Ontario, our research[1] and others[2] have found that respiratory disease accounts for approximately 10% of the admissions to the ED in Ontario, and we found that over a 5-year period influenza and pneumonia combined accounted for 0.34% of visits. Based on these numbers, we concluded that even by removing all influenza cases it is hard to see how this will significantly impact overall ED volume.

As Dr. Grafstein points out, the outcome of reducing ED volume is not a sensitive measure, and there are many different and very complex issues that combine to affect ED volume. He further mentions, and I would like to stress, that this outcome was chosen by the Ontario government as 1 of only 2 reasons for implementing this program.[3] I would like to add that it is not an outcome that would be chosen by most researchers examining the efficacy of such a program without sufficient empirical evidence that influenza had a major impact on ED volume. However, because it was the reason given for initiating a universal immunization campaign this is why we chose to study it.

Finally, I would like to separate the issue of the potential public health benefits of vaccination for influenza from that of ED volume. As stated by Dr. Grafstein, immunization has been shown to reduce mortality and morbidity in populations at high risk for complications from influenza,[4,5] and Ontario has been providing free influenza vaccinations to this population since 1984. Although the cost and effectiveness of mass immunization programs for low-risk individuals has been questioned,[6–10] targeting and enhancing the immunization rates of high-risk people may be a more cost-efficient and efficacious way to further reduce hospitalization and mortality within the population. One way to accomplish this goal may be ED immunization programs. Our study focused only on the goal of reducing ED volume and the ability of a universal influenza immunization program to achieve this end.

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To the Editor:

Groll and Henry[1] are to be commended for tackling the complex and controversial issue of influenza and its relationship to ED utilization. They compared annual influenza rates across Ontario with total winter ED visits at selected EDs and found that the two were not related. They concluded that influenza does not impact ED volume and that influenza vaccination is unlikely to alleviate ED overcrowding. These conclusions have substantial public health implications. However, we are concerned that their methods may be flawed and their conclusions premature.

For each city, their analysis was based on 5 observations (i.e., 5 years). Not only was the power to detect a difference limited, but such a small number of observations may seriously compromise the stability of the statistical model used. Further, the use of such standard models to examine longitudinal data is often plagued by autocorrelation, since the data does not fulfill the assumption that observations are independent from each other (e.g., the volume of a given ED in one year is associated with its volume the next).

The outcome measure was also problematic. As the authors note, total ED volume fluctuates widely due to many factors, and ED overcrowding has not been shown to be related to ED volume in several studies.[2,3] This is mainly because the majority of ED patients are young, low-acuity patients, often with minor injuries, who are unlikely to contribute substantially to overcrowding.[4] Hence, the increasing overcrowding likely relates not so much to changes in total ED volume, but to an older and sicker ED patient population, more of whom may require admission than in the past.

If influenza is a contributor to this phenomenon, one would be more likely to detect the effect by focusing on older patients with complications of influenza likely requiring admission, such as pneumonia, asthma/COPD and congestive heart failure, all of which

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have been shown to be related to influenza outbreaks.[5] The authors looked at only some of these conditions, and only for all age groups combined, and again with limited power. Other studies have found significant associations between influenza outbreaks and ED overcrowding,[6] as well with increased ED utilization by the elderly.[7]

For all of these reasons, conclusions regarding the absence of benefit of influenza vaccination campaigns on ED utilization are likely premature and possibly incorrect. A full understanding of the impact of influenza outbreaks on EDs is still lacking.

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[One of the authors responds:]

I appreciate the comments by Drs Schull and Mamdani on our study of influenza and ED volume.[1] I agree with their conclusions that our study needs to be repeated with a larger number of hospitals and for a longer time period, and hope that this will be accomplished in the near future. I also feel that a full understanding of the impact influenza on ED volume is lacking. However, I feel that this research should have been undertaken prior to the launching of the universal influenza immunization campaign.

I stress "universal immunization," because, as Drs. Schull and Mamdani point out, "the majority of ED patients are young, low-acuity patients, often with minor injuries, who are unlikely to contribute substantially to overcrowding. Hence, the increasing overcrowding likely relates … to an older and sicker ED patient population, more of whom may require admission than in the past."[2,3] However, the older, high-risk patients were not the primary target of the universal immunization campaign, and they have been provided free influenza vaccinations since the 1980s.[1] If one concludes that the high-risk population is responsible for ED overcrowding then concentrating efforts on increasing their immunization compliance may be a more effective strategy. None of the above information changes the fact that ED volume is highest in the summer, when there are few influenza cases.[1,3]

Finally, Drs. Schull and Mamdani state that "other studies have found significant associations between influenza outbreaks and ED overcrowding,[4]...". Unfortunately, the outcome of ambulance diversion as a measure of ED overcrowding is not universal nor uniform, as many hospitals are simply not able to divert ambulances. Furthermore, ambulance diversion is an administrative decision and can be based on several criteria such as beds available outside the ED and ED staffing, and these may vary at different hospitals. Using ambulance diversion as the outcome in Kingston, for example, would result in no relationship between ED volume and diversion, because Kingston is not able to divert ambulances.

Once again, I thank Drs. Schull and Mamdani for their interest in this research and look forward to more studies on the impact of influenza immunization on ED volume.

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In-flight emergencies

To the Editor:

Drummond and Drummond's excellent review of medical emergencies in flight correctly highlights British Airways (BA) leadership in on-board medical equipment.[1] I must add to this BA's superb staff training and organization. I have been involved in 3 episodes of