Exit block in the emergency department: recognition and consequences

Exit block and crowding create conditions in emergency departments that can harm patients and the staff who look after them. Key to solving exit block is recognizing that it exists and that the whole hospital is involved in preventing harmful consequences.

Exit block in the emergency department exists when a patient has received his/her initial investigation and treatment in the emergency department, there is a management plan for care and the decision to admit has been made but the patient cannot access an appropriate hospital bed in a timely manner. The patient remains in the emergency department, occupying a cubicle space and usually remains on an emergency department trolley.

Exit block can affect one patient or many. Every patient should be able to access a bed in the right inpatient ward environment for their problem in a timely way. When exit block affects multiple patients, the emergency department becomes crowded. Crowding in the emergency department occurs when flow is disrupted. In consequence the capacity of the department becomes inadequate because of a mismatch between input, throughput and output (Asplin et al, 2003). In practical terms, this can happen for a variety of reasons: a surge of new patients (input), staff sickness, laboratory or radiology delays (throughput), or lack of available inpatient beds (exit block). Several of these factors may co-exist.

A crowded department can be recognized when there are no free cubicles or even space to bring new patients into and there are consequent delays in ambulance handovers. In the USA this phenomenon is referred to as access block (Fatovich et al, 2005).

There is no single definition of emergency department crowding but there are a number of internationally validated scoring systems to identify when the condition exists (Weiss et al, 2006; Beniuk et al, 2012; Boyle et al, 2012). A consensus statement (International Crowding Measure in Emergency Departments) (Boyle et al, 2013) identified the emergency department relevant definitions shown in *Table 1*.

The simplest measure of crowding is occupancy – the ratio of the total number of patients in the emergency department and the total number of treatment bays. The consensus definition defined cubicle occupancy of over 100% as crowded.

Occupancy combined with knowledge of live state ambulance off-load times and how many patients are waiting more than 2 hours from decision to admit before leaving the department gives the clinician in charge of a department a reliable guide of the system's function (College of Emergency Medicine, 2014).

Exit block is a system problem not a department problem

Exit block can occur in any part of the emergency care system. Exit block as a result of delayed inpatient discharge back to the community means that there are fewer

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Table 1. International Crowding Measure in Emergency Departments (ICMED) to measure emergency department crowding

Exit block measures	ICMED definitions	Shop-floor practice	Comment
Emergency department boarding time	An emergency department is crowded when less than 90% of patients have left the emergency department 2 hours after the admission decision	In practice this means that 10% of admitted patients have had a time from decision to admit to finally leaving the department of over 120 minutes	The Accident and Emergency Improvement team of Monitor, the sector regulator for health services, uses 65 minutes as the benchmark time for this part of the patient journey
Number of patients boarding in the emergency department	Boarders are defined as admitted patients waiting to be placed in an inpatient bed. An emergency department is crowded when there is greater than 10% occupancy of boarders in the emergency department	In practice this means that in a 20-bedded emergency department, two cubicles are being used by patients ready to leave to go to a ward	This is irrespective of how long they have been waiting to go to the ward – the capacity of the unit is reduced

From Boyle et al (2013)

inpatient beds available to new patients coming into the system. There are multiple causes for delayed discharges, some within control of the hospital (such as discharge process not being planned to allow patients to get out before midday and at weekends) but some relating to community facilities such as availability of nursing home or intermediate care beds. Exit block from the inpatient services will show up in increased length of stay data. An unnecessarily long length of stay is likely to exacerbate exit block from the emergency department and perpetuate the problem, leading to more crowding. A crowded emergency department is the thermometer of the rest of the system; the temperature is measured with reference to the 4-hour access standard. Crowding cannot simply be attributed to large volumes of patients attending emergency departments. In general, the largest patient group attending are low acuity patients who only need brief if important interventions and have short lengths of stay. Crowding in the major treatment areas is usually caused by the inability of the sickest patients who need admission to access a bed – exit block (*Table 2*).

