



Methods to go from process  
outcomes to health outcomes  
(e.g. use of surrogate measures  
and interrupted time series)

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# Acknowledgements, conflicts, disclaimer

- Thanks to Anthony Matthews (LSHTM) for key slides
- I teach on pharmaco-epidemiology at LSHTM and they charge fees!
- I have no (other) commercial conflicts
- I am an (“Expert”??) member of PRAC, appointed by the EC
- These views are my own and not necessarily those of the rest of the Electronic Health Records Group at LSHTM or of PRAC

# My questions

1. Are there independent data that relate possible process outcomes to health outcomes? If so, then a measure of the regulatory advice on the drug interaction in reducing prescriptions with interacting drugs may be a reasonable surrogate.
2. Are the methods for interrupted time series adequate to estimate effects of regulatory actions?
3. Should we ask for major regulatory decisions to be accompanied by an estimate of the public health impact and a plan to measure it?

# October 2013 – March 2014



Statin side-effects questioned



Health chief slams statins:  
Millions face terrible side effects  
as prescription escalates

**The Telegraph**

Why I've ditched statins for good



Doctors' fears over statins may cost  
lives, says top medical researcher



**TODAY**

What is the truth about statins?

**MailOnline**

Statins do NOT have major side effects,  
claims study: Research finds users less  
likely to suffer maladies than control group

# Study of effect of media on statin prescribing



Carried out in UK CPRD in January 2011 - April 2015

Initiation & cessation of prescriptions

Exposure time period: October 2013 - March 2014

Outcome: Initiating or stopping statins within each month throughout the study period

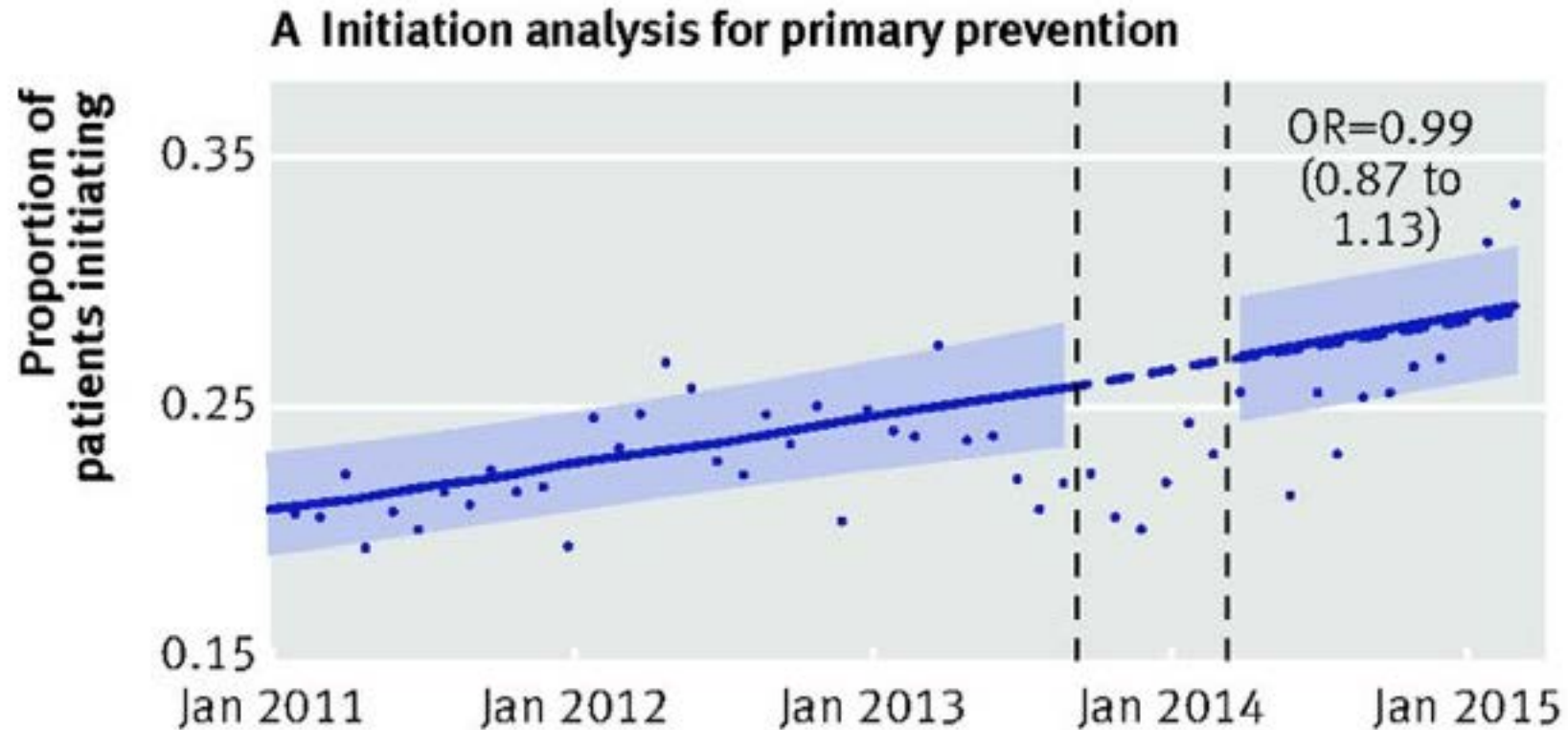
Matthews, A., et al., Impact of statin related media coverage on use of statins: interrupted time series analysis with UK primary care data. *BMJ*, 2016. 353: p. i3283.

