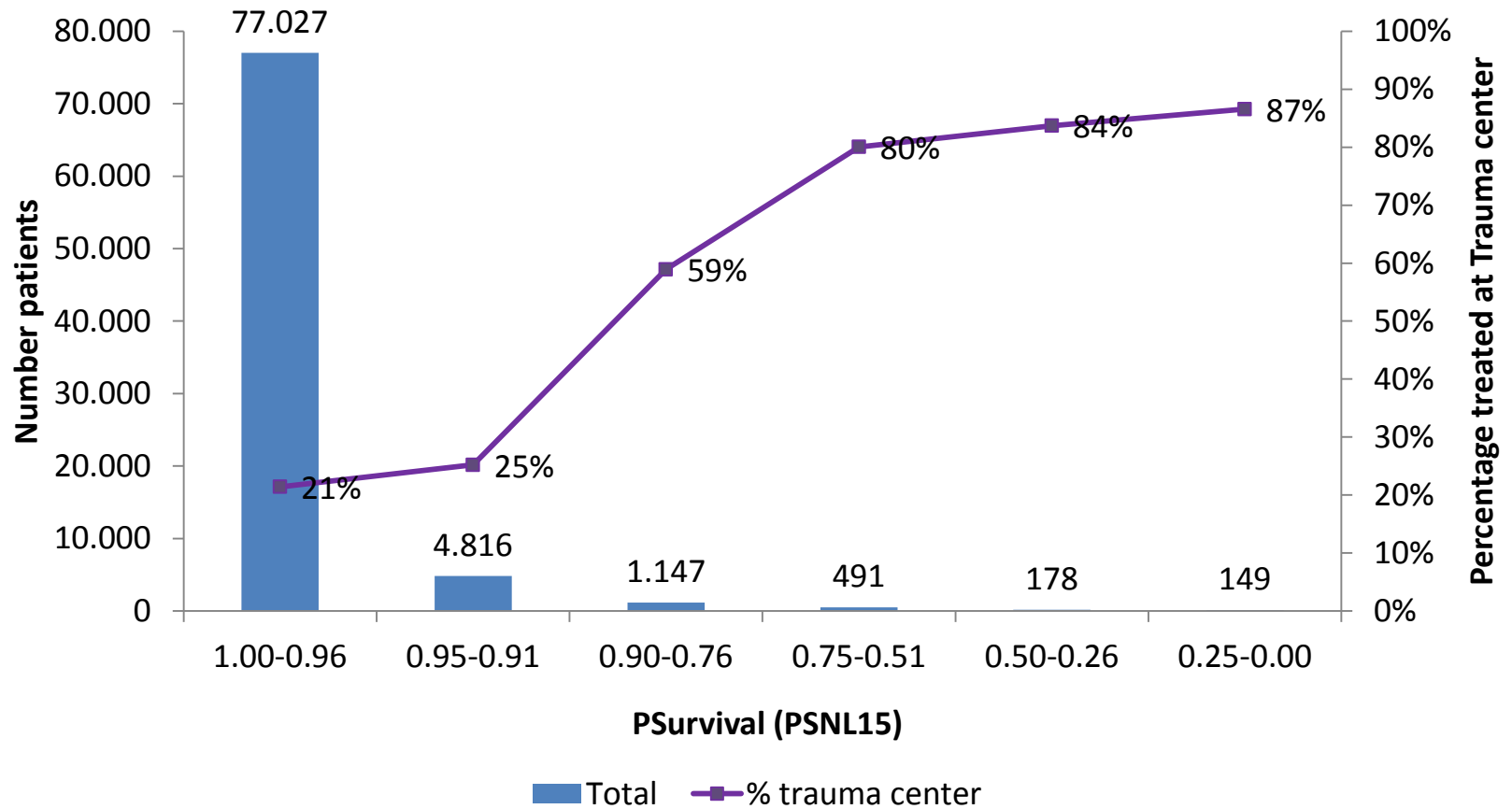
## Dutch - TRISS coefficients 2015

$$P_{\text{survival}} = 1 / (1 + e^{-b}) ;$$

$$b = b_0 + b_1(\text{RR code}) + b_2(\text{SBP code}) + b_3(\text{GCS code}) + b_4(\text{ISS}) + b_5(\text{Age})$$

