BRIEF REPORTS

# Care in the Emergency Department: How Crowded Is Overcrowded?

Ula Hwang, MD, MPH, John Concato, MD, MS, MPH

## Abstract

**Objectives:** To examine how emergency department (ED) overcrowding has been defined in the medical literature. **Methods:** Using the National Library of Medicine's PubMed and MEDLINE databases (1966 to 2002), a comprehensive review of the English-language medical literature was conducted to identify explicit criteria for defining ED overcrowding. Inclusion criteria were original articles, editorials, and reviews; news articles and letters to the editor were excluded. Using a standardized extraction form, publications were described as primary if the title or an objective statement in the introductory or methods paragraph referred to crowding or overcrowding; all other citations were categorized as secondary. Each report was then evaluated to determine whether crowding or overcrowding was defined explicitly or implicitly. Explicit definitions included phrases such as "Crowding was defined as …" or "Overcrowding occurred when …"; other definitions were characterized as implicit. **Results:** A total of 231 candidate articles were identified; 91 met inclusion criteria, and 53 (58%) were primary articles about ED crowding or overcrowding. Among these primary articles, 23 (43%) had explicit definitions of crowding or overcrowding. The definitions varied widely in content and focus, including ED, hospital, or external (nonhospital) factors. **Conclusions:** Although ED overcrowding has been a topic of frequent investigation, current definitions of the problem are often implicit or focus on factors outside of the ED itself. A more consistent approach to defining ED overcrowding would help to clarify the distinctions between causes, characteristics, and outcomes of overcrowding. **Key words:** crowding; overcrowding; emergency department. ACADEMIC EMERGENCY MEDICINE 2004; 11:1097–1101.

Reports of emergency department (ED) overcrowding were prominent in the late 1980s, with alarming stories[1–4] of overburdened, understaffed, and underfinanced EDs. Coinciding with an increase in the number of emergency medicine training programs, as well as efforts by managed care organizations to decrease ED use, rates of ED utilization stabilized during the early 1990s.[5] ED overcrowding, although still occurring, perhaps was less severe or was accepted as the status quo within the emergency medicine community.

The problem of ED overcrowding has since regained national prominence. Descriptions of hospital and ED overcrowding became more common in the late 1990s,[5–7] with concerns including threats to the nation's capacity for providing health care. Subsequently, data in the National Hospital Ambulatory Medical Care Survey[8] indicated that the number of ED visits per year increased by 2.7 million from 2001 to 2002 alone. A report by the Center for Studying Health System Change suggested that a substantial fraction of the increase in utilization is from insured users,[9] contrary to popular belief that overcrowding is caused by uninsured nonurgent patients. The issue of ED overcrowding has also become a focus of attention at the Institute of Medicine, which has created a panel on the future of emergency care, with crowding as one of its major topics.[10]

An important but underrecognized aspect of this complex issue involves the challenge of defining overcrowding. Although several commentaries have discussed the problem of overcrowding,[11–15] a consensus has not been reached. Our objective was to assess how ED overcrowding has been defined in the medical literature. We performed a comprehensive review of published articles to identify explicit definitions of ED overcrowding.

## METHODS

Using the PubMed and MEDLINE search engines from the National Library of Medicine, we conducted a review of the English-language medical literature from January 1, 1966, to December 31, 2002, using the search terms "emergency" *and* "crowd*/$" *or* "overcrowd*/$." This search resulted in a total of 230 articles. A search was also conducted using MEdical Subject Headings (MeSH) terms "emergency

From the Section of Emergency Medicine (UH) and the Robert Wood Johnson Clinical Scholars Program, Department of Internal Medicine (UH, JC), Yale University School of Medicine, New Haven, CT; and the Clinical Epidemiology Research Center, West Haven Veterans Affairs Medical Center (JC), West Haven, CT.
Received January 27, 2004; revision received April 16, 2004; accepted May 28, 2004.
Address for correspondence and reprints: Ula Hwang, MD, MPH, Department of Emergency Medicine, Mount Sinai School of Medicine, Box 1149, One Gustave Levy Place, New York, NY 10029. Fax: 212-426-1946; e-mail: ula.hwang@mssm.edu.
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services'' *and* ''crowding,'' which generated 22 articles; one was a unique addition to the initial search. For our review, inclusion criteria were original articles, editorials, and reviews; news articles and letters to the editor regarding other publications were excluded.

