Author's response to reviews

Title: Musculoskeletal symptoms of the upper extremities and the neck: a cross-sectional study on prevalence and symptom-predicting factors at visual display terminal (VDT) workstations

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Author's response to reviews: see over
To

BMC Musculoskeletal Disorders
Melissa Norton, MD

Editor-in-Chief

Dear colleague,

thank you very much for the approval of the rather long period we needed for the consideration of the reviewers’ comments. This delay was due to requirements of a large case control study performed simultaneously.

We were very pleased by the accuracy of the reviewers’ work and found the comments very helpful to sharpen the content of the manuscript. Please find the point-by-point description of the changes made below.

Unfortunately, the native speaker who was asked to see through the final version of the manuscript will do so only in the next couple of days. Therefore, we send to you the manuscript in a provisional version with respect to the language check.

In case the content of the manuscript is judged positive we will be able to provide a text revised according to the suggestions of the native speaker.

We will be most pleased if you find this manuscript worthy of publication and look forward to hearing from you.

Yours sincerely

Monika A. Rieger, MD.

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Point-by-point description of the changes made

- changes with regard to comments of reviewer 1
  …some of the statistical analysis lacked clarity, however. I also could not understand the rationale for the selection of predictors in the final model. I also felt that the discussion could be developed in some respects (e.g. discussion of psychosocial factors).

  We extended the chapter about statistical methods and also the description of the calculations and the methods used in the survey. We made major modifications in the discussion chapter especially with regard to the comparison of our results with findings in other studies.

Page 1
i. Title: VDT should be given in full.
   added: Visual display terminals
In addition, the title was changed a little bit.

Page 3

ii. Background: I feel this would benefit from an introductory sentence setting the scene, before reporting the literature search.

This chapter now starts with the following words: “Musculoskeletal symptoms or disorders in the upper extremities and the neck among employees working at visual display terminal (VDT) workstations is a topic in occupational health research since many years. Yet, current prevalence data are rare in Germany. As working conditions may play a major role for symptom prevalence a cross sectional study should be performed focusing on workstations representative for German conditions with regard to VDT workstations’ ergonomics and work organisation. The findings should be discussed against the background of literature.”

iii. I think ‘Aim of this study’ would be a better sub-heading.

This proposal was accepted.

Page 4

iv. I would refer to a ‘workstation’ rather than a ‘workplace’ – the latter tends to be used for a ‘place of work’ (e.g. office, factory, shop).

We now use the term “VDT workstation” throughout the manuscript.

I think you probably mean ‘currently’, not ‘actually’. The temporal sense of ‘aktuell’ does not carry across to ‘actual’.

The reviewer was right – and we changed the word

vi. They received ‘advice’, not ‘advices’.

Accepted

vii. If a 95% CI for a percentage is based on an approximation, would this not be a normal approximation?

We added the following sentences: “The calculation of a binomial confidence interval relies on approximating the binomial distribution with a normal distribution. According to Sachs [38] a binominal distribution is adequate approximated to normal distribution if n*p*q ≥ 9 (n= sample, p= frequency of outcome, q=1-p).”

viii. Although it is implicit in the choice of 95% CIs, it would be good to state explicitly that alpha was set at p # 0.05 (two-tailed).

We added this information.

Page 5

ix. As there was a single outcome variable (but multiple predictors) within each model, these were ‘multivariable analyses’, not ‘multivariate analyses’.

The words were changed.

x. Maybe refer to ‘categories’ rather than ‘modules’.

This was changed.

xi. What is a ‘pseudo-correlation’; what is a ‘base confounder’? I don’t think this is usual terminology.

We got some advice of our statistician and added the following information: “The individual stress factors as well as moderating factors were derived from four categories: individual factors, workplace factors, psychosocial factors, and workplace characteristics (figure 2). Yet, they were only included into the model if no collinearity could be documented…. Variables were defined as collinear if the correlation between them was r>0.4. The variable with the
highest correlation with the outcome parameter “symptom in this region” was retained in the model; the other variable(s) were deleted. Before forming the final model, logistic regression analyses was carried out for all the categories adjusted to the significant individual factors. Only the remaining significant variables were included in the final model."

xii. What does ‘adjusted to individual significant factors’ mean? Do you mean that only the statistically significant factors were selected from the possible predictors in a particular category?
   See the annotation to point xi.

xiii. What do you mean by ‘they were reduced by the factors that correlated strongly with each other’? Do you mean that where collinearity was identified, one or more of the variables involved in the collinear relationship was removed?
   If so, how was collinearity assessed – e.g. what level of association led to a conclusion that variables were collinear?
   See above

Page 6

xiv. I think you mean that the important factors were ‘fulfilled’, not ‘given’.
   You are right – thank you.

xv. For the mean age and mean VDT use, give the s.d.s as well.
   This information is added.

xvi. When reporting symptom prevalence in the 3rd paragraph, make it clear that these are figures for the whole sample, so that readers can reconcile them immediately with the bottom row in Table 3.
   We adapted the table and the text.

xvii. 4th paragraph: you should establish the abbreviation ‘OR’ when ‘odds ratio’ is first introduced under ‘Statistical methods employed’. Note that it should be ‘odds ratio’ (as on page 4) not ‘Odds Ratio’ (as here) – but ‘OR’ is of course fine as the abbreviation. If you wish to quote the p values for individual factors, with the exception of ‘p < 0.001’, I would suggest exact p values rather than ‘p < 0.05’, ‘p < 0.01’.
   The abbreviation OR was introduced in the methods section.
   We would like to stay with the p-values of p<.05, p<.01, p<.001 as it is easy readable in the text. The exact p-values for the final model are given in table 5.

