

Influenza and Outcomes in ESRD Patients

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Introduction

- ◆ Morbidity and mortality attributable to influenza is high in the general population¹.
- ◆ Compared to the general population, dialysis patients may be at higher risk of hospitalization and death and disease due to influenza.
- ◆ Yearly influenza vaccination is recommended for all end-stage renal disease (ESRD) patients due to a high risk of influenza-related complications.
- ◆ The association between strength and timing of the influenza season with outcomes has been investigated in the general population.
- ◆ Similar analyses have not been performed in the ESRD population.
- ◆ Through the CDC's Outpatient Illness Surveillance, information on patient visits to health care providers for influenza-like illness (ILI) is collected.
- ◆ ILI is defined as fever (temperature of 100°F [37.8°C] or greater) and a cough and/or a sore throat without a known cause other than influenza.
- ◆ ILI measures a set of clinical symptoms caused by a number of viral pathogens that infect the upper and lower respiratory tract, and is a measure of severity and timing of general respiratory virus activity not specific to influenza.
- ◆ We assessed the association between CDC ILI data and outcomes in ESRD patients.

1. Simonsen L, Reichert TA, Viboud C, Blackwelder WC, Taylor RJ, Miller MA. Impact of Influenza Vaccination on Seasonal Mortality in the US Elderly Population. Arch Intern Med. 2005;165(3):265-272.

Methods

- ◆ Weekly CDC ILI data was obtained from 2000-2012, and aggregated to monthly.
- ◆ The monthly number of deaths and hospitalizations (all-cause and cause-specific) among US ESRD patients during the same time period was calculated.
- ◆ Death information was obtained from the Centers for Medicare and Medicaid Services (CMS) Death Notification Form (CMS 2746), and hospitalizations were ascertained using Medicare inpatient claims for ESRD patients.
- ◆ Using additive time series decomposition, we subtracted out seasonal and trend components from both series, and computed correlations between the ILI and mortality/hospitalization data.

Results

- ◆ Figure 1 displays the monthly number of deaths among ESRD patients from 2000-2012.
- ◆ Figure 2 displays the weekly percent of outpatient visits with ILI from 2000-2012.
- ◆ Figure 3 shows deaths and ILI data after removing seasonal and trend components. The squares in the figure highlight some of the correlated peaks in the size and temporal occurrence of death and ILI.
- ◆ There were 2 influenza seasons (2003-2004 and 2009-2010) during this time period where the peak was at the end of the calendar year (early in the influenza season) instead of at the beginning of the next calendar year.
- ◆ Similar "early" peaks are seen in deaths among ESRD patients.
- ◆ There is also correlation between other peaks and valleys of the ILI data and ESRD deaths; correlation coefficient = 0.70.
- ◆ Correlations were also calculated with other hospitalization outcomes, shown in table 1.

Figure 1. Number of Deaths Among Individuals with ESRD

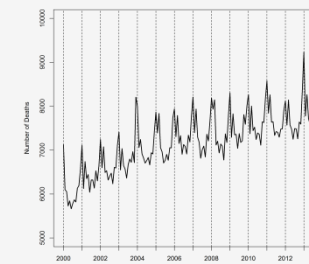


Figure 2. US Percent of Outpatient Visits with Influenza-Like Illness

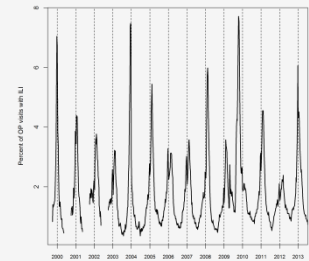


Figure 3. Deaths and ILI After Removing Seasonality and Trend

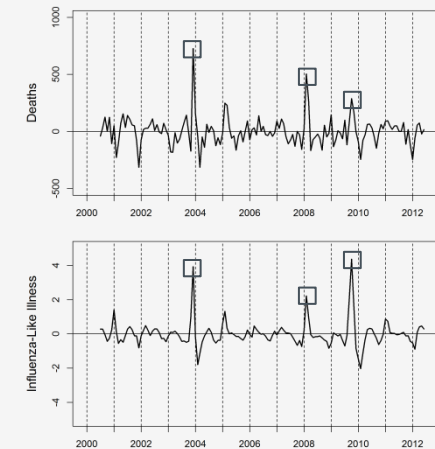


Table 1. Correlations Between Other Outcomes and ILI (after removing seasonality and trend)

Outcome	Correlation
Death	0.70
All-Cause Hospitalization	-0.02
Myocardial Infarction	0.16
Influenza/Pneumonia Hosp	0.69
Stroke/TIA	0.02
Any Infection	0.42
Ischemic Heart Disease Hosp	0.08
Vascular Access (non-infectious) hosp	0.09
Vascular Access (infectious) hosp	-0.14

Conclusions

- ◆ Estimates of the effect of influenza on mortality in the general population suggest that approximately 5% of winter deaths are due to influenza¹.
- ◆ Our analyses suggest that death, as well as some types of hospitalizations, are highly correlated with ILI in the ESRD population.
- ◆ ILI is a measure of general respiratory viral activity; influenza may actually be responsible for much less than half of all ILI, suggesting that influenza vaccination alone cannot completely curtail the seasonal increases in deaths and hospitalizations.
- ◆ Also, a number of studies have shown an inadequate initial, and possibly quickly waning immune response to influenza vaccination in ESRD patients.
- ◆ However, influenza does contribute to the seasonal increases, and influenza vaccination is an important measure for the prevention of serious illness in ESRD patients. Strategies to improve the immune response of this immunocompromised population may further improve the efficacy of vaccination, such as use of the high-dose vaccination, or repeat vaccination during the influenza season.