



Coordination Centre

Forecasting the prescription rates of antibiotics in the UK between 2013 to 2023 incorporating the impact of COVID-19

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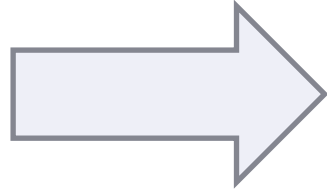


Disclosure

This study was funded by EMA and performed via DARWIN EU®. The study funder was involved in revising the study protocol and the objectives and reviewing the study report including the results.

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Drug shortages



- ↑ **Mortality**
- ↑ **Adverse events**
- ↑ **Drug errors**




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Availability of medicines before and during crises

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The European Medicines Agency (EMA) plays a key role in coordinating the European Union's (EU) response to medicine supply issues caused by crises such as major events or public health emergencies. EMA also has an important role in monitoring medicine shortages that cannot be resolved through measures taken at national level and that might lead to a crisis situation.

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EU actions to tackle shortages of GLP-1 receptor agonists

Preventing shortages of antibiotics during winter

EMA has two bodies to carry out its crisis preparedness and management responsibilities:

- [Executive Steering Group on Shortages and Safety of Medicinal Products \(MSSG\)](#)
- [Medicines Shortages Single Point of Contact \(SPOC\) Working Party](#)

For more information, see:

- [Crisis preparedness and management](#)

Study objective:

- To compare different models forecasting the usage of antibiotics through **AutoRegressive Integrated Moving Average (ARIMA)** and **ARIMA with eXogenous variables (ARIMAX)**.

Methods:

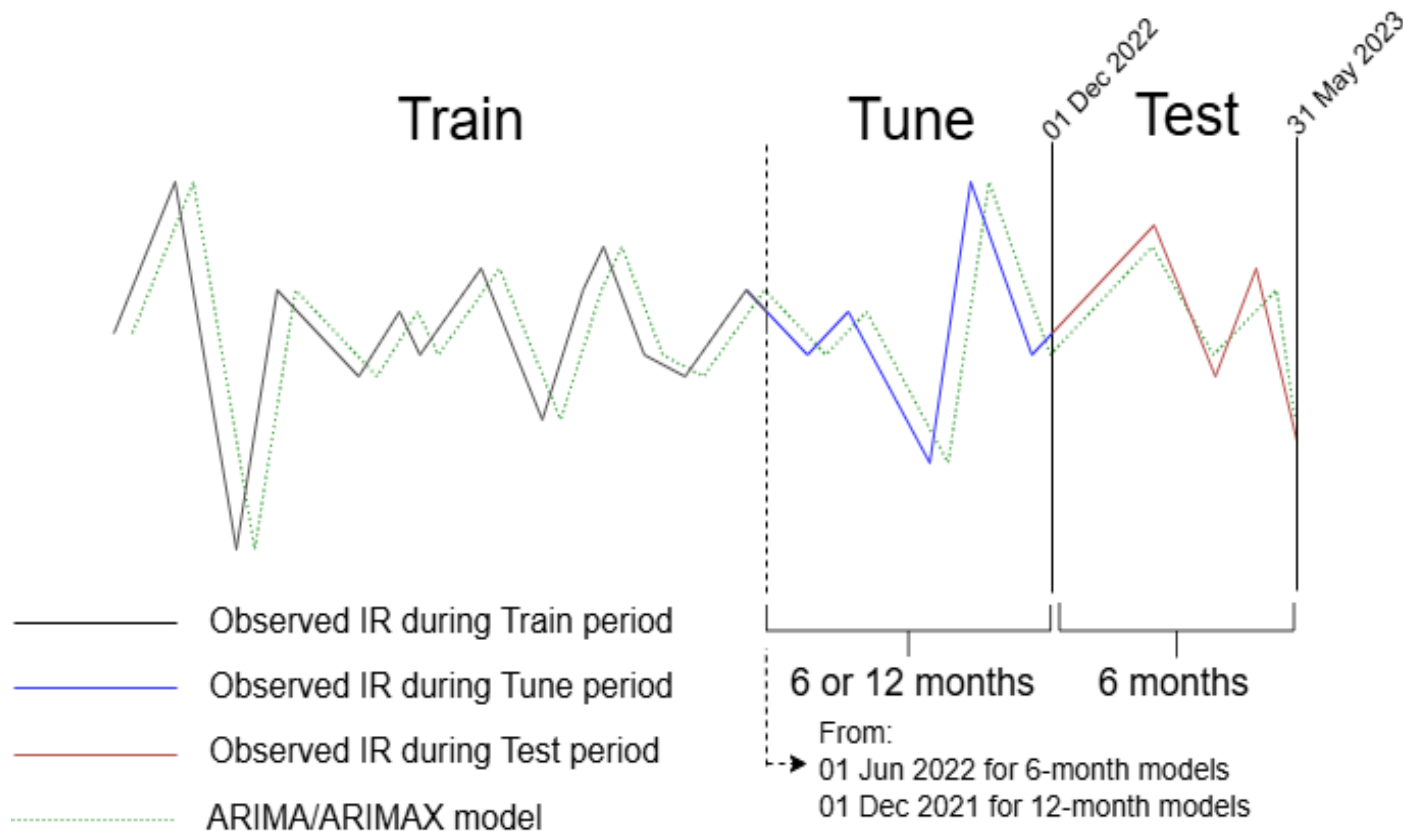
- We used time series data on incident use of 6 antibiotics in the UK ( **CPRD** GOLD mapped to OMOP-CDM¹)