# Statistical Analysis

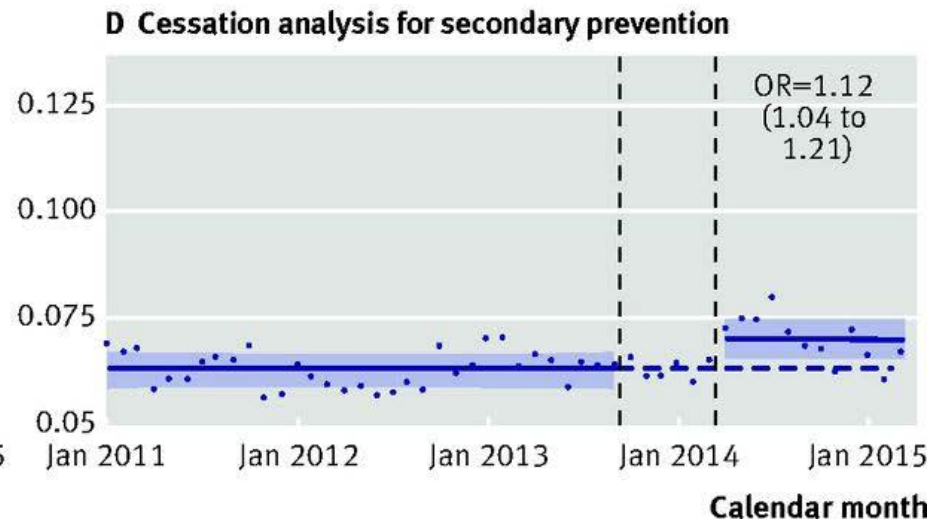
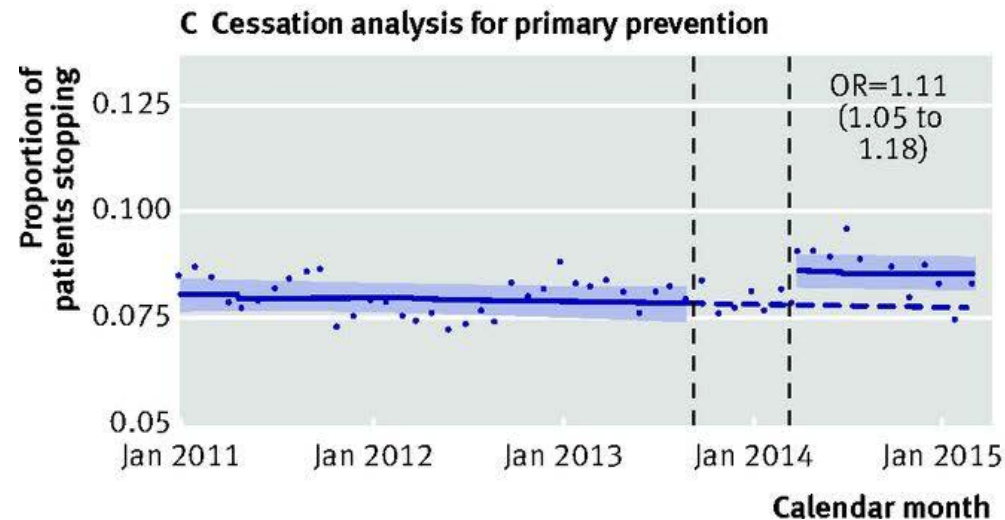
