v. 2, n. 10, 2022

International Journal of Health Science

DESCRIPTIVE STUDY OF INFLUENZA HOSPITAL MORBIDITY IN THE FEDERAL DISTRICT, BRAZIL, 2008-2019

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Abstract: In Brazil, in 2011, the Ministry of Health published regulations for the transfer of funds to the 26 states, the Federal District and municipalities, with the objective of establishing the influenza surveillance service, and it was noticed that only the Federal District had 100 % coverage of the disease's vital statistics since 2008, which made it possible to monitor its morbidity and mortality. Therefore, the objective was to describe hospitalizations for influenza in the Federal District, from 2008 to 2019. This is a descriptive and quantitative study, carried out using secondary data available at the Department of Informatics of the Unified Health System (DATASUS). It was observed that there was a predominance of hospitalizations in 2009, which is in line with the period of influenza A (H1N1) pandemic. On the other hand, the mortality rate was higher in 2014, when the H3N2 subtype circulated in South America. The epidemiological profile of hospitalizations showed a predominance of males, age group under five years and higher average days of hospitalization in the elderly. It was identified that these findings are in line with the scientific literature regarding the climate variable and viral subtype of circulating influenza. This study can help to identify the distribution of hospital morbidity of the disease in the Federal District and encourage the planning of disease prevention and treatment.
Keywords: Human Influenza, morbidity, Hospitalization.

INTRODUCTION

Respiratory tract diseases are among the leading causes of morbidity and mortality worldwide (ROCKMAN; LAURIE; BARR, 2020). In this group, influenza stands out as the predominant viral infection and constitutes a challenge for public health systems, as it affects about 5 to 15% of adults and 20% to 30% of children annually, having as a group the elderly, children in early childhood and those with comorbidities or those who are immunocompromised are at risk (WHO, 2020). This is due to the ability of its viral etiological agent to rearrange itself with viruses from other species, which generates new subtypes of viruses for which most people have little or no immunological protection (CORTESE et al., 2020).

The etiological agent of influenza belongs to the Orthomyxovirus family, also called influenza virus, and is subdivided into types A, B and C, of which only types A and B have clinical relevance in humans. Influenza A viruses show greater variability and, therefore, are divided into subtypes according to the differences in their surface glycoproteins. Three hemagglutinins (H1, H2 and H3) and two neuraminidases (N1 and N2) are known to be present in these viruses with the potential to infect humans (CAINI et al., 2016). These characteristics, associated with climatic and geographic instabilities, contribute to the construction of a pandemic potential of the disease (SANTOS; GOMES; COSTA, 2020).

The first pandemic to be documented was the "Russian flu" in 1889, caused by influenza A, of the H2N2 subtype, which resulted in about one million deaths. However, the most serious known was the "Spanish flu" in 1918, due to the H1N1 subtype, which led to death between 40 and 50 million people. Still in the 20th century, in 1957, the "Asian flu" pandemic was recorded, again due to the H2N2 subtype, which ended the lives of about two million people; in 1968, another so-called "Hong Kong flu" resulted in about one million deaths, due to the H3N2 subtype, still in circulation. Subsequently, the implementation of the flu vaccine, in 1999, allowed important advances in the immunoprophylaxis of the population, but even so, it proved to be insufficient to prevent the 17 thousand deaths recorded in the 2009 pandemic, known as ''swine flu'. ', caused

by the H1N1 subtype (CHOI; SASTRE, 2020).

The new quadrivalent influenza (QIV) vaccines, licensed in 2015, contain two influenza A strains (A/H1N1 and A/H3N2) as well as two B strains (B Victoria and B Yamagata), while the earlier trivalent vaccines (TIV) contained only one B strain. The concordance between the composition of the vaccine subtype strain and the circulating subtype strain is a key factor in the effectiveness of vaccination during an epidemic. In Brazil, it is estimated that 4 to 6 million cases occur annually, although the vaccination strategy began in 1999 and annual campaigns are carried out, with the aim of reducing hospitalizations, complications and deaths (BELLINGHEN et al. 2018).