Incidence Rates [95%CI] per 100,000 person-years between July 2013 – May 2023

Fitted into ARIMA models

Amoxicillin
Amoxicillin and Clavulanate
Azithromycin
Cefuroxime
Clarithromycin
Phenoxymethylpenicillin

Methods: ARIMA/ARIMAX models



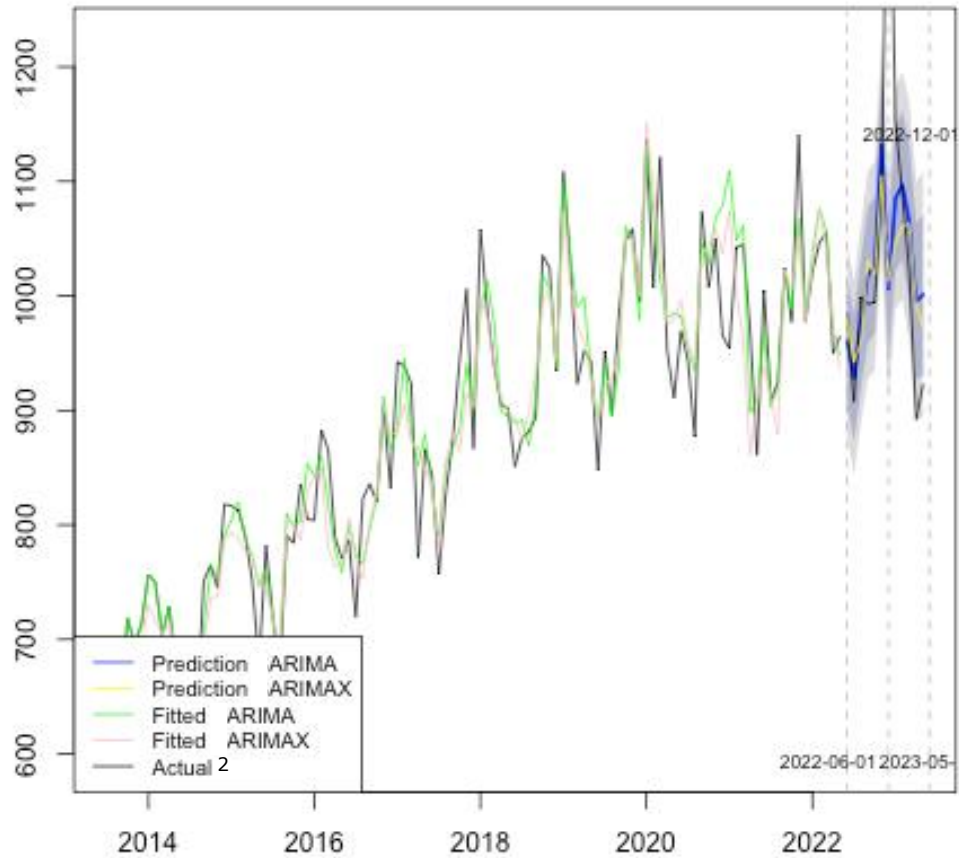
Tune period: predictive performance of the model is evaluated and refined.

