Annales Françaises d'Anesthésie et de Réanimation 32 (2013) 465–471

Monothematic meeting of Sfar

# Statement of severe trauma management in France; teachings of the FIRST study☆,☆☆

## *État des lieux de la prise en charge du traumatisé grave en France ; enseignements de l'étude FIRST*

C. Tissier [a,b], C. Bonithon-Kopp [a,b], M. Freysz [a,*,b] the French Intensive care Recorded in Severe Trauma (FIRST) study group

[a] *Department of emergency medicine, university hospital center, 14, rue Paul-Gaffarel, BP 77908, 21079 Dijon, France*
[b] *Faculty of medicine, university of Burgundy, 7, boulevard Jeanne-d'Arc, 21079 Dijon, France*

ARTICLE INFO

*Keywords:*
Severe blunt trauma
Emergency medicine mobile unit
Pre-hospital management
Epidemiological study
Medical-staffed air ambulance
Trauma imaging

ABSTRACT

*Introduction.* – The blunt trauma victim management is still a matter of debate and comparing studies involving different emergency medical services and health care organization remains fictitious. Hence, the French Intensive care Recorded in Severe Trauma (FIRST) was conducted in order to describe the severe blunt trauma management in France. The present paper aimed at recalling the main results of FIRST study.
*Methods.* – The FIRST study was based on a multicenter prospective cohort of patients aged 18 or over with severe exclusive blunt trauma requiring admission to university hospital care unit within the first 72 h and/or managed by medical-Staffed Emergency Mobile Unit (SMUR). Multiple data were collected about patient characteristics, clinical initial status, typology of trauma and the main endpoints were 30-day mortality.
*Results.* – Sixty-one percent of trauma patients were road traffic victims and 30% were domestic, sport or leisure trauma. Patients who benefited from medical pre-hospital management were globally more severely injured than those who received basic life support care by fire brigades. Therefore, they were delivered more aggressive treatment in the pre-hospital setting and the median time for their hospital admission was lengthened. However, their 30-day mortality was significantly reduced. The probability of death was also decreased when casualties were transported by SMUR helicopter directly to the university hospital. In the in-hospital setting, the performance of a whole-body computed tomography (CT) was associated with a significant reduction in the mortality risk compared with a selective CT.
*Conclusion.* – The FIRST study suggests the benefit of a medical management in the pre-hospital setting on the survival of trauma patients. The emergency physician (EP) expertise in the pre-hospital and initial hospital phases would lead to the concept of the appropriate care for the appropriate trauma patient. It also highlights the necessity to set up organized regional sectors of care and registries.


*Mots clés:*
Traumatisme grave fermé
Service mobile d'urgence et de réanimation
Prise en charge préhospitalière
Étude épidémiologique
Médicalisation héliportée
Imagerie du traumatisé grave

RÉSUMÉ

*Introduction.* – La prise en charge du traumatisé grave est actuellement toujours sujette à débat et la comparaison des études impliquant des systèmes sanitaires préhospitaliers différents reste illusoire. L'étude FIRST (French Intensive care Recorded in Severe Trauma) a été conduite pour décrire la prise en charge du traumatisé fermé grave en France. Cet article rappelle les principaux résultats de l'étude FIRST.
*Méthodes.* – L'étude FIRST était basée sur une cohorte multicentrique de patients âgés de 18 ans et plus avec un traumatisme sévère fermé et dont l'état nécessite une admission en réanimation dans les 72 heures après le traumatisme et/ou une prise en charge préhospitalière médicalisée par le service

☆ Article presented at Monothematic meeting of Sfar (Société française d'anesthésie et de réanimation): "Severe trauma: the first 24 hours", Paris, May 29th, 2013.
☆☆ This article is published under the responsibility of the Scientific Committee of the "Journée Monothématique 2013" de la SFAR (http://www.jmtsfar.com). The editorial board of the *Annales françaises d'anesthésie et de réanimation* was not involved in the conception and validation of its content.

* Corresponding author.
*E-mail address:* marc.freysz@chu-dijon.fr (M. Freysz).

0750-7658/$ – see front matter 
http://dx.doi.org/10.1016/j.annfar.2013.07.003

mobile d'urgence et de réanimation. Les données concernaient les caractéristiques du patient, l'état clinique initial, le type de traumatisme et la mortalité à 30 jours.

*Résultats.* – Soixante et un pour cent des traumatismes étaient dus à des accidents de la route et 30 % étaient d'origine domestique, sportive ou de loisirs. Les patients bénéficiant d'une prise en charge médicalisée étaient globalement plus gravement atteints que ceux recevant des soins de base par les équipes pompiers. Ils bénéficiaient de traitements plus agressifs en phase préhospitalière et le temps médian d'admission au premier hôpital était légèrement allongé. Cependant, la mortalité à 30 jours était significativement réduite. La probabilité de décès était également diminuée pour les victimes transférées par le Smur héliporté directement au centre hospitalier universitaire. À l'hôpital, la réalisation d'une tomodensitométrie corps entier était associée à une réduction significative du risque de mortalité en comparaison à la tomodensitométrie sélective.

