Intern Emerg Med (2015) 10:171–175
DOI 10.1007/s11739-014-1154-8

EM - EDITORIAL

Overcrowding in emergency department: an international issue

Salvatore Di Somma · Lorenzo Paladino · Louella Vaughan · Irene Lalle · Laura Magrini · Massimo Magnanti

Received: 25 October 2014 / Accepted: 10 November 2014 / Published online: 2 December 2014

Abstract Overcrowding in the emergency department (ED) has become an increasingly significant worldwide public health problem in the last decade. It is a consequence of simultaneous increasing demand for health care and a deficit in available hospital beds and ED beds, as for example it occurs in mass casualty incidents, but also in other conditions causing a shortage of hospital beds. In Italy in the last 12–15 years, there has been a huge increase in the activity of the ED, and several possible interventions, with specific organizational procedures, have been proposed. In 2004 in the United Kingdom, the rule that 98 % of ED patients should be seen and then admitted or discharged within 4 h of presentation to the ED ('4 h rule') was introduced, and it has been shown to be very effective in decreasing ED crowding, and has led to the development of further acute care clinical indicators. This manuscript represents a synopsis of the lectures on overcrowding problems in the ED of the Third Italian GREAT Network Congress, held in Rome, 15–19 October 2012, and hopefully, they may provide valuable contributions in the understanding of ED crowding solutions.

Keywords Overcrowding · Emergency department · Organizational procedures

Abbreviations

ED	Emergency department
LOS	Length of stay
NHS	National Health Service
AMUs	Acute medical units
Hr	Hour
FCP	Full capacity protocol

Introduction

Emergency department (ED) overcrowding has become a serious and growing problem common around the world with significant worldwide public health problems [1]. Overcrowding is the product of several hospital internal and external factors, and the most relevant are the insufficient access to hospital beds, and shortage of ED nursing and physician staff. Overcrowding can lead to patients' poor outcomes and increased length of stay (LOS). Many international studies document the damages to ED patients waiting for care: adverse events, increased morbidity and mortality, prolonged LOS, and an overall inferior health care. Several strategies have been proposed to solve the problem but actually they are not able to definitely counteract the issue [2].

On behalf of GREAT network.

S. Di Somma (✉) · I. Lalle · L. Magrini
Department of Emergency Medicine, Faculty of Medicine and Psychology, Medical-Surgery Sciences and Translational Medicine, Sant'Andrea Hospital, Sapienza University of Rome, Via di Grottarossa 1035-1039, 00189 Rome, Italy
e-mail: salvatore.disomma@uniroma1.it

L. Paladino
Department of Emergency Medicine, SUNY Downstate/Kings County Hospital Medical Center, Brooklyn, NY 11203, USA

L. Vaughan
Department of Medicine, Northwest London Collaboration for Leadership in Applied Health, Research and Care, London, UK

M. Magnanti
Department of Emergency Medicine, S. Giovanni Addolorata Hospital, Via dell' Amba Aradam 8, 00184 Rome, Italy
e-mail: magnantimassimo@libero.it

ED overcrowding statement

ED overcrowding is neither new, nor unforeseeable. It was front cover news of such international publications such as Time magazines as far back as 20 years ago. In recent years, EDs in the United States have seen a near thirty million patient per year increase in volume. During the same time period, approximately a third of urban area EDs were closed [3]. In the U.S. health care system, hospital emergency departments are unique in their legal obligation to treat all patients in need, without regard for their ability to pay. As a result, EDs often serve as the "safety net," offering a place of last resort for uninsured or underinsured patients who lack other options for care. Economic viability is a very important factor in the closure of EDs. This problem, however, does not just affect the American health care system, but is an International public health issue [4].

Efficient patient through put and shortening LOS are well-known concepts because of their fiscal impact on the hospital, and their ability to lessen overcrowding. Holding admitted patients in the ED is highly correlated with longer patient throughput times. Boarding in the ED results in decreased patient satisfaction, financial loss from walk-outs, decreased patient safety, and decreased staff morale. Pines et al. [5] demonstrate that ED boarding decreases patient satisfaction with the entire hospitalization, not just the ED portion. In fact, patient's satisfaction is correlated with the amount of time spent in the ED.

Boarding in the ED increases LOS, which in turn increases health care costs [6]. Inpatients who remain in the ED 1 day after admission consistently have a greater average length of stay by 10–13 % than those who are promptly transferred to inpatient units. A 3-year study, by Krochmal et al. [7] at a 490-bed hospital shows an increased cost of over 2 million dollars per year.