Test period: accuracy of the ARIMA model to forecast is evaluated.

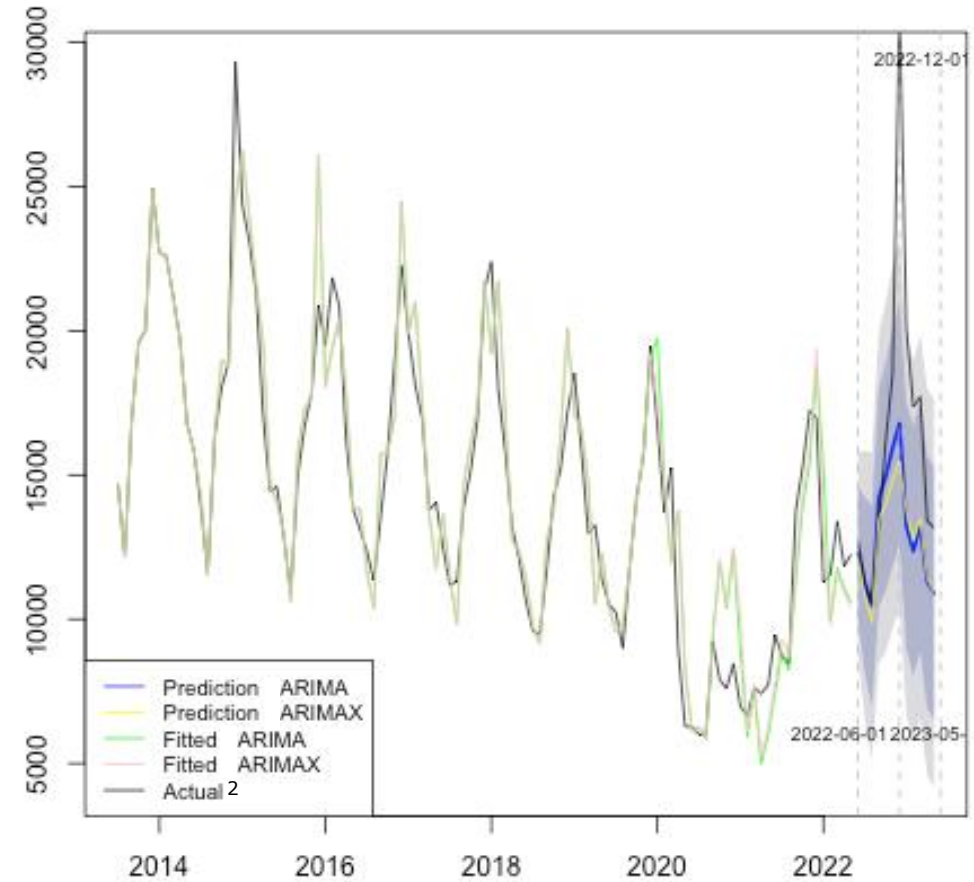
ARIMAX: inclusion of a model term (between Jan 2020 to Dec 2021) for the effect of the COVID-19 pandemic.

