

The results and challenges of using administrative health data within a natural experimental evaluation of the abolition of prescription fees in Scotland

Andrew James Williams
European Centre for Environment and
Human Health
University of Exeter
Truro, United Kingdom
a.williams2@exeter.ac.uk

William Henley
Health Statistics Group
University of Exeter
Exeter, United Kingdom
w.e.henley@exeter.ac.uk

John Frank
Usher Institute of Population Health
Science and Informatics
University of Edinburgh
Edinburgh, United Kingdom
john.frank@ed.ac.uk

Keywords— Fees, Pharmaceutical, interrupted time series, prescription, hospital admission, natural experiment, quasi-experimental, co-payment

I. INTRODUCTION

In April 2011 Scotland abolished the prescription fee (co-payment) which had applied to all community prescribed items. Nicola Sturgeon, then Scottish Health Secretary, had described the prescription fee as a ‘tax on ill health.’ Beyond reporting on the change in number of items prescribed, no evaluation of the policy had been planned or commissioned. However, the availability of administrative prescribing and hospital admissions data permitted the design and conduct of an interrupted time series evaluation of any impact of the policy change.

II. METHODS

A. Data

The Community Health Index (CHI) is a unique identifier used across Scottish Health Services which permits the linking of data from different services. Hospital admissions data are recorded in the Scottish Morbidity Records (SMR), while community prescribing data are recorded in the Prescribing Information System (PIS). Unfortunately, CHI was not recorded in the PIS during the whole study period (July 2005 – December 2013), limiting this study to a general practice level data.

B. Exposure

Prior to the fee abolition those in certain age groups or with certain conditions were exempt from the fee, permitting the identification of intervention and counterfactual cases. These groups had to be vulnerable to changes in medication adherence and identifiable within SMR and PIS. Those with asthma or Chronic Obstructive Pulmonary Disease (COPD) taking inhaled corticosteroids were identified as the intervention group, while those taking medication for diabetes mellitus formed the counterfactual group.

C. Analysis

Mixed effects Poisson models were used to analyse the impact of the policy change on hospital admissions offset by practice size and adjusted for seasonality. Similar linear models were fitter for prescriptions (Defined Daily Doses). The interrupted time series operators fitted both a step and a slope change. Generalised Additive Mixed Models were also fitted as a sensitivity analysis without the interrupted time series operators but with eight knots distributed evenly throughout the time series to relax the linear assumption and check for changes in the time series unrelated to the policy change.

III. RESULTS

Prescriptions data were available for 73.6% of the practices across Scotland while admissions data were available for 75.9%. Both the analyses of admissions and prescriptions identified statistically significant step and/or slope changes in the time trends contemporary with the policy change. However, the changes were of greater magnitude in the counterfactual than the intervention group. The sensitivity analysis revealed that apart from hospital admissions for diabetes, each of the time series demonstrated marked non-stationarity unrelated to the policy change.

IV. DISCUSSION

Administrative data permitted the design and conduct of a rigorous evaluation of a major policy change which would otherwise have been very expensive. However, limitations with the data meant that the evidence was not sufficient to demonstrate that abolishing prescription fees is an effective or ineffective policy in terms of reducing hospital admissions or socioeconomic inequalities in hospital admissions.

The study encountered two of the common challenges of ‘big data’ research. Firstly, the data used were originally collected for financial rather than health or research purposes, and therefore were not optimal for the study. Secondly, the surfeit of data meant that the models estimated many statistically significant coefficients, which were not clinically meaningful.

Prior to the policy change less than 13% of the prescriptions dispensed in Scotland were paid for by the patient; a smaller proportion of those would have been for chronic medication sensitive conditions, rather than acute short-term conditions. The study may have been like ‘using a sledgehammer to crack a nut’.

ACKNOWLEDGMENTS

The authors would like to acknowledge the support of Corri Black, Chris Dibben, Ruth Jepson, Anne Ludbrook, Jill Pell, Marion Bennie, Simon Hurding, Sean MacBride-Stewart, Margaret Ryan, Stuart McTaggart and Doug Kidd.

Farr Institute @ Scotland, which is funded by the following consortium: Arthritis Research UK, the British Heart Foundation, Cancer Research UK, the Economic and Social Research Council, the Engineering and Physical Sciences Research Council, the Medical Research Council, the National Institute of Health Research, the National Institute for Social Care and Health Research (Welsh Assembly Government), the Chief Scientist Office (Scottish Government Health Directorates), (MRC Grant No: MR/K007017/1). JF and AJW worked for the Scottish Collaboration for Public Health Research and Policy which is funded by the SCPHRP core grant from the Medical Research Council (Grant Number MR/K023209/1) and the Chief Scientist Office of Scotland. WH received support from the National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care (CLAHRC) for the South West Peninsula. The funders played no role in the conceptualisation or realisation of the research and no role in the decision to submit it for publication.

