Author's response to reviews

Title: Perceived risk, anxiety, and behavioural responses of the general public during the early phase of the Influenza A (H1N1) pandemic in the Netherlands: results of 3 consecutive online surveys.

Authors:

Marloes Buls (bultsm@ggd.rotterdam.nl)
Desirée J.M.A. Beaujean (desiree.beaujean@rivm.nl)
Onno de Zwart (dezwarto@ggd.rotterdam.nl)
Gerjo Kok (g.kok@maastrichtuniversity.nl)
Pepijn van Empelen (p.vanempelen@erasmusmc.nl)
Jim E. van Steenbergen (jim.van.steenbergen@rivm.nl)
Jan Hendrik Richardus (j.richardus@erasmusmc.nl)
Hélène A.C.M. Voeten (voetenh@ggd.rotterdam.nl)

Version: 2 Date: 24 September 2010

Author's response to reviews: see over
Comment reviewer 1:

Minor essential revisions

Background

1) Paragraph 1, last sentence : please give a reference.

*In the revised manuscript, we refer to Rothberg MB and Haessler SD (Complications of seasonal and pandemic influenza. Critical Care Med 2010, 38:e91-7). In their review they describe that, in contrast to seasonal influenza, severe disease from pandemic H1N1 concentrated in older children and young adults. They also conclude that most complications have occurred among previously healthy individuals.*

2) Paragraph 2 last 2 sentences; For flow I would advise the 2nd last sentence “When the World...” be moved to the end of Paragraph 1. The last sentence “In the Netherlands...” moved to be the first sentence of Paragraph 1 and start the next sentence with ‘Nevertheless, during the 2009...”

*As the reviewer advised we have moved some sentences for a better flow of the information described in the background section.*

3) Paragraph 3: Add Seale et al who performed a general public survey using cross sectional design.

*In the revised manuscript we added Seale et al. (Why do I need it? I am not at risk! Public perceptions towards the pandemic (H1N1) 2009 vaccine. BMC Infect Dis 2010, 10:99) as a reference. They assessed the beliefs, perceived risk and attitudes of the Australian community towards the influenza pandemic and willingness to accept the pandemic (H1N1) 2009 influenza vaccine.*

Methods

4) Timing: The second data collection period has the end date, please give the start date.
The second data collection period started on 15 June and ended on 19 June 2009. Now, the start and end dates are clearly mentioned for all the three data collection periods.

5) Participants: This section needed several readings. To clarify who constituted the study group it would be helpful to use the first sentence to state the study population from whom the study group was selected. Please include that ‘all’ respondents of the first and second survey were invited to participate (i.e. unlike the first and second survey the third survey were not at random selected from the 1st and 2nd).

The participants section is now described as follows:
‘At three different time points, an online survey was filled out by a representative internet panel, named the Flycatcher panel (www.flycatcher.eu). This panel consists of people from the Dutch general public who volunteer to participate in online questionnaire surveys. The Flycatcher panel consists of 20,000 members. The distribution of demographic variables (gender, age, region, and level of education) of the panel members is comparable to the general Dutch population. The panel meets high quality requirements and is ISO-certified. For the first and second survey, independent random samples were drawn of approximately 1000 panel members aged 18 years and older. All respondents of the first and second survey were invited to participate in the third (follow-up) survey. Panel members who participated in the first or second survey but did not respond to the follow-up survey (n=255) were excluded from further analysis. Sampled panel members were invited to participate in this study by sending an email with an Internet link. The surveys were online for a period ranging from 5 to 10 days. Panel members received 1.50 Euro in credits for completion of the survey, which could be exchanged for gift vouchers.’

Online questionnaire

6) For researchers not familiar with behavioural theories a very brief rationale for the choice of these two specific ones over say the theory of planned behaviour which includes a control construct would be helpful. A discussion about control on risk perception and intention might be useful to consider in your Discussion section.

We used the Protection Motivation Theory and the Health Belief Model because risk perception is one of the central constructs of these theories. These theories are successfully
used in studies on risk perceptions and behavioral responses during outbreaks of SARS and Avian Influenza [see ref. 1, 2 below]. As the reviewer described, the Theory of Planned Behavior (TPB) includes a control construct, namely the ‘perceived behavior control’ which refers to people’s perception of their ability to perform a given behavior. Perceived behavior control of the TPB is comparable to ‘self-efficacy’ of the PMT, as used in our survey, which refers to the level of confidence in one’s ability to take measures. Because these constructs are comparable, a further explanation in the discussion section is not necessary.

