Excess mortality among the elderly in 12 European countries, February and March 2012

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In February and March 2012, excess deaths among the elderly have been observed in 12 European countries that carry out weekly monitoring of all-cause mortality. These preliminary data indicate that the impact of influenza in Europe differs from the recent pandemic and post-pandemic seasons. The current excess mortality among the elderly may be related to the return of influenza A(H3N2) virus, potentially with added effects of a cold snap.

In most winter seasons, excess all-cause mortality among the elderly is observed in Europe. The extent of this excess varies considerably between seasons and between countries [1-5]. Most often, this excess has been attributed to seasonal influenza illness, especially in seasons dominated by A(H3N2) virus subtype, but other factors such as cold weather and infections resulting from other respiratory agents also play a role [1-8].

Since the beginning of February 2012, an increased number of excess deaths among the elderly has been observed in a number of European countries that carry out weekly monitoring of all-cause age-specific mortality.

The aim of this article is to describe the occurrence of this recently observed excess mortality in Europe and consider potential explanations in order to encourage other countries to assess their situation and share experiences.

Monitoring all-cause mortality in Europe

Since autumn 2009, monitoring of weekly all-cause mortality has been carried out in up to 16 countries across Europe. This was initially part of the European monitoring of excess mortality for public health action (EuroMOMO), a project funded first by the European Union Health Programme [9] and later, European mortality monitoring received funding from the European Centre for Disease Prevention and Control (ECDC). The public health value of the project was underlined in the 2009 influenza pandemic, when these excess mortality outputs became important for European risk assessments [10-12].

A common statistical algorithm is used in EuroMOMO-participating countries to generate weekly indicators for age group-specific excess mortality that are comparable across countries. The algorithm is a time-series Poisson regression model with number of weekly deaths as a dependent variable adjusting for trend and seasonal variation. The algorithm also corrects for the delay observed between data collection and data processing in each country.

The main indicators generated are:
- total weekly number of deaths corrected for delay in registration;
- expected weekly number of deaths (baseline);
- weekly number of excess deaths (defined as observed number minus the expected number of deaths);
- standard deviation around the baseline (z-score);
- total mortality (all age groups) and mortality stratified into age groups (<5, 5–14, 15–64 and ≥65 years).

Standard deviation scores (z-scores) are used to standardise outputs and enable comparison of mortality patterns between different populations and between different time periods. Excess mortality above two z-scores from the baseline is considered above the normal level of the standard variation of data. Details of the EuroMOMO algorithm can be found elsewhere [13].

Data outputs from individual partner countries are compiled by the Statens Serum Institut in Denmark. Data analysed for this paper included all-cause mortality from week 1 (2 January) up to and including week 11 (18 March) 2012. A total of 14 countries submitted data: Belgium, Denmark, Finland, France, Germany (Hessen region), Greece (regions of Athens, Keratsini, Magnisia and Kerkira), Hungary, Ireland, the Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom (UK) (England and Wales).

Data on influenza activity were derived from the ECDC weekly influenza surveillance overview [14], EuroFlu [15] and from personal communication with national influenza surveillance representatives. Increased influenza activity was defined as medium or high influenza intensity, as reported through these channels.

Results

All-cause mortality among the elderly (individuals aged ≥65 years) has been above two z-scores from the baseline for two consecutive weeks or more in Belgium, Portugal and Spain from week 5, in France and the Netherlands from week 6, in Finland, Hungary, Sweden and Switzerland from week 7. In the UK mortality among the elderly has been above 2 z-scores in weeks 7–8 and 11–12. Ireland reported a one-week peak of a z-score above 2 in week 9 and Greece in week 10. Denmark and Germany reported no excess mortality.

Although data from week 11 may be influenced by reporting delay, it appears that mortality has peaked and is now decreasing in Belgium, Finland, France, Portugal, Spain, Sweden and the Netherlands.

In Spain and Portugal, mortality has been above two z-scores from the baseline for two and three weeks, respectively, in the age group 15–64 years of age. Otherwise, there has been no sign of excess mortality in other age groups studied (0–4, 5–14 years).

In Portugal, Spain, France, Switzerland, Finland, Hungary, Ireland and Greece excess mortality among the elderly coincided with or followed after reported increased influenza activity (Figure 2). In Belgium, Sweden and the Netherlands, excess mortality seemed to precede, at least partly, reported increased influenza activity. In the UK, there was excess mortality but no reported increased influenza activity and in Germany, there was reported increased influenza activity but no excess mortality. Denmark, which has observed no excess mortality to date, reported no increased influenza activity. Among the countries that observed excess mortality, only the UK did not see medium or high influenza activity at least in parts of the same time period.

