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# Seasonal Admissions Crisis in a Public Hospital: Should Hospitals “Prepare” for the Winter?

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## Abstract

*Objectives:* To investigate a possible link between the overcrowding noted in Emergency Departments (EDs) in Israel in the winter of 2006 and the decreased proportion of high-risk patients receiving the influenza vaccine that year because of a public scare, and to present a potential solution to the general increase in patient load in winter.

*Methods:* The pattern of admissions in the ED of a tertiary hospital in northern Israel from September to December 2006 was compared to that in 2005 using data collected from the computerized departmental files.

*Results:* In the winter of 2006, there was a 5.5% increase in total ED admissions and a 4.1% increase in medical ED admissions. Diagnoses of fever increased by 62%, of respiratory diseases by 15.6%, and of acute coronary syndrome by 15.1%. The number of internal medicine ward admissions for pneumonia increased by 43.9%, and the number of patients requiring mechanical ventilation rose by 21%. Our hospital managed the crisis by establishing a "virtual" ad hoc internal medicine department that utilized all available beds throughout the hospital.

*Conclusions:* Government and health officials and the media must take precautions to prevent the spread of misinformation among the public which can have detrimental effects on the health of high-risk groups and lead to overcrowding in hospitals. The problem in 2006 served to highlight the worsening decline in the number of available ED beds in Israel. The creation of a stand-by mini-internal medicine unit within the hospital could provide a temporary solution.

**MeSH Words:** Influenza vaccine, emergency department overcrowding, admission crises

## Introduction

At an urgent meeting regarding the admissions crisis in Israeli hospitals, the Israel Medical Association (HARI) reported an occupancy rate of more than 110% in November and December of 2006, mainly in the public hospitals. It was also our impression that the burden on the ED at

our tertiary center in 2006 was higher than in the previous year, with patients sometimes waiting up to 12 hours for an empty bed. Our inquiries among administrators of several other EDs throughout the country yielded similar findings. Influenza vaccinations are normally started in Israel in October and remain effective for about 3 months [1]. Studies have found the influenza

vaccine to be beneficial in protecting the high-risk population and in reducing the morbidity and mortality from complications of upper respiratory tract infections [2] and influenza-like diseases [3]. The vaccine has also been proven safe for use in children [4]. However, in 2006, the vaccination program in Israel was temporarily halted by the Ministry of Health in order to investigate 4 deaths in central Israel allegedly related to the vaccine. When no link was found, the community medical services were ordered to proceed with the program. However, because of the reports in the media and the resulting widespread panic, many high-risk subjects decided to forgo immunization. The Maccabi Community Medical Services, for example, reported that only 37.4% of their high-risk population (116,170 people) received the influenza vaccine in 2006 compared to 55% (170,500 people) in the previous year. Similar rates were noted for the Haifa district, separately (34.7% or 20,777 patients in 2006 compared to 53%, or 31,707 people, in 2005) [data derived from internal publications of the Maccabi Community Medical Services distributed to its physicians].

The aim of the present study was to determine if the increased burden in the ED of our hospital in 2006 was related to the disturbances in the influenza vaccination program the same year. We also sought to describe the solution developed by the hospital to meet the crisis.

### Patients and methods

The study was conducted in a major tertiary care hospital in Haifa, Israel. The hospital's 34-bed ED has an average of 118,000 visits per year. Patients who present at the ED are directed by a triage nurse according to their clinical symptoms and age to one of three waiting areas: medical, surgical (trauma), or pediatric.

For purposes of the present study, we retrospectively examined the pattern of ED visits from September to December 2006 (winter season) and compared the findings to the same period in 2005. Data were collected from the computerized files of the ED Admissions Office. It is our departmental practice to enter the diagnostic ICD-9 code into the ED file prior to the patient's admission to a hospital ward or

discharge. In addition, for the same time period, we analyzed the number of patients admitted to the Departments of Internal Medicine for treatment of upper respiratory tract infection and reviewed the report of the Israel Ministry of Health for data on deaths from pneumonia [5].

Statistical analysis was performed with the chi-square test; the level of significance was defined as  $p < 0.05$ .

### Results

In the winter of 2006, the total number of visits to the ED was 5.5% higher than in the same period in 2005. The medical area of the ED was visited on average 160 times more per month, for an overall increase of 4.1% over the previous year. Visits to the pediatric area increased by 18.9% (Table 1).

Accordingly, the rate of admissions from the medical ED to the hospital increased by 8.1%. That is, there were 51 more admissions to the hospital in the winter of 2006 than in the winter of 2005 ( $p < 0.001$ ).

Further analysis of the distribution of ED visits by cause revealed a 62% increase in diagnoses of fever ( $p < 0.001$ ), a 15.6% increase in diagnoses of respiratory diseases (upper respiratory tract infection, asthma, bronchitis, chronic obstructive pulmonary disease, pneumonia) ( $p = 0.003$ ), and a 43.9% increase in diagnoses of pneumonia alone ( $p < 0.001$ ). There was also a 15.1% increase in the number of ED visits for acute coronary syndrome (angina pectoris, pulmonary edema, and acute myocardial infarction) ( $p = 0.003$ ). On some weekends, there were more than 20 patients waiting for an available hospital bed.

