Trauma Care before and after Optimization in a Level I Trauma Center

Life-Saving Changes

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RATIONALE

- Trauma care systems have evolved rapidly in Western countries and specialized trauma care has become more organized
- The implementation of the trauma centers has led to a significant reduction in mortality and length of hospital stay
- Aim of the study:** Evaluation of the trauma care in a level I trauma center after further optimizations of the in-hospital infrastructure related to the trauma care and the trauma

Optimizations of level 1 trauma center

- 24/7 in-hospital coverage of:
- Trauma surgeon
 - Intensivist
 - Anaesthesiologist
 - Emergency physician
- Renovated trauma rooms with a CT-scan and options for conventional radiography
- The intensive care reached the highest quality accreditation
- Distinction between the basic trauma team and the multi trauma team
- Optimization of weekly trauma care training

METHODS

- Cohort study
- Period I** versus **Period II**
January 2010 - July 2012 January 2014 - July 2016
- Inclusion: All adult trauma patients admitted to our trauma center directly
- Data was obtained from the trauma registry database and the hospital records
- Logistic and linear regression models
All confounders found within the demographics, characteristics of trauma and logistic data were included in the final model
- Missing data values were imputed according to multiple imputation with 20 imputations and 5 iterations

Primary Endpoint

- In-hospital mortality
- Mortality at the trauma room
- Mortality within 48-hours
- Total in-hospital mortality

Secondary Endpoints

- Emergency room time
- Time until CT
- Hospital length of stay
- ICU length of stay
- Complications
- Delayed diagnoses

INCLUSION

RESULTS

Primary Endpoint

Mortality	Period I	Period II	Univariate model	Adjusted model*	With the implementation of the 24/7 coverage of the staff members, the experience of the trauma team increased. A higher experience level has been shown to be associated with higher survival rates. Accordingly, the mortality at the trauma room and the total in-hospital mortality decreased significantly. The mortality within 48-hours did not change in the second period. The highest percentage of mortality during the first 48-hours is consistent with comparable international studies.
		n (%)	n (%)	OR [CI]; p value	OR [CI]; p value	
		At the trauma	17 (1,3)	5 (0,2)	0,16 [0,06-0,42]; <0,001	0,18 [0,05-0,63]; 0,008
		Within 48-hours	58 (4,5)	71 (2,9)	0,64 [0,45-0,91]; 0,014	0,86 [0,54-1,37]; 0,534
In-hospital	90 (7,0)	101 (4,2)	0,58 [0,43-0,78]; <0,001	0,63 [0,42-0,95]; 0,030		

Secondary Endpoints

Emergency room time	Test	Period I	Period II	B [CI]*	p value	The presence of the senior clinicians during the trauma care in combination with the optimized facilities and the optimized trauma care training results in a significant decreased emergency room time.
		Linear regression	159,5 [123,0-227,0]	124,0 [90,0-165,0]	-30,0 [-33,0- -27,0]	<0,001

Time until CT	Test	Period I	Period II	B [CI]*	p value	In the second period there is a lower threshold to perform a CT-scan and the time until CT is significantly shorter.
		Linear regression	30,0 [15,0-53,0]	20,0 [9,0-32,0]	-21,6 [-24,4- -18,9]	<0,001

ICU-length of stay	Test	Period I	Period II	B [CI]*	p value	Significant shorter ICU-length of stay. Probably based on faster stabilization of vital functions as a result of the presence of the senior clinicians.
		Linear regression	3,0 [2,0-8,0]	2,0 [2,0-5,0]	-1,8 [-2,6- -1,0]	0,022

Hospital length of stay	Test	Period I	Period II	B [CI]*	p value	Significant shorter hospital length of stay. Also based on faster stabilization and the involvement of the staff members.
		Linear regression	4,0 [2,0-11,0]	3,0 [2,0-9,0]	-1,5 [-2,1- -0,9]	0,010

Delayed diagnoses	Test	Period I	Period II	OR [CI]*	p value	The presence of the senior clinicians during the trauma care and the increased number of CT-scans, results in more clinically relevant diagnoses. This results in a significant lower number of delayed diagnoses during the trauma care.
		Logistic regression	40 (3,1)	12 (0,5)	0,2 [0,1-0,2]	<0,001

Complications	Test	Period I	Period II	OR [CI]*	p value	A significant reduction of complications during hospitalization is shown. Probably partly related to the increasement in clinically relevant diagnoses based on the increased number of CT-scans.
		Logistic regression	130 (10,1)	109 (4,5)	0,4 [0,3-0,6]	<0,001	

Legend: period I (reference value) versus period II; OR odds ratio; B regression coefficient; CI 95% Confidence interval. *Adjusted for ISS, GCS, SBP, age and severe neuro-trauma.

CONCLUSION

→ Improved survival rates

→ Shorter emergency room time

→ Shorter time until CT

→ Shorter ICU-Length of stay

→ Shorter hospital length of stay

→ Less delayed diagnoses

→ Less complications

This study shows a significant value of 24/7 in-hospital coverage of senior clinicians and renovation of the trauma room with a CT scan and options for conventional radiography. The optimizations of the in-hospital infrastructure related to the trauma care and the trauma team resulted in improved mortality rates and improved clinical outcomes.