Using a standardized extraction form, publications were described as primary if the title or an objective statement in the introductory paragraph referred to crowding or overcrowding; all other citations were categorized as secondary. Each primary report was then evaluated to determine, by consensus of both authors, whether crowding or overcrowding was defined explicitly or implicitly. Explicit definitions required operational measurements of overcrowding. Examples included phrases such as ''Crowding was defined as …'' or ''Overcrowding occurred when … .'' Implicit definitions were not clearly stated in the corresponding paper; issues regarding ED overcrowding were discussed, but a specific definition was lacking. (Within the emergency medicine community, debate exists regarding whether the term ''crowding'' or ''overcrowding'' is the appropriate term. To enhance readability, this article hereafter uses only the term overcrowding.)

## RESULTS

Among the 231 candidate articles, 91 articles met our inclusion criteria and 53 (58%) were primary articles about ED overcrowding. Among the primary articles, 23 (43%) had explicit definitions of ED overcrowding. These 23 core articles[5,16–37] included five analytic studies, six descriptive studies, two review articles, and ten editorials.

The review found substantial variation in the definition of overcrowding in the ED. As shown in Table 1, the published definitions could be grouped into categories based on whether the specific focus of assessment involved ED factors (e.g., waiting times); hospital-related, but non-ED factors (e.g., lack of inpatient beds); factors external to the hospital (e.g., ambulance diversion); or a combination of these factors. The actual criteria found for overcrowding are also shown in Table 1 for the eight ED factors, 11 hospital-related factors, one external factor, and three combinations of these categories.

Importantly, although some of the published definitions overlap (e.g., regarding bed availability), core papers that defined overcrowding did not use identical criteria, excluding five papers by two separate academic groups that included the same authors.

## DISCUSSION

Although ED overcrowding has been a frequent topic of investigation and comment, a consistent approach to determining the problem has not been promulgated. Among 53 articles discussing ED overcrowding, only 23 (43%) stated an explicit definition of the phenomenon. Hospitals can vary considerably in many substantive ways (e.g., urban or rural setting, private or teaching status, with or without designation as a trauma center), such that a single definition may not be suitable for all situations. Nonetheless, standardized approaches for measuring ED overcrowding calibrated to particular environments are useful to recognize, understand, and correct related problems in this health care environment. Conversely, implicit definitions of overcrowding are undesirable, both in clinical care (e.g., using limited resources for a problem that may or may not exist) and in research (e.g., projects that do not define overcrowding cannot be replicated).

We suggest that the definition of overcrowding should focus on standardized criteria and use operational definitions that are easily understood and based on events that occur within the ED itself. Examples of measures specific to the ED are tracking of waiting times and treatment times, or patient-to-bed ratios. In our review, a minority of core papers ($n = 8$) had criteria for overcrowding that focused on ED factors. The majority of articles ($n = 15$) with explicit definitions had criteria that were based on hospital factors (e.g., availability of beds elsewhere in the hospital), external factors (e.g., status regarding ambulance diversion), or a combination of categories. These results suggest that an increased emphasis is warranted regarding events occurring in the ED.

Factors used to define overcrowding should also be distinguishable from possible causes (e.g., a shortage of nurses for available positions) and effects (e.g., decreased efficiency for providing care) of overcrowding. In this context, some of the inconsistencies we found in the definition of overcrowding appear to originate from the close interrelationship among overcrowding itself and related causes and outcomes. For example, a lack of beds for patients admitted to the hospital has been described[6,7,22] as a cause of overcrowding, but was also cited[23] as a definition of ED overcrowding itself. Similarly, ambulance diversion has been used as a measure of overcrowding,[34,38] but could also be considered an outcome caused by ED overcrowding.