In 2011, the Ministry of Health (MS) published regulations for the transfer of funds to the 26 states, the Federal District and municipalities, with the objective of establishing the surveillance service for respiratory diseases, with special emphasis on sentinel surveillance of influenza and vaccination schedules. In 2012, Schuck-Paim et al. (2012) pointed out that only the Federal District had 100% coverage of influenza vital statistics since 2008. This aspect contributes to the monitoring of hospital morbidities caused by this disease, which can serve as a subsidy for the planning of annual vaccination and the organization assistance at all levels of care. Therefore, this study aimed to describe hospitalizations for influenza in the Federal District, Brazil, from 2008 to 2019.

METHODOLOGY

This is a descriptive, retrospective and quantitative study using secondary data regarding hospitalizations for influenza, of a population residing in the Federal District, from 2008 to 2019. The time frame of 12 years was chosen based on the availability of data, as well as the possibility of demarcating the year (2008) that preceded the pandemic by the H1N1 influenza virus (2009) until the most recent availability of data in 2019.

Data were extracted from Authorizations for Hospital Admissions (AIH) of the Hospital Information System (SIH) of the Department of Informatics of the Unified Health System (DATASUS), in the domain: *datasus.gov.br*, with marking from the list of morbidities of the International Classification of Diseases and Related Health Problems – 10 (ICD-10), group "Influenza [flu]". The following variables related to the hospitalization profiles were selected: sex, age, race/color, number of days spent in the hospital, month and year of competence, hospitalization regime (public or private), character of hospitalization (elective or urgent), deaths and mortality rate. The data were tabulated in the program: *Excel* (*Microsoft Office Home and Student*, 2013). For qualitative variables, the relative frequency of information was calculated and, for quantitative variables, measures of central tendency and dispersion were calculated in the statistical software R version 3.6.3.

The monthly and annual hospitalization rate per 100,000 inhabitants was obtained by dividing the number of hospitalizations (numerator) according to place of residence and the resident population (denominator), with data based on the 2000 and 2010 demographic censuses, according to the Brazilian Institute of Geography and Statistics (IBGE). It is noteworthy that the secondary data used in this research are public and publishable, thus dispensing with submission and approval by the Research Ethics Committee (CEP).

RESULTS AND DISCUSSION

From January 2008 to December 2019, of the total of 1,820,009 hospitalizations, 891 (0.05%) were registered for influenza [influenza] in public and affiliated services of

the Unified Health System (SUS) in the Federal District, with the registration of 55 (6.17%) deaths. The year 2009 had the highest number of hospitalizations (26%, n=228) (Figure 1a), consequently, the highest hospitalization coefficient (9/100,000 inhab.) when compared to other years (Figure 1b). However, the year 2014 had the highest mortality rate (15.79/100,000 inhab.). The increase in the number of hospitalizations in 2009 is in line with the record of the H1N1 influenza pandemic and explains that, in 2014, despite the expansion of vaccination in Brazil, there was the circulation of subtype A (H3N2), predominant in South America. (RESENDE et al., 2015). Influenza seasons dominated by the A (H3N2) subtype are typically associated with 2 to 3 times higher mortality than in seasons dominated by the H1N1 subtype and influenza B viruses (THOMPSON et al., 2003). This situation explains the record of the highest mortality rate in this period.

In this study, the distribution of monthly hospitalization coefficients per year shows that the months of April, May, September and October had the highest medians of these coefficients (Figure 2). The months that show *outliers* demonstrate the increase in the number of hospitalizations in the year with a record of a pandemic. In Brazil, studies show evidence of seasonal influenza activity, starting in the equatorial regions of the North and Northeast between March and April, spreading to areas with a tropical and subtropical climate in the South, during the winter season, in general, in the months June and July (CAMUS, 2009; MALHÃO et al., 2013; PAULA; RIBAS, 2016).