*Conclusion.* – L'étude FIRST suggère l'intérêt de la médicalisation en phase préhospitalière sur la survie du patient traumatisé grave fermé. L'expertise de l'urgentiste en phase préhospitalière et intrahospitalière initiale aboutirait au concept de juste soin adapté au patient traumatisé grave. Elle suggère également la nécessité d'une régionalisation des réseaux de soins et l'établissement de registres.



## 1. Introduction

The management of severe trauma casualties is a major public health issue in most countries. The first step of this management takes place initially on the scene and conditions the whole health care chain. During the last decade, a massive improvement in trauma care was observed from the pre-hospital and the emergency department (ED) setting to the Intensive Care Unit (ICU), associated with progress in imaging diagnosis or emergency trauma surgery. In spite of these improvements, the type of pre-hospital management still remains a matter of debate. No clear-cut decision about the involvement of each different emergency medical systems occurring in the world, displaying basic-life support (BLS) or advanced-life support (ALS) care. This duality emphasizes the hampering compete between scoop-and-run strategy and stay-and-play strategy [1]. The BLS care providers, generally fire brigades, can perform oxygen delivery, immobilization, dressing and cardiopulmonary resuscitation with bag valve ventilation. The ALS care, provided by paramedics or medical-staffed teams, consists in endotracheal intubation for mechanical ventilation and intravenous fluid loading according to protocols. In America and Canada, out-of-hospital care is provided by paramedics. In European countries and especially in France, pre-hospital severe trauma care is initially provided by fire brigades or medical-staffed teams (SMUR, Service Mobile d'Urgence et de Réanimation) according to the decision of a remote dispatching emergency physician (EP). This SMUR management allows a variety of therapeutic strategies, involving ALS care. Indeed, the EP can perform rapid sequence induction before endotracheal intubation for mechanical ventilation, sedative and analgesic drug administration, pleural exsufflation, appropriate fluid loading and osmotherapy. Hence, several studies compared these entities in the trauma field and support the concept of "the faster, the better". The pre-hospital medical-staffed teams would lengthen the on-scene time because more aggressive care would be provided to the patient before his transport to the hospital [2]. However, most of these studies describing trauma implying a haemorragic shock underline the concept of golden hour but caution must be taken for the extension of this concept for blunt trauma patients without hemorrhagic mechanism [3].

In addition, the pre-hospital setting highlights the issue of trauma victim transport, according to the mode of transport (either by air or ground ambulances) and the level of care of the facility of first admission. Indeed, routing the severe blunt trauma patient to a non-trauma center first would be associated with an increased mortality compared with the trauma-center as first admission [4]. Actually, with regards to the rich literature on these topics, it appears difficult to tilt the balance in favor of such strategy, mainly due to the studies that are poorly comparable in trauma care systems that are completely different [5]. Hence, numerous American studies derived from in-hospital data and reflect a strategy of pre-hospital trauma care without medical-staffed expertise. Furthermore, these American data include more penetrating traumas than in Europe where blunt trauma is more frequent [6]. These two entities display major differences in their clinical status, management and outcomes. In France, data in the field of trauma were the result of regional epidemiological registries [7–9], collecting data from road traffic collisions whatever the severity of injury. Unfortunately, occupational accidents, domestic trauma or falls from a high height were not integrated in these registries. Yet, these injury mechanisms can induce the same medical management from diagnosis and therapeutic approach [10]. Consequently, in France, at the beginning of the last decade, there was no previous complete study that investigated the impact of medical management in the pre-hospital setting on the outcome of trauma victim. Hence, the French Intensive care Recorded in Severe Trauma (FIRST) observational study was performed with the view to describing the management of patients with severe blunt trauma. The study tried to answer to the previously mentioned issues. The impact of medical pre-hospital management by SMUR was compared with non-medical pre-hospital management by fire-brigades on 30-day mortality of severe blunt trauma victims. The influence of mode of transport by SMUR (by air-ambulance or ground-ambulance) and the level of hospital of the first admission was evaluated on the patient outcome. Then, the benefit of a complete imaging compared with a selective imaging in early trauma management was assessed on mortality. The pattern of early surgical and medical procedures was also evaluated in trauma patients. Finally, the use of motor component of the Glasgow Coma Scale (GCS) was evaluated on the performance of pre-hospital triage scores.

## 2. Materials and methods

### 2.1. Inclusion criteria

The FIRST study was performed according to a national hospital program of clinical research begun in 2003 with the view to reducing the morbidity and mortality of car crashes. Initially spread to each French university hospitals, corresponding to level I trauma center, the FIRST study eventually focused on the 14 most active centers in terms of patient inclusion [11]. FIRST study was an observational prospective study from December 1st, 2004 to April 30th, 2007. This study enrolled all patients aged 18 or over with