Title

Construction of an Epidemiological Bulletin at Gaia Primary Health Care Trust

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Abstract (4000 a 6000 characters, including spaces):

Introduction: Monitoring and surveillance, along with communication, are essential public health operations [1]. The heat and cold extreme temperatures contingency plans require monitoring of influenza vaccination, health services demand (both in primary care and emergency departments), and all-cause mortality [2, 3]. Added to this, epidemiological surveillance is a cycle, which includes interpretation and communication of the data collected [4]. All these operations are executed by the public health unit and serve as a basis for decision making by health care managers. In this paper, we describe the creation, publication and dissemination of an epidemiological bulletin at Gaia Primary Health Care Trust, which aims to provide a scientific basis for primary health care managers to adjust health care services supply levels according to observed and forecast need.

Methods: We first calculated a seasonality index for influenza, defined as weekly demand for primary health care services with a diagnosis of influenza divided by the average demand in the last 9 years.

Then, we designed a dashboard of demand for primary health care and emergency department services due to influenza, using as expected high and low the mean plus or minus one or two standard deviations.

Thirdly, we created a forecast model of immunisation coverage for influenza vaccine in adults older than 65, based on the mean cumulative percentage of vaccines administered to adults older than 65 in each week of the flu season.

We also created a forecast model of demand for primary health care due to influenza, through a regression model using historic primary care demand and meteorological variables (humidity, temperature and wind speed) as independent variables. We set cut off points to maximise sensitivity.

As regards mortality surveillance, we set weekly mortality expected highs and lows based on average and standard deviation.

Finally, we presented notifiable disease occurrence in graphs organised by classes of disease and developed case definition diagrams.

All this information was compiled in the epidemiological bulletin, in the form of an electronic dashboard distributed via email to the top and middle management of the primary health care trust.

Results: After obtaining a seasonality index for influenza, we were able to reduce the period of influenza surveillance from 32 weeks to 14 weeks. Fifty-seven epidemiological bulletins have been published by the public health unit of Gaia between January 2017 and March 2019,

weekly during flu season (defined as the period when the seasonality index for influenza is above 100), and monthly during the rest of the year. Figure 1 features both dashboards of demand for primary health care and emergency department services due to influenza, respectively, from left to right. The graphical representation of the forecast model of immunisation coverage for influenza vaccine in adults older than 65 can be seen in figure 2. Figure 3 features a graphical representation of mortality surveillance. Figures 4 to 6 show notifiable disease occurrence in graphs organised by classes of disease.

Discussion and conclusions: The Gaia Primary Health Care Trust epidemiological bulletin provides a scientific basis for health care managers to adjust health care services supply levels according to observed and forecast need, especially in, but not restricted to, the context of the heat and cold extreme temperatures contingency plan.

The models developed adapt measurement tools applied at the national level and replicate international best practice to the local reality of the population served by Gaia Primary Health Care Trust. Their use increases epidemiologic surveillance efficiency and allows for real-time visualisation of information regarding vaccination and health care demand due to influenza. In turn, this improves how health care supply is matched to demand, by fine-tuning health professional teams, health services opening times and influenza vaccine stocks to forecast need.

The health problems monitored by the epidemiological bulletin are present in all primary health care trusts in Portugal. The statistical models constructed for monitoring and forecast require data that are either publicly available or accessible by all public health units. The methods are described in a section of the bulletin. Therefore, it can be freely replicated by other public health units.