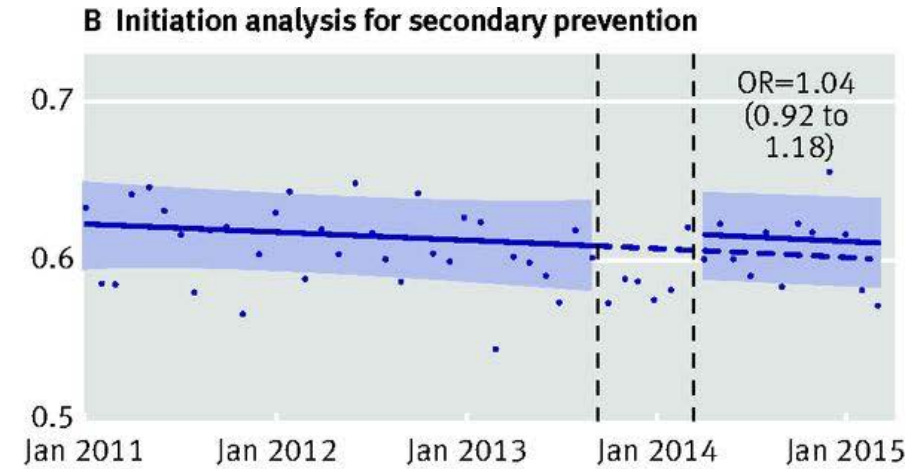
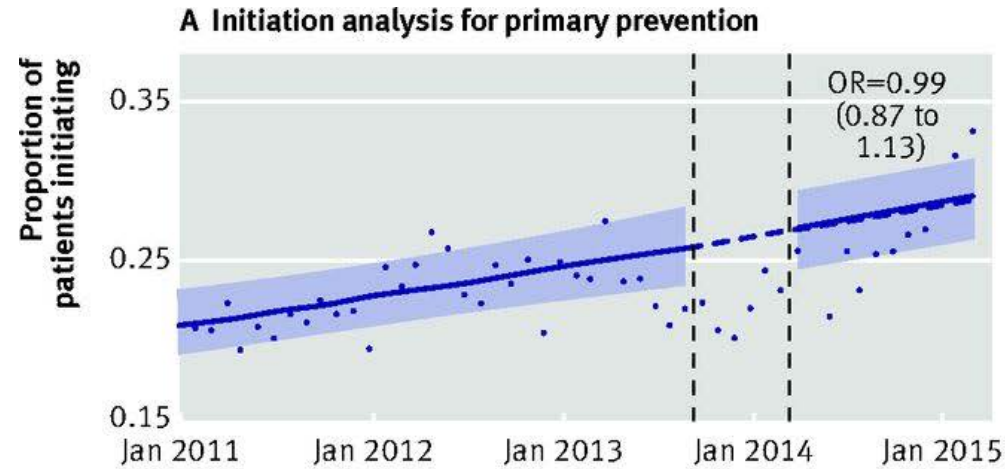