With regard to the epidemiological profile of hospitalizations, it was observed that males accounted for 53% (n=475) of the cases and the mean age was 21 years (SD±22), with a predominant age group of children under five years (43%, n=404) (Figure 3). It is noteworthy that the race variable was not completed in 86% (n=795) of the notifications, making a representative measurement difficult. According to Almeida and Steinke (2016), the record of influenza in children may be associated with climatic instabilities. On the other hand, Nyamusore *et al.* (2018) and Lafond *et al.* (2016) point out that it is the immunization coverage by age group that can influence the reduction or increase in the occurrence of cases.

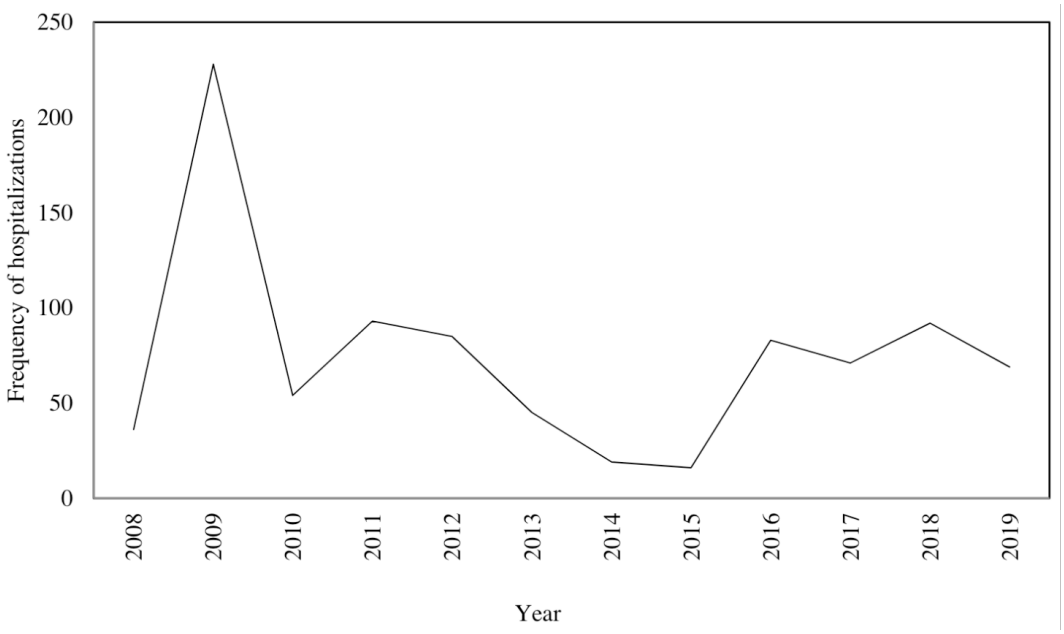
In this study, most hospitalizations were registered in public hospitals (58%, n=522), while 6% (n=55) were registered in private hospitals and 35% (n=316) did not present this information. It is noteworthy that 96% (n=852) of hospitalizations were urgent and the average length of stay was equal to 5 (SD± 1.8) days, with higher records in the age groups over 60 years old. (Figure 4). According to Iuliano *et al.* (2018), about 160,000 hospitalizations in this age group are recorded annually for causes related to influenza and pneumonia or comorbidities.

CONCLUSION

In this study, it was observed that the highest number of hospitalizations for influenza occurred in 2009. On the other hand, the highest mortality rate was recorded in 2014. This finding is in line with what the literature presents regarding the pandemic in 2009, as well as as on the circulating subtype (H3N2) in South America in 2014, which has a 2 to 3 times greater chance of death than the other subtypes. The months of April and September had the highest hospitalization coefficients, which may be associated with the climate of the region. The predominant age group in this study was younger than five years, but the elderly had higher average length of stay than other age groups. This may be related to the presence of comorbidities.

