Excess Mortality associated to Influenza epidemic in Portugal, from 2007/2008 to 2014/2015 seasons

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BACKGROUND & OBJECTIVES

Mortality in the north hemisphere is higher in winter than in summer seasons, due to the influenza epidemics as well as cold temperatures.

Portuguese influenza surveillance comprises clinical and laboratorial notifications of Influenza-like Illness (ILI) attended in the primary health care units and emergency rooms. Without information on specific cause of deaths in real time, estimation of influenza impact has been accessed using Portuguese Daily Mortality Monitoring System (VDM), that covers all cause mortality of Portuguese population.

The aim of this study was to provide excess mortality, potentially associated to Influenza each season (between 2007/08 and 2014/15).

METHODS

Data

Total daily number of deaths was obtained from the VDM system. Data was aggregated by week and stratified by age group (≤4 years, 5 to <15, 15 to <50, 50 to <65 and ≥65 years). Data extraction was performed on April 21st 2016.

Information on influenza epidemic periods (EP - set of consecutive weeks with influenza virus detection and ILI incidence rate above the upper 95% confidence limit of the ILI incidence rate baseline) was provided by the Portuguese General Practitioners Sentinel network (Rede Médicos-Sentinela).

Methods

A cyclical regression model was fitted to all cause mortality time series after excluding all periods potentially associated with excess mortality from week 40/2007 to week 40/2015 to obtain the expected mortality (baseline).

The excess deaths attributed to influenza was estimated by summing the positive differences between the observed and the baseline mortality during the epidemic period.

Excess deaths rate ratio for each epidemic period was obtained dividing the observed deaths by the expected, assuming no changes on the population at risk.

RESULTS

Only 2007/08 season did not present any excess deaths. In all other seasons at least one of the age groups presented statistically significant excess deaths rate ratio.

The most affected age group was ≥65 years ($20/10^5$ in 2013/14 and $253/10^5$ in 2014/15).

In the last three seasons, excess of mortality were observed only above 50 years of age.

Higher excess of deaths were observed when A(H3) influenza virus sub-type was dominant.

TABLE 1: Excess deaths /100000 inhabitants by season (EP)

	Predominant virus	0-4	5-14	15-49	50-64	65+
2007/2008	B	1	1	0	2	0
2008/2009	A(H3)	2	1	***2***	***9***	***149***
2009/2010	A(H1)pdm09	3	0	***2***	5	15
2010/2011	B/A(H1)pdm09	2	1	***2***	***7***	***39***
2011/2012	A(H3)	***5***	1	2	***10***	***201***
2012/2013	B/A(H1)pdm09	2	1	1	***8***	***36***
2013/2014	A(H1)pdm09/A(H3)	1	0	1	***5***	***20***
2014/2015	B/A(H3)	4	1	1	***11***	***253***

NOTE: Italic and bold numbers represent significant excess deaths.

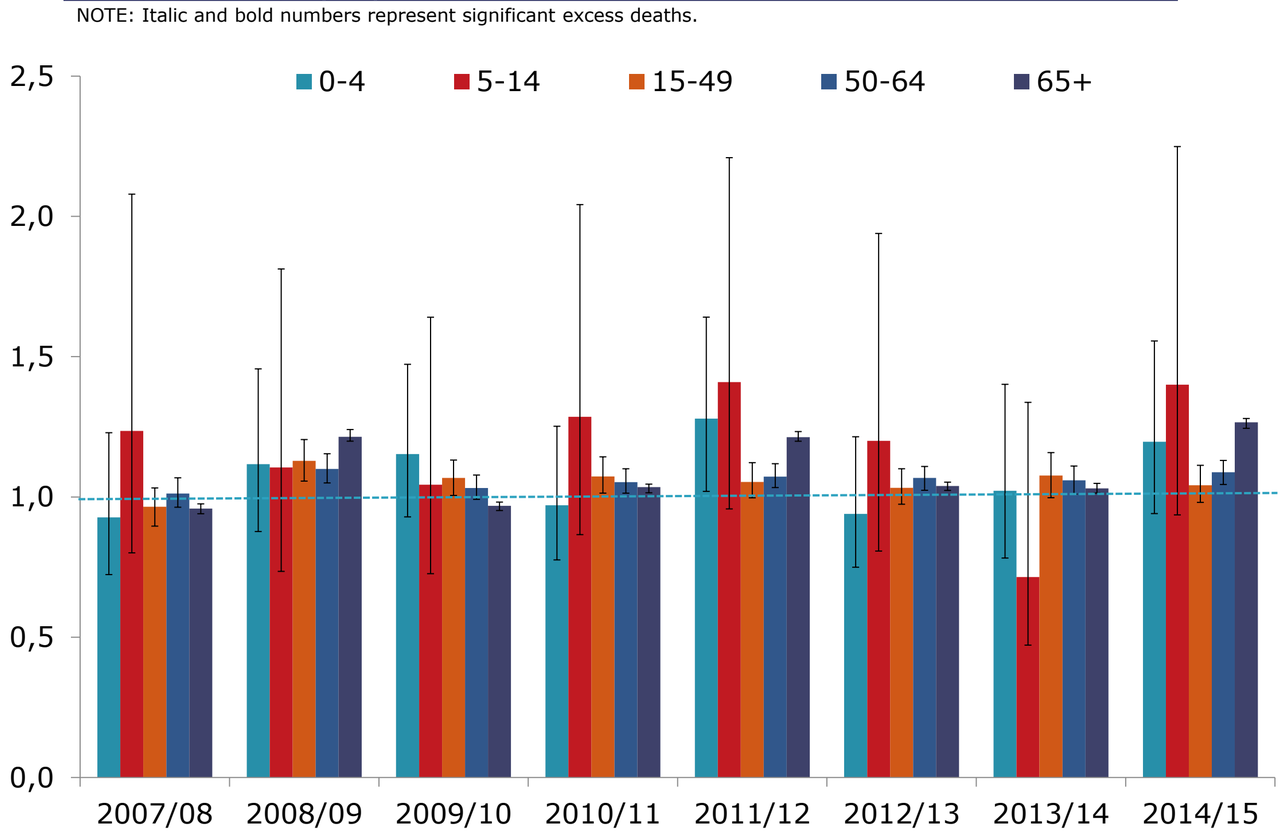

FIGURE 1: Excess deaths rate ratio by season (EP)

CONCLUSIONS

Impact on mortality was observed in almost all influenza epidemics, with a higher impact in the elderly.

Different impacts were observed according the predominant influenza virus type or sub-type.

Given the low number of deaths in the youngest age group, excess deaths rate ratio could be overestimated. The use of all cause mortality can overestimate the excess mortality associated with influenza epidemics, but there is a gain on timeliness and international comparability.

This knowledge allows adapting control measures according to severity of the epidemic.

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