In the questionnaire section we now give a brief explanation why we applied these theories and we explain the meaning of the constructs, which makes it easier to understand for researchers not familiar with behavioural theories:

‘The questionnaire was based on an integrated model to explain health behaviour, including constructs from the Protection Motivation Theory (PMT) [31] and the Health Belief Model (HBM) [32]. These theories were applied because risk perception is one of the central constructs. Risk perception is specified as a combination of perceived severity (a person’s belief on how serious contracting the illness would be for him/her) and perceived vulnerability (a person’s perception of the chance that he/she will contract the disease). Furthermore, the PMT has two other key constructs besides risk perception, namely response efficacy (a person’s belief in the effectiveness of the preventive measure) and self efficacy (a person’s level of confidence in his/her ability to perform the preventive measure). The PMT states that a high risk perception will only lead to preventive behaviour if response efficacy and self-efficacy are also high.’

7) Clarify that the three survey periods used the same survey.

In the online questionnaire section we now describe that:
‘The questionnaire was similar across the three survey rounds’.

8) Mention whether there were any constructs with a Cronbach alpha <0.6 dropped from the first step of the MLR model?

As mentioned in table 2, Cronbach’s alfa of the measured constructs ranged from 0.6 to 0.9, which means a (very) good internal consistency. So, there were no constructs with a Cronbach’s alpha <0.6.

9) Has there been any test retest reliability of the 1-5 scale?
We did not do a test-retest study of the questionnaire used in our study. This was not possible, because the Influenza pandemic was ongoing. During a real pandemic, with increasing threat and media attention, one will never get consistent answers on different time points because the perceptions and behavioural responses are changing as a result of the ongoing pandemic. We however performed a test-retest study with a comparable questionnaire, dealing with risk perception and behavioral responses in a hypothetical scenario of an outbreak of Bordetella pertussis in a day care center or primary school. Two consecutive measures were held amongst parents of 0-12 year olds, 2-3 weeks apart from each other. The test-retest reliability of 55 items (on a 1-5 scale) was measured. Of these items 13% had a weak correlation (0.3-0.5), 75% an intermediate (0.5-0.7) and 11% a strong correlation (>0.7). This overall ‘intermediate’ correlation may be related to the fact that parents may have no clear view of pertussis, because they are unfamiliar with the disease. Thus, these results are not so relevant for the current study and we do not mention them in our paper.

Analysis

10) Move the first sentence to Participants. I would also move all development of constructs to the development of the online questionnaire to allow readers to fully understand how you’ve developed the constructs before moving to the next subsection of the methods. This will leave only the chosen statistical analysis used in this section.

As the reviewer advised we have moved the first sentence to participants section. The development of construct was moves to the online questionnaire section to get a better flow and make it fully understandable for the readers how we’ve developed the constructs. In the analysis section we now only describe the chosen statistical analysis.

Results

11) It would be helpful for readers around the world to have lower, intermediate and higher education described briefly in the Methods section.

The different educational levels are now specified as: lower education (i.e. primary education, lower general or lower vocational education or less), intermediate education (i.e. secondary general or vocational education) and higher education (i.e. higher professional education or university).

12) Have you examined the unemployment in the study group by age group? The
study group is more likely to be 50 years of age or older and less likely to have an 18 year child living at home suggesting that your study group may be retired rather than unemployed.

We cross tabulated employment by age group. Among the 18-29 year olds 23% was unemployed; among 30-49 year olds 21% and among the 50+ year olds 64%. Indeed our group is retired rather than unemployed. We therefore replaced ‘unemployed’ by ‘unemployed/retired’ in the revised paper.

13) Mention the number of steps from the first to the final model.

To clarify our multivariate analysis procedure, we now explain that: ‘For the multivariate regression analysis, all factors with a p-value<0.1 in the univariate analysis were entered in the multivariate model, and taken out one-by-one (starting with the most insignificant one etc.) until only statistically significant predictors (p<0.05) remained.’ With this description we implicitly indicate the number of steps in the procedure. Adding the exact number of steps is not informative.

Major revision

Methods - Online questionnaire

14) The development of several composite scales is usual practice and Table 2 explains each item for each construct. However, once you make a decision to use a composite scale an examination of the individual items (as in Table 2) undervalues the construct. I would move Table 2 to an appendix with the Cronbach alpha for survey 1 and remove all analysis between the survey periods.

The first objective of this study was to identify trends over time in risk perception, feelings of anxiety, and behavioural responses. Because we did 3 surveys, we were able to analyze trends over time. These time trends make clear how people react over a period with changing risk and publicity. This provides useful and interesting information, for example for local and national health institutes.