Among the limiting factors of this study,

a) Distribution of the absolute frequency of hospitalizations



b) Distribution of hospitalization coefficient and mortality rate

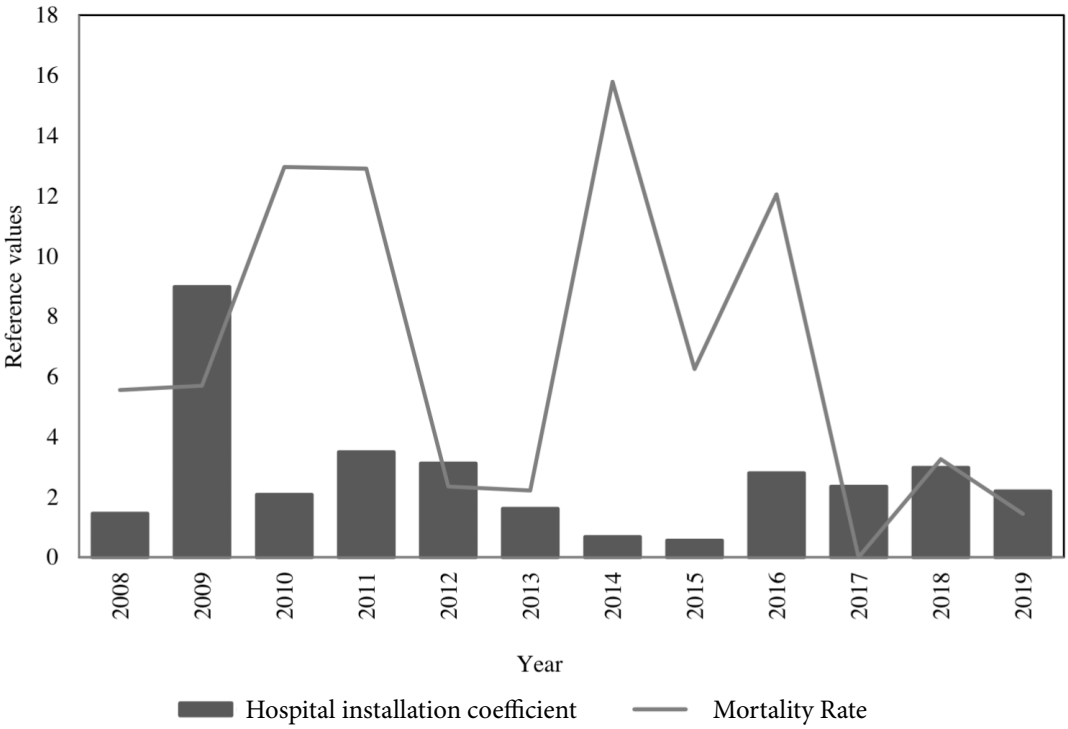


Figure 1 - Annual distribution of hospitalizations, hospitalization coefficient, and influenza [influenza] mortality rate in the Federal District, Brazil, 2008 to 2019

Source: DATASUS. Ministry of Health. Brasília, 2020. Own Preparation.