ED overcrowding also leads to increased medical errors [8]. According to the Joint Commission on the Accreditation of Healthcare Organizations, 50 % of sentinel events occur in the ED, and one third of these are because of overcrowding. As a natural consequence, mortality also increases in ED overcrowding [9, 10]. Cardosos et al. [11] demonstrate a 1.5 % increase in mortality for each hour an ICU patient borders in the ED.

Administrations must realize that overcrowding is not solely an ED problem, and governments must realize that this is a public health crisis, and allocate resources accordingly. "Less than 5 % of American doctors work in EDs, but they provide more acute care to Medicaid beneficiaries and the uninsured than the rest of America's doctors combined". However allocation of resources and reimbursement rates do not reflect this.

Discussion/how to solve emergency department overcrowding: a world-wide problem. The potential utility of clinical indicators

Long waits in the ED not only contribute to the problem of overcrowding, but also are associated with increased patient morbidity and mortality [5, 9, 12–14]. The long delays experienced by patients attempting to access emergency care in the United Kingdom gained a high profile in the 1990s, and led to the United Kingdom being the first country to introduce mandatory, nationwide clinical indicators [15].

The rule that 98 % of ED patients must be seen and then admitted or discharged within 4 h of presentation to the ED ('4 h rule'), introduced in 2004, has been very effective at face value, and has led to the development of further acute care clinical indicators [16, 17]. Other countries are now following the lead of the National Health Service (NHS), with the goal of ending inappropriately long waiting times [18].

Waiting for treatment has been described as 'part and parcel' of the NHS, and was traditionally seen as a useful means of 'balancing supply and demand' [15]. However, by the early 1990s, the chaotic and disorganized system of entry to acute care, coupled with increasing patient demand, had led to overcrowded EDs, very long waits for initial assessment and then for inpatient beds, with concomitant concerns about patient safety [15, 17]. The outcry in the public domain about the perceived poor quality of care led to the introduction of the 4 h rule in 2004, with a 90 % target set for March 2004 and 98 % target by January 2005.

It was recognized at the time that the target would not be successful without a significant reorganization and 'whole system change' across the entire acute care pathway, especially acute medical and surgical services [19]. As a result, approximately £ 820,000,000 was directly invested in improving ED care in the period 1998–2007 [20].

Despite the fact that every acute hospital in the United Kingdom was directly affected by the 4 h rule, there was a remarkable lack of research into its impact on both patient care and ED functioning [16]. National monitoring clearly demonstrated a major impact on ED LOS, with the percentage of patients being seen within 4 h increasing from 77 to 96 % between 2002 and 2004, despite a 37 % increase in ED presentations between 2002 and 2006 [19]. Although there is evidence of some reduction of the time to first being seen by a treating clinician, the proportion of hospital where the median time to review was <1 h, remained unchanged at 57 % between 2000 and 2007 (interquartile range 43–70 %) [21]. Two studies report minor falls in ED presentations within 7 days [22, 23]. Studies exploring attitudes and beliefs about the 4 h rule find that while many staff and patients were positive about

the resulting service reconfigurations, concerns were expressed about the pressure that the rule placed on doctors and nursing staff, and that quality was compromised by time considerations taking priority over other aspects of care and fragmentation of care for certain subgroups of patients [21, 24, 25].

Given that other studies find strong relationships between ED waits, particularly time to first assessment, and mortality, the relative lack of marked improvements in patient outcomes is notable.

Studies, however, examining service reconfiguration around acute care pathways, particularly the development of Acute Medical Units (AMUs), demonstrate more positive results. A review of nine before-and-after studies of AMUs, reports significant reductions in inpatient mortality, decreased length of stay and improved hospital functioning [26].

Following the success of the 4 h rule in driving system change in the United Kingdom, about a decade ago, Australian health authorities introduced initiatives aimed at coping with the increasing demand. Task forces developed strategies that included improving efficiency and monitoring inpatients who stayed for longer periods of time. In 2008, the Western Australian government announced that EDs would adopt a 4 h rule, whereby firstly 85 % and eventually 98 % of patients would be either discharged home or admitted to a ward within 4 h of presentation [18, 27, 28].

Significant improvements in meeting the target was found at all four hospitals affected, although only one hospital was able to attain the target >95 % of the time. This was accompanied by a fall in hospital mortality, and a decrease in the number of patients waiting >8 h for an inpatient bed. Such improvements came at a cost, with an increase in the number of patients admitted to hospital; a clear shift in workload from the ED to the downstream wards; an increase in nursing staff stress, and reports of junior doctor intimidation; an increase in administrative workload; and a decrease in allied health input in the ED.

