

# EXCESS PNEUMONIA AND INFLUENZA HOSPITALIZATIONS ASSOCIATED WITH INFLUENZA EPIDEMICS IN PORTUGAL FROM 1998 TO 2010.

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## Background:

Influenza virus circulate every year, causing epidemics usually benign for the human population, but that can complicate into other diseases, like pneumonia [1].

This is particularly the case in specific groups, like the elderly, with higher risk of complications associated with influenza infection leading to hospitalization or death [2].

Since the influenza laboratory diagnosis is not usually performed, the impact of influenza epidemics has been measured through indirect ecologic methods.

The knowledge of influenza impacts on the hospitalizations is essential for better resource management and for preparing mitigation measures.

## Objective:

This study aims to:

1. Estimate excess number of hospitalizations from pneumonia or influenza (P&I) (ICD-9:480-487) as main diagnosis during influenza epidemics from seasons 1998-1999 to 2009-2010 in Portugal mainland (total and age groups).
2. Compare P&I excess number of hospitalizations age distribution during seasonal epidemics with pandemic (H1N1) 2009
3. Measure the correlation between excess number of hospitalizations from P&I per season, and influenza vaccine coverage in the elderly.

## Material and Methods:

Weekly hospitalizations with principal diagnosis of Pneumonia and influenza (P&I) were extracted from the National Hospital Discharge database (1998-2010).

Information on Influenza epidemic periods and dominant type of virus was defined from data from national influenza surveillance system. Influenza vaccine coverage (IVC) was obtained from telephone surveys conducted by INSA.

Age-specific baseline hospitalization rates free of influenza epidemics, was estimated by ARIMA model after excluding time periods associated with influenza epidemics, using Flubase R package [3].

Excess numbers of hospitalizations were calculated by subtracting expected hospitalizations rates from the observed during influenza epidemic periods. Correlation between excess number of hospitalizations and IVC was measured with Spearman rho coefficient.

## Conclusions:

Influenza epidemics associated P&I excess number of hospitalizations pattern differs between age groups and dominant virus sub-type. Results suggest that at population level, increase in vaccine coverage was associated with a decrease of excess number of hospitalizations during A(H3) influenza dominated seasons.

## Results:

Average excess number of hospitalizations per season was 1,826 range (0 to 4,129), with seasonal average rate of 14.8 per 100,000 inhabitants.

During epidemics with seasonal A(H3), age groups that most contributed to the excess number of hospitalizations were 65+ (72%) and 0-4 (13%). On the other hand epidemics with seasonal influenza A(H1)/B dominance showed a reverse order with a higher contribution of 0-4 (62%) and the elderly (19%). Finally with the pandemic A(H1)pdm dominance the higher contribution was from the 20-49 (50%) followed by 5-9 (18%) (Table 1).

Table 1. Excess hospitalizations associated to influenza, total and %, according to age groups and influenza type

|                  | 0-4  |      | 5-9  |      | 20-49 |      | 50-64 |      | 65+   |      | Total<br>n |
|------------------|------|------|------|------|-------|------|-------|------|-------|------|------------|
|                  | n    | %    | n    | %    | n     | %    | n     | %    | n     | %    |            |
| Seasonal A(H3)   | 2214 | 13.0 | 388  | 2.3  | 838   | 4.9  | 1349  | 7.9  | 12270 | 71.9 | 17058      |
| Seasonal A(H1)/B | 165  | 61.8 | 50   | 18.9 | 0     | 0.0  | 0     | 0.0  | 52    | 19.4 | 267        |
| A(H1)pdm         | 356  | 12.9 | 482  | 17.5 | 1366  | 49.5 | 459   | 16.6 | 96    | 3.5  | 2759       |
| Total            | 3091 | 13.5 | 1402 | 6.1  | 3569  | 15.6 | 2266  | 9.9  | 12514 | 54.8 | 22843      |

Figure 1. Scatter plot of the vaccine coverage rates versus the Excess of Hospitalizations Rate according to the dominant sub-type virus for seasons 1998-1999 to 2008-2009 in population with 65 or more years of age.



Excluding the 2009-2010 pandemic season, correlation between excess number of hospitalizations and IVC in the elderly was -0.268 (CI95%: -0.768 to 0.435), but not significant. Restricting to A (H3) dominant epidemics a significant correlation -0.757 (CI95%: -0.962 to -0.009) was observed (Figure 1).

## References:

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