References

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Figures

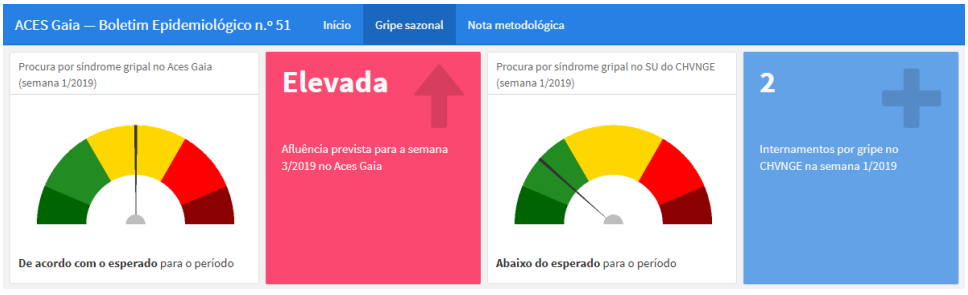

Fig. 1: Demand dashboards

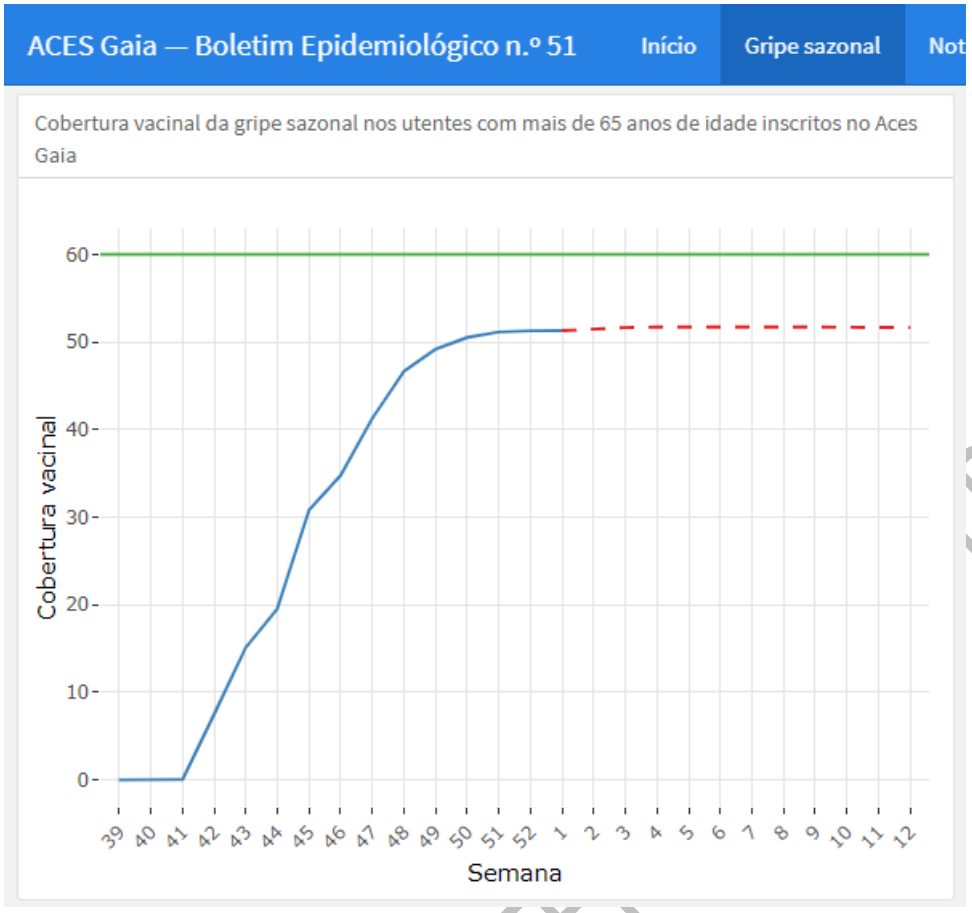

Fig. 2: Forecast of immunisation coverage