Exit block affects the experience of the individual patient but also has a significantly detrimental effect on the function of the department and the care experienced by other patients. Exit block and the development of a crowded department also has a damaging effect on staff and their capacity to provide high quality care (Hoot and Aronsky, 2008; Moskop et al, 2009; Morris et al, 2011).

Table 2. Consequences of crowding and exit block

Increased patient mortality	
Increased length of stay of admitted patients	
Delayed time-critical intervention	Less frequent and less adequate pain relief
	Delayed antibiotic administration
Increased risk of adverse events	
Decreased departmental function	'Under triage', inferior care in terms of standard performance measures, increased left without treatment rates, blockage to ambulance off-load
Decreased patient satisfaction	
Increased staff stress and burnout	
Less direct supervision and training of junior clinical staff	

Table 3. Emergency department length of stay and mortality

Mean length of stay ≥6 hours *vs* <1 hour	Adjusted odds ratio for death	Adjusted odds ratio for admission
Triage category 1–3	1.79 (1.24–2.59)	1.95 (1.79–2.13)
Triage category 4 and 5	1.71 (1.25–2.35)	1.66 (1.56–1.76)

Adjusted odds ratios (95% confidence intervals) for death and admission to hospital within 7 days of emergency department visit among all non-admitted (seen and discharged and left without being seen). Canadian triage and acuity scale: triage scores grouped as high acuity (1–3: resuscitation, emergent, and urgent) and low acuity (4–5: less urgent and non-urgent). From Guttman et al (2011)

Exit block and mortality

The most serious effect for patients in a crowded department is the association with mortality – both for patients admitted and those discharged (Richardson, 2006; Sprivulis et al, 2006; Forero et al, 2011; Guttmann et al, 2011). A single hospital study in Australia found a 34% higher 10-day mortality rate for admitted patients who had been managed during a crowded period as compared with those managed during a non-crowded period (Richardson, 2006). 'Over-crowded' shifts were defined as those shifts in the highest quartile of mean occupancy for three 48-week periods between 2002 and 2004. The figures translate to 13 excess in-hospital deaths per year in a department seeing 50 000 patients annually. The conversion (admission) rate was 20%.

In 2011 a study was done looking at the outcome for patients who were not admitted – the majority of emergency department attendances. The researchers found that presenting during shifts with longer waiting times was associated with a greater risk of short-term death and admission to hospital (Guttmann et al, 2011). These results are summarized in *Table 3*. This was a large study looking at the 7-day outcome of almost 14 million non-admitted patients who had attended between 2003 and 2007. In this study mean length of stay was used as a proxy for crowding and compared patients with similar levels of illness (based on Canadian Triage Acuity Scale). Importantly all these patients were deemed well enough for discharge by the emergency medicine teams who saw them.

The increased mortality seen in patients treated in a crowded department would not be acceptable as a treatment effect difference in a trial of any medical intervention. The trial would be stopped and the entire patient group would receive the favourable intervention – in this case an emergency department functioning properly with appropriate patient flow through the system and no unnecessary delays.

Exit block and in-hospital stay

Exit block and a prolonged length of stay in the emergency department has been associated with a prolonged in-hospital stay (Liew et al, 2003). Prolonged in-hospital stay in turn exacerbates exit block in the emergency department so the problem self perpetuates. This is partly as a result of patients outlying on the wrong type of ward for their needs. Outliers, such as medical patients on surgical wards, suffer poorer care and unnecessarily long hospital stays (Audit Commission, 2003).

Exit block and quality of care

A study found that for every hour spent in the emergency department the odds of experiencing an adverse event in hospital increases by 3% (Ackroyd-Stolarz et al, 2011). Experiencing an adverse event doubled length of stay in hospital – 20.2 days *vs* 9.8 days ($P< 0.00001$).