Results: 6-month tune period with ARIMAX were usually better

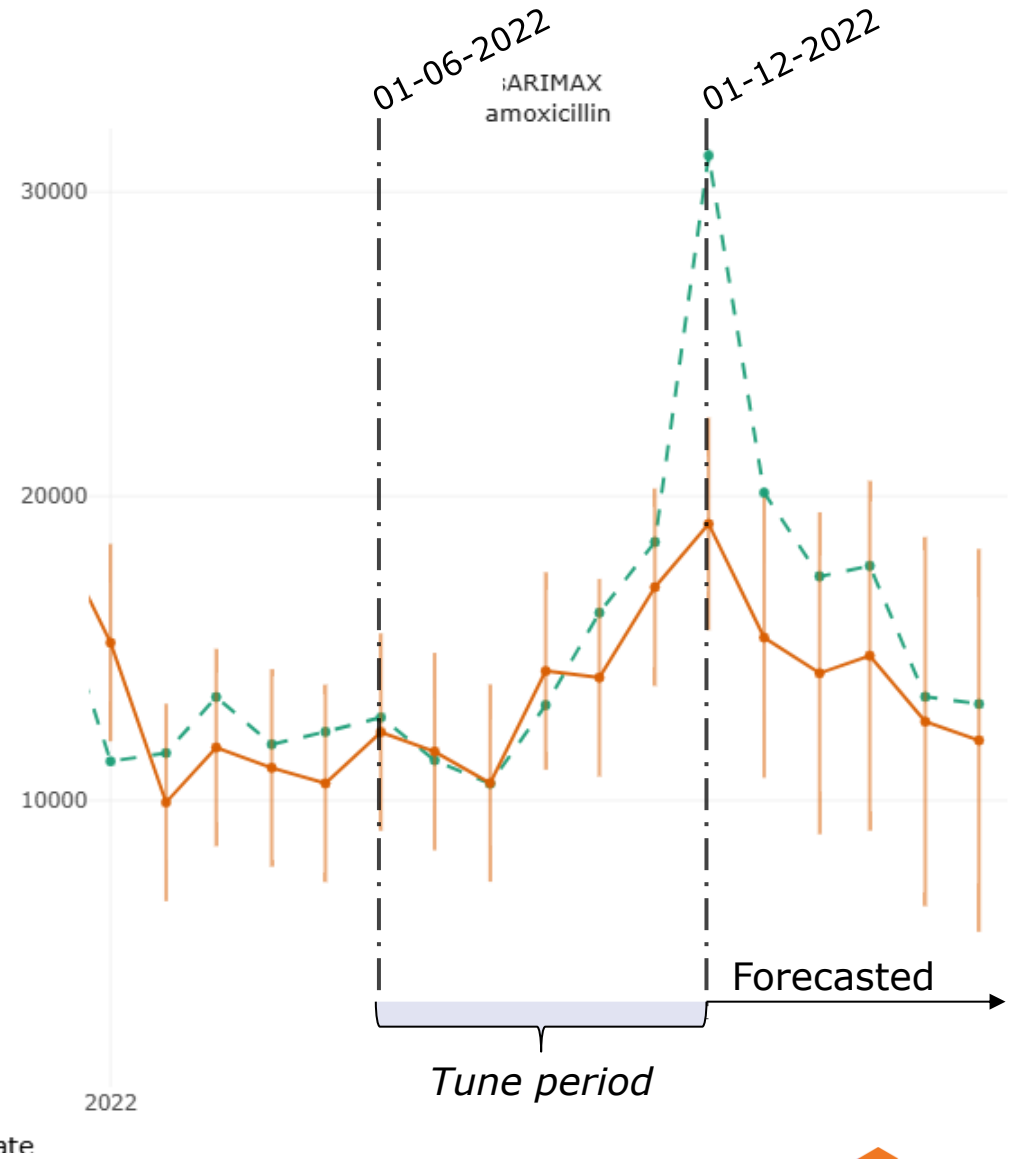
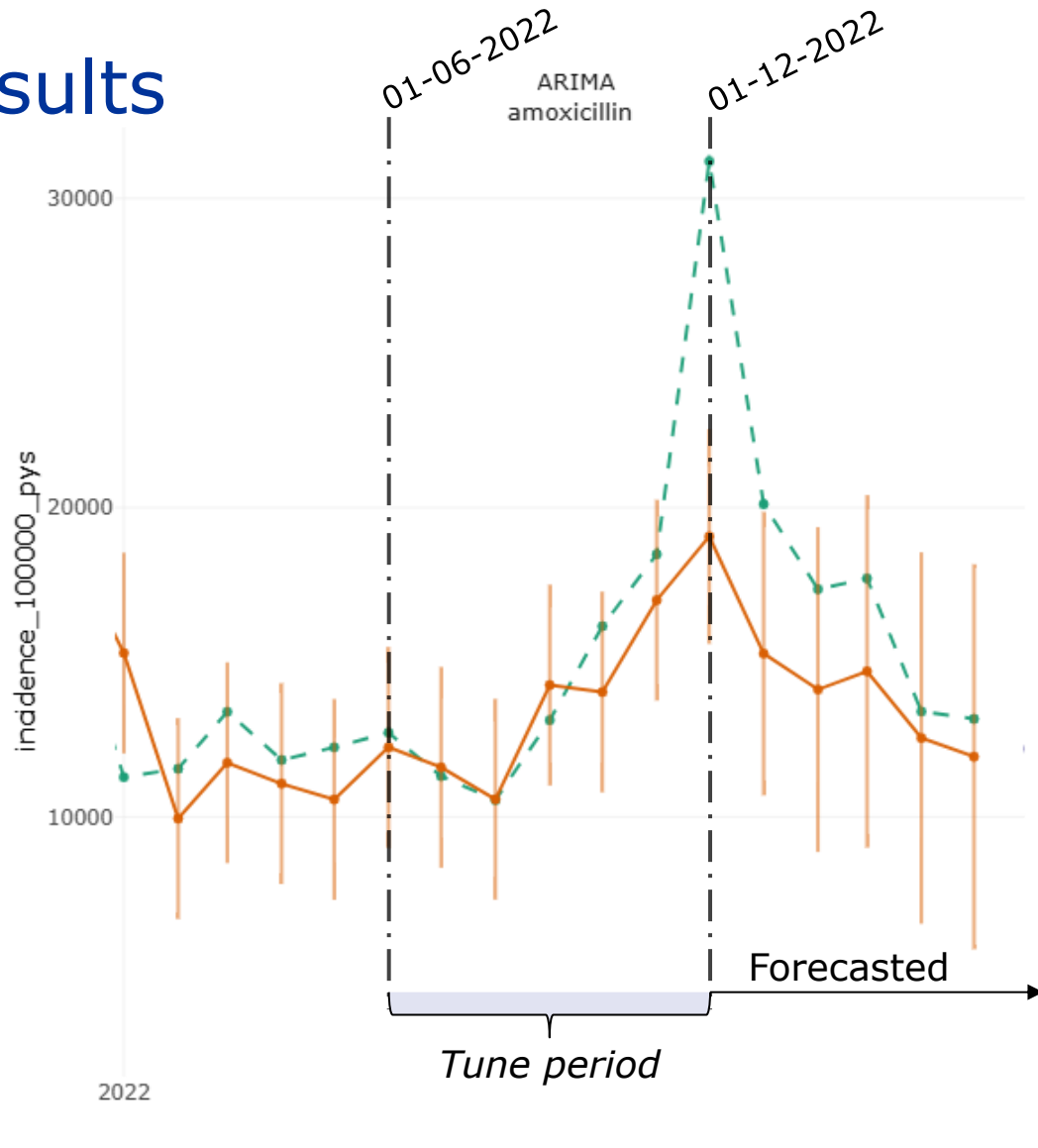
Predicted IR¹ using ARIMA and ARIMAX for azithromycin



Predicted IR¹ using ARIMA and ARIMAX for amoxicillin



Results



Legend - - CPRD_GOLD - Observed - - CPRD_GOLD - Forecast - - CPRD_GOLD - Train and Tune

Conclusions

- Forecasting the usage of antibiotics with ARIMA models is possible.
- We obtain more accurate predictions when using:
 - 6-month tune period (compared to a 12-month tune period)
 - Term to model the impact of COVID-19 between Jan 2020 and Dec 2021

Thank you!



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