



CONTEMPORARY ISSUES

Emergency department crowding: Time to shift the paradigm from predicting and controlling to analysing and managing

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1. Introduction

Patients queuing at the front desk; complaints about uncomfortable chairs; patients and family members discussing the long waiting times just loud enough for others to hear; hopeful eyes when a name is called, followed by disappointed (sometimes even angry) gazes when it appears to be a different name than expected. . .

The fact that most emergency departments (EDs) are often crowded is well known amongst healthcare professionals and repeatedly described within the literature (Boyle et al., 2012; Pines et al., 2011; Pitts et al., 2012; Verelst et al., 2014). Emergency department (ED) crowding has also become a public concern. The latter is reflected by the increased media attention. This attention is not unjustified, given the significant consequences for both patients (e.g. mortality and morbidity) and caregivers (e.g. work related stress

and burnout) (Johnson and Winkelman, 2011). Although the recognition of the ED crowding problem began at least a decade ago, many unanswered questions remain. When considering these questions, one might wonder – how it is possible that we are able to treat complex diseases, yet not able to prevent a simple queue?

2. ED crowding problem

The ED crowding problem is, in essence, a classical economical problem – a discrepancy between supply and demand. Despite the large number of publications describing the consequences, there is however little consensus on a definition of ED crowding. The simplest of definitions states that “crowding occurs when the identified need for emergency services exceeds available resources for patient care in the ED, hospital, or both” (Hoot and Aronsky, 2008, p. 126).

Notwithstanding the lack of a standard criterion definition, the literature is replete with efforts to measure crowding (Hoot et al., 2007; McCarthy et al., 2011). The criteria used to validate these crowding measures include: clinician opinion, consensus panel, ambulance diversion, patients left without being seen, times to care, and

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forecasting. Nevertheless, the lack of an unambiguous definition is a first hurdle in finding appropriate solutions. As without a clear definition it is difficult to describe what actually needs to be solved.

The model most referred to when describing the crowding problem and its causal factors is the ‘conceptual model of ED crowding’ proposed by [Asplin et al. \(2003\)](#). This model distinguishes three interdependent components: i.e. input, throughput, and output. Input factors include not only the volume, but also the acuity and type of patients. Throughput factors refer to the activities within the ED that may interfere with patient flow. Output factors refer to obstacles preventing patients from leaving the ED (e.g. lack of staffed hospital beds).

Research has brought us to the following main causes of ED crowding: (1) patients with unnecessary or inappropriate reasons attend the ED (input), and (2) difficult access to staffed hospital beds for patients requiring hospitalisation (output). There are, however, also indications that the increasing use of technical investigations, like laboratory testing or imaging, has become a major contributor to longer patient stays in the ED (throughput) ([Kocher et al., 2012](#); [Pitts et al., 2012](#); [Retezar et al., 2010](#)). In general, output factors are considered as the main cause of ED crowding. More specifically, the lack of inpatient beds is referred to as the single most important cause of ED crowding (e.g. the lack of available critical care beds leads to high acuity patients remaining in the ED) ([Moskopp et al., 2009](#)).

In addition, there is an extensive amount of literature regarding ED models of care and service enhancements. Due to considerations of space, this paper cannot provide a comprehensive review of existing models. A recent review discusses ED models of care in the context of care quality, care effectiveness, and cost ([Wylie et al., 2015](#)).

Overall, with only a poor description of the problem and little to none structural solutions, this is a poor result coming from decades of research and millions of public resources spent. Most published studies concerning ED crowding merely comprehend a scientifically translated “cry for help” from the staff involved. Hence, we think it is time for a new paradigm.

3. Think quality, not crowding

ED crowding can be viewed upon from different perspectives: the caregivers’ perspective, patients’ perspective, hospitals’ perspective, and even as wide as the entire healthcare systems’ perspective. All these viewpoints generate different definitions and meanings. Caregivers by example, talk the most about the number of patients, creating the perception amongst ED staff that unnecessary or inappropriate ED attendance is the cause of all problems ([Sanders, 2000](#)). Let us be clear that health care providers, and not the patients, assign the label “unnecessary” or “inappropriate” ([van der Linden et al., 2014](#)). From the patient’s perspective, there is just the need for care ([de Valk et al., 2014](#)). In their point of view, crowding means bad service stemming from inadequate management.

