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Sentinel surveillance of influenza and other respiratory viruses, Brazil, 2000–2010

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ABSTRACT

There are scanty data on the epidemiology of influenza and other respiratory viruses in South America and Brazil. The aim of this study was to summarize the data from the Brazilian surveillance system of influenza and other respiratory viruses and discuss the patterns of viral circulation. The system is based on detecting cases of influenza-like illness in sentinel sites and weekly collection of five nasopharyngeal secretions samples, which are processed in state public health laboratories for respiratory viruses by indirect immunofluorescence assay. Data from 2000 to 2010 were described over time, by region, gender, and age group, and an analysis of Spearman correlation was performed between monthly influenza detection and rainfall and temperature data in two state capitals with the highest number of positive samples, one from the northeast region (Maceió) and other from the southern region (Curitiba). There were 3,291,946 visits for influenza-like illness; of these, 37,120 had samples collected and 6421 tested positive: 1690 (26%) influenza A, 567 (9%) influenza B, 277 (4%) parainfluenza 1, 571 (9%) parainfluenza 2, 589 (9%) parainfluenza 3, 742 (12%) adenovirus, and 1985 (31%) respiratory syncytial virus. Overall, increased activity of respiratory syncytial virus was observed from March to June, preceding the peak of influenza activity, from May to August, but with regional differences. In Maceió, there was a weak correlation between temperature and influenza detection ($\rho = 0.05$), but a moderate positive correlation between rainfall and influenza detection ($\rho = 0.36$). In Curitiba, a high correlation was observed between the decrease in temperature and rainfall and the increase in influenza detection ($\rho = -0.83$ and -0.78 respectively). These data are important to guide public health control measures as the best time for influenza vaccination and use of antivirals.

Introduction

Acute respiratory infections of viral origin are among the leading causes of mortality and morbidity in young children, elderly, and immunocompromised patients in developed and developing countries.[1] The influenza virus is the main respiratory virus that can lead to greater number of hospitalizations and deaths.[2–7] In temperate countries, influenza activity has been well described, with marked seasons of influenza in the winter, usually December–April in the Northern Hemisphere and June–September in the Southern Hemisphere,[8] whereas in

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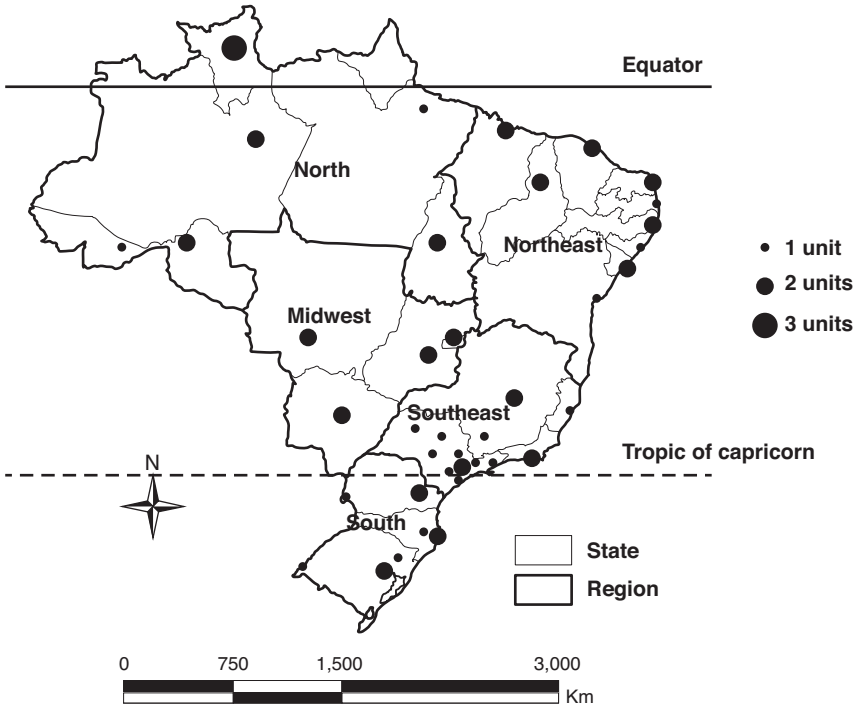

Fig. 1 – Map of Brazil divided by regions and states, showing the location of the 60 sentinel units for respiratory viruses in 2010.

tropical and subtropical regions of the world with ill-defined seasons, the circulation of influenza can be described as less pronounced seasonal fluctuations related to the rainy season or that occur throughout the year.[9–11] In Brazil, the seasonality of influenza has been described as a wave that begins in April in northern equatorial and travels to the south for a period of approximately three months, reaching the temperate regions of the country in July.[12] Data from the northeast region show that influenza season is linked to the rainy season in this region.[13]

Among other respiratory viruses, respiratory syncytial virus (RSV) is the leading cause of bronchiolitis in infants and is associated with substantial morbidity and mortality in children aged <5 years old[14,15] and can also lead to hospitalizations and death in seniors and adults with chronic diseases.[2,16] The RSV season typically overlaps the influenza season, beginning in the fall and lasting throughout the winter in temperate regions; and in tropical regions, it is associated with the rainy season.[17] The parainfluenza virus (PIV) is the second leading cause of bronchiolitis and the leading cause of laryngotracheobronchitis or croup in children aged <5 years old.[18,19] The PIV-1 and PIV-2 circulate more often during the fall, causing biennial epidemics in children, and PIV-1 is usually more prevalent. The PIV-3 circulates throughout the year with largest circulation in the second half of the year, during spring.[20]

The information on the epidemiology and seasonality of influenza and other respiratory viruses is crucial for the development of effective control measures, particularly the best time for application of influenza vaccine. However, information on the epidemiology of influenza and other respiratory viruses is sparse in middle- or low-income countries, located in tropical or subtropical regions of the world,[10,11] especially in South America. Brazil is the largest country in South America, extending over 35° of latitude, which includes the Amazon tropical areas in the north to subtropical and temperate areas in the south. The Brazilian Ministry of Health began influenza and other respiratory viruses surveillance in 2000 with the following objectives: (a) monitor the strains of influenza viruses that circulate in the five Brazilian regions; (b) respond to unusual situations; (c) assess the impact vaccination against the disease; (d) follow the trend of morbidity and mortality associated with the disease; and (e) produce and disseminate epidemiological information.[21]

The aim of this study is to summarize the data generated by sentinel health units and state public health laboratories from 2000 to 2010 from the national sentinel surveillance system for influenza and other respiratory viruses and discuss the seasonality and circulation of respiratory viruses in Brazil.

Materials and methods

The sentinel surveillance of influenza and other respiratory viruses began with a sentinel unit in 2000 and expanded gradually to reach 60 units in 2010, reaching at least one unit in 26 of the 27 states, and all the five Brazilian regions (Fig. 1). This system is based on a network of sentinel units that include outpatient clinics, emergency care departments, or general hospitals that report weekly via an online system called SIVEP_Gripe, the aggregate total number of visits, and total visits for influenza-like illness (ILI), defined as a case of fever accompanied by cough or sore throat with no other diagnosis.