Implementation of a nationwide trauma network for the care of severely injured patients

Steffen Ruchholtz, MD, Rolf Lefering, PhD, Ulrike Lewan, MD, Florian Debus, MD, Carsten Mand, MD, Hartmut Siebert, MD, and Christian A. Kühne, MD, Marburg, Germany

BACKGROUND:
Regional differences in the care of severely injured patients remain problematic in industrial countries. In 2006, the German Society for Trauma Surgery initiated the foundation of regional networks between trauma centers in a TraumaNetwork (TNW). The TNW consisted of five major elements as follows: (a) a whitebook on the treatment of severely injured patients; (b) evidence-based guidelines (S3); (c) local audits; (d) contracts of interhospital cooperation among all participating hospitals; and (e) TraumaRegister documentation. TNW hospitals are classified according to local audit results as supraregional (STC), regional (RTC), or local (LTC) trauma centers by criteria concerning staff, equipment, admission capacity, and responsibility.

METHODS:
In 2006, the German Society for Trauma Surgery initiated the foundation of regional networks between trauma centers in a TraumaNetwork (TNW). The TNW consisted of five major elements as follows: (a) a whitebook on the treatment of severely injured patients; (b) evidence-based guidelines (S3); (c) local audits; (d) contracts of interhospital cooperation among all participating hospitals; and (e) TraumaRegister documentation. TNW hospitals are classified according to local audit results as supraregional (STC), regional (RTC), or local (LTC) trauma centers by criteria concerning staff, equipment, admission capacity, and responsibility.

RESULTS:
Five hundred four German trauma centers (TCs) were certified by the end of December 2012. By then, 37 regional TNWs, with a mean of 13.6 TCs, were established, covering approximately 80% of the country’s territory. Of the hospitals, 92 were acknowledged as STCs, 210 as RTCs, and 202 as LTCs.

In 2012, 19,124 patients were documented by the certified TCs. Fifty-seven percent of the patients were treated in STCs, 34% in RTCs, and 9% in LTCs. The mean (SD) Injury Severity Score (ISS) was highest in STCs (21 [13]), compared with 18 (12) in RTCs and 16 (10) in LTCs. There were differences in expected mortality (based on Revised Injury Severity Classification) according to the differences in the severity of trauma among the different categories, but in all types, the expected mortality was significantly higher than the observed mortality (differences in STCs, 1.8%; RTCs, 1.4%; LTCs, 2.0%).

CONCLUSION:
According to our findings, it is possible to successfully structure and standardize the care of severely injured patients in a nationwide trauma system. Better outcomes than expected were observed in all categories of TNW hospitals. (J Trauma Acute Care Surg. 2014;76: 1456–1461. Copyright © 2014 by Lippincott Williams & Wilkins)

LEVEL OF EVIDENCE:
Epidemiologic study, level III. Therapeutic/care management study, level IV.

KEY WORDS:
Severely injured patients; trauma center; trauma system; quality management; trauma registry.

Moreover, the data from the TraumaRegister DGU of the German Society for Trauma Surgery (Deutsche Gesellschaft für Unfallchirurgie [DGU]) have revealed significant differences among participating hospitals.5,8,9

Two main factors might influence these findings. First, there are significant geographic and infrastructural variations among the trauma centers (TCs). In the federal states of Germany, the sizes of the care areas in hospitals differ greatly. The care area is nine times larger for a hospital in Mecklenburg-Western Pomerania (4,634 km²) than in North Rhine-Westphalia (541 km²).4

Second, the treatment concepts and equipment facilities in trauma hospitals vary significantly. A 2003 survey, performed in 51 hospitals participating in the TraumaRegister DGU, revealed that 14% of the hospitals lacked radiographic diagnostics and that 23% lacked sonographic diagnostics in the emergency department.10 Biewener et al.7 analyzed the quality of trauma care relative to the level of the designated hospital in the federal state of Saxony. Patients treated in community hospitals showed a significantly higher mortality rate after severe trauma. Nonetheless, variations in the quality of care influencing mortality after severe trauma were also found among university TCs.5,6

To establish optimal nationwide standards for trauma care in all German hospitals involved in the treatment of severely injured patients, the TraumaNetwork DGU (TNW) was

Submitted: January 30, 2014, Revised: February 27, 2014, Accepted: March 12, 2014,
From the Department of Trauma, Hand and Reconstructive Surgery (S.R., U.L., F.D., C.M., C.A.K.), University Hospital Giessen and Marburg GmbH, Marburg; IFOM (R.L.), Witten Herdecke University, Cologne; and German Society for Trauma Surgery (H.S.), Berlin, Germany.
Address for reprints: Steffen Ruchholtz, MD, Department of Trauma, Hand and Reconstructive Surgery, University Hospital Giessen and Marburg GmbH, Marburg, Germany, Baldingerstrasse, 35043 Marburg, Germany; email: ruchholtz@med.uni-marburg.de.

DOI: 10.1097/TA.0000000000000245

J Trauma Acute Care Surg
Volume 76, Number 6

Copyright © 2014 Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.