**The scale and variation of the impact of COVID-19 on prescribing of medicines in primary care in Wales**

# Abstract

## Aim

## Methods

## Results

## Conclusion

# Introduction

# Methods

## Data Sources

## Data Linking

* The final dataset included n GP practices

## Data preparation

* Used Quantity as the measure of prescribing
  + Number of pills etc.
  + Using quantity as a measure is robust to changes in volume of drug per prescription (e.g., changing from a one- to three-month supply)
* Manipulated from original data in the flowing ways:
  + Aggregated by GP practice and month
  + Monthly total divided into daily total based on number of days in the calendar month
  + Scaled by 1000 patients to allow for comparison across practices (i.e., (1000 \* quantity) / npat)
* Split the data into pre-COVID (Jan 2015-Feb2020) and COVID (Mar-Aug 2020)
  + This time split was chosen as the UK lockdown began in March 2020
* Pre-COVID data
  + Used to create forecasts for a non-COVID counterfactual (i.e., what would the levels of prescribing have been if the COVID pandemic had not occurred)
  + The process to do so comprised of two main steps:
    1. Identification of a suitable time series model
    2. Using the model identified to create a six-month forecast
  + Time series modelling
    - Applied N different time series models to the data with the aim of deciding on the best model empirically
    - Log transformed data to ensure values >0 (use the median from forecast to avoid issues with biased means from back transformation)
    - Used the following models:
      * ARIMA
      * Decomposition model
      * ETS (Holt-Winters Additive Model)
      * TSLM
      * Seasonal Naïve (+ drift)
      * Prophet
      * Combination models
    - Used the following (scaled) fit criteria:
      * RMSE 1st
      * MAE 2nd
    - Used cross-validation to reduce the likelihood of overfitting
    - Three-month step (reduce computation burden)
    - Six-month forecast window (this is the horizon we will be using in the forecast step)
    - Code in serCymruTools package (<https://github.com/w-hardy/serCymruTools>)
    - Once the best model had been chose for each GP practice, we used that to create forecasts for each individual GP practice from Mar to Aug 2020
  + This was done for each individual GP practice in Wales where there was sufficient data. Across each separate drug data set, we applied the following rules for excluding GP practices:
    1. Missing any data in the COVID months
    2. Missing more than 10% of the pre-COVID data (i.e., 6 months)
    3. MAPE for the model selection > 50
    4. Significant changes to prescribing in the six months pre-COVID
  + Missing data in pre-COVID data
    - Missing data was replaced with the mean for the remainder of the time series

## Statistical Analyses

# Results

# Discussion

# References