Author's response to reviews

Title: Diagnostic labelling and other GP characteristics as determinants of antibiotic prescribing for acute respiratory tract episodes

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Author's response to reviews: see over
Response on the referees’ comments

Diagnostic labelling and other GP characteristics as determinants of antibiotic prescribing for acute respiratory tract episodes

Referee 1:

Major Compulsory Revisions:

1. The notion of ARTEs is a worry. It will be an unfamiliar term to most GPs, who commonly call them something like ‘acute respiratory infection’, ARI’s or ‘upper respiratory tract infections’, URTIs and so on. To most of us the issue is less whether the episode is an infection, as whether the infection is viral or bacterial. It is a pity this was not the discriminator.

   We have chosen for acute respiratory tract episodes, because ICPC-codes like “nasal congestion” and “earache” may not always indicate an infection. The concept of acute respiratory tract episodes addresses symptoms as well as infections. Furthermore, the issue whether the infection has a viral or bacterial origin is not as important as doctors may think. After all, most bacterial infections do not need to be treated by antibiotics. To make the abbreviation more familiar to GPs, we have changed this from ART into acute RT.

2. The whole design concept is dependent on the way patients with acute ARTEs are distributed among GPs is homogenous. However there may other factors operating that the authors may have not taken into account. In particular we know that patient behaviour is influenced by doctors’ prescribing habits. Could there not be similarly operating some influence of patients who want antibiotics to find the doctor in the practice more likely to prescribe them? This might explain the added correlation with the volume of acute RT.

   We agree that patient behaviour is influenced by doctors’ prescribing habits and thus the incidence of acute RT presented to a GP (patient behaviour) may be related with doctors’ prescribing habits. In this relation diagnostic labelling might be an intermediate factor: GPs who label acute RT episodes more as infections than as symptoms might trigger patients to revisit the GP on a subsequent occasion. Therefore, we have explored if diagnostic labelling and the incidence of acute RT episodes presented to a GP were independently associated with the volume of antibiotic prescriptions for acute RT episodes. We have demonstrated that both patient behaviour (i.e. the incidence of acute RT episodes) and diagnostic labelling are correlated with doctors’ prescribing habits and that the incidence of acute RT episodes is not correlated with diagnostic labelling.

Minor Essential Revisions:

1. It is worth making things clearer in the Abstract: ‘Diagnostic labelling’ should be spelled out as “the proportion of acute respiratory episodes to be labelled infections”; and the ‘volume of prescribed antibiotics’ should be called “number of antibiotic prescribed per listed patient per year”.
We have accordingly changed the sentence.

2. In general the English needs copy-editing to ensure quality (eg p10 here is a tautology in the beginning sentences; and GP’s should be GPs’).
   We have changed text into: “Male gender and GPs’ endorsement of the need of antibiotics in case of white spots in the throat were relatively weakly associated with the volume of antibiotic prescriptions for acute RT episodes.”

3. In the Abstract in particular I think it is necessary to explicitly describe the time duration of the study.
   We have changed text into: “Data of a 12 months period were analysed by means of multiple linear regression analysis.”

4. ref 10 should have one of the earlier studies by Howie which really were the first introduction of the idea of diagnostic labelling being an effect rather than a cause.
   We have replaced reference 12 by:

Referee 2:

Major Compulsory Revisions:

1. Introduction: Studies should be cited as the referenced term or by the author and not as ‘the 2001 study’.
   We have changed text into
   "In all, the DNSGP-2 is assumed to provide...”.

2. Introduction: Please give the reference for the ICPC-1 diagnostic code.
   We have added the reference:

3. Methods: The term antibiotic should be defined – did it include quinolones also?
   We have introduced in text: “...(ACT) [18]. Antibiotics were identified by ATC-code J01. Acute RT episodes...”. 

4. Methods: How can GPs medical knowledge on antibiotic prescribing be assessed on a 10 point scale on a questionnaire? Were the questionnaires personally administered or were they mailed? This seems to be a self-assessment and is a very subjective assessment and seems to be indicated by the high score attained with low SD.
   The questionnaire sent to the participating GPs contained 10 questions on respiratory tract infections and antibiotics, which had to be answered by “right” or “wrong”. (E.g.” If antibiotics are indicated in case of acute otitis media, amoxicillin is the first choice antibiotic” and “Hemophilus influenzae is sensitive to co-trimoxazol). The answers were sent back and scored by our research team. Every good answer produced 1 point.
5. Methods: The data in Table 2 on Views on respiratory tract symptoms and antibiotics is not discussed in the Methods. 
   We have mentioned these views in the Methods section, paragraph Questionnaire: “..., views on RT symptoms and antibiotics rated on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree) [19,20] and GPs’ medical knowledge...”.

6. Results: In Table 2, the rate of ART episodes per 1000 patients/year is 236.9 (in the text) or 275.9? The right number is 236.9, so we have changed the number in Table 2 accordingly.

7. Results: Demographic analysis of the patients should be presented and also analysed for associations with prescribing. Age, gender, social class, rural or urban location etc. may be predictors of prescribing. It would be interesting to see differential prescribing rates for children and adults.
   A paper regarding determinants of consulting the GP and the GPs’ management is in press:

8. Results: Did the authors look at associations between prescribing broad and narrow spectrum agents? Was there any pattern for the prescription of cephalosporins, macrolides, quinolones etc?
   We have published a study on this subject in 2005:

9. Results: Does the database indicate if GPs requested any investigations or did the questionnaire look for this (This was not directly related to the main outcome measure – perhaps the authors did not have these data?).
   We do not have these data. As far as we know Dutch GPs seldomly use additional investigations in acute RT episodes.