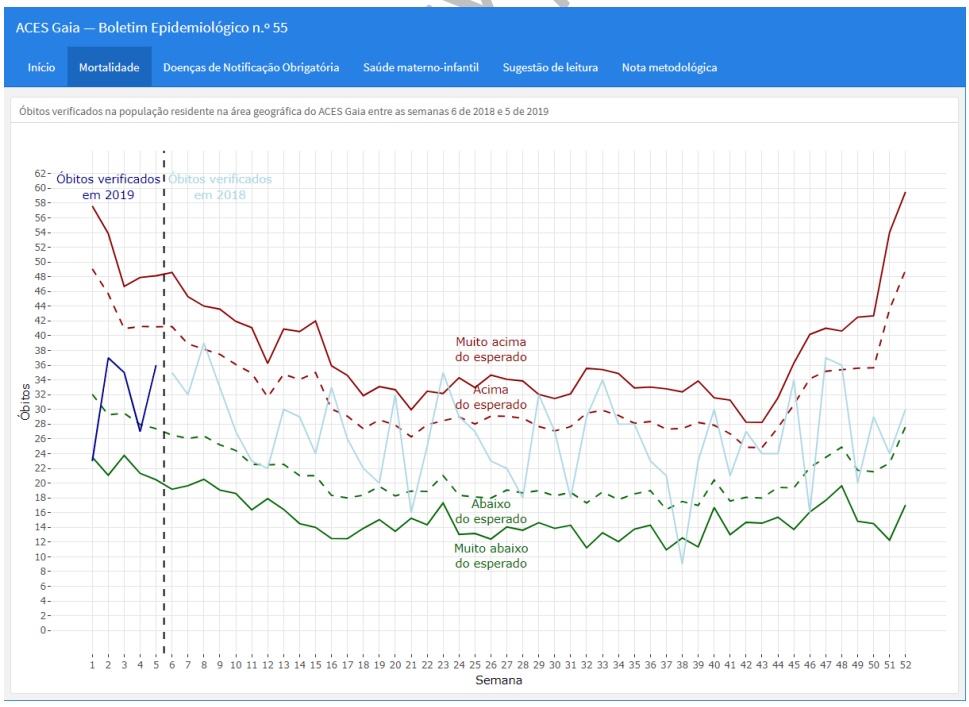

Fig. 3: Mortality surveillance

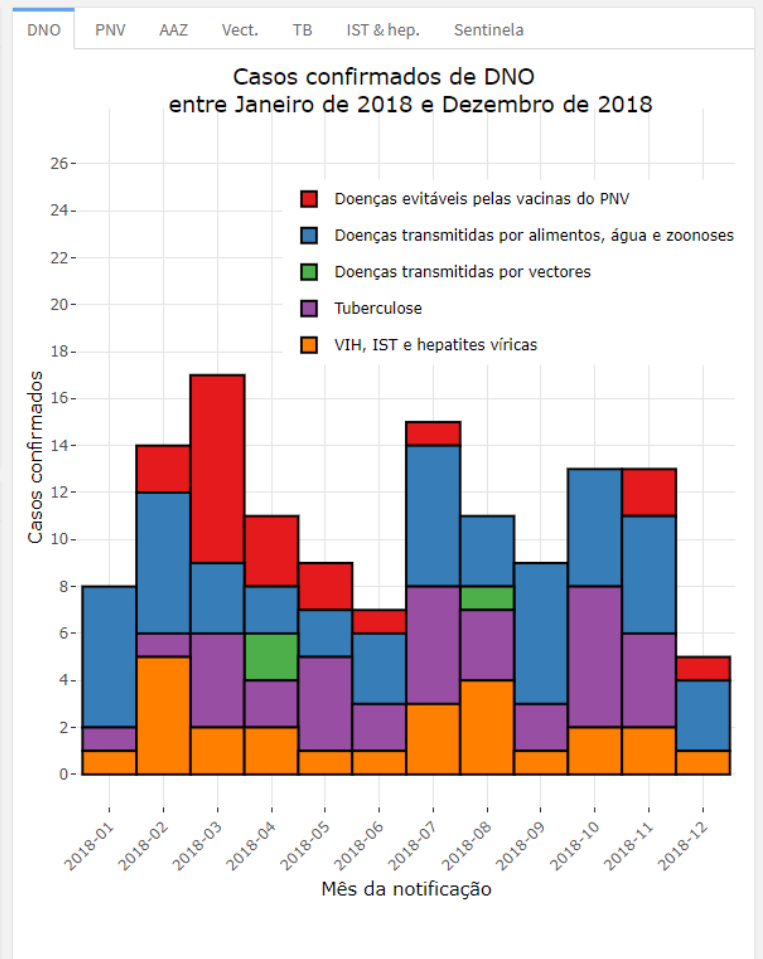

Fig. 4: Notifiable disease occurrence (total cases divided by 5 different groups of diseases)