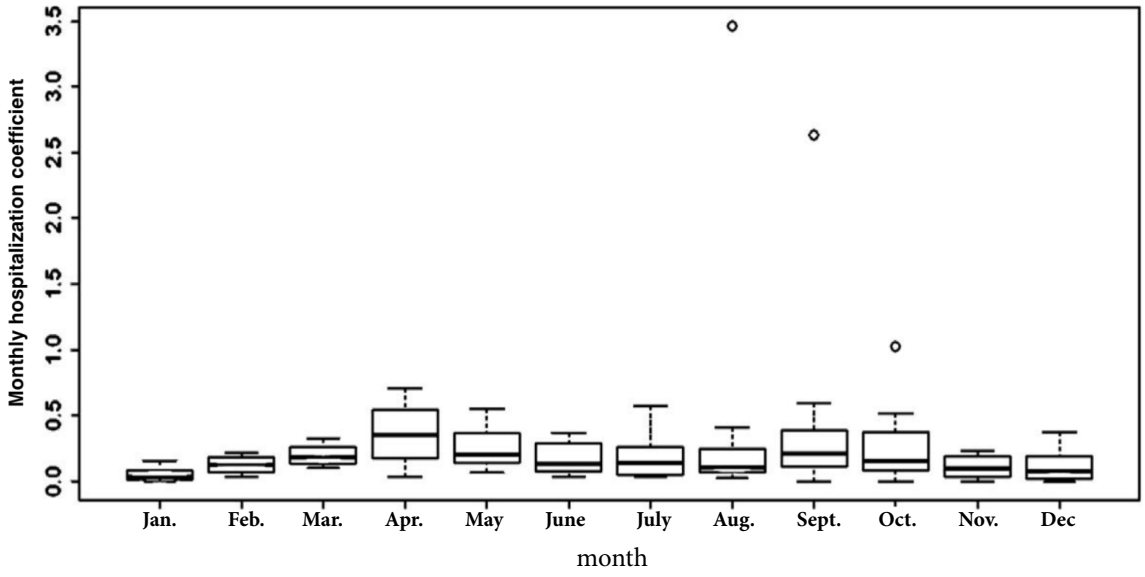


Figure 2 - Distribution of monthly hospitalization rates for influenza [flu] in the Federal District, Brazil, 2008 to 2019

Source: DATASUS. Ministry of Health. Brasília, 2020. Own Preparation.

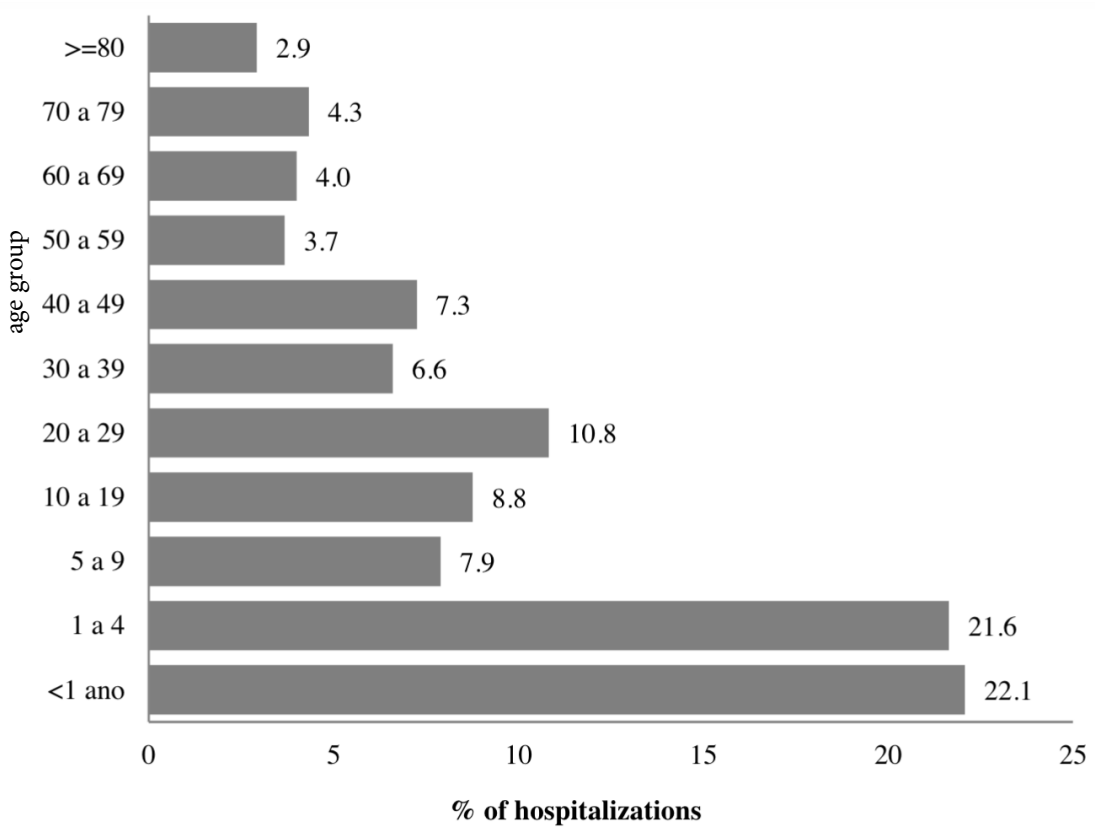


Figure 3 - Distribution of hospitalizations for influenza [influenza] by age group, Federal District, Brazil, 2008 to 2019