By 2009, there were pressing concerns about the utility of the 4 h rule [17]. There had been persistent doubts about the veracity of the data reported by individual hospitals. Only 26 % of senior ED doctors in one survey, for example, reported that the figures submitted were an accurate reflection of the performance of their department, and 16 % admitted to knowledge of direct manipulation of the data [25]. This was coupled with an increasing awareness that there was a poor correlation between the ability of a hospital's ED to meet the target and the overall quality of care provided [21, 29]. The rising tide of ED presentations of 5–8 % year-on-year [30], and the increasing preference for patients to attend an ED in preference to their own General Practitioner also pointed to the unwanted effect of the 4 h rule creating record levels of demand [21, 31].

As a result, a new set of indicators for ED and acute care was announced in December 2010, coming into full effect from April 2011 [32]. These new indicators were chosen to represent quality of care across a broader spectrum of the acute care pathway and included targets for: time to initial nursing review; time to treatment; ambulatory care; unplanned re-attendances; patients leaving the department without being seen; service experience and senior review for certain key conditions. Importantly, the target that 98 % of patients must be admitted or discharged within 4 h was replaced by 95 % seen within 4 h, but no waits >6 h. The introduction of the new, more relaxed 4 h target almost immediately resulted in a significant increase in the percentage of patients waiting for more than 4 h.

Local authorities, such as NHS London, are also seeking to introduce performance and quality targets outside the ED, reflecting the shift in the treatment of most acutely unwell medical and surgical patients from the ED to acute admissions units. While these new targets have, overall, been considered laudable, there have been concerns about secondary uses of the indicators, such as their guiding decision-making about local service provision, particularly the potential closure or amalgamation of local EDs.

The United Kingdom and Australian experience leaves little doubt that the introduction of performance- and quality-related targets/indicators can be a powerful driver for change in the acute setting. It remains true, however, that the ability of time-related targets to impact on patient outcomes is surprisingly un-robust.

Experience also suggests that the introduction of targets can result in perverse incentives and unintended outcomes, the most serious of which include creation of a demand for emergency care, and the prioritization of the target over the quality of patient care. Other unintended effects, such as increases in hospital admissions, the burden placed on inpatient clinical staff to meet the targets and the necessity of complex and labor-intensive mechanisms to monitor the targets, may also have a negative impact on service provision and hospital functioning. Thus, although the use of clinical indicators should be broadly advocated, stringent targets created without thought to the local clinical context, and mechanisms to monitor and review clinical outcomes and the impact of the broader hospital and local health systems, are to be likely to be counterproductive.

From a research viewpoint, the introduction of clinical indicators would provide significant opportunities for organizational research. The factors that allow a hospital or department to meet externally imposed targets, such as organizational structure, culture, leadership, level of resources or the behavior of individuals, have still not been fully explored in the acute setting. Investigations of which

targets provide desired changes, whether that be improvements in patient safety or quality of care, or the behavior of physicians and other staff is crucial, allowing for smaller numbers of key targets, rather than the imposition of targets on every aspect of care. The financial and economic implications of the introduction of targets also need careful exploration, particularly in these times of fiscal constraint.

How to solve the problem of patients waiting to be admitted in hospital from the emergency

When an ED is overcrowded, the LOS in hospital is extended, and the hospital occupancy rates get worse, and when the occupancy rates exceed 85–90 %, ED boarding increases [33]. There are a lot of proposals for action on boarding, but some have proved able to modify it more than others. Recently the Joint Commission has produced standards addressing patient flow, boarding, and behavioral health emergencies, and hospitals, starting from January 1, 2014, must measure and set goals to mitigate the boarding of patients who come through the ED, recommending boarding time frames must not exceed 4 h [34].

Another organizational procedure that tries to address the problem of blocking the flow of patients to be admitted, is the full capacity protocol (FCP) [35]. This protocol, widely used in several countries, seeks to standardize the common practice of admitting patients to an inpatient hallway. The key points of the protocol are: criteria for determining when the ED is at full capacity (full capacity = ED beds filled, and boarded patient waiting >2 h), the process for implementing the transfer (max 2 patients/hallway), the types of patient eligible for a hallway bed, and guidelines for discontinuing the practice. The results of the application of FCP are usually a faster placement in rooms of the patients, a reduction in LOS times, and an improved staff and patient satisfaction without negative impact on patient outcomes.

