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The impact of patient volume on surgical trauma training in a Scandinavian trauma centre

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Summary

Objective: Some of the problems faced in trauma surgery are increasing non-operative management of abdominal injuries, decreasing work hours and increasing sub-specialisation. We wanted to document the experience of trauma team leaders at the largest trauma centre in Norway, hypothesising that the patient volume would be inadequate to secure optimal trauma care.
Methods: Patients registered in the hospital based Trauma Registry during the 2-year period from 1 August 2000 to 31 July 2002 were included.
Results: Of a total of 1667 patients registered, 645 patients (39%) had an Injury Severity Score (ISS) $>$ 15. Abdominal injuries were diagnosed in 205 patients with a median ISS of 30. An average trauma team leader assessed a total of 119 trauma cases a year (46 patients with ISS $>$ 15) and participated in 10 trauma laparotomies.
Conclusion: Although the total number of trauma cases seems adequate, the experience of the trauma team leaders with challenging abdominal injuries is limited. With increasing sub-specialisation and general surgery vanishing, fewer surgical specialities provide operative competence in dealing with complicated torso trauma. A system of additional education and quality assurance measures is a prerequisite of high quality, and has consequently been introduced in our institution.

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Introduction

Trauma represents a leading cause of disability and preventable death. Serious abdominal injuries are still a major challenge to the surgeon because of severe acute haemorrhage and problems with rapid control of the bleeding site.[21] This is underlined by the observation that the majority of preventable deaths after blunt abdominal trauma is due to unrecognised or under-estimated abdominal injuries[12,22] as well as evidence showing that the majority of acute trauma deaths in hospital are due to exsanguination.[18] Recent reports from countries where trauma surgery is a separate speciality express worry about the recruitment and competence of future trauma surgeons in managing such critical injuries.[6,11,14–17] With the general trend towards non-operative management and the treatment secured by interventional radiological procedures,[5,8,9,11,13,19] only the most difficult cases will remain to be performed as open procedures.

Norway is a sparsely populated country and trauma surgery cannot exist as a separate speciality. It has been well documented that general surgeons with adequate training can decrease mortality in trauma.[22] In Norway, trauma patients and emergency surgical cases are traditionally treated by the same surgeons who also have their elective day-time schedules. However, the trend towards highly focused specialisation may preclude adequate expertise in any broadly based speciality and threaten the quality of trauma care.

The purpose of this study was to document the trauma team leaders' exposure to trauma cases at the largest trauma centre in Norway, hypothesising that the volume would be inadequate to secure optimal trauma care. Based on these figures, we intended to focus on the need for supplemental theoretical and practical education to reach the optimal achievable quality of trauma care in Norway.

Materials and methods

Ullevaal University Hospital (UUH) is by far the largest trauma centre in Norway. It serves as a primary hospital for the city of Oslo and a regional trauma referral centre for about 2.5 million people, representing approximately half the Norwegian population. In 1984, the hospital implemented an institution-specific trauma system with a one-tiered trauma team. The criteria for activation of the trauma team were revised in 1999.[10]

Table 1 In-house on call trauma team at Ullevaal University Hospital, Oslo

Senior surgical resident (team leader)
Consultant anaesthetist
Thoracic surgical resident
Anaesthetist in training
Nurse anaesthetist
Emergency department nurse
Radiographer
Laboratory technician
Operation room nurse

The most experienced senior resident on call is the trauma team leader. The members of the trauma team are listed in Table 1. No surgical consultants are in-house at night. The residents are on call one night in seven.

The data for this study were obtained from the UUH Trauma Registry. All trauma patients admitted through trauma team activation or with penetrating injuries proximal to elbow or knee or with ISS $\geq$ 9 admitted to UUH within 24 h after injury were included. Patients classified dead on arrival were included. Outcome was defined as dead or alive at discharge after somatic hospital stay including a possible rehabilitation period in a local hospital.

Our analysis included all patients entered in the Trauma Registry during the 24 month period from 1 August 2000 to 31 July 2002. Data accrued were age, gender, Injury Severity Score (ISS)[3], mechanism of injury, and mortality rates. We then further analysed the subgroup with diagnosed abdominal injuries. All patients with injuries in body region 4 according to the Abbreviated Injury Scale, update 98 (AIS 98)[2] except those with AIS grade 1 abdominal wall injuries were included. Patients with diaphragmatic injuries were also included (AIS codes 440699.2–440606.4). Data analysed in the subgroup with abdominal injuries were organs injured, AIS score, associated extra-abdominal injuries, operative procedures, and outcome measured by mortality rates. Additional information was obtained from direct review of charts.

Values are given as median and quartiles where appropriate. The study was approved by the Regional Committee for Medical Research Ethics.

Results

Of the 1667 patients included in the Trauma Registry during the study period, 645 (39%) were severely injured (ISS $>$ 15) (Table 2). The average annual number of patients assessed by each trauma team