Source: DATASUS. Ministry of Health. Brasília, 2020. Own Preparation.

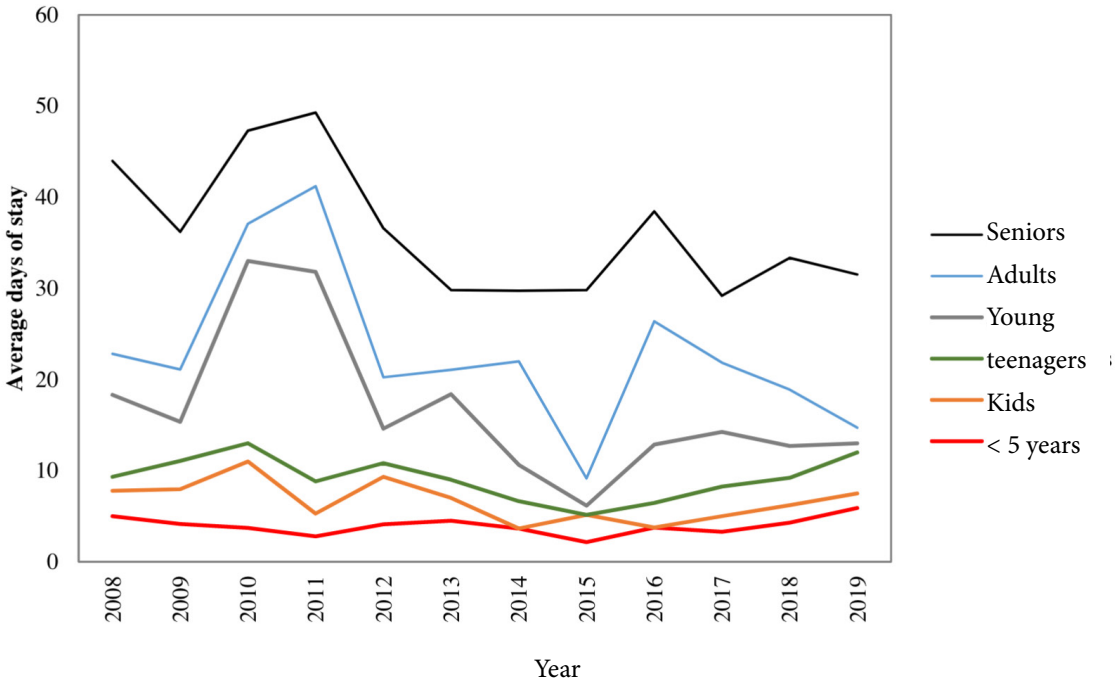


Figure 4 - Distribution of mean length of stay of hospitalizations for influenza [flu] by age group and year, Federal District, Brazil, 2008 to 2019

Source: DATASUS. Ministério da Saúde. Brasília, 2020. Elaboração Própria.

the use of secondary data is included, due to the possible existence of underreporting or incorrect filling of admission forms. However, it is noteworthy that this study is original in its objective and seeks to respond to the observation of the behavior of a disease that has a pandemic history. With the emergence of other diseases, such as Covid-19, transmitted by the new coronavirus (SARS-CoV-19), also a pandemic, it is important to recognize the distribution of respiratory diseases that will share the epidemiological space with this disease. This study does not exhaust all possibilities for discussion on the subject, but it can generate hypotheses for other studies to be carried out, as well as it can support the process of planning actions for the prevention and treatment of influenza.

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