The composite scales are calculated by adding up the individual items and dichotomize the outcome on the median. This was done to get a (close to) 50%-50% distribution, which would give most power in the logistic regression analysis. These composite scales are not mean scores, and therefore cannot to be interpreted in an absolute sense; they only make sense in
the comparisons over time. The individual items are of great value because they can be interpreted in an absolute sense, and give useful information at one time point. For example, as we look at the intention to take preventive measures we can see that the intention to get vaccinated against the Influenza A (H1N1) at a certain moment is 77% whereas the intention to stay home is 57%.

15) With sample sizes relatively large and so I am surprised all constructs of a 1-5 scale were recoded into a dichotomous scale. Have you attempted a multiple linear regression entering the independent constructs as 1-5 scales (sum all items and divided by total number of items to get the scale back to 1-5) with the dependent variable on 1-5 scale. Then present the range, median and interquartile range for each in a new Table 2. Use the interquartile range to standardise the beta coefficients (IQR*beta coefficient prior to exponentiation) of each of the significant predictors in the two models. This way you can compare the effects of each construct on the dependent variable because each construct is now standardised.

The second objective of this study was to assess factors significantly associated with 1) taking preventive measures and 2) strong intention to comply with government-advised preventive measures in the future.

Ad 1) Because the first outcome is a binary outcome, we cannot perform linear regression analysis. We did however perform a logistic regression analysis including the independent constructs as continuous variables on a 1-5 scale (as suggested by the reviewer: by summing all items for a specific construct, divided by the total number of items), rather than as dichotomous variables. Results are shown in Table 1 below. The predictors were completely the same compared to the original analysis.

Ad 2) To assess factors significantly associated with intention to comply with government-advised preventive measures we performed a linear regression analysis. Both dependent and independent variables were entered as 1-5 scales (again by summing the items and divide it by total number of items to get the scale back to 1-5). Results are shown in Table 2 Below. Except for perceived severity, the predictors we find in the final linear regression model were also present in the original analysis.

So, the results of new and the original analysis are very similar. There are a number reasons why we prefer to retain our original analysis. First, the interpretation of the results using dichotomous summary scales is easier and better to understand for the wider public of the BMC Public Health. For example, an odds ratio of 2.0 that refers to a dichotomous predictor as low/high perceived anxiety is easy to understand (‘people with high anxiety twice
more often took preventive measures than people with a low anxiety); for an anxiety scale of 1 to 5 this is less easy to interpret. Second, presenting the results from a logistic and linear regression analysis in one table may be confusing. Third, when performing a linear regression, the predictors should meet the ‘assumption of linearity’, which means that the relationship between the predictor and dependent variable has to be linear. Most predictors we used are normally distributed. To fix this, the data can be transformed, but makes the analysis more difficult and the results hard to interpret.

In the discussion section, at study limitations, we have added a sentence: ‘In the logistic regression analysis we may have lost some power, because we used dichotomized summary scores as predictors. However, we have performed additional regression analysis with the predictors as continuous variables, and found minimal differences (data not shown).’

16) Table 3 presents the survey 3 – why not model surveys 1 and 2 as the three surveys represent different periods during the 2009 H1N1 season.

The second objective of this study was to assess factors significantly associated with taking preventive measures and strong intention to comply with government-advised preventive measures in the near future. We used data from survey 3 (August 2009), because a substantial amount of people took preventive measures at that moment (resp. 40%) compared to survey 1 (11%) and survey 2 (14%). In the revised manuscript we now declare why we used data of survey 3: ‘For the regression analysis we used data from survey 3 (August 2009), when a substantial amount of people took preventive measures (resp. 40%) compared to survey 1 and 2 (resp. 11% and 14%).

Analysis

17) I think the choice of presenting both univariate analysis and multivariate models leave readers with the dilemma about which analysis is preferable. Present the multivariate if the premise is that there will be a complex statistical dependence among independent variables. If you believe that participants’ perceived severity is not developed in the absence of say perceived vulnerability then presenting univariate analysis as well only causes confusion rather than add to the understanding of behaviour. On this basis I would remove the univariate analysis from Table 3.
Presenting data of both univariate and multivariate logistic regression analysis in one table is common practice in epidemiology. It shows how the predictors are associated with the outcome, without the influence of other factors (univariate), but also when other factors are included (multivariate). The shifts between univariate and multivariate logistic regression analysis are interesting. For example, perceived severity is univariately associated with taking preventing measures, but not significant when other factors are included in the model. Presenting both univariate and multivariate analysis in one table is a common way of presenting these data and used in a lot of studies.

