

# The 'who are all these people?' study

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## ABSTRACT

**Background** Overcrowding of emergency departments (EDs) adversely affects the delivery of emergency care and results in increased patient mortality.

**Objective and methods** To examine what contributes to the ED crowd and to specifically examine the patient associated population. The ED in which the research was performed is consistently one of the most overcrowded in Ireland.

**Results** On average 66.7% of the patients in the ED during the study period were boarded awaiting a hospital bed following full processing by the ED staff and agreement by the on-call team that admission was required. The most overcrowded part of the department was the majors area. In this area 55.5% of those present were patients, visitors accounted for 16.6% of occupants, nursing staff 11%, on-call teams 7% and the ED doctors 6.3%.

**Conclusions** Knowing who the people in the crowd are helps to guide management decisions about how the crowd might be reduced. Our department now has a strict accompanying person/visitor policy that limits the number of visitors to patients and limits visiting times for those relatives with a patient who is experiencing a prolonged stay in the ED.

## INTRODUCTION

The global challenge of overcrowding of emergency departments (EDs) which is known to adversely affect the delivery of emergency care and result in increased patient mortality has been defined as an excess of patients in the clinical areas of EDs, forcing them to work beyond their available capacity.<sup>1–6</sup>

A visitor came to the ED in which this research was undertaken and on seeing the level of crowding asked 'who are all these people?' This study was performed to answer this important question and also to develop a greater understanding of the components of the crowd. It was hoped it would inform solutions to address the problem.

The metrics available for ED overcrowding have highlighted the patient numbers and workload but there is more to the crowd in EDs and the patient associated population must also be considered.<sup>7–11</sup>

## METHODS

A prospective observational study was performed in an ED in an Irish urban 800-bed teaching hospital. The ED provides care to 49 000 adult patient attendances per year. The admission rate is 24%. The catchment population is in excess of quarter of a million people. The ED has a three-bay resuscitation room, a majors area with 14 curtained cubicles and two single trolley side rooms with a psychiatry interview room. There is an assessment area with

two examination couches and a separate minors assessment and treatment unit.

The research ED is consistently one of the most overcrowded in Ireland.<sup>12</sup> The three consultants, two associate specialists, 17 junior doctors, four advanced nurse practitioners and the nursing, administration and support services provide an adult emergency medicine service 24 h per day, 365 days per year. Apart from two cubicles used for triage, almost invariably the majors area cubicles are occupied by boarded patients awaiting admission. As a result newly arrived patients are examined in the assessment area on examination couches and discharged or returned to the waiting room pending the results of tests. If they are unwell enough, they will be transferred to the resuscitation area or the majors area to undergo treatment, await investigations or results of tests, or await assessment by the on-take teams and hospital admission.

Admitted patients awaiting a ward bed are boarded in the ED majors area or resuscitation suite. Frequently there are insufficient trolleys or bays for all those sick enough to require hospital admission, and as a result patients not infrequently wait on plastic chairs in hallways or open floor areas pending the availability of a ward bed.

In this environment, four members of the research team gathered information by surveying the occupants of the entire department each day at 08:00, 14:00 and 21:00 over a 30-consecutive day study period. The survey was completed by the researchers going to each part of the department and establishing the numbers of people in each clinical area and the role of each person by direct questioning. The data were gathered on a proforma and entered onto an Excel spreadsheet.

Descriptive statistics presenting means, SDs and percentages are included. A Pearson correlation coefficient showed the relationship between visitor and staff numbers with patient numbers. Regression analysis was used to describe the association between visitor and staff numbers with patients and time of day and the weekend effect. Analysis was conducted with Stata V.10. A p value less than 0.05 was deemed to be significant.

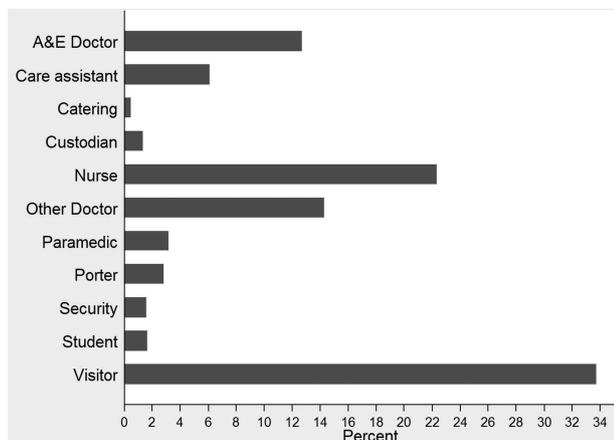
## RESULTS

Over the study period 3922 patients were surveyed. On average 2.9% of the patients in the department were undergoing triage at the survey times, 21.2% were either awaiting or undergoing processing by the ED doctors or advanced nurse practitioners, 9.2% were awaiting review by the on-call teams and 66.7% of patients were boarded awaiting a hospital bed following full processing by the ED staff and agreement by the on-call team that admission was required.