Figure 1 shows a conceptual model that can assist investigators, as well as reviewers and editors, in understanding how a particular study is pertinent to ED overcrowding. A more cogent definition of ED overcrowding would promote studies to examine factors that cause it, such as increased complexity of patients presenting to the ED, lack of beds for patients admitted to the hospital, and shortage of nursing staff.[7] Separating factors that cause overcrowding from the phenomenon itself can assist in the development of interventions to ease overcrowding. These factors have been mentioned in evaluations of ED overcrowding in the past,[33] but not necessarily as part of a systematic evaluation.

**TABLE 1. Explicit Definitions of ED Overcrowding**

1. ED factors
   - Real-time computerized tracking of waiting times, treatment times, and current census of actual patients in the ED being treated or waiting to be seen[5]
   - Number of visits >120/d (840/wk)[16]
   - Lack of capacity in observation area[17]
   - *Response of nurses' and physicians' opinions of ED overcrowding and telling of being rushed[18]
   - ED bed ratio, acuity ratio, provider ratio, demand value[19]
   - *Patients wait >30 min, or all ED beds filled >6 h/d, or patients placed in ED hallway, or physicians rushed[20]
   - *Patients wait >30 min, patients wait >60 min, ED beds filled >6 h/d, patients placed in hallways >6 h/d, waiting room filled >6 h/d, physicians feel rushed >6 h/d[21]
   - *Patients wait >60 min to see physician, ED beds full >6 h/d, patients placed in ED hallways >6 h/d, emergency physicians feel rushed >6 h/d, waiting room filled >6 h/d[22]
2. Hospital factors
   - When there are no available in-hospital beds for patients admitted from the ED[23]
   - †ED crowding occurs when ED patients are ready but unable to be admitted to either a floor or an ICU bed and are held in the ED[24]
   - Reduction of inpatient beds and a critical shortage of health care professionals[25]
   - †When admitted ED patients cannot leave the department because all staffed inpatient and ICU hospital beds are occupied and no beds are available in neighboring facilities for transfer[26]
   - From boarding inpatients already admitted to the hospital for hours to several days[27]
   - When patients needing admission cannot leave the ED because of unavailability of inpatient beds[28]
   - †When admitted ED patients cannot leave the department because all staffed inpatient and ICU beds in the hospital are occupied and no beds are available in neighboring facilities for transfer[29]
   - When acute care beds become filled[30]
   - When the delay in transfer of admitted patient to a hospital bed is longer than 4 h[31]
   - (Admitted) patients held overnight in the ED[32]
   - Too many sick patients, and too many admitted patients[33]
3. External factors
   - Periods of ambulance diversion[34]
4. Combination of factors
   - Patients wait >90 min, ED beds filled >6 h/d, >30% ED beds filled with admitted patients, patients in hallway >6 h/d, full waiting room >6 h/d[35]
   - Registered ED patients who Leave Without Being Seen (LWBS), and frequency and duration of EMS diversion[36]
   - Staff shortages, lack of available beds, poor operational process, increased number of patients who seek care, lack of universal access, shortage of inpatient beds, and hospital closures[37]

*A group of authors publishing similar criteria.
†A (different) group of authors publishing similar criteria.