Discussion

As in previous winter seasons, a number of European countries are experiencing increased mortality in the elderly population. Unlike the past two seasons, the excess mortality this year coincided in most countries with late increased influenza activity. An impact of influenza on the elderly is not unexpected, as this year is dominated by influenza A(H3N2): according to the ECDC weekly influenza surveillance overview of 30 March 2012, 95% of the influenza A viruses detected from sentinel and non-sentinel sources this season were type H3N2 [17]. In contrast, influenza A(H1N1) pdm09 was the prevailing type in the past two years. The pandemic virus more or less spared the elderly – although some countries, such as the UK, did observe excess mortality in middle-aged adults likely to be attributable to influenza A(H1N1)pdm09 activity [4,10,18].

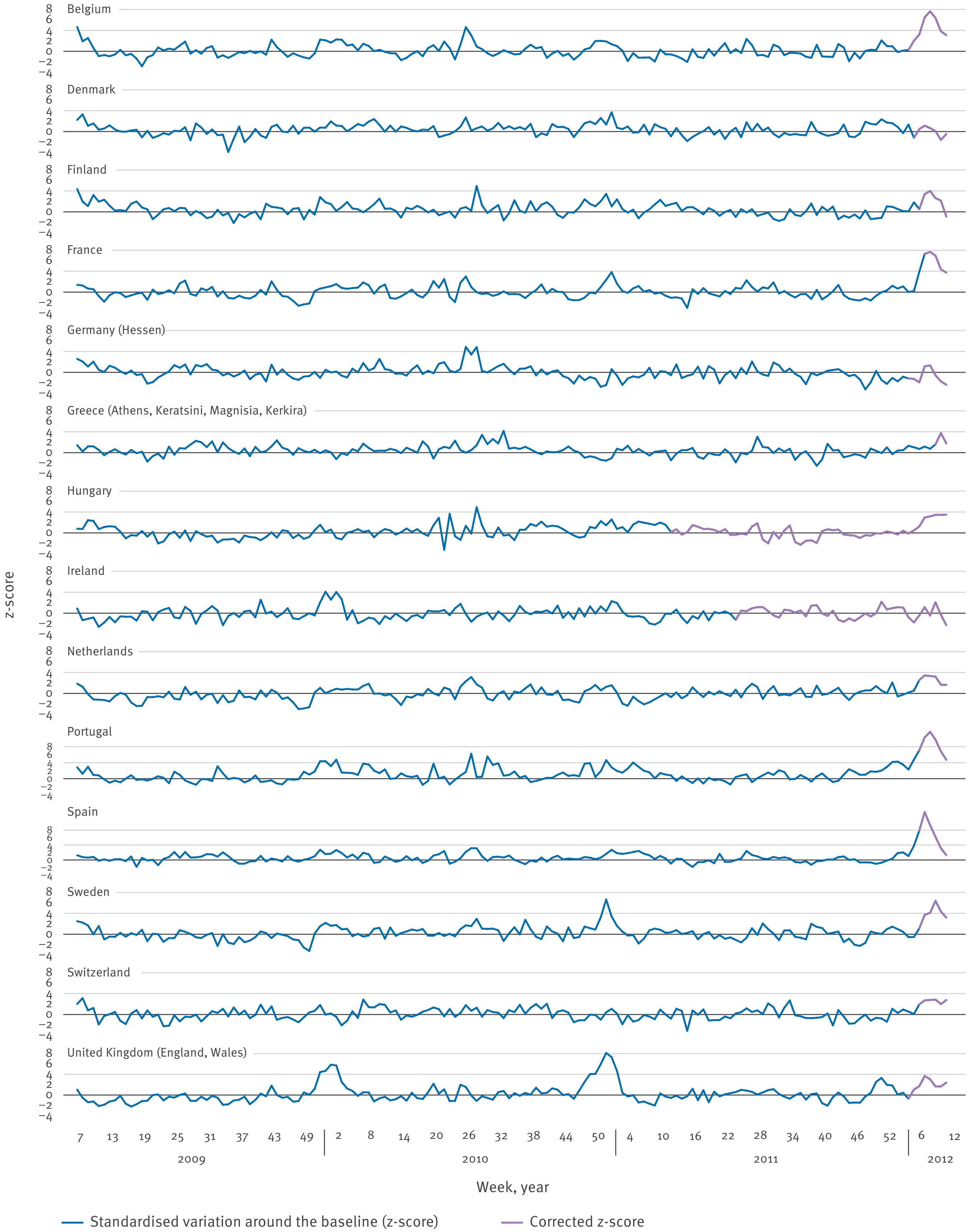
There are, at present, differences in observed excess mortality between European countries using the EuroMOMO algorithm. The available influenza data do not offer an exhaustive explanation for these differences. In most countries, excess mortality coincided or followed after reported increases in influenza activity. This pattern has been regularly observed in the pre-pandemic years [1-5,8] and corroborates the association of influenza (in particular influenza A(H3N2)) and excess deaths in the elderly. In particular, in the present season there are reports that some of these influenza A(H3N2) viruses are an imperfect match with the A(H3N2) strain included in the current vaccine; however, the contribution of this to the epidemiology of the observed excess mortality is unclear at this stage [19].