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**Figure 1** Percentages of staff and visitors in the majors area.

The mean number of patients in the majors area, which has 16 clinical care spaces, was 30.4 (SD 4.5), giving an average occupancy of 190%. The average numbers of boarded patients was 33.5 (SD 7.0), equivalent to 209% occupancy.

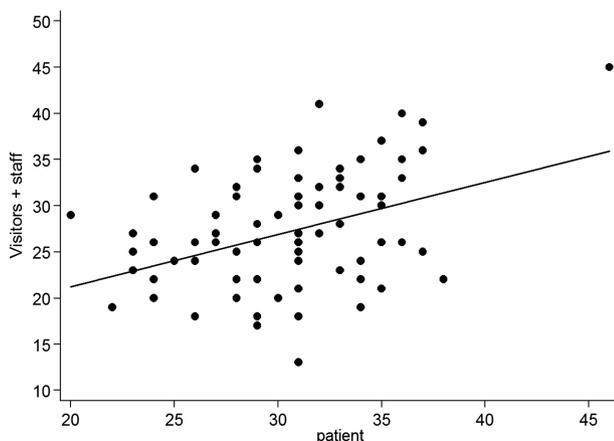
The most overcrowded part of the department was the majors area. In this area 55.5% of those present were patients, visitors accounted for 16.6% of occupants, nursing staff 11%, on-call teams 7% and the ED doctors 6.3%. The percentages of all those making up the patient associated population are shown in figure 1.

In the resuscitation area there was an average of 0.9 nurses to each patient at each time point.

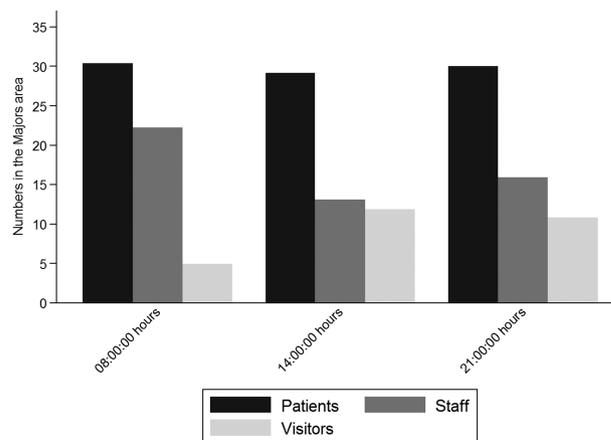
The combined number of staff and visitors was correlated with patient numbers in the majors area. There was a significant effect of patient numbers on staff and visitor numbers. Figure 2 shows that more patients meant more personnel in the area and more visitors, with a correlation coefficient of 0.3961 ( $p < 0.001$ ).

Two separate models were used to predict both visitor and staff numbers in the majors area (see online supplementary appendix 1).

In the first model, time of day was found to be predictive of visitor numbers. The number of accompanying persons was lower in the mornings (5 per 30 patients) than in the afternoons or evenings (11 per 30 patients) ( $p < 0.001$ ). The number of



**Figure 2** Correlation between patient numbers and combined visitor and staff numbers.



**Figure 3** Weekday numbers of staff, patients and visitors in the majors area by time of day.

accompanying persons at the weekend did not differ significantly from weekdays ( $p = 0.43$ ).

In the second model, the numbers of patients and time of day were predictive of staff numbers with more staff in the morning (25 staff per 30 patients) as compared to the afternoon (15 staff per 30 patients) and evening (17 staff per 30 patients) ( $p < 0.001$ ).