Trying to give an overview of the possible interventions to improve the flow of patients waiting for admission, we should start with reducing hospital admissions from the ED. In addition to the large workload to select the patients who require admission, the use of observational medicine (observational units/clinical decision units) is increasingly extended to reduce hospitalization. The result of the pressure on the reduction of admission from the ED is that now we need to talk of inappropriate discharges rather than inappropriate admissions. A second level of interventions is the hospital as a whole. In addition to the target time and full capacity protocol, there are several procedures that are able to improve patient flow. But the bottlenecks are not always in the hospital: if the primary care and post-acute care (post-acute beds, aged care beds, rehabilitation beds, nursing home care), does not work well, we can hardly deal with the overcrowding [36].

Finally, it would be appropriate that any hospital that wants to improve the flow of patients would organize a plan that is based on the following actions, according to the Agency for healthcare research and quality from United States Department of Health: [37] Measuring ED and Hospital Performance, forming a patient flow team, identifying strategies, planning the change and sharing results.

Conclusions

ED overcrowding could be considered as a “local” manifestation of a “systemic” disease. The causes of it are a complex network of interwoven processes, and the effects of ED crowding are numerous and adverse. Various targeted solutions have been attempted, but further studies of efficacy are needed.

ED boarding is one of the main factors for overcrowding, but emergency physicians and hospitals as a whole must take actions to mitigate the problem because the ED alone cannot solve the problem.

Always keeping in mind that targets cannot overrule clinical judgment, 90 % of all patients should leave the ED within 6–8 h, improving the use of existing beds as first-line hospital strategy, and only later considering the use of admitted patients to hallway beds when the ED is close to full capacity.

However, future work needs to systematically evaluate interventions and guide evidence-based policy. It is important to study how to ameliorate the entire emergency healthcare system to function more effectively.

Acknowledgments The authors thank Dr. Angelo Ianni for his helpful and valuable review, and input on this manuscript.

Conflict of interest None.

References

1. Hoot NR, Aronsky D (2008) Systematic review of emergency department crowding: causes, effects, and solutions. Ann Emerg Med 52:126–136. doi:10.1016/j.annemergmed.2008.03.014
2. ACEP (2008) Task force report on boarding emergency department crowding high-impact solutions. American College of Emergency Physicians, Irving
3. Hsia RY, Kellermann AL, Shen YC (2011) Factors associated with closures of emergency departments in the United States. J Am Med Ass 305(19):1978–1985. doi:10.1001/jama.2011.620
4. Pines JM, Hilton JA, Weber EJ, Alkemade AJ, Al Shabanah H, Anderson PD, Bernhard M, Bertini A, Gries A, Ferrandiz S, Kumar VA, Harjola VP, Hogan B, Madsen B, Mason S, Ohlén G, Rainer T, Rathlev N, Revue E, Richardson D, Sattarian M, Schull MJ (2011) International perspectives on emergency department