We then reviewed the number of patients in the hospital's Departments of Internal Medicine who required mechanical ventilation during this period for acute respiratory failure secondary to acute left heart failure or secondary to pneumonia, asthma, exacerbation of chronic pulmonary obstructive disease, or acute bronchitis. We found a 21% increase over the same period in 2005 ( $n = 369$  vs.  $n = 304$ ). There were times when a single internal medicine department had as many as 10 patients receiving mechanical ventilation on the same day.

**Table 1. Visits to the ED and Hospitalizations from the ED in winter of 2005 and 2006.**

Period	Total ED		Medical ED		Pediatric ED No. Visits
	No. Visits	No. Pts. Hospitalized	No. Visits	No. Pts. Hospitalized	
Sept-Dec 2005	38418	12795	15892 (41.3%)	6587	4608
Sept-Dec 2006	40541	13478	16556 (40.8%)	7154	5481
Delta	2123 (5.5%)	683 (5.3)	664 (4.2%)	567 (8.1%)	873 (19%)

Statistics published by the Israel Ministry of Health showed that the number of deaths due to pneumonia in the winter of 2006 was double that in the same period in 2005 (n=62 vs. n=34). Pneumonia was the sole cause of death in 58 patients in December 2006 compared to 13 patients in December 2005. Furthermore, patients receiving mechanical ventilation in the winter of 2006 accounted for 5.2% of the total number of hospitalized patients in the country [5].

**Discussion**

Our study shows that there was a significant increase in the number of visits to the ED for dyspnea due to respiratory diseases or acute left heart failure in the winter of 2006. According to the reports of the Israel Center for Disease Control (Gertner Institute), most of the acute respiratory illnesses in 2006 in Israel were caused by the influenza A virus which was supposed to be well covered by the current vaccine. Only in early February were a few cases of influenza B infections recorded [6]. We suggest that the erroneous implication of the vaccine in 4 deaths in the community and the consequent fear of the public to undergo vaccination, even after the issue was cleared up, was at least partly responsible for both the unusually high number of infections and the overcrowding in the country's hospitals. Although by the design of the present study we cannot rule out the potential effect of other factors, it stands to reason that similar scenarios may take place in the future, and further investigation and planning must be considered to prevent a repeat of this winter's problems.

Although the crisis in 2006 was unique, it highlights the decades-long deficit in acute care beds in Israeli hospitals. According to the database of the European Health for All, WHO Regional Office for Europe [6], from 1990 to 2002, the number of acute care beds dropped not only in Israel, but in all European countries as well, except Belgium. However, Israel and Turkey are at the bottom of the scale [7]. At present, Israel has a lower number of beds per 1000 citizens (2.1 beds) than Germany (9 beds), the United Kingdom (3.9 beds), and Canada (3.2 beds) [8]. The problem was exacerbated in 2006 because of the greater complexity of cases. The percentage of mechanically ventilated patients was the highest in the last 10 years, and the vast majority of these patients were admitted from intensive respiratory care units.

Some reports from Israel claimed that as a result of the decrease in the number of acute care beds in public hospitals, the number of admission days decreased from 7.2 in 1976 to 4.4 in 1996. This, in turn, led to an average 92% increase in hospital bed occupancy, thereby increasing the efficiency of patient work-ups [9,10]. However, these data do not take into account the quality of treatment provided to patients forced to lie in the hallway or the effect of the reduced quality of care on hospital readmissions or outcome after discharge. The ideal number of acute care beds per 1000 patients has not been established because of the confounding influence of many different factors, such as disease patterns and social structure of the population [11], in addition to the efficiency and quality of the work-up in the community [12], and the provision of alternatives to hospital care [13].

A study performed at hospitals in Winnipeg, where the number of beds decreased by 24% (727 beds) from 1991 to 1997, showed that the resulting drop in admissions occurred mainly among the less ill patients. There was no change in admissions of very ill medical patients who needed the most complex care. The findings suggested that the quality of care in hospitals had not deteriorated, but the authors could not reach any conclusions regarding the effect on the rate of readmissions [14].

Leaving patients in the ED for a few days has proven to lead to high mortality rates [15]. To meet the crisis of 2006, our hospital attempted to manage the extra burden by utilizing every available bed in the hospital, even those that did not belong to the Departments of Internal Medicine. In effect, the hospital created a "virtual" department of internal medicine that was run by internal medicine staff. The extra beds, however, were mostly delegated to patients with mild disease because the nursing staff was not well qualified to treat complicated cases.

Other hospitals found alternative solutions. Some opened an internal medicine department within the ED; some added beds in the hallways, and some closed for 24 hours, with the permission of the Israel Ministry of Health, to shift patient inflow to other centers.

We suggest that until the problem of overcrowding is resolved at the national level, hospitals should take steps to prepare for the expected burden in winter. The Israel Ministry of Health now mandates that hospitals add an extra senior physician to the evening and night shifts in the ED. However, we believe this is not enough. We propose maintaining a mini-internal medicine department on standby with extra, well trained, medical staff. For the long term, hospitals might consider establishing "general wards" staffed by nurses qualified to treat both surgical patients and patients with internal diseases, combined with a modified admissions system that makes efficient use of every available bed in the hospital in accordance with the demands of the moment.

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**Competing Interests:** None declared

**Funding:** None declared.

This manuscript has been peer reviewed

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