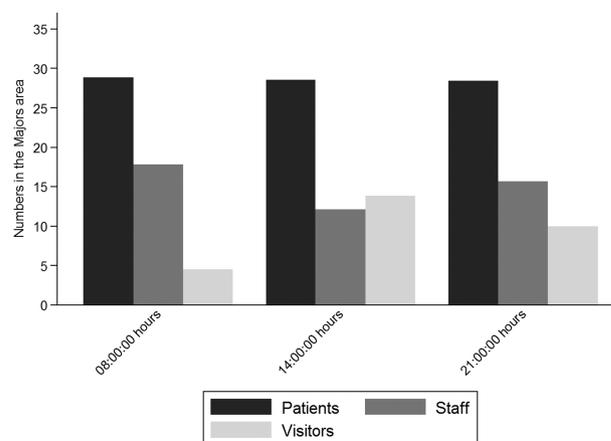
The relationships between staff, patient and visitor numbers and time of day, both during the week and at the weekend, are presented in figures 3 and 4.

We found a patient to staff and visitor/accompanying persons ratio of 1.12—that is, for every single patient there were 1.12 additional persons making up the patient associated population.

## DISCUSSION

Articles relating to ED overcrowding have not used a uniform definition which in turn hinders real comparisons being drawn between centres and to date has precluded meta-analysis.<sup>13 14</sup> Overcrowding is primarily the result of access block—that is, lack of timely availability of ward beds which results in admitted patients being boarded or housed in the ED.<sup>15 16</sup>

Increased hospital occupancy is strongly associated with prolonged length of stay in the ED for patients requiring admission.<sup>17</sup> Modest reductions in hospital occupancy have resulted in highly significant reductions in ED waiting times.<sup>18</sup>



**Figure 4** Weekend numbers of staff, patients and visitors in the majors area by time of day.

Over the timeframe of the study, boarded patients requiring hospital admission consistently accounted for the largest proportion of patients in the ED. Having large numbers of admitted patients housed in the ED increases the size of the crowd because of the personnel needed to care for these patients, including catering staff, security staff, healthcare assistants, nursing staff and in-house teams, as well as visitors and relatives. We now refer to the non-patient group as 'the patient associated population'. Clearly the ED nursing staff and medical staff are rostered for duty in the department, but as a result of patients being boarded in the ED, in-house teams not infrequently have to do a part of their rounds in the ED. This can mean that medical, surgical, and other specialty teams are in the department, seeing patients who have been there for a number of days. Particularly in the morning, we found that in-house teams outnumbered ED doctors.

As patients have protracted stays waiting for a bed, they have catering needs; they may receive three meals a day for a number of days in our ED.

ED nurses occupied with the care of boarded admitted patients are not available to see new patients arriving at the ED. This in turn slows the processing of patients requiring emergency assessment.

The research highlighted the fact that visitors contributed to the overcrowding. In this context the department now has a strict visitors/accompanying persons policy facilitated by swipe access doors from the waiting room, and an increased security presence which has helped to reduce the component of crowding related to visitors.

Crowding has a negative impact on the patients' experiences of EDs and the performance of the departments as well as increasing healthcare costs and increasing stress levels among the staff providing care in a densely populated department.<sup>19–25</sup> Previous research has found that patients find ED crowding frightening and uncomfortable and that it compromises their dignity and the confidentiality of the consultation process.<sup>1 19 20</sup> The measures taken in the hospital where the research was performed regarding overcrowding have involved streaming of patients with minor injuries to a separate area, advanced triage, expediting of investigations, the development of a patient flow team and an acute medical unit, as well as the introduction of a visitors policy for the ED. For those involved in delivering emergency care, an overcrowded, noisy, department does not help in the delivery of emergency care on what for many patients is one of the worst days of their lives.

## CONCLUSIONS

Knowing who the people in the crowd are helps to guide management decisions about how crowding might be reduced. Access block resulting in large numbers of boarders in the ED is the major contributor to overcrowding and must be addressed.<sup>1 2 5 16 21</sup> Crowding begets overcrowding as boarded patients create a significant workload for medical, nursing and ancillary staff as well as increasing visitor numbers in the ED. The service and social needs of such patients create a patient associated population, and visitors are a significant component of this group. Visiting/accompanying persons must be managed to avoid them compounding the crowding. Our department now has a strict accompanying/visitor policy that limits the number of visitors to patients and limits visiting times for those with a patient who is experiencing a prolonged stay in the ED. Addressing the length of time patients requiring admission are

delayed in the ED will have the greatest impact on reducing ED overcrowding.

**Contributors** PG developed the research question and methods, was involved in data analysis and wrote the paper. DJ, MB, AM and AM gathered the data. KM and FH were involved in study design and advised on the research. PO provided statistical analysis and advice on study design and performance.

**Competing interests** None.

**Ethics approval** Beaumont Hospital Ethics Committee.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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