Alert-Early System for Outbreaks with Pandemic Potential

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An overview:

- Aims to anticipate outbreaks and advise the health authorities on science-based decision-making measures;

- It is developed in close interaction with the stakeholders;

- Integrates into existing systems for using regularly-generated multimodal data;

- Leverages *bona fide* health data and several alternative data;

- The system is scalable to all Brazilian cities and adaptable to different syndromes;

- It is built to preserve data security in parallel with swift data management;

- AESOP's data models and open-source products will be available to leverage, adapt, replicate, and scale, contributing to a global federated model of digital health surveillance.

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## Characteristics of the AESOP outbreak detection system

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>AESOP</th>
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<tbody>
<tr>
<td>Fit for purpose</td>
<td>Upfront involvement of stakeholders/end-users.</td>
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<td>Sensitivity</td>
<td>Prediction &amp; Forecasting leveraging diverse data streams.</td>
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<td>Specificity</td>
<td>Advanced molecular pathogen characterization.</td>
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<td>Rapid response</td>
<td>Earliest possible detection of human health anomalies.</td>
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<td>Scalability</td>
<td>All 5,570 Brazilian municipalities.</td>
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<td>Integration with existing systems</td>
<td>Most data from current systems.</td>
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<td>Data security, privacy and trust</td>
<td>Data not individually identified and to be used in a federated network.</td>
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<td>Easy to use</td>
<td>Pathogen Threat Detection Dashboards Adapted to User Requirement</td>
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<td>Cost-effectiveness</td>
<td>Based on continuously collected health surv. data (except genomic)</td>
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<td>Flexibility</td>
<td>Incorporation of new data sources; Adaption to other syndromes.</td>
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AESOP’s overview and objectives

- Increase accuracy and anticipate the identification of the initial steps of an outbreak by detecting rise of respiratory infections at the Primary Health Care level;

- Molecularly characterize known or unknown infectious agents implicated in perturbation of the human health;

- Characterize the climatological and socio-economic conditions that facilitate outbreak spreading;

- Model the outbreak dispersion providing the basis of rational mitigation/control measures.


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Weekly syndromic surveillance for ARI encounters at PHC data and COVID-19 cases in Bahia State – Brazil, 2020

Brazilian National PHC database quality indicators, 2023
2017 - Jul 2023 - 1.300.200.810 coded encounters

Completeness

% of Epi Weeks Reported in the last 24 weeks
- All PHC facilities in the country
- Weekly reports on PHC encounters due to ILI causes

Timeliness

The time span between date of encounter – registry in the database

Total number of encounters per number of week lag between date of encounter and date of registry in the database, in the current week

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AESOP’s alerts for all 5,570 Brazilian Municipalities, 2023

EARS C2 Alerts base on: a) PHC syndromic ARI detection; b) Drug sales

Select the week for map
2023-02-11

Filter only alert - APS
Filter only alert - OTC

O total na tabela Crescimento mês é calculado utilizando as probabilidades de crescimento (Soma na mês).
- <50% = 0,5
- 50-75 = 0
- 75-95 = 0,5
- >95 = 1

Select the week for map
2023-03-04

Filter only alert - APS
Filter only alert - OTC

O total na tabela Crescimento mês é calculado utilizando as probabilidades de crescimento (Soma no mês).
- <50% = 0,5
- 50-75 = 0
- 75-95 = 0,5
- >95 = 1

Select the week for map
2023-06-03

Filter only alert - APS
Filter only alert - OTC

O total na tabela Crescimento mês é calculado utilizando as probabilidades de crescimento (Soma no mês).
- <50% = 0,5
- 50-75 = 0
- 75-95 = 0,5
- >95 = 1

Select the week for map
2023-09-02

Filter only alert - APS
Filter only alert - OTC

O total na tabela Crescimento mês é calculado utilizando as probabilidades de crescimento (Soma no mês).
- <50% = 0,5
- 50-75 = 0
- 75-95 = 0,5
- >95 = 1

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Dashboard for visualization of early warnings

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How does AESOP contribute to ARS surveillance?

- Anticipates outbreaks at the PHC level pinpointing areas at risk;

- Combined to molecular surveillance, the clinical signal may facilitate early identification of human cases infected by H5N1;

- Complements, but does not replace, currently used surveillance strategies.
Thank you!
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