Results

18) Given my suggestion that Table 2 be removed to an appendix without analysis between surveys for individual items the results pertaining to this table can be removed from the Results and focus of the impact of the your models.

See answer on point 14.

References (mentioned in the reply to the reviewer)


Table 1: Factors associated with taking any preventive measures regarding Influenza A (H1N1) (survey 3, n=934)

<table>
<thead>
<tr>
<th>Taking one or more preventive measures</th>
<th>Logistic regression - dichotomous predictors (old)</th>
<th>Logistic regression - continuous predictors (new)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR&lt;sub&gt;m&lt;/sub&gt;, 95% CI p-value</td>
<td>OR&lt;sub&gt;m&lt;/sub&gt;, 95% CI p-value</td>
</tr>
<tr>
<td><strong>Children &lt; 18 yrs in household</strong></td>
<td>Yes</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>1.45 1.04-2.00 0.03</td>
</tr>
<tr>
<td><strong>Anxiety (summary score)</strong></td>
<td>low anxiety</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>high anxiety</td>
<td>1.93 1.43-2.61 0.001&lt;</td>
</tr>
<tr>
<td><strong>Perceived self-efficacy (summary score)</strong></td>
<td>low self-efficacy</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>high self-efficacy</td>
<td>1.68 1.26-2.22 0.001&lt;</td>
</tr>
<tr>
<td><strong>Avoidance statements</strong></td>
<td>(fully) disagree/not disagree-agree (1-3)</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(fully) agree (4-5)</td>
<td>1.43 1.07-1.90 0.02</td>
</tr>
<tr>
<td><strong>Attention paid to the information</strong></td>
<td>(very) little/some (1-3)</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>much/very much (4-5)</td>
<td>2.36 1.67-3.33 0.001&lt;</td>
</tr>
</tbody>
</table>

OR<sub>m</sub>: multivariate odds ratio; -: not statistically significant.
Table 2: Factors associated with strong intention to comply with measures regarding Influenza A (H1N1) (survey 3, n=934)

<table>
<thead>
<tr>
<th></th>
<th>Logistic regression - dichotomous predictors (old)</th>
<th>Linear regression - continuous predictors (new)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ORₘ</td>
<td>95% CI</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-29 years</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>30-49 years</td>
<td>1.77</td>
<td>0.94-3.35</td>
</tr>
<tr>
<td>above 50 years</td>
<td>2.61</td>
<td>1.39-4.90</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Middle</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>High</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Perceived severity (summary score)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>low severity</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>high severity</td>
<td>1.62</td>
<td>1.07-2.44</td>
</tr>
<tr>
<td><strong>Anxiety (summary score)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>low anxiety</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>high anxiety</td>
<td>2.22</td>
<td>1.44-3.42</td>
</tr>
<tr>
<td><strong>Perceived efficacy (summary score)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>low efficacy</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>high efficacy</td>
<td>2.57</td>
<td>1.77-3.74</td>
</tr>
<tr>
<td><strong>Perceived self-efficacy (summary score)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>low self-efficacy</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>high self-efficacy</td>
<td>21.53</td>
<td>14.70-31.55</td>
</tr>
<tr>
<td><strong>Reliability of governmental information</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>not (at all)/little reliable (1-3)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(very) reliable (4-5)</td>
<td>1.74</td>
<td>1.19-2.55</td>
</tr>
</tbody>
</table>

ORₘ: multivariate odds ratio; -: not statistically significant.

† Included preventive measures, i.e. 1) keep away from crowded places; 2) practice better hygiene; 3) avoid regions with the new flu; 4) wear face mask; 5) seek medical advice with the onset of flu symptoms; 6) take antiviral medication; 7) stay away from school or work; 8) get a new vaccine against the new flu.
Reviewer report 2:

1) The authors stated that the Internet panel members who responded were not fully representative of the whole Dutch population and were more likely older, Dutch ethnicity, and unemployed, and then discussed factors more likely. Yet they concluded ‘this population difference likely did not lead to bias in the trends over time or in predictors of behavioral responses’. Needs more discussion to explain (p. 9-10).

