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Original Research Article

How the changes in the system affect trauma care provision: The assessment of and implications for Lithuanian trauma service performance in 2007–2012

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ABSTRACT

Objective: The aim of this study was to identify and assess the effects of changes in the Lithuanian trauma service from 2007 to 2012. We postulate that the implications derived from this study will be of importance to trauma policy planners and makers in Lithuania and throughout other countries of Eastern and Central Europe.

Materials and methods: Out of 10,390 trauma admissions to four trauma centers in 2007, 294 patients (2.8%) were randomly selected for the first arm of a representative study sample. Similarly, of 9918 trauma admissions in 2012, 250 (2.5%) were randomly chosen for comparison in the study arm. Only cases with a diagnosis falling into the ICD-10 “S” and “T” codes were included. A survey of whom regarding changes in quality of trauma care from 2007 to 2012 was carried out by emergency medical service (EMS) providers.

Results: The Revised Trauma Score (RTS) mean value was 7.45 ± 1.04 for the 2007 year arm; it was 7.53 ± 0.93 for the 2012 year arm ($P = 0.33$). Mean time from the moment of a call from the site of the traumatic event to the patient’s arrival at the trauma center did not differ between the arms of the sample: 49.95 min in 2007 vs. 51.6 min in 2012 ($P = 0.81$). An application of the operational procedures such as a cervical spine protection using a hard collar, oxygen

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therapy, infusion of intravenous fluids, and pain relief on the trauma scene was more frequent in 2012 than in 2007. Management of trauma patients in the emergency department improved regarding the availability of 24/7 computed tomography scanner facilities and an on-site radiographer. Time to CT-scanning was reduced by 38.8%, and time to decision-making was reduced by 16.5% in 2012.

Conclusions: Changes in operational procedures in the Lithuanian pre-hospital care provision and management of trauma patients in emergency departments of trauma centers improved the efficiency of trauma care delivery over the 2007–2012 period.

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1. Introduction

Trauma constitutes an important public health problem, leading to approximately 10% of the world's deaths [1,2]. In Lithuania, trauma mortality as a proportion of all deaths from external causes was reported to be even higher at 13.2% in 1999 (4091 deaths in males and 1177 deaths in females) than the 11.9% reported in 2006 (4092 deaths in males and 1248 deaths in females) [3]. Not surprisingly, injury is reported to be the third leading cause of mortality in Lithuania, preceded by cardiovascular and oncological diseases, and it is the primary cause of death in the working population [3]. Regarding disability-adjusted life years lost per 100,000 individuals of both genders annually, injury ranks first in the country, followed by neuropsychiatric conditions and cardiovascular diseases [4,5]. The magnitude of the particular problem related to road traffic accidents has been stressed, as well [6].

Globally, the Republic of Lithuania was among the top four countries of the European region regarding age-adjusted, standardized death from external causes in 2006 [4,5]. Russia, Belarus, and Kazakhstan were the other top countries where the age-adjusted, standardized death rates exceeded 150 cases per 100,000 individuals of both genders of all ages. It is important to mention, for the sake of clarifying the magnitude of the problem in those countries, that Germany, the UK, the Netherlands, and Malta were the countries with the lowest age-adjusted, standardized mortality from external causes ≤ 30 cases per 100,000 individuals of both genders in 2006.

It is well known that an inclusive trauma system, encompassing the coordinated provision of care for a trauma patient in a pre-hospital setting, trauma centers, and rehabilitation facilities within the defined geographical area, has a crucial role in improving the management and outcomes of severely injured patients and reducing the toll of injuries [7–12]. As the toll of traumatic injuries was noted to be disproportionately high in Lithuania, the national trauma service and trauma care provision were openly criticized. An urgent call for discussion about the future of the Lithuanian trauma model was released in 2010 [4].

Few well-budgeted trauma programs aimed to revitalize injury prevention, improve trauma care provision, and create a coordinated trauma system in Lithuania were launched in order to reduce trauma morbidity and mortality rates by 30% and overseen by the Ministry of Health of the Republic of Lithuania in 2000–2012 [13–18]. The programs included an

introduction of the key components of a trauma system at the national level. Examples included the broad spectrum of trauma prevention activities; trauma education and training (most of the ED and EMS (emergency medical service) personnel, including physicians, paramedics, nurses and other staff who participated in at least one of the courses: advanced life support and trauma life support course, advanced trauma life support, advanced critical life support and first medical aid); a unified emergency call system; the EMS computerized dispatch protocols; acquisition of new, well-equipped ambulances; formation of trauma teams and activation systems in trauma centers (mean time of trauma team arrival in the ED was 4 min, which is the standard in the USA and western Europe); development and integration of standard operative protocols, care pathways, and clinical guidelines into the practice (criteria for identification of severely injured patients and massive blood transfusion protocols were approved); and modernization, construction, or re-construction of emergency departments for trauma centers. Key changes to the trauma patient pathway are depicted in Fig. 1. In line with this, the structural reorganization of the EMS was completed. It resulted in a decrease in the mean number of EMS teams on call for one shift from 5 to 4.5. Such reduction in personnel was not significant but met the needs of the public, for example, one EMS station serviced a population that decreased by 5000 individuals within the same serviced territory (mean 1200 km²), i.e. from 64,659 to 59,430 in 2007–2012 [19].

The aim of this study is to identify and assess the effects of the above-mentioned changes on the Lithuanian trauma service within the 2007–2012 period. This study was undertaken to clarify the impact of these changes on the quality of care for trauma patients in the field and in emergency departments. We postulate that conclusions and implications of this study may be of importance for trauma policy planners and makers in Lithuania and other countries of Eastern and Central Europe.

2. Materials and methods

The representatives of 26 EMS stations and four trauma centers agreed to participate in this study that, in fact, was the audit of the national trauma service. Trauma centers were the hospitals integrating the multi-disciplinary trauma teams with necessary technological adjuncts and human resources.

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