

# Emergency department overcrowding: a survey among European neurotrauma centres

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## ABSTRACT

**Background** ED overcrowding is an increasing problem worldwide that may negatively affect quality of care and patient outcomes. We aimed to study ED overcrowding across European centres.

**Methods** Questionnaires on structure and process of care, including crowding, were distributed to 68 centres participating in a large European study on traumatic brain injury (Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury).

**Results** Of the 65 centres included in the analysis, 32 (49%) indicated that overcrowding was a frequent problem and 28 (43%) reported that patients were placed in hallways 'multiple times a day'; 27 (41%) stated that multiple times a day, there was no bed available when a patient needed to be admitted. Ambulance diversion rarely occurred in the participating centres.

**Conclusion** Similar to reports from other parts of the world, ED crowding appears to be a considerable problem in Europe. More research is needed to determine effective ways to reduce overcrowding.

questionnaires by presentations, workshops and emails. It was repeatedly emphasised that answers provided by respondents would be handled confidentially. The set of questionnaires was subsequently distributed online and the PIs were asked to coordinate the completion by involving experts from their centre. Experts were mainly ED physicians, but some questions were completed by neurosurgeons, neurologists, intensivists and administrative staff members. Additional information regarding the development, validation and distribution of the provider profiling questionnaires can be found in a previous publication.<sup>4</sup>

A total of four questions addressed ED overcrowding and ambulance diversion. ED overcrowding was defined in the survey as 'a situation in which there are more patients in the ED than the ED can handle (due to lack of beds, access blocks etc.)'.<sup>5</sup> Access block refers to a situation where no hospital bed is available within a reasonable amount of time (8 hours).<sup>6</sup> Ambulance diversion was defined as a situation where ambulance services are requested to bypass this hospital and deliver patients to other hospitals.

## INTRODUCTION

ED overcrowding has been reported in many countries including the USA, Canada, the UK and Australia.<sup>1,2</sup> However, knowledge about how often overcrowding occurs in European EDs is limited. We aimed to study the frequency of crowding in European EDs in 68 centres participating in a large multicentre study on traumatic brain injury (TBI).<sup>3</sup>

## METHODS

This study was part of the provider profiling study of the Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI).<sup>4</sup> Ethical approval was obtained for CENTER-TBI.<sup>3</sup>

Questionnaires on structure and process of TBI care were distributed among all 68 centres participating in this study. Questionnaires were developed through a comprehensive literature search and expert opinion meetings, and were pilot-tested in 16 of the participating centres. Reliability of the set of questionnaires was assessed by calculating the concordance rate among 5% duplicate questions and was adequate (median: 0.85).<sup>4</sup> The relevant questions are reproduced in table 1.

The principal investigators (PIs) for each site of the CENTER-TBI study were informed about the

## RESULTS

Of the 68 centres participating in the CENTER-TBI study, 3 were excluded since no data were available on ED overcrowding, resulting in 65 participating centres (response rate: 96%). The question on ambulance diversion was completed by 63 respondents.

Approximately half of the respondents indicated that overcrowding was considered a frequent problem in their ED (n=32, 49%; table 1).

Respondents indicated that patients were placed in the hall 'multiple times a day' in 28 centres (43%). Another seven centres (11%) indicated that this happens approximately once a day. The remainder indicated that this occurs on a weekly basis (n=11, 17%) or less frequent.

Twenty-seven centres (41%) reported that 'multiple times a day' there is no bed available when a patient needs to be admitted to the hospital (access block). In the remainder of the centres, this happens approximately once a day (n=9, 14%), on a weekly basis (n=11, 17%) or less frequent.

Ambulance diversion, which might be a strategy to reduce ED overcrowding, is never used in more than half of the centres (n=43, 66%). For 12 EDs (19%) it was used less than six times a year (n=12, 19%) and the remaining 6 EDs used it more



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**Table 1** Overcrowding characteristics among 65 centres participating in the Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury study

Characteristics	n (%)
<b>Is overcrowding considered a problem?</b>	
Never	4 (6)
Sometimes	29 (45)
Frequent problem	32 (49)
<b>Patients are placed in the hall</b>	
Multiple times a day	28 (43)
Approximately once a day	7 (11)
On a weekly basis	11 (17)
On a monthly basis	3 (5)
Seldom	12 (18)
It has not occurred in the last 5 years	4 (6)
<b>No available bed when a patient needs to be admitted (access block)</b>	
Multiple times a day	27 (41)
Approximately once a day	9 (14)
On a weekly basis	11 (17)
On a monthly basis	6 (9)
Seldom	9 (14)
It has not occurred in the last 5 years	3 (5)
<b>Frequency of ambulance diversion</b>	
Never	43 (66)
<6 per year	12 (19)
6 per year—1 per month	2 (3)
1 per month—1 per week	2 (3)
1 per week—2 per week	3 (5)
>2 per week	1 (2)

frequently. There were no trends based on geographical location or income of the country.

## DISCUSSION

This survey study showed that crowding is a frequent problem among EDs in European neurotrauma centres. Our findings are similar to previous investigations; in a US study, 525 (91%) of the investigated hospitals experienced overcrowding as a serious problem and related this problem to a shortage of hospital beds.<sup>7</sup> In a Canadian survey study among 243 ED directors, more than half of the participants reported that overcrowding was a major problem.<sup>8</sup> In our study, access blocks were also frequently reported. This is in line with research by Richardson and Mountain,<sup>2</sup> who indicate that overcrowding is not just an ED problem, but involves the transition of patients to other departments. Our study adds to this knowledge by providing high-quality data on ED overcrowding in a large number of European EDs.

A strength of our study is its high response rate (96%) and the inclusion of multiple hospitals. A limitation of our study is

the survey design. Although we asked centres for their general policy, we cannot exclude that the answers were based on individual opinions. Moreover, our sample includes mainly level I trauma centres specialised in the treatment of neurotrauma. Consequently, current results might not be generalisable to all European EDs or EDs outside Europe. In addition, the definition of overcrowding that we used is subjective, and therefore respondents might have interpreted the definition differently. To prevent this problem, however, we mainly asked specific questions (eg, how often does it occur that patients are placed in the hallway?). In one of the questions, however, we used the word 'overcrowding' explicitly and the results of this question should therefore be interpreted with caution.

ED overcrowding appears to be a frequent problem in European EDs. Since overcrowding may influence quality of care<sup>2</sup> and is also associated with patient outcomes,<sup>2</sup> research on potential solutions for overcrowding should be prioritised.

**Collaborators** The CENTER-TBI investigators and participants are listed at <http://dx.doi.org/10.1371/journal.pone.0161367>.

**Contributors** KBV wrote the first draft of the manuscript and analysed the data. MC coordinated the development and examination of the provider profiling questionnaire, supervised the analyses and revised the paper. All authors critically commented on the manuscript and approved the final version.

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**Competing interests** None declared.

**Patient consent** Not required.

**Ethics approval** IRB of all centres participating in the CENTER-TBI study.

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**Data sharing statement** Additional data are not available.

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