BLUNT INJURIES – DUTCH TRISS COEFFICIENTS 2015					
	<i>ED measurement</i>	<i>Dutch PS NL 2015</i>	<i>NTDB (Schluter 2010)</i>	$\Delta$	<i>p value</i>
b0	Intercept	1,509	1,649	-0,140	0,719
b1	RR	0,237	0,010	0,228	0,001
b2	SBP	0,646	0,426	0,220	0,004
b3	GCS	0,401	0,631	-0,230	0,001
b4	ISS	-0,109 (AIS08)	-0,080 (AIS98)	-0,029	0,000
b5	AGE (>55)	-2,209	-1,627	-0,588	0,000

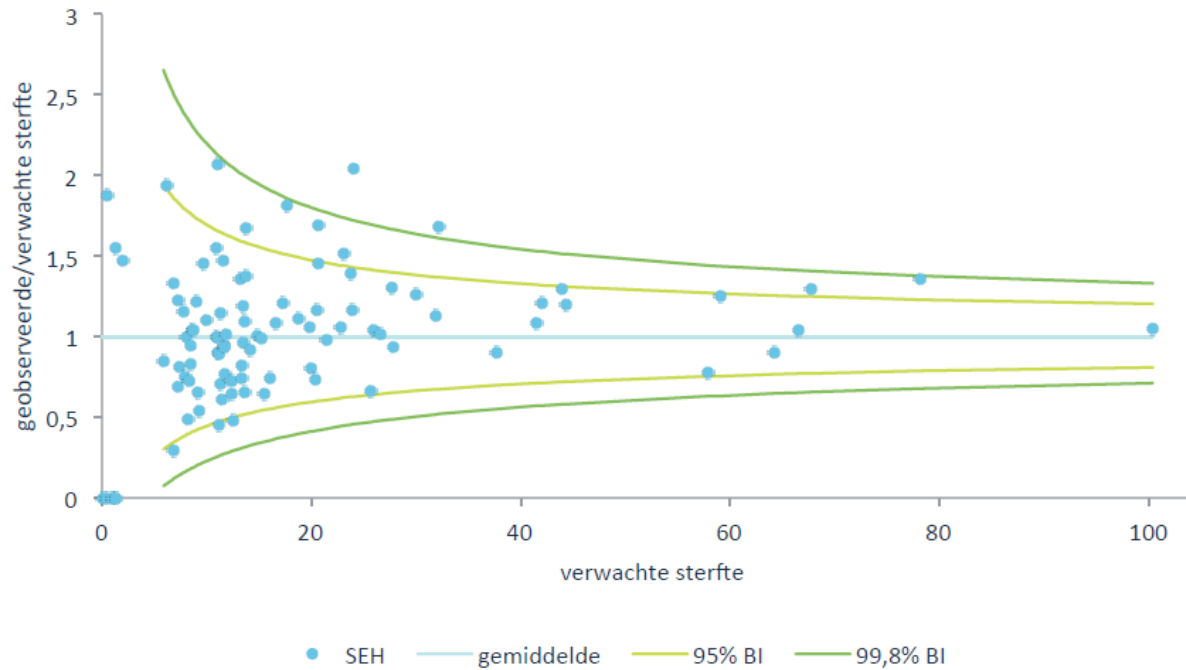
## Psurvival distribution (PSNL15) (2015)



## SMR Funnelplot

Standardized Mortality Ratio (SMR): observed/expected : indirect comparison

**Figuur 56: SMR (ziekenhuismortaliteit) LTR, ontbrekende waarden vervangen door maximale waarden (2015)**



*Figure 55  
annual report*

## Improvements need to be made...

- More direct treatment  $ISS \geq 16$  at 11 regional trauma centers
- Probability of survival -'Ps' risk adjustment model Dutch Trauma Registry
- Improve completeness of registry data
- .... Further analyses!



TRAUMAZORG IN BEELD

# Landelijke Traumaregistratie 2011 - 2015

Rapportage Nederland



## Special thanks to



- All participants
- Scientific committee
- Reports: Carin Zwartjes (IVZ)
- Analyses: Sonia Amodio & Erik van Zwet (biostatistics LUMC)
- Database: Brigit Kooijman & Ronald Brand (Advanced Datamanagement LUMC)