What alternative do patients have? Can we expect non-medical trained individuals to distinguish between urgent and non-urgent conditions? Several papers illustrate that it is difficult to estimate the acuity of one’s own disease and that even experienced emergency physicians can not judge the appropriateness of their own ED visits ([Berger, 2010](#); [Cunningham, 2006](#); [Cunningham et al., 1995](#)). Patient education programmes might be a solution for specific conditions of ED attendance, but – as hard as it is to organise – designation of patients to the most appropriate healthcare service is not the task of the patient but rather the responsibility of the health care system itself. In this regard, the Dutch system where a general practitioner is integrated in the ED shows promising results ([Kool et al., 2007](#)).

Should we really spend more time and resources on measures to reduce the number of patients ([Nagree et al., 2013](#))? A recent study showed that the number of patients simultaneously present at the ED has moderated predictive power regarding the occurrence of unsafe waiting times for high-urgency patients ([Bergs et al., 2014](#)). This suggests that crowding compels more than just the number of patients. By example, a waiting room full of patients with strained ankles and minor lacerations, does not require as many resources compared to the arrival of four high acuity patients. Crowding not only results from the number of patient and their characteristics (e.g. care complexity), factors related to organisational culture, and resilience have their equal share of impact.

Given this, should we continue using the wide variety of definitions founded on the perspectives of sole groups of stakeholders? Or should we develop a definition based on conditions concerning all stakeholder groups? We believe that such common interests can be found in the field of quality and safety of care.

4. Measuring quality and safety in the ED

In order to monitor progress, quality and safety of care should be measured in a valid and objective manner. Developing indicators that are relevant, valid, feasible, and easy to measure have proven to be difficult. Although conceptual frameworks and error taxonomies are available, a practical scorecard for measuring quality and safety over time in the ED is lacking. In this regard, [Pham et al. \(2014\)](#) proposed a framework that measures safety on 4 major domains: (1) how often patients are harmed, (2) how often appropriate interventions are delivered, (3) how well errors in the system are identified and corrected, and (4) ED safety culture. Although examples of specific measures for each of these domains are provided, the authors recognise that consensus should be reached on which key measures are important for the ED environment and patients ([Pham et al., 2014](#)). Recently, the International Federation for Emergency Medicine proposed a series of quality indicators ([Lecky et al., 2014](#)). These indicators, in tabular form, are designed to answer nine quality questions regarding the domains structure, process and outcome. There is an urgent need to improve the evidence base to determine which quality indicators have the potential to successfully improve clinical outcomes, staff and patient experience in a cost-efficient manner ([Lecky et al., 2014](#)).

Besides a solid set of quality and safety indicators, a standard set of definitions on performance measures and operational metrics are needed to uniformly measure ED operational performances. The required key definitions and metrics for operational performance are already available in the literature ([Solberg et al., 2003](#); [Welch et al., 2006, 2011a, 2011b](#); [Wiler et al., 2013](#)).

As crowding may affect different stages of the ED process, it seems most appropriate to measure quality and safety in relation to occupancy (i.e. the number of patients simultaneously present at the ED). In other words, we need to determine the effect of occupancy rates on the selected quality indicators in order to determine the capacity of the ED. Only then will it be possible to measure the potential relationships between ED occupancy rates and decreased quality and/or safety, followed by the establishment of a threshold to define crowding.

5. The ED as a complex adaptive system

Even with all definitions and measurements in place, the problem of ED crowding will not be solved easily. The dynamics of patient flows in the ED are anything but not linear ([Nugus et al., 2014](#)). The relation with its causal factors is complex and not easily understood.

The context in which ED crowding takes place is characterised by a complex adaptive system (CAD) ([Chinnis and White, 1999](#)). The

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