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Compliance with evidence-based clinical management guidelines in bleeding trauma patients

A. Godier[1,2], M. Bacus[3], E. Kipnis[3], B. Tavernier[3], A. Guidat[3,4], A. Rauch[5,6], E. Drumez[7], S. Susen[5,6] and D. Garrigue-Huet[3,8,*]

[1]Service d'anesthésie-réanimation, Fondation Ophtalmologique Adolphe de Rothschild, Paris, France, [2]INSERM UMR-S1140, Université Paris Descartes, Sorbonne Paris Cité, France, [3]CHU de Lille, Pôle d'anesthésie-réanimation, Lille, F-59000, France, [4]CHU Lille, Délégation Qualité Risques Vigilances, Lille, France, [5]Institut d'Hématologie et de Transfusion, CHU Lille, Lille, France, [6]Université Lille, Inserm, CHU Lille, U1011 – EGID, Lille, F-59000, France, [7]Université Lille, CHU Lille, EA 2694 – Santé publique: épidémiologie et qualité des soins, Lille, F-59000, France and [8]CHU Lille, Pôle de l'Urgence, Lille, F-59000, France

*Corresponding author. E-mail: delphine.garrigue@chru-lille.fr

Abstract

Background: In 2007, the multidisciplinary European Task Force for Advanced Bleeding Care in Trauma published guidelines for the management of the bleeding trauma patient. The present study aimed to assess compliance with the European guidelines during the first 24 h in a level I trauma centre and to determine whether compliance impacts mortality.
Methods: This was a retrospective study of consecutive bleeding trauma patients referred to a university hospital in France between 2010 and 2014. A reference document was developed on the basis of the European guidelines to transform the guidelines pragmatically into 22 objectively measurable criteria. We measured per-patient and per-criterion compliance rates and assessed the impact of guideline compliance on mortality.
Results: A total of 121 bleeding trauma patients were included. The median (interquartile range) per-patient compliance rate was 75 (65–82)% and the per-criterion compliance rate 64 (57–81)%. Mortality rates were 18 and 32% at 24 h and 30 days, respectively. After adjusting for injury severity, per-patient compliance rates were associated with decreased mortality at 24 h (odds ratio per 10% increase in patient compliance score, 0.43; 95% confidence interval 0.26–0.71; $P = 0.0001$) and at 30 days (odds ratio per 10% increase in patient compliance score, 0.47; 95% confidence interval 0.31–0.72; $P = 0.0004$).
Conclusions: We found that compliance with protocols based on European guidelines impacts trauma outcome, because patient compliance was associated with survival. Further work is needed to improve adherence to these guidelines, with ongoing monitoring to ensure best practice and optimal patient outcome.

Key words: bleeding; compliance; guidelines; mortality; trauma

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Editor's key points

- Clinical practice guidelines aim to standardize practice and improve outcomes.
- Institutions and clinicians should monitor compliance with guidelines.
- This study found that survivors had higher compliance scores than non-survivors.
- Inadequate assessment and treatment of hypocalcaemia was the most common problem.

According to the World Health Organization, ~800 000 Europeans die from injuries annually.[1] Bleeding is the leading cause of death for patients admitted to hospital for trauma, and trauma-induced coagulopathy increases both the risk and the severity of bleeding.[2] Thus, traumatic injury is a major public health problem that requires ongoing investigation in the areas of prevention, acute care, and rehabilitation.

In order to reduce trauma mortality, the multidisciplinary European Task Force for Advanced Bleeding Care in Trauma launched the STOP the Bleeding Campaign.[3] This campaign aims to improve health-care quality by publishing European guidelines for the management of the bleeding trauma patient and by promoting and monitoring the implementation of these guidelines. In 2013, an updated version of the 2007 guidelines already updated once in 2010 was published.[2] These guidelines were designed for in-hospital patient management and were based on a systematic review of the most recent published literature. The core of the guidelines includes 34 recommendations deemed critical to trauma patient care and three additional guidelines regarding development and implementation of local protocols to manage trauma patients. The latest version of the guidelines also encourages each institution to assess compliance with the management strategy, considering that protocol adherence and regular compliance assessments are part of institutional quality management.