- Interrupted time series analysis
- Using a generalised linear model with a binomial error structure
- Allowed for varying monthly numerators and denominators
- Modelled changes in the proportion of patients initiating and stopping statin therapy for primary and secondary prevention before and after the exposure time period
- ***But the effect of cessation on CVD outcomes themselves was not measured. It requires some thought as to how this could be done.***

# Results – Primary analyses

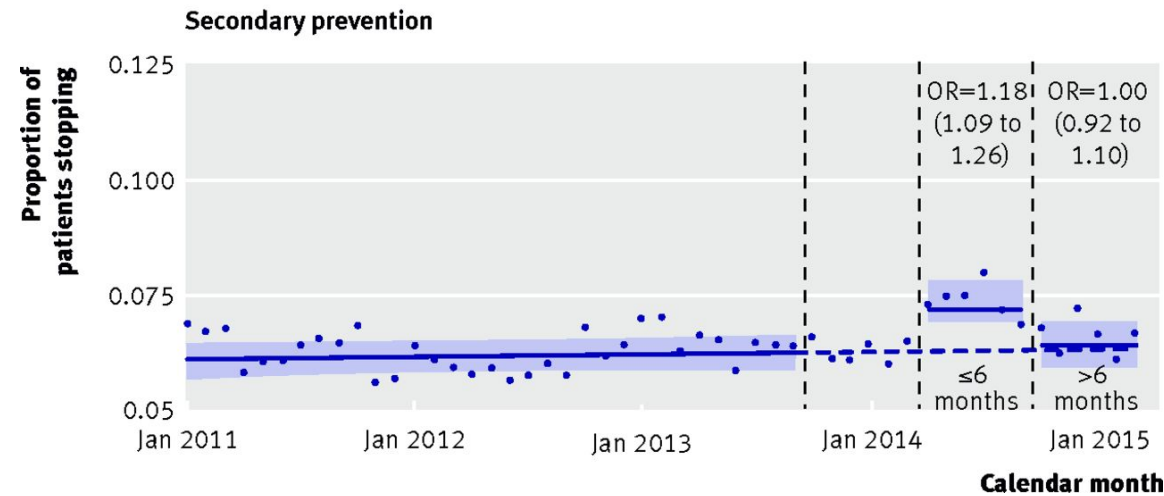
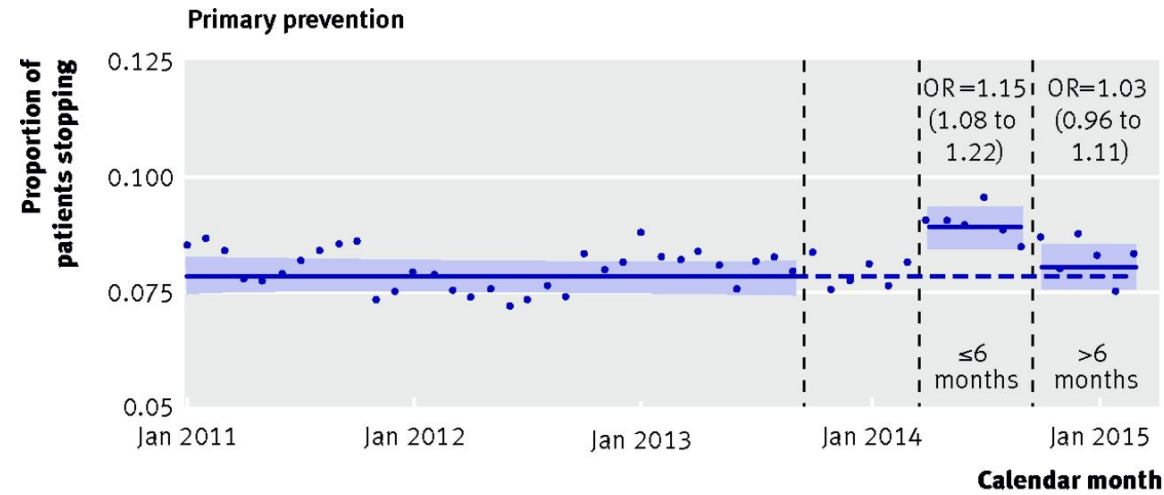