10. Results: The results talk of ‘no difference between upper and lower ARTs (page 8). Where is the data on the distribution of RTIs as URTIs or LRTIs?
   Data (not in text):
<table>
<thead>
<tr>
<th></th>
<th>AB prescriptions/ 1,000 patients</th>
<th>episodes/ 1,000 patients</th>
<th>AB prescriptions/ episode</th>
</tr>
</thead>
<tbody>
<tr>
<td>upper acute RT</td>
<td>60.9</td>
<td>150.3</td>
<td>0.41</td>
</tr>
<tr>
<td>lower acute RT</td>
<td>36.4</td>
<td>45.8</td>
<td>0.42</td>
</tr>
</tbody>
</table>

11. Results: Male gender of the GP is a predictor for prescribing in the Conclusions on page 14 but it is not stated in the Results. Is this finding consequent to the representation of male GPs in the database?
   The (weak) association between male gender and the volume of antibiotic prescriptions of acute RT episodes has been stated on page 10.

12. Discussion: GPs persist in prescribing after diagnostic labelling irrespective of the frequency of ART episodes indicating their prescribing habits have set in over an average
of just 18 years after registration. Though approximately half the number of GPs (54%) consulted the national guidelines once a week, 56% of them had seen a pharmaceutical representative in the preceding month before the questionnaire. There are issues here which need to be discussed e.g. on the importance of educational interventions for rational prescribing. The authors should emphasise the necessity of CME programs for GPs to avoid prescribing for symptoms and discuss interventions to reduce such antibacterial prescribing.

We agree, so we have changed text in the Conclusion paragraph into:

"... Therefore, quality assurance programs and postgraduate courses should emphasise to use evidence based prognostic criteria (e.g. chronic respiratory co-morbidity and old age) as an indication to prescribe antibiotics in stead of single inflammation signs or diagnostic labels. Structured peer review groups combined with (postgraduate) education of GPs may be suitable methods to implement such recommendations."

13. Discussion: Reference nr.12, I could not get the fact as the authors state on diagnostic labelling form Howie’s paper. Please check it.

We have changed this reference (see Referee 1, remark 4).

14. Conclusion: Diagnostic labelling is not correlated with the number of ART episodes – so how do the authors conclude that ‘The more ART episodes are presented to a GP----the more GPs prescribe antibiotics for RT episodes.’??

We have concluded that diagnostic labelling is not correlated with the number of acute RT episodes. However, both diagnostic labelling and the number of acute RT episodes/1,000 patients presented to a GP are correlated with the volume of antibiotic prescriptions. So, it is correct to conclude that ‘The more acute RT episodes are presented to a GP, and the more GPs label these episodes as infections rather than as symptoms, the more GPs prescribe antibiotics for acute RT episodes.”

15. Conclusion: Male gender is a determinant likely due to 75% of males among the GPs. According the multiple linear regression analysis male gender is an independent determinant which means that the association cannot be attributed to the relatively high prevalence of males (75%) among the participating GPs.

16. Suggest the title to be altered to read as ‘Diagnostic labelling as determinant of antibiotic prescribing for acute respiratory tract episodes in general practice.’

We have accordingly changed the title.
Referee 3:

Minor Essential Revisions:

1. The research question in this paper is rather complicatedly formulated and could probably be reformulated in a more simple way.
   We have changed text into:
   "Therefore the present study explored if diagnostic labelling, the incidence of acute RT episodes presented to the GP, and other GP characteristics were associated with the volume of antibiotic prescribing for acute RT episodes. This study was based on data of a nationwide study."

2. I also find the used terminology a bit confusing. “Volume of prescribing” could maybe be replaced by “tendency to prescribe” which expresses better what is meant. 
   Replacing “volume of prescribing” by “tendency to prescribe” might suggest that we only have measured GPs’ inclination to prescribe antibiotics. However, we have used actual prescribing data and so we have chosen to use “volume of antibiotic prescribing”.

3. It would also maybe more accurate if “incidence of ART episodes presented to the GP” was used and not the more general “incidence or ART episode”.
   We agree and have accordingly changed text.

4. p6 last sentence “assuming the variation of the incidence of ART infections among practices is rather zero…” I think the authors meant to say that the distribution of the various kinds of infections is the same in different practices so that differences in labelling can be considered as a characteristic of the GP or practice, but as this “incidence” (meaning the total number of ART) is also used as one of the determinants of antibiotic prescribing this is rather confusing.
   We agree. We have changed text into:
   "…assuming that the distribution of the various kinds of acute RT infections is about the same among the participating practices, while…”.

5. “inclination to prescribe new drugs”: is this self rated?
   The questionnaire sent to the participating GPs contained 5 items on prescribing new drug, which had to be scored form 1 (strongly disagree) to 5 (strongly agree). The score of these items were summarised by our research team and divided by 5 to get a scale from 1 to 5.

Referee 4:

1. page 2 (methods section): Multiple Linear Regression Analysis should replace Multivariate Linear Regression Analysis.
   We have accordingly replaced these words.

2. In page 20, Explained variance should be replaced by Variation explained by the model.
   We have accordingly replaced these words.