The definition of polytrauma revisited: An international consensus process and proposal of the new ‘Berlin definition’

Hans-Christoph Pape, MD, Rolf Lefering, PhD, Nerida Butcher, MD, Andrew Peitzman, MD, Luke Leenen, MD, Ingo Marzi, MD, Philip Lichte, MD, Christoph Josten, MD, Bertil Bouillon, Uli Schmucker, PhD, Philip Stahel, MD, Peter Giannoudis, MD, and Zsolt Balogh, MD, Aachen, Germany

BACKGROUND: The nomenclature for patients with multiple injuries with high mortality rates is highly variable, and there is a lack of a uniform definition of the term polytrauma. A consensus process was therefore initiated by a panel of international experts with the goal of assessing an improved, database-supported definition for the polytraumatized patient.

METHODS: The consensus process involved the following:
1. Expert panel. Multiple meetings and consensus discussions (members: European Society for Trauma and Emergency Surgery [ESTES], American Association for the Surgery of Trauma [AAST], German Trauma Society [DGU], and British Trauma Society [BTS]).
2. Literature review (original articles before June 8, 2014).
3. A priori assumptions by the expert panel. The basis for a new definition should include the Injury Severity Score (ISS) based on the Abbreviated Injury Scale (AIS): “A patient classified as polytraumatized should have a mortality rate of approximately 30%, twice above the established mortality of ISS > 15.”
4. Database-derived resources. Deductive calculation of parameters based on a nationwide trauma registry (TraumaRegister DGU) with the following inclusion criteria: multiple injuries and need for intensive care therapy.

RESULTS: A total of 28,211 patients in the trauma registry met the inclusion criteria. The mean (SD) age of the study cohort was 42.9 (20.2) years (72% males, 28% females). The mean (SD) ISS was 30.5 (12.2), with an overall mortality rate of 18.7% (n = 5,277) and an incidence of 3% of penetrating injuries (n = 886). Five independent physiologic variables were identified, and their individual cutoff values were calculated based on a set mortality rate of 30%: hypotension (systolic blood pressure ≤ 90 mm Hg), level of consciousness (Glasgow Coma Scale [GCS] score ≤ 8), acidosis (base excess ≤ −6.0), coagulopathy (international normalized ratio ≥ 1.4/partial thromboplastin time ≥ 40 seconds), and age ≥ 70 years.

CONCLUSION: Based on several consensus meetings and a database analysis, the expert panel proposes the following parameters for a definition of “polytrauma”: significant injuries of three or more points in two or more different anatomic AIS regions in conjunction with one or more additional variables from the five physiologic parameters. Further validation of this proposal should occur, favorably by multivariate analyses of these parameters in a separate data set. J Trauma Acute Care Surg. 2014;77: 780–786. Copyright © 2014 by Lippincott Williams & Wilkins)

KEY WORDS: Definition of polytrauma; assessment of patients with multiple injuries; conventional parameters for assessment; biomarkers for polytrauma; grading of patients.

The terminology applied to quantifying injury severity has been vague and inconsistent.1-6 Descriptions such as “critically injured,” “severely injured,” or “critically ill with multiple injuries” have been used interchangeably.2,3 To our knowledge, the term polytrauma was first used approximately half a century ago, when survival rates began to improve for these patients. Descriptive definitions were used, such as “at least two severe injuries of the head, chest or abdomen, one of them in association with an extremity injury.”4 “any patient with two or more significant injuries,”5 or “a patient with two or more injuries, one of them being potentially life threatening.” Isolated life-threatening conditions were also separated and the term barytrauma was coined.6

From the Department of Orthopedics/Trauma (P.L.), Aachen University Medical Center; and Harald Tscherne Lab for Orthopaedic Trauma (H.-C.P., P.L.), Aachen; Institute for Research in Operative Medicine (IFOM) (R.L., B.B.), University of Witten/Herdecke, Witten; Department of Orthopedics (R.L., B.B.) at Merheim, Cologne; and Department of Trauma, Hand, and Reconstructive Surgery (I.M.), J. W. von Goethe University, Frankfurt; Department of Orthopaedic Trauma (C.J.), University of Leipzig, Leipzig; and AUC-Academy for Trauma Surgery (U.S.), Munich, Germany; Department of Traumatology (N.B., Z.B.), John Hunter Hospital and University of Newcastle, Newcastle, Australia; Department of Surgery (A.P.), University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania; and Department of Orthopaedic Surgery (P.S.), Denver Health Medical Center, Denver, Colorado; Department of Trauma (L.L.), Utrecht University, Utrecht, the Netherlands; and Department of Trauma (P.G.), Academic Unit of the University of Leeds, West Yorkshire, United Kingdom.

Address for reprints: Hans-Christoph Pape, MD, Department of Orthopedics/Trauma, Aachen University Medical Center, Germany, F. Pauwels Professor and Chairman, Department of Orthopaedic Trauma, 30 Pauwels St, 52074 Aachen, Germany; email: papehc@aol.com.

DOI: 10.1097/TA.0000000000000453