Studies have shown that patient care deteriorates in a crowded department. In particular, critical interventions get delayed. Time-sensitive interventions in patients with pneumonia, acute myocardial infarction and severe sepsis have been documented as being poorly delivered as measured against professional guidelines during periods of emergency department crowding (Pines et al, 2007; Shin et al, 2013). A study looking at compliance with the resuscitation care bundle advocated by the Surviving Sepsis Campaign found compliance at 31.9% during 'low' crowding periods, dropping to 16.4% during 'high' crowding periods, and decreased likelihood of the timely implementation of the bundle elements. Another study found crowding associated with an increase in 28-day mortality in patients with community-acquired pneumonia (Jo et al, 2012). Quality of care also deteriorates in areas such pain assessment and analgesia (Hwang et al, 2006). Dignity of patients may also be impaired (Mah, 2009).

The effects of a gridlocked emergency department have implications for other services. Ambulances are unable to deliver patients into crowded emergency departments (Fatovich et al, 2005) and consequently less able to respond to further emergency calls.

Clinician behaviour alters when faced with a crowded department and clinical decisions for the individual patient may be compromised because of the pressures of the whole unit. One study found more patients triaged to a lower triage category during crowded shifts than non-crowded shifts and that, although not statistically significant, this triage group showed an increased mortality when compared to the group triaged to a higher triage category. This finding suggests that probable under-triage had occurred (Richardson, 2006). The same study showed that any excess mortality was more probable in the elderly.

Exit block and crowding also affect patient behaviour and experience. Many health-care systems recognize that patients booking in and then leaving without treatment reflects crowding and deficiencies in care (Goodacre and Webster, 2005). Crowding is associated with higher rates of patients leaving before assessment and treatment, although a large Canadian study (Guttmann et al, 2011) demonstrated no increase in adverse outcomes in this group. This study found that these patients were slightly younger, had lower acuity scores, were more likely to attend in the evening and more likely to live in an urban area.

Those who remain in a crowded department are also likely to have had a poorer patient experience. The Canadian Association of Emergency Physicians and the National Emergency Nurse Affiliation issued a joint statement where they made the point that: 'Hospital EDs [emergency departments] are loud, brightly lit environments where patients lie on hard stretchers with limited privacy or dignity, poor access to bathroom facilities, and little or no opportunity for sleep.' Unsurprisingly, patient satisfaction scores decrease with crowding (Tekwani et al, 2013).

Exit block and staff

Exit block and crowding lead to a dysfunctional department which then becomes a stressful and unpleasant place to work. In a survey of emergency department directors by Bond et al (2007) 62% reported 'overcrowding' as a major or severe problem during the past year and that it had a major impact on increasing stress among nurses. Emergency medicine in the UK is experiencing a workforce crisis with many unfilled training posts and trainees and qualified consultants leaving to work in other countries. In 2013 46 emergency medicine consultants emigrated from the UK and there were over 450 UK-trained emergency medicine registrars working in Australasia. Exit block in the UK was cited as a major reason for choosing to work overseas (unpublished data, College of Emergency Medicine, 2013). Morale was highlighted as an important concern in the Francis report. A study looking at emergency nurses found approximately 82% had moderate to high levels of burnout, and nearly 86% had moderate to high levels of compassion fatigue (Hooper et al, 2010).

Conclusions

Exit block represents a significant risk to patient safety. The evidence shows that exit block is associated with excess mortality and morbidity for patients, irrespective of whether they are admitted or discharged. It gives patients a poor experience of health care and damages staff morale. This in turn exacerbates issues of recruitment and retention. The nosocomial 'condition' of exit block is treatable and health-care organizations must ensure that it is eliminated. **BJHM**

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KEY POINTS

- Exit block can occur in and be caused by any part of the emergency care system.
- Exit block from the emergency department causes emergency department crowding.
- Exit block causes patient harm. Most importantly mortality of both admitted and discharged patients is increased.
- Exit block and crowding cause departmental dysfunction and decreased standards of care.
- Exit block and crowding in the emergency department increases health-care workers' stress.

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