Although several studies demonstrate that protocol implementations are associated with better outcomes for trauma patients,[4–7] very little is known about compliance with trauma guidelines and even less about the clinical impacts of guideline compliance. The Lille University Teaching Hospital is a level I trauma centre affiliated with the University of Lille, with an average of 350 trauma team activations annually. According to a quality assurance and performance improvement programme, the trauma service decided to evaluate adherence to guidelines and determine whether standardized guideline-driven initial management of the trauma patient would improve outcome. The objectives of the present study were to measure compliance with the European guidelines during the first 24 h of trauma management and determine whether compliance had an impact on patient mortality. We hypothesized that better compliance with these guidelines would reduce mortality.

Methods

We conducted a retrospective study of bleeding trauma patients referred to our level I trauma centre at the Lille University Teaching Hospital from May 2010 to October 2014. All bleeding trauma patients arriving directly from the scene were included. Patients were excluded if <15 yr old or pregnant. For the purposes of this study, and because this point was not specified in the European Guidelines, bleeding trauma patients were defined according to a transfusion requirement of six red blood cell (RBC) units or more within the first 24 h. The institutional Ethics Committee (CPP Nord-Ouest IV) approved this study and waived the need for consent from the patients.

We contributed to the guidelines published by the multidisciplinary European Task Force for Advanced Bleeding Care in Trauma and entitled 'Management of bleeding and coagulopathy following major trauma: an updated European guideline'.[2 8] Given that they were updated in 2013, we combined both versions according to the hospital admission date of each patient. The term 'European guidelines' refers to these guidelines thereafter.

The first study aim was to develop a reference document based on the European guidelines to transform recommendations regarding trauma management during the first 24 h into objectively assessable criteria. To this end, and to reduce analysis bias, a multidisciplinary trauma task force was formed with representatives from anaesthesia, intensive care medicine, surgery, imaging, haematology, and health-care risk management departments. Using the European guidelines as a template,[2] the task force developed a set of 22 criteria, grouped into the five categories specified in the European guidelines. Of the 31 recommendations published in 2010 (37 in the 2013 version), three recommendations were not included in the analysis as it was considered that compliance could not be evaluated precisely because of the recommendation itself [R3 (initial assessment)] or the retrospective nature of our evaluation [R16 (damage control surgery) and R17 (local haemostatic measures)]. Among recommendations added in 2013, one [R29 (antiplatelet agents)] was considered *a priori* not reliably measurable (and eventually concerned only two patients) and two recommendations [R30 (desmopressin) and R32 ('novel' anticoagulants)] were not applicable to any of our patients and are thus not reported. Finally, three were institutional recommendations (R35–37), and one applied to management after the first 24 h (R34, thromboprophylaxis), and were thus excluded from our analysis. All other recommendations ($n = 27$) were selected as such, or combined, into 22 criteria corresponding to individual management of trauma patients during the first 24 h. The resulting criteria consisted of either explicit definitions or thresholds for measurable parameters to assess easily whether the patient received the care or not. Twenty criteria were answered by 'yes', 'no', or 'not applicable' if the patient was not eligible for that care, as no patient fulfilled all 20 criteria (for example, not all patients needed pelvic stabilization or tourniquet use). Two time-related criteria were assessed (in minutes). Criteria and their definitions of compliance and deviation are summarized, along with the corresponding 2013 guidelines recommendations, in Table 1.

The reference document was then filled in for each patient, regarding each of the 22 criteria, using retrospectively collected data extracted from patient charts. Data not reported in the charts were considered as 'care not performed' by default and were scored as 'no compliance'. When parts of the patient records were not found, data were considered as missing data.

Compliance was analysed in two different ways: either compliance with each given criterion within the entire study population, which we termed 'per-criterion compliance' or compliance across criteria for each given patient, which we termed 'per-patient compliance'. Per-criterion compliance rates were measured as the proportion of 'yes' for a given criterion, whereas per-patient compliance rates were measured for each individual patient as the proportion of 'yes' among the panel of criteria.