Methods: Influenza Testing

Nasopharyngeal swabs, tracheal aspirates, sputum, and/or bronchoalveolar lavage samples were collected within 24 hours of admission to the ICU and used to screen for influenza A infection using influenza A and B rapid antigen enzyme-linked immunoassay, respiratory virus screening with direct fluorescent antibody, or respiratory virus panel by reverse-transcriptase polymerase chain reaction (RT-PCR). Test selection varied by hospital, clinician, and lab availability. Confirmatory testing was performed at the Utah Department of Health or the Centers for Disease Control and Prevention using real-time RT-PCR Detection Panel (rRT-PCR Swine Flu Panel) in accordance with published guidelines.[1]

Methods: Additional Definitions

The parameter that gave the lowest score per 24h period was used to determine SOFA score,[2] including the worst Glasgow Coma Scale score to determine brain failure. Multiorgan failure included two or more organ dysfunctions/failures, where organ failure was defined by a SOFA organ component score ≥ 2.

Methods: Additional Explanation of Demographic and Obesity Analyses

Salt Lake County demographics were obtained from the U.S. Census Bureau, 2007. Categories of BMI (< 30, 30-39, and ≥ 40) were obtained from the Utah Behavioral Risk Factor Surveillance System[3] using SAS-callable SUDAAN version 10.0.0 (SAS Institute, Inc., Cary, North Carolina). The surveillance system contains data only on adults ($\geq$18 years old). Expected BMI for three individuals in our cohort younger than 18 years was estimated using data for those 18 to 24 years old. Analyses comparing age, sex, BMI, and race/ethnicity of the study cohort to Salt Lake County were performed using Fisher exact tests in SAS 9.2 (SAS Institute, Inc., Cary, North Carolina). P values for these analyses are two-sided ($p<0.05$).

During the time of enrollment, novel H1N1 was epidemic in Salt Lake County, and all persons in the county were at risk for this infection. The hospitals included in the analysis varied in their algorithms

for use of screening tests for influenza. Hospitalized and non-hospitalized patients with influenza-like illnesses were not routinely tested for novel H1N1 when it became epidemic during this period. All but two ICU patients in this ICU cohort were residents of geographically diverse neighborhoods within Salt Lake County. Based on Utah Department of Health surveillance data, this cohort included the majority (47 of 51) of all patients admitted to an ICU in Salt Lake County with novel H1N1 infection during this time. Therefore, we used the adult (≥18 years old) county population as the control group for a demographic and anthropometric examination of our ICU cases.

To compare the frequency of obesity in the ICU novel H1N1 patients compared to others in Salt Lake County adjusted by age and sex, we aggregated data by age (18-24, 25-34, 35-44, and ≥45), sex (male, female), and BMI (<30, 30-39, and ≥40). Then, we calculated observed rates of ICU admission within BMI strata adjusted for age and sex in our cohort. A standardized morbidity ratio (SMR)[4] with 95% CI was calculated as the number of observed ICU cases in each BMI group divided by the expected number given Salt Lake County population's distribution of age, sex, and BMI. We reviewed comparative data between our cohort and the county and noted that Hispanic whites and Pacific Islanders were over-represented in our cohort. Therefore, we evaluated the stability of our SMR findings by recalculating the SMR after exclusion of each of these racial/ethnic groups as well as of patients <18 years old (n=3) and of non-Salt Lake County residents (n=2).

Results: Additional Clinical Data of Overall Cohort

Patients had typical influenza symptoms on illness presentation: fever (100%), cough (89%), shortness of breath (66%), chills (32%), malaise (28%), headache (28%), nausea (23%), sore throat (23%), myalgias (21%), vomiting (21%), diarrhea (15%), and hemoptysis (15%).

Among the 10 patients without lung injury, one was a pregnant female admitted for close observation, one was a chronic lung disease patient who required nocturnal mechanical ventilation, three had exacerbations of asthma, and the remaining five had severe sepsis: three with severe gastrointestinal illness, one ruled out for bacterial meningitis, and one with known cardiomyopathy.

References

1 CDC protocol of realtime RTPCR for influenza A (H1N1). Geneva: World Health Organization, April 2009.

2 Vincent JL, de Mendonca A, Cantraine F, et al. Use of the SOFA score to assess the incidence of organ dysfunction/failure in intensive care units: results of a multicenter, prospective study. Working group on "sepsis-related problems" of the European Society of Intensive Care Medicine. Crit Care Med 1998; 26:1793-1800

3 Utah Department of Health. Office of Public Health Assessment. Utah Behavioral Risk Factor Surveillance System 2006-2008.

4 Kahn HA, Sempos CT. Statistical Methods in Epidemiology. New York, NY: Oxford University Press, 1989