Reviewer's report

Title: Variations in statin prescribing for primary cardiovascular disease prevention: cross-sectional analysis

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Reviewer: Jan Van der Meulen

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This is a paper describing variations in statins use in England for primary prevention of cardiovascular disease using a database of prescriptions and a database of GP practice characteristics. The analysis is carried out at GP practice level.

The authors had to overcome two main challenges. First, they had to standardise the statins that were prescribed using the daily defined doses so that they could calculate the number of patients that received a prescription. Second, they had to allocate some of the statins prescriptions to primary and some to secondary prevention of cardiovascular disease.

It was concluded that the absolute estimated prescribing rates were lower than expected given the prevalence of high CVD risk groups and that there were social inequalities.

Compulsory revisions

The paper contains a large number of deficiencies which are minor in itself but all together undermine what could be a good paper. They authors show a lack of attention to detail. I'll give a number of examples:

1) On page 2, they write in the Methods paragraph of the Abstract: "Linear regression modelling of data including estimates for prescribing rates of statins for primary CVD prevention, IMD quintile, proportion of population from an ethnic minority, and age of 65 years." Albeit not "wrong" this sentence could be a lot clearer and reflect better the structure of the actual analysis: "Linear regression was used to model prescribing rates of statins for primary CVD prevention as a function of IMD quintile, proportion of .... and age over 65 years."

2) There is no mention in the Abstract of the methods they used to overcome the two main challenges that were mentioned above.

3) On page 2, the Results paragraph of the Abstract does not contain any quantitative results.

4) More subtle but indicative of a lack of attention to detail: in Results paragraph of Abstract, the authors write "Practice with higher estimated levels of statins prescribing ... had a smaller proportion of ethnic minorities, were less deprived and had fewer elderly patients", which doesn't reflect the structure of the analysis with has prescribing levels as dependent and the practice characteristics as
independent variables. Confusingly, the results are also summarised in the
Conclusion paragraph in a correct way (in terms of distinguishing dependent and
independent variables but now referring to lower prescribing rates (in other
words, changing the direction of the way the results are being presented). In all,
no major mistakes were made but a lot of subtle little stumbling blocks for the
reader were created.

5) In Introduction, the "UK" is mentioned several times, and I thought that in
several places should be replaced by "England".

6) In the Introduction, the authors refer to the "QOF" without introducing the
acronym or explaining what it is which is required for an international readership.

7) The standardisation of statin use based on the "defined daily doses" should be
to better explained (page 5).

8) It is also unclear to what extent the different data sources all relate to the
same period (the data on statins prescribing is from 2006/7). See for example,
the description of data sources at bottom of page 5.

9) The adjustment for the fact that patients can have both CVD and stroke should
be described in greater detail in this paper rather than referring to another
source.

10) I did not fully understand how some of the sensitivity analyses were carried
out. The authors "assumed only patients with heart disease and stroke who had
a cholesterol < 5 mmol/l were taking a statin." What does that mean in practice?
They also assumed that only 70% of prescriptions were dispensed. How does
this related to the adherence factor of 1.25 that they originally used (I thought a
factor of 1.25 suggested that 80% (=1 / 1.25) of prescriptions were dispensed
which does not differ a lot from 70%),

11) "dependant" should be "dependent" (page 8).

12) What criterion was used to decide whether a data point was an "influential
outlier" (page 8).

13) I'm confused about what is meant by "1% increase in relative prevalence"
(page 8)? What does this mean? How does this relate to the results presented in
Table 2? A better link between text and tables would help the reader to digest the
result.

14) An example of poor writing: "There was evidence for inequity with lower
estimates of statins .... with respect to ethnicity ....and social deprivation." This
statement can be a lot clearer and easier to read with a bit rewriting.

15) "Estimates of prescribing rates were lower than anticipated given the
prevalence of diabetes, hypertension and the population over 65 years." What
rate did the authors anticipate and what were these anticipated rates based on?

16) Tables 1 an 2 present GP practice characteristics but some are included only
in Table 1 and not in Table 2 and some only in Table 2 and not in Table 1. Also,
the order of presentation of the common characteristics is different. The authors
seemed to have used the standardized coefficients to order the characteristics.
However, given that there are positive and negative coefficients this order of the
numerical value doesn't reflect the effect size.

14) I would invite the authors to address these issues - and perhaps a few more that I did not list - in order to increase the quality of the paper.

**Level of interest:** An article of importance in its field

**Quality of written English:** Not suitable for publication unless extensively edited

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I don't have any competing interests.