The data presented in Figure 2 suggest that the overlap between influenza activity and excess mortality was discordant in a few countries. There are several possible explanations for this observation. Firstly, the different patterns may suggest that other factors contribute to the occurrence of excess mortality. Indeed, there was a cold spell across Europe during weeks 4 to 6 this year throughout Europe, which might add to excess mortality in some countries, but not in others. It is well known that periods of extreme cold are associated with excess mortality [1,4,7,20,21]. In Spain, Belgium and the Netherlands, excess mortality could be observed before influenza transmission increased: we hypothesise that the cold spell could have been a contributing factor in those countries.

Secondly, the current definition of increased national influenza activity is based on a risk assessment by each European country. As a consequence, there are subjective differences in how this is interpreted. This may also partially explain the apparent discordance between observed excess mortality and reported level

Figure 1

Weekly mortality among those aged ≥65 years in 14 EuroMOMO countries as standardised deviations from the baseline (z-scores), week 7 2009–week 11 2012 (9 Feb 2009–18 March 2012)



EuroMOMO: European monitoring of excess mortality for public health action.
Corrected z-scores are z-scores corrected for delay in death registration.

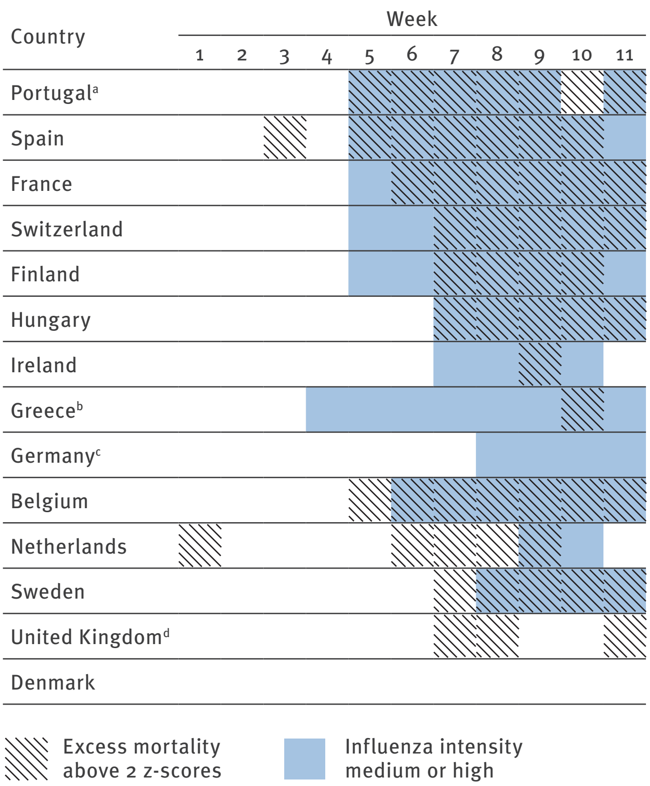
of influenza activity seen in some counties. It highlights the importance of developing more standardised objective measures of influenza activity. Finally, it is possible that infections other than influenza may contribute to excess mortality among the elderly in some countries.

The occurrence of potential risks at similar times – i.e. the cold snap and increased influenza activity – this winter season highlights the difficulty of disentangling the effects of different causes of excess mortality. Studies have shown that multivariate regression models can be successfully used to better quantify the impact of mortality risks such as influenza viruses, other respiratory viruses as well as extreme weather conditions [1,4,22,23].

In order to assess the public health impact of influenza at the population level, it is important to develop a common European approach to estimate the number of excess deaths associated with influenza. By including relevant and standardised indicators of influenza activity, virological data, vaccination data, climatic data and other respiratory infection data, it will be possible to perform a timely regression analysis to estimate excess mortality associated with influenza. We recommend that a standard approach should be developed with the results summarised at the end of the influenza season when final data are available. However, it is also important on an ongoing basis to collate, analyse, interpret and disseminate mortality data in order to inform public health actions. As cause-of-death in most countries will not be available in a timely fashion, this has to be carried out based on all-cause mortality data, and has to be interpreted in a qualitative method as in the present paper. On the basis of our preliminary data, we hypothesise that the epidemiology of the impact of influenza in Europe differs in the 2011/12 season from the recent pandemic and post-pandemic seasons, with excess mortality in the elderly caused by the return of influenza A(H3N2) virus, potentially with the added effects of a cold snap.

Figure 2

Excess mortality above two z-scores above baseline among those aged ≥65 years and increased influenza intensity, in 14 EuroMOMO countries, by week, weeks 1–11 (2 January–18 March) 2012



EuroMOMO: European monitoring of excess mortality for public health action.

[a] Mortality data from [16].
[b] Athens, Keratsini, Magnisia, Kerkira.
[c] Hessen.
[d] England, Wales.

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