A parallel discussion also applies to potential consequences of ED overcrowding. Assumptions are often made that overcrowding negatively impacts patient care, but surprisingly little evidence[16,39] has been published to support such assertions. Demonstration of such direct associations is essential to understand how overcrowding affects the health care system. Clinical outcomes, including medical errors, delays in the care of patients (e.g., time to antibiotic or thrombolytic therapy), and patient satisfaction, are measures already used in hospitals (and as national standards) to gauge the quality of health care. Similar studies can evaluate the direct impact of overcrowding. If objective data indicate that ED overcrowding

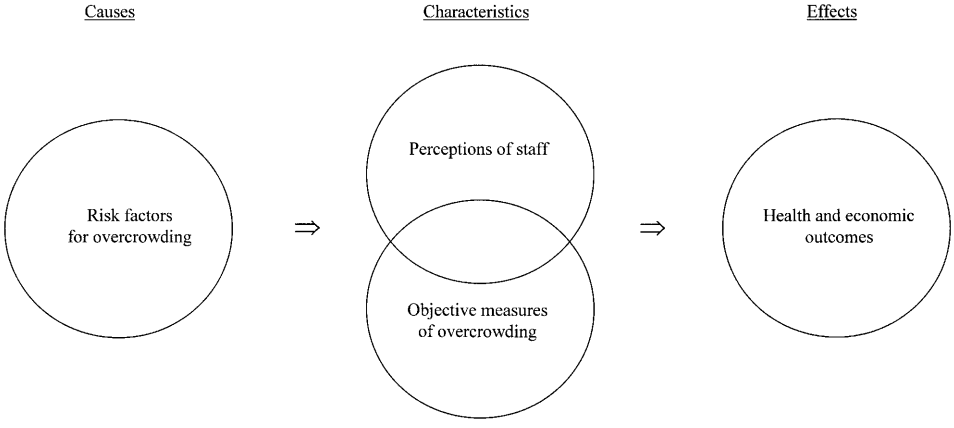


**Figure 1.** Conceptual model showing how a particular study is pertinent to emergency department overcrowding.

leads to adverse health outcomes, the need to solve the problem takes on greater urgency.

Although our proposal to reach consensus regarding definitions of ED overcrowding is simple conceptually, many recent reports and initiatives on this topic have proceeded without identifying a suitable focus of measurement. For example, early in 2003, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) released proposed guidelines[40] to address overcrowding in hospital EDs. As part of the initiative, JCAHO conducted a survey that asked for definitions of ED overcrowding, reflecting the ambiguity on which the same guidelines were based. In addition, the U.S. General Accounting Office recently surveyed more than 2,000 hospitals and found that one in ten reported being on ambulance diversion for more than 20% of a one-year period.[38] When presenting these data, the report acknowledges that no standard measure of overcrowding currently exists. Finally, as an example of efforts to directly address the problem of overcrowding, the Robert Wood Johnson Foundation, as of May 2003, launched an initiative (Urgent Matters)[41] to help hospitals reduce ED overcrowding. Promulgating a definition of ED overcrowding was not a focus of this effort, and corresponding criteria for overcrowding were implicit, not explicit.

## LIMITATIONS

We acknowledge that our literature search may not be complete, with new articles being published on this topic virtually every month. The implications of our analysis will be more worrisome, however, if new and different definitions of overcrowding are being proposed. Our review was intended to identify ''operational'' measures of overcrowding, rather than focusing on a theoretical definition of the problem. Other (more complex) conceptual models of overcrowding have been developed[15,42,43]; our schema complements, rather than contradicts, these models. We also recognize that the subjective perception of ED overcrowding and its relationship to objective measures is an important aspect of the problem and warrants further research. Finally, we did not assess the quality of each published article, yet variability in definitions is a problem unto itself, regardless of other methodologic issues that may detract from a research investigation.

## CONCLUSIONS

Emergency department overcrowding warrants the same scientific rigor that is used in clinical research to define comorbidity, quality of life, and other phenomena. Definitions of ED overcrowding should be based on direct measurements of the problem itself, helping researchers and policy makers to focus on the distinctions between causes of, characteristics of, and outcomes caused by overcrowding. Effective interventions will require participation by all components of the health care system—patients, providers, departments, hospitals, communities, state and federal agencies—but a better definition of ''what the problem is'' represents a strong determinant of success.

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