How to determine influenza seasonality—
A brief approach to different methodologies

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Analysis of seasonality allows:

- An understanding of what is usual or 'normal'
- Preparation for increased influenza activity periods, including planning for immunization campaigns
- Grouping of countries or regions with similar patterns

Seasonality in the tropics and subtropics:

- Less defined and requires more analysis
- Presents multiple peaks and activity identifiable throughout the year that might coincides with rainy seasons
Influenza Seasonality

**AVERAGE EPIDEMIC CURVE**
The usual level of influenza activity occurring during a typical year. This is the calculated average of several epidemic years.

**ALERT THRESHOLD**
A level above which, varying by the time of year, influenza activity is greater than most years.

**SEASONAL THRESHOLD**
Level of influenza activity that signals the start and end of the season. When the weekly rate exceeds the seasonal threshold, there is sustained community transmission and the onset of influenza season.

Influenza Seasonality—Averaging Methodology


Influenza seasonality—Negative Binomial Model Methodology

✓ Weekly proportion of influenza positive samples.
✓ Logistic regression model for each country, assuming a negative binomial distribution, to predict monthly influenza activity as a factor of monthly and annual historical activity.
✓ It also looks at whether the peak % of influenza positivity occurred during similar months each year.
Influenza seasonality—Negative Binomial Model Methodology

1º peak: EW 16 to EW 32
2º peak: EW 34 to EW 43
Influenza Seasonality—Methodologies Compared

1º peak: EW 16 to EW 32
2º peak: EW 34 to EW 43

1º peak: EW 17 to EW 33
2º peak: EW 38 to EW 52

Influenza seasonality—MEM Methodology

✓ MEM refers to the “Moving Epidemic Method”
✓ Calculation of the arithmetic mean of pre- and post-epidemic rates for all historical seasons
✓ Rates of weekly incidence of ILI, SARI or proportions of visits of at least six consecutive seasons, excluding the 2009/2010 pandemic season
✓ Program runs in the R software package
✓ 3 Steps involved:
  1. Define length of epidemic period per season
  2. Define epidemic threshold
  2. Define thresholds of medium, high and very high intensity
Influenza seasonality—Other Methodologies

- Sequential monitoring method in which the current magnitude of the chart statistic and, therefore, the decision on whether or not the chart should be determined depends on the observed (and possibly expected) CuSum.

- Monitoring of deaths from influenza by SE observed less expected, where expected deaths are predicted using a time series regression model adjusted for historical data. Serfling.

- Determination of monthly proportion of positive cases of influenza of all positive in a given year and consideration of a month that increased influenza activity (if the monthly proportion ≥ 10% for two or more years) PATH.
Influenza seasonality

Analysis of seasonality:

✓ Allows to reduce morbidity, mortality and economic costs, and helps vaccine decision-making.

✓ Requires routine and timely data collection.

✓ Variety of statistical methods available to define influenza activity.

✓ Combination & comparison of methods.

✓ Seasonality in the tropics and subtropics is less defined, may present multiple peaks and requires thorough analysis.
References

¡Muchas gracias!

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