

Research Letter

Traumatic Brain Injury—Results From the Pilot Phase of a Database for the German-Speaking Countries

With an estimated incidence of up to 849/100 000 head of population in Europe, traumatic brain injury (TBI) remains a leading medical and socioeconomic challenge (1, 2). In spite of this, data on TBI in Germany are sparse to date because of mostly lacking or uncoordinated data collection structures. A newly conceived databank for TBI that is substantially harmonized with other international data collection structures in the Trauma Registry of the German Society of Trauma Surgery (TR-DGU) aims to improve this state of affairs. The pilot phase of this databank has been concluded and initial results are available.

Methods

The TBI-databank is a modular extension of the TR-DGU that has been in existence since 1995 and records—in addition to the TR-DGU standard data (3)—slightly over 300 TBI-specific additional data regarding the diagnostic evaluation, acute care, disease course, and treatment result (Glasgow Outcome Scale extended [GOSe] after 6 and 12 months). It was conceived by an interdisciplinary expert group from the DGU and the German Society of Neurosurgery (DGNC) and technically implemented by the German Academy of Trauma Surgery (AUC). Data entry is done prospectively and electronically, with the inclusion criteria

analogue to the TR-DGU; experienced trauma with inpatient admission via the emergency trauma room and subsequent need for monitoring, as well as additional TBI, defined by a code ≥ 1 on the Abbreviated Injury Scale (AIS). This means TBI is included in isolation as well as with accompanying injuries ranging to polytrauma. For the pilot phase (January 2019 through December 2020) nine specialist hospitals that participated in the TR-DGU were released to enter data. The results are reported for metric case numbers as means \pm standard deviations, for ordinal case numbers as medians and ranges, and for categorical variables as percentages.

Results

In the pilot phase, analyses of data from 200 patients in the TBI-databank were included. These were of a mean age of 54.7 ± 23.2 years, 71.5% (n=143/200) were men. Blood thinning medication was taken by 26.3% (n=41/156); the most common cause of TBI was a fall (56.8%; n=113/199). Accordingly, injuries occurred mostly in the domestic environment (35.2%; n=113/199). Intubation on location was required in 44.3% (n=86/194). According to the Glasgow Coma Scale (GCS), 40.5% (n=81/200) had mild TBI (GCS 13–15), 11% (n=22/200) had a moderate injury (GCS

TABLE

Demographics, diagnostic evaluation, and treatment results

Variable	Total: N = 200 (%)	Mild traumatic brain injury: n = 81 (%)	Moderate traumatic brain injury: n = 22 (%)	Severe traumatic brain injury: n = 97 (%)
Severe or life-threatening general disorder (ASA 3–4) (19)*	45 (24.9)	27 (33.3)	3 (20)	15 (15.5)
GCS (median; range) (0)*	9; 3–15	14; 13–15	11; 9–12	3; 3–8
Traumatic finding on cranial CT				
– Acute subdural hematoma (19)*	119 (65.7)	47 (64.4)	14 (70)	58 (65.9)
– Epidural hematoma (22)*	38 (21.3)	9 (12.7)	6 (28.6)	23 (26.7)
– Traumatic subarachnoid hemorrhage (18)*	137 (75.3)	47 (63.5)	17 (81)	73 (83.9)
– Skull fracture (6)*	117 (60.3)	40 (50)	18 (81.8)	59 (64.1)
Intracranial emergency surgery				
– Invasive ICP measurement (3)*	41 (20.8)	1 (1.3)	5 (22.7)	35 (36.5)
– Craniotomy (3)*	33 (16.8)	9 (11.4)	3 (13.6)	21 (21.9)
– Decompressive craniectomy (3)*	19 (9.6)	3 (3.8)	4 (18.2)	12 (12.5)
Extracranial emergency surgery (9)*	21 (11)	4 (5.3)	0 (0)	17 (18.3)
Further intracranial surgery over the course of the disease (4)*	42 (21.4)	15 (19)	8 (36.4)	19 (20)
Stay in intensive care ward (mean \pm standard deviation) (0)*	11.9 \pm 13.3 days	8.1 \pm 10.3 days	13 \pm 10 days	14.8 \pm 15.4 days
Inpatient stay (mean \pm standard deviation) (0)*	17.1 \pm 13.7 days	15.1 \pm 10.1 days	16.1 \pm 9 days	18.9 \pm 16.6 days
In-hospital mortality(0)*	37 (18.5)	6 (7.4)	2 (9.1)	29 (29.9)
cause of death (0)*				
– Under limited treatment (3)*	27 (73)	5 (83.3)	2 (100)	20 (74.1)
– Traumatic brain injury as the suspected	29 (78.4)	2 (33.3)	1 (50)	26 (89.7)
Discharge/transfer (1)*				
– Home (1)*	59 (29.6)	37 (45.7)	7 (31.8)	15 (15.6)
– Subsequent curative inpatient treatment	82 (41.2)	29 (35.8)	9 (40.9)	44 (45.8)
– Other hospital(1)*	16 (8)	8 (9.9)	2 (9.1)	6 (6.25)
– Other	5 (2.5)	1 (1.2)	2 (9.1)	2 (2.1)
– Sonstige (1)*				
GOSe 5–8 at discharge (80)*	83 (69.2)	54 (85.7)	6 (46.2)	23 (52.3)

