



ED overcrowding: “Hey, remember that canary we had? It died in the coal mine.”

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The international crisis of Emergency Department (ED) overcrowding has been rapidly accelerating over the past 20 years since first being described in 2000 [1]. Given the supply/demand mismatch of health care resources currently experienced in many nations, overcrowding has been referred to as a “canary in a coal mine”, an early warning allusion to a dangerously overloaded health system. In the United States, frameworks for addressing ED overcrowding frequently focused on the input, or demand side solutions, such as ambulance diversion, alternate destinations of ambulance, and access to alternate care sites. Few of these have been successful in truly reducing ED boarding and overcrowding [2].

In this issue, Tian et al. introduce a novel and important model for understanding the input and output dynamics of ED overcrowding by highlighting the variable of inpatient boarding due to the inability to discharge acute care inpatients to alternate care sites, also termed blocked discharges [3]. Although not fully characterized, it is estimated that approximately 20% of inpatient discharge are subject to some type of block hindering timely discharge [2]. In this study, investigators developed a discrete-event computer model to simulate patient flow in and out of the ED based on actual administrative data from six provincial hospitals in Saskatchewan. Variables could then be modified to measure the effect on overcrowding and ED flow. The uniqueness of this discrete-event simulation allows for a more holistic view of ED throughput, boarding, and overcrowding. Most ED medical directors know intuitively that when there are no inpatient beds available, ED boarding and ambulance wait

times quickly follow. When there is no boarding, patient-flow metrics return to a nominal level. This simulation model is an important step toward quantitating the complex interplay of input and output factors on ED throughput. In addition, their model confirmed prior work showing that input factors are not the primary cause of ambulance wait time, ED boarding, and overcrowding. Diverting low acuity patients has had no substantial effect on throughput metrics. They have also confirmed that aligning physician services with volume, such as time to physician contact, can improve throughput metrics. In our experience, though, the potential stress on the human assets (physician and nursing) with these modifications must be carefully managed. Merely throwing more personnel at the issue is not always the solution and can result in low morale and fatigue.

Although each health system is different, the factors in play in ED boarding and overcrowding are quite similar [3]. Quality improvement science was developed from productivity science. Productivity is simply defined as the ratio of output versus input. Manufacturing has long studied productivity. Balancing output and input to maximize profit and minimize costs is the fundamental tenet of producing goods. A computer manufacturer wants an efficient and productive supply chain and thus only builds a computer when it is sold. In contrast, a restaurant with too many people waiting due to slow service and people having extended meals results in unbalanced productivity. Though medicine is not about making computers or pasta dishes, it is subject to the same forces.

In the United States, a fragmented health care system consisting of employer-funded insurance, under-funded public insurance, large private health care systems, and under-funded public health care systems has always been viewed as a primary contributing factor in ED boarding and overcrowding. Medical care in the United States is very expensive and key drivers of care are not always based on clinical outcomes or value, but on reimbursement rate. Currently, reimbursement favors surgical procedures. Patients

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need to move through quickly to allow productivity in this model. However, this model is not sustainable as acute care hospitals care for the spectrum of human illness which is neither precise nor predictable. The prevailing impression in the United States was that it was due to the lack of primary care that forced people to the ED with resulting boarding and overcrowding, an input problem. Some have lamented that if we just fix this issue, it will be better. Emergency Medical Service (EMS) systems have focused on alternate destination policies, treat-and-release policies, and a myriad of other input solutions. However, less than 30% of patients come to the ED by ambulance. The results of these efforts on ED boarding and overcrowding have been minimal at best. That said, ED boarding has reached a breaking point in many locations, including Northern California. Ambulance off-load delays and EMS units being held on “wall-time” have reached such a critical level that, at times, no emergency ambulances are available in a community for several hours. The resulting public health and political response has been haphazard and not based in evidence. Local municipalities and state government leaders threaten to fine hospitals for ambulance off-load delays assuming that it is a hospital management problem.

Interestingly, even in countries with well-developed National Health Systems, such as Canada, United Kingdom, and Australia, these problems are still present. This supports the current evidence that this is not an input problem. An increasing general population and an aging and medically reliant population, coupled with longer life expectancy, have dramatically increased demand for health care. In Canada, the population over age 85 years is anticipated to triple by 2068 [4]. Most regions have not responded with balanced

supply. More importantly, supply is not always more acute care hospitals. The response needs to be better output with post-discharge access to long-term care support, chronic care facilities, rehabilitation centers, case management, mental health support, and other post-acute care services. Tian et al. helped illustrate this issue with their computer simulation. Perhaps, the new slogan to address ED boarding and overcrowding should be “If you need an ambulance, build a nursing home.”

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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