In the discussion section we now describe that:
‘The Internet panel members who responded to our online questionnaire were not fully representative of the general Dutch population. In our study, participants were more likely to be in the older age group (> 50 years) (52% versus 44%), of Dutch ethnicity (91% versus 80%), and unemployed (43% versus 24%). We cross tabulated all the measured constructs by age group (18-49 years/>50 years), employment status (employed/unemployed) and ethnicity (Dutch/non-Dutch) (data not shown). For these constructs, there were no differences between the Dutch and non-Dutch participants. Among both the older and unemployed, the perceived efficacy, self efficacy and intention to comply with measures were significantly higher, and they more agreed with statements on avoidance. Perceived vulnerability and reliability of governmental information were lower among both the older and unemployed. Furthermore, the older age group paid more attention to the information of the government. Among the unemployed the perceived severity was higher and they less agreed with the underestimation statements. This population difference may have led to a substantial bias in the absolute outcomes of table 2, but only to a small bias in the trends over time or in the predictors of behavioural responses’.

2) It may be questionable whether these results would apply across countries/states of repressive regimes which do not have the trust of the population, or across cultures, especially indigenous peoples.

This is an very interesting topic for future research. Additional studies on risk perception among the public are needed to further understand the field of preventive behavior as related to control of infectious disease. It should be very interesting to study risk perception and behavioral responses during outbreaks of infectious diseases across different countries/cultures and compare these results. We are trying to collaborate with international partners to use the same survey which allows to compare data from different countries.
3) One typo: p. 9 first prg after Discussion subtitle, line 9 - insert word ‘with’ in sentence ‘Having a strong intention to comply (insert ‘with’) government-advised preventive measures’.

*The word ‘with’ is inserted in this sentence.*
Reviewer report 3:

1) Since there is an overrepresentation of older and unemployed population in the sample, it would be interesting to understand more specifically differences in perceptions and behaviours between younger and active population and older unemployed population.

In the revised manuscript we describe in the discussion section that: ‘The Internet panel members who responded to our online questionnaire were not fully representative of the general Dutch population. In our study, participants were more likely to be in the older age group (> 50 years) (52% versus 44%), of Dutch ethnicity (91% versus 80%), and unemployed (43% versus 24%). We cross tabulated all the measured constructs by age group (18-49 years/>50 years), employment status (employed/unemployed) and ethnicity (Dutch/non-Dutch) (data not shown). For these constructs, there were no differences between the Dutch and non-Dutch participants. Among both the older and unemployed, the perceived efficacy, self efficacy and intention to comply with measures were significantly higher, and they more agreed with statements on avoidance. Perceived vulnerability and reliability of governmental information were lower among both the older and unemployed. Furthermore, the older age group paid more attention to the information of the government. Among the unemployed the perceived severity was higher and they less agreed with the underestimation statements. This population difference may have led to a substantial bias in the absolute outcomes of table 2, but only to a small bias in the trends over time or in the predictors of behavioural responses’.

2) The sentence ‘during the current study period, there was no official recommendation from the Dutch Government….campaign’ is not clear. Does it mean that the Dutch government did not issue any recommendations for the public? It would be interesting to see what was the government communication messages and when they were delivered.

Indeed, at the moment of the last data collection period in August 2009 the government was in the process of preparing a national campaign. This national campaign called ‘Fight the flu’ was launched after the third data collection period at the end of August 2009. This campaign included announcements on television and a leaflet, which was sent to every home in the country, providing information about what people can do to prevent themselves and others. Because the government had not yet actively informed the general public about the
preventive measures people have to take, we asked respondents about preventive measures which could be advised by the government in the future.

We now describe in the revised manuscript that:
‘During the current study period, there was no official recommendation from the Dutch government to take preventive measures; the government was in the process of preparing a national information campaign called ‘Fight the flu’. This campaign was launched at the end of August 2009, including announcements on television and a leaflet which was sent to every home in the country providing information about what people can do to prevent themselves and others. Because the government had not yet actively informed the general public about preventive measures, respondents were asked if they took preventive measures but also about their intention to comply with government-advised measures in the near future.’

3) Page 11. The authors mention ‘irrational’ arguments. Are these really irrational? They are certainly emotional but not necessarily irrational.

The arguments we describe focus on feelings of anxiety for the disease or fear for side effects of the vaccination or antiviral treatment. We agree with the reviewer that these emotions are not necessarily irrational. Therefore, we deleted the word ‘irrational’ in this sentence.
Editorial comments:

1) Document, within your manuscript, the name of the ethics committee which approved your study.

*In the revised manuscript we now describe in the method section that:*

‘The nature of this general internet-based survey amongst healthy volunteers from the general population does not require formal medical ethical approval according to the Dutch law.’

2) Include copies of the surveys administered in your study as additional files to your submission.

*A copy of the survey we used in our study is submitted as additional file.*