# Results – Primary analyses





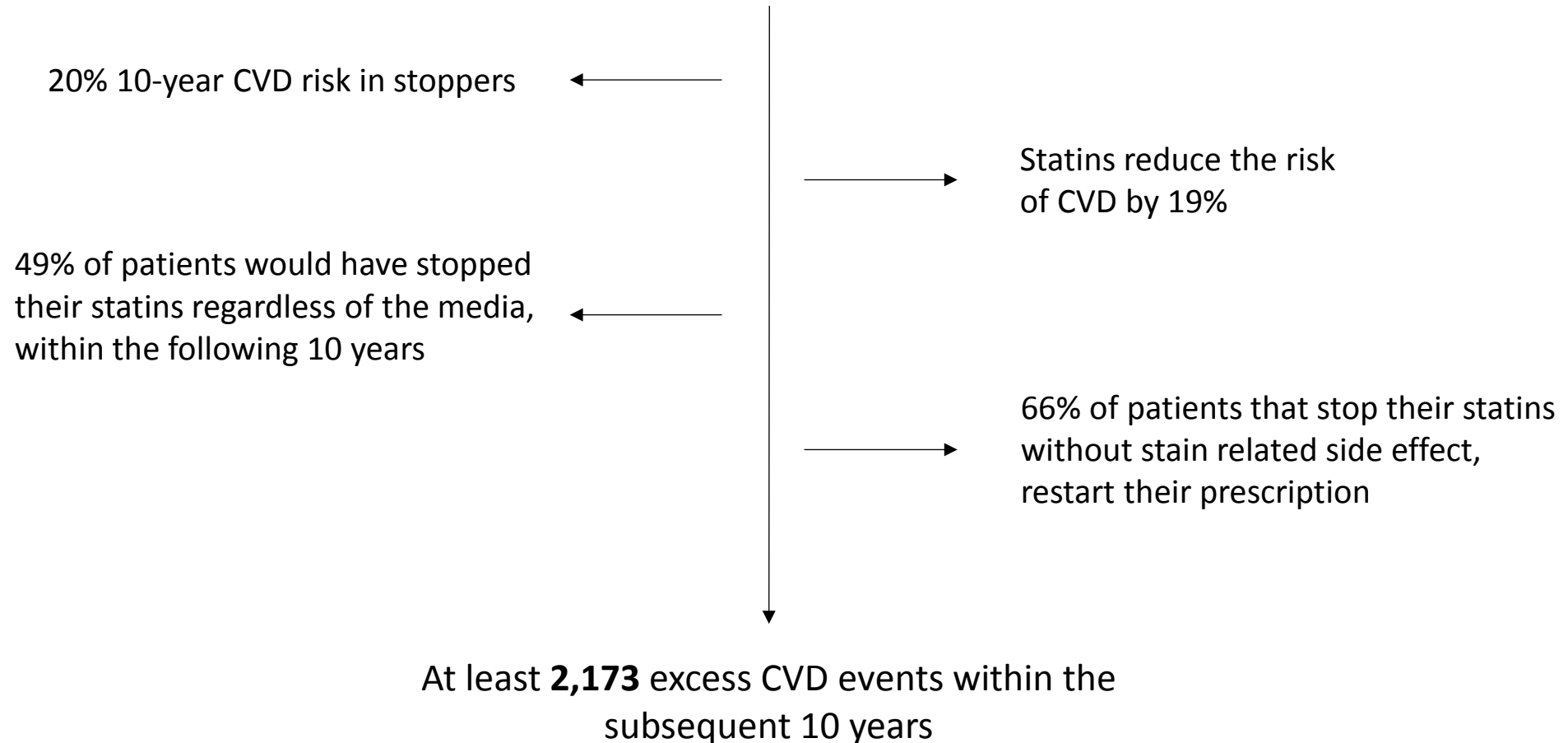
# Results – How long did the increase in cessation last?



# Public Health Impact



**218,971** excess patients stopping statins in the 6 months following the media coverage



# Impact



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WEDNESDAY, JUNE 25, 2016 www.dailymail.co.uk DAILY NEWSPAPER OF THE YEAR 65p WHEN YOU SPEND £40 AT   
RETAIL AND FIVE STAR PAGE 12

**Victory, vitriol and the craziest few days of my life**  
**SARAH VINE** AKA MRS MICHAEL GOVE SEE PAGE 17

**Experts say warnings that made patients stop taking vital drug have put lives at risk**

**DON'T GIVE UP YOUR STATINS**

By Ben Spencer  
Medical Correspondent

**MORE than 200,000 patients stopped taking statins because of fears over side-effects, experts said last night.**

They estimate that as a result at least 800 lives will be lost by 2024. Campaigning medical journals with 'an axe to grind' were blamed for having misled both patients and their doctors. Taken by up to ten million Britons a year to cut cholesterol and ward off heart disease, statins are said to save around 7,000 lives annually. However there is controversy over side-effects that include muscle pain, nosebleeds, headaches and higher risk of type 2 diabetes. The experts from the London School of Hygiene and Tropical Medicine logged a 210,000 drop-off in statin usage from October 2013. That was at the peak of the row about the potential problems with the drugs. The blip lasted around six months - after which most patients resumed their treatment. The research team said however even this short period could be responsible for at least 2,300 extra strokes and heart attacks in the decade up to 2024, killing more than 400 people. They blame papers published by the British Medical Journal in July 2013 that claimed the risks of taking statins were far more serious

**New bawls please ... it's little Miss Murray** PAGE FIVE



Turn to Page 2

Debut baby: Andy Murray's four-month-old daughter Sophia makes her first appearance at Wimbledon yesterday

# Impact of change in paracetamol pack size

- Hawton et al. Long term effect of reduced pack sizes of paracetamol on poisoning deaths and liver transplant activity in England and Wales: interrupted time series analyses. *BMJ* 2013;346:f403