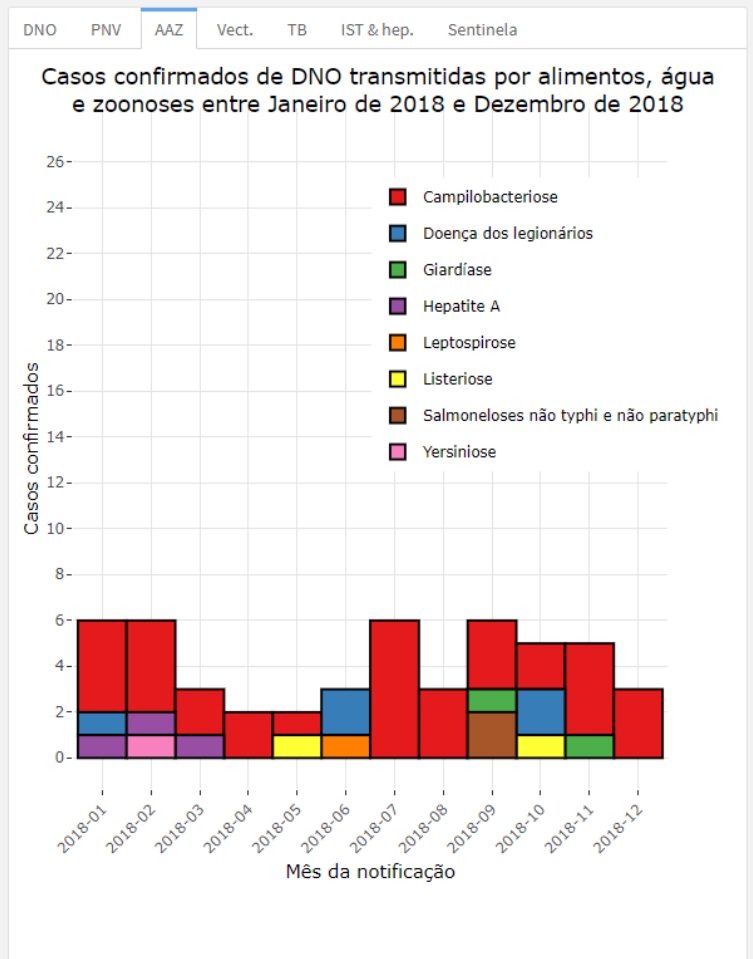

Fig. 5: Notifiable disease occurrence (group of diseases transmitted by food, water or animal vectors)

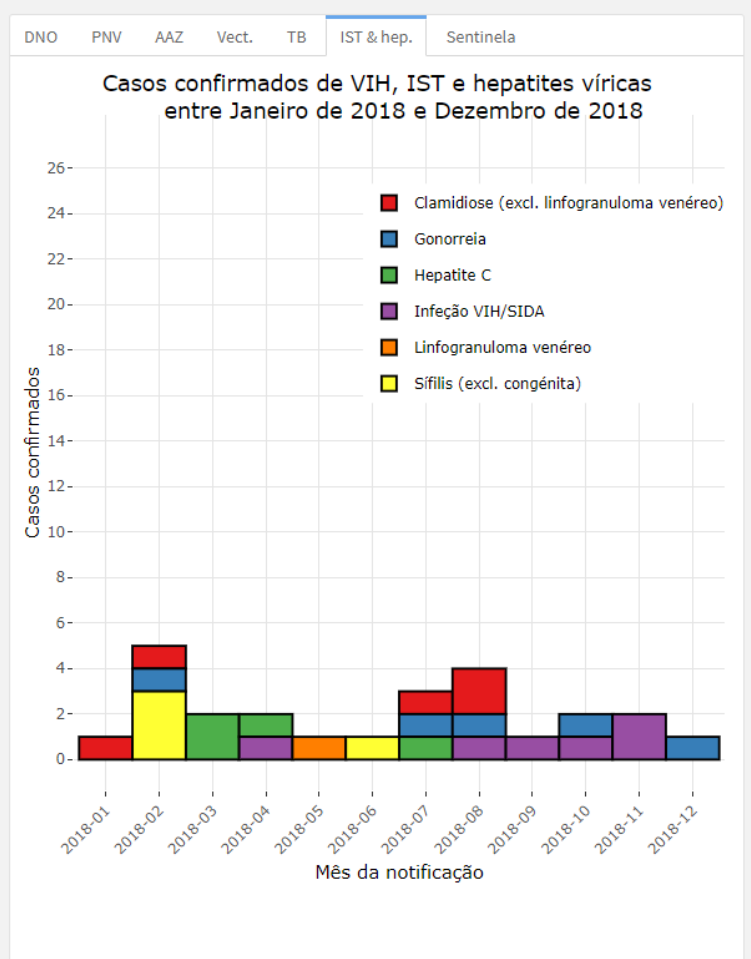

Fig. 6: Notifiable disease occurrence (group of diseases: HIV, STI and viral hepatitis)