xviii. Am I reading this correctly? Did you determine a single set of predictors for all the regions (neck, shoulder etc) based on significant predictors for the individual regions? If so, this would mean that the final model for a particular region might include a predictor on the basis that it was significant in a model for another region, but not in respect of the region concerned. Why was the choice of predictors for the final model not specific to the region concerned? If there was a particular rationale for this approach, it should be given.
   Unfortunately, our text suggested this misconception. To prevent this, we changed the text of this section.
   “Despite analysing separately for individual regions (neck, shoulder, elbow/forearm, hand/wrist) the results of these steps are described cohesively as some predictors are the same. First, the initial variables (figure 2) were checked for collinearity (step 1). “

xix. The range of values of the Nagelkerke pseudo R-squared statistics is stated in the discussion, but these statistics should be stated explicitly for each model in the results section.
We added as following: “The explained variance of the final models described above was very small and resulted in an explanatory power of Nagelkerke’s R-square with 11% for the neck, 5% for the shoulder, 4% for the elbow/forearm and 3% for the hand/wrist model.”

xx. Looking across the final models across the four regions, some of the ORs, and their lower confidence limits, are very close to unity; their statistical significance is largely attributable to the large sample size. The magnitude of the associations needs to be discussed.

We added this point to the discussion section: “In the sample investigated, some predicting factors could be identified for musculoskeletal symptoms of the upper extremities. Due to the stepwise procedure applied in the multivariable analyses collinear factors could be excluded thus leading to rather slender models for the symptoms in the different regions. Yet, it has to be borne in mind that most of the ORs, and their lower confidence limits, are very close to unity and that the explained variance in the models was only small (Nagelkerke’s R-square: 3-11%).”

xxi. I had understood that age and sex were control variables in the analyses, but age does not appear in Table 5. As a control variable, it should be presented in the model (irrespective of its significance).

Age is collinear with years on the job, the latter showing more effect. Thus age was discarded and “years on the job” was included into the calculation of the final model (see table 5). There was an inconsistency between the text and the table, but we adapted this.

xxii. You refer to ‘sex’ in the text, but ‘gender’ in Table 5. In this context, ‘sex’ is probably the better term.

Is “sex” really the better term? In the literature we read both but in our ears gender sounds more familiar in this context. We changed “sex” to “gender” in the whole text!

Page 7
xxiii. 2nd paragraph: as the outcome was dichotomous, I would refer to ‘association’ not ‘correlation’.

Thank you – we changed this.

xxiv. The offer ‘to undergo’, not ‘to underwent’.

Sorry for this stupid mistake.

xxv. Please state the magnitude of the difference in the percentage of women in the subgroup, compared to the total sample.

We added this information.

Page 8
xxvi. The symptoms were ‘more prevalent’, I think, not ‘more pronounced’ (which would suggest the intensity of the symptoms, not their frequency).

You are right – thank you.

xxvii. I think the role of psychosocial factors should be discussed more fully, and related to other empirical studies. In general, a broader range of occupation medicine literature could be drawn upon in the discussion, I feel. I think possible biases connected with the use of a cross-sectional design to gather information on recalled symptomatology could be explored in more detail in relation to the study, and any attempts to minimize such biases could be explained and evaluated.

Literature was added and statements about the cross-sectional design were made in the new chapter „Limitations of the study”.

xxviii. In the tables, figures and legends there seems to be inconsistent us of ‘N’ and ‘n’. Generally speaking, ‘n’ is best when describing samples or subsamples, with ‘N’
reserved for populations. Probably the only place where it might make sense to use ‘N’ would be in Figure 1, for ‘total employees’

We changed this in the figures and tables.

Page 15

xxix. It is normally recommended that the limits of a CI are separated by a comma, not a dash.

   Was changed

Page 16

xxx. The meaning of the bold font needs to be explained in the legend to the table.

   This information was added

xxxi. The rows in table 6 seem to be labelled the wrong way round.

   We are sorry: there was an accidental interchange in the table.

xxxii. The differential shading in Figure 6 needs adjusting – the two shades are too close. Why not just have shaded vs unshaded?

   We changed the reference group in white.

xxxiii. Figure 4. A bar chart is an inappropriate display for a point estimate of an OR and CI. This needs to be an error plot. Shading is redundant, as the vertical axis identifies the categories.

   We changed the figure as suggested.

xxxiv. Figure 7. Although an argument could be made for a bar chart to display these prevalences, as the emphasis is on the point estimate and the CI, an error plot would again be better. I think this figure is referred to as ‘Table 7’ on page 8.

   See above. Yes, there was a mistake in the text!
- changes with regard to comments of reviewer 2

1. Background.
   a. Why are the literature databases only searched from 1990-2005? It is now the end of 2007. I would like to see a literature search up to date.
      The literature research was reperformed thus covering the period 1990-2007.
   b. I miss several important studies in Table 1. Only one report from the NUDATA-study, no work from Dr Gerr’s group in the US. I would like an updated review of the literature and studies included in Table 1, otherwise such a table makes no sense.
      Many studies were added, also two essential reviews were included.

2. Goal of this study. First, I think the aim of the study was to determine the prevalence of symptoms not disorders. I do not understand the second sentence and suggest that it is omitted. I suggest that this paragraph is condensed into one or two sentences which clearly describes the aim(s) with the study.

   We revised the text as follows: “The aim of this study was to determine the prevalence of work-related symptoms of the upper extremities and neck in employees who regularly perform VDT work. The cross sectional study focussed on workstations representative for German conditions with