MJA
The Medical Journal of Australia

Appendix

This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.

Appendix to:

Schaffer AL, Buckley NA, Dobbins TA, et al. The crux of the matter: did the ABC's Catalyst program change statin use in Australia? *Med J Aust* 2015; 202: 591-594. doi: 10.5694/mja15.00103.

Appendix

Description of autoregressive integrated moving average (ARIMA) modelling

An ARIMA model, used to model observations that display serial correlation, consists of an autoregressive (AR) component, a differencing component (or "integration," I), and a moving-average (MA) component. An ARIMA model is specified by (p,d,q), where p is the number of autoregressive terms, d is the number of differences needed to achieve stationarity, and q is the order of the moving-average.

We used the Box-Jenkins methodology (12) to choose the most appropriate ARIMA model. Time series frequently exhibit a trend, and ARIMA requires that the trend is removed (i.e. are "stationary") before parameters can be estimated. We achieved stationarity by "differencing" the time series; that is, by subtracting the previous value of the outcome from the current value. Our data also displayed seasonality. To remove the seasonal trend, we took the "seasonal difference" of the time series by subtracting the value of the outcome from the same week of the previous year from the current value. We tested that the time series was stationary using the augmented Dickey-Fuller test.

We next identified the order of the autoregressive and moving-average terms. This was achieved by examining the autocorrelation and partial autocorrelation plots, which describe the correlation of the time series with its various lags. The most appropriate p (autoregressive) and q (moving-average) orders were those that removed autocorrelation, which we confirmed using the Ljung-Box chi-square test for white noise. This tests the hypothesis that the data are independently distributed and that any observed correlation is a result of randomness rather than serial correlation.

We estimated the *p*, *d* and *q* orders separately for each model being estimated.

Once the most appropriate model was identified, we included a component called a "transfer function" that represents the impact of the *Catalyst* on statin dispensing and discontinuation. The transfer function describes the shape of the impact of *Catalyst*. We tested two types of transfer functions: a "step function," which represents an immediate and permanent impact, and a pulse function, which represents a temporary impact that decays exponentially over time. Model diagnostics (e.g. Akaike information criterion and Schwarz criterion) were used to choose the most appropriate measure of the impact. Residual plots were examined to assess the assumptions of Normality and independence.