*In parentheses: proportion of missing patient data per variable; CAUTION: the percents in the traumatic brain injury subgroups refer to the collective of available data, respectively ASA, American Society of Anesthesiologists; CT, computed tomography; ICP, intracranial pressure; GOSe, Glasgow Outcome Scale extended

9–12), and 48.5% (n=97/200) had a severe brain injury (GCS 3–8). Patients with mild TBI particularly often had severe or life threatening general disorders (33.3%; n=27/78) and, in view of a median Injury Severity Score (ISS) of 18 (4–43), often had accompanying injuries. Furthermore, in the context of the trauma room diagnostics, intracranial traumatic pathologies were seen on computed tomography (CT) scanning in 93.7% of cases (n=75/80). Still in the trauma room, intracranial emergency surgery was carried out in 54.2% (n=52/96) of patients with severe TBI. This consisted most commonly (68/8%; n=35/51) of invasive measuring of intracranial pressure (ICP) (Table). Decompressive hemicraniectomy was necessary during the inpatient stay in 20% (n=19/95) of patients with severe TBI; 26.1% (n=24/92) patients received osmotically effective substances to lower ICP. Moreover, patients with severe TBI were ventilated for a mean of 11.9±13.4 days, with pneumonia being a common complication (40.2%; n=39/97). The in-hospital mortality rate after severe TBI was 29.9% (n=29/97). At the time of the 6-month follow-up, a favorable therapeutic outcome (GOSe 5–8) had been achieved in 35 of the 47 participating patients (74.5%) overall and in 16 (80%) of the 20 patients with severe TBI.

Discussion

The present results are consistent with international data and convincingly confirm for Germany too a demographic and epidemiologic shift toward elderly multimorbid patients with TBI, with a domestic fall as the cause of the injury (4). The fact that 40.5% (n=81/200) of those treated in intensive care had only a mild TBI reflects the current healthcare reality/landscape in Germany and should be critically scrutinized in these times of bed shortages. Possible explanations might be severe general disorders or frequent intracranial traumatic findings on CT in this cohort. Mortality due to severe TBI remains relevant, at 30%. In this setting, the TBI-databank allows for the first time an insight into the practice of therapy limitation, which seems common, at 74.1% (n=20/27). The same applies for longer term treatment results after severe TBI, which are now being collected in Germany for the first time and may actually be favorable. But as far as this issue is concerned, the interpretation of the TBI-databank's results is hampered by low participant numbers and should be undertaken with caution. Still, such a reflection on longer term treatment results may in the future also allow conclusions about the importance of early subsequent inpatient rehabilitation, which is commonly done in Germany, at 41.2% (n=82/199). Since, however, latterly more than 30,000 patients every year have been documented in the TR-DGU, with a rate of 33% for isolated TBI and 56% for TBI in combination with other injuries the potential for the TBI-databank DGNC/DGU in the TR-DGU is enormous. Since 1 November 2021, the databank is open to all TR-DGU associated hospitals/centers in the German-speaking region.

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Conflict of interest statement

MG is the founder and adviser of Neurolog GmbH.

CH received support/funding from Witten/Herdecke University and the DGU. She is a steering committee member of the TBI-databank DGNC/DGU and deputy managing director of the AUC. She is active in various working groups in the DGU that collaborate with the TR-DGU.

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The remaining authors declare that no conflict of interest exists.

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