crowding. Acad Emerg Med 18(12):1358–1370. doi:10.1111/j.1553-2712.2011.01235.x
5. Pines JM, Iyer S, Disbot M, Hollander JE, Shofer FS, Datner EM (2008) The effect of emergency department crowding on patient satisfaction for admitted patients. Acad Emerg Med 15(9):825–831
6. Richardson DB (2002) The access-block effect: relationship between delay to reaching an inpatient bed and inpatient length of stay. Med J Aust 177(9):492–495
7. Krochmal P, Riley TA (1994) Increased health care costs associated with ED overcrowding. Am J Emerg Med 12(3):265–266
8. Liu SW, Thomas SH, Gordon JA, Hamedani AG, Weissman JS (2009) A pilot study examining undesirable events among emergency department-boarded patients awaiting inpatient beds. Ann Emerg Med 54(3):381–385. doi:10.1016/j.annemergmed.2009.02.001
9. Richardson DB (2006) Increase in patient mortality at 10 days associated with emergency department overcrowding. Med J Aust 184(5):213–216
10. Sprivulis PC, Da Silva JA, Jacobs IG, Frazer AR, Jelinek GA (2006) The association between hospital overcrowding and mortality among patients admitted via Western Australian emergency departments. Med J Aust 184(5):208–212
11. Cardosos LT, Grion CM, Matsuo T, Anami EH, Kauss IA, Seko L, Bonametti AM (2011) Impact of delayed admission to intensive care units on mortality of critically ill patients: a cohort study. Crit Care 15(1):R28. doi:10.1186/cc9975
12. Bernstein SL, Aronsky D, Duseja R, Epstein S, Handel D, Hwang U, McCarthy M, John McConnell K, Pines JM, Rathlev N, Schafermeyer R, Zwemer F, Schull M, Asplin BR, Society for Academic Emergency Medicine, Emergency Department Crowding Task Force (2009) The effect of emergency department crowding on clinically oriented outcomes. Acad Emerg Med 16:1–10. doi:10.1111/j.1553-2712.2008.00295.x
13. Plunkett PK, Byrne DG, Breslin T, Bennett K, Silke B (2011) Increasing wait times predict increasing mortality for emergency medical admissions. Eur J Emerg Med 18:192–196. doi:10.1097/MEJ.0b013e328344917e
14. Guttman A, Schull MJ, Vermeulen MJ, Stukel TA (2011) Association between waiting times and short-term mortality and hospital admission after departure from emergency department: population based cohort study from Ontario, Canada. BMJ 342:d2983. doi:10.1136/bmj.d2983
15. Department of Health (2000) The NHS Plan: a plan for investment, a plan for reform. Department of Health, UK
16. Jones P, Schimanski K (2010) The four hour target to reduce emergency department 'waiting time': a systematic review of clinical outcomes. Emerg Med Australas 22:391–398. doi:10.1111/j.1742-6723.2010.01330.x
17. Hughes G (2010) Four hour target for EDs: the UK experience. Emerg Med Australas 22:368–373. doi:10.1111/j.1742-6723.2010.01326.x
18. Hughes G (2012) The four hour target in Western Australia: a progress report. Emerg Med J 29:526–527. doi:10.1136/emermed-2012-201253
19. Alberti G (2004) Transforming emergency care in England. Department of Health. http://www.dh.gov.uk/publications
20. Walker I, Grise E (2007) Our future health secured? A review of NHS funding and performance. Kings Fund, London
21. Healthcare Commission (2008) Not just a matter of time: a review of urgent and emergency care services in England. Commission for Healthcare Audit and Inspection, London
22. Freeman J, Croft S, Cross S, Yap C, Mason SM (2009) The impact of the four-hour target on patient care and outcomes in the emergency department: an analysis of hospital incidence data. Emerg Med J 27(12):921–927. doi:10.1136/emj.2009.085431
23. Kelman S, Friedman JN (2009) Performance improvement and performance dysfunction: an empirical examination of distortionary impacts of the emergency room wait-time target in the English National Health Service. J Public Adm Res Theory 19:917–946
24. Mortimore A, Cooper S (2007) The '4-hour target': emergency nurses' views. Emerg Med J 24:402–404
25. British Medical Association (2005) BMA survey of A&E waiting times: 1–15. Available from URL: http://www.bma.org.uk/images/AEwaitingtimes_tcm41-20446.pdf
26. Scott I, Vaughan L, Bell D (2009) Effectiveness of acute medical units in hospitals: a systematic review. Int J Qual Health Care 21:397–407. doi:10.1093/intqhc/mzp045
27. Geelhoed GC (2012) Emergency department overcrowding, mortality and the 4-hour rule in Western Australia. MJA 196:122–126
28. Department of Health (2011) Four hour rule program progress and issues review. Department of Health, Perth. http://www.health.wa.gov.au
29. Wood H, Fontain P, Harvey D et al (2009) Investigation into Mid-Staffordshire NHS Foundation Trust. Healthcare Commission, London
30. Department of Health (2012) A&E attendances. Department of Health. Available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Statistics/PerformancedataandstatisticsAccidentandEmergency/DH_077485
31. Imison C, Poteliakhoff E, Thompson J (2012) Older people and emergency bed use: exploring variation. The King's Fund, London
32. Department of Health (2010) A&E clinical quality indicators implementation guidance. Department of Health, UK
33. Proudlove NC, Gordon K, Boaden R (2003) Can good bed management solve the overcrowding in accident and emergency departments? Emerg Med J 20:149–155
34. Standards Revisions to Address Patient Flow Through the Emergency Department (2012) The Joint Commission. www.jointcommission.org/assets/1/18/Pre_Publication_EDO_HAP.pdf
35. Viccellio P (2001) Emergency department overcrowding: an action plan. Acad Emerg Med 8(2):185–187
36. Rabin E, Kocher K, Pines J, Hwang H, Rathlev N, Asplin B, Truegger NS, Weber E (2012) Solutions to emergency department boarding and crowding are underused and may need to be legislated. Heath Affairs 8:1757–1766. doi:10.1377/hlthaff.2011.0786
37. Improving patient flow and reducing emergency department crowding (2011) AHRQ Agency for Healthcare and Reducing Emergency Department Crowding. http://www.ahrq.gov/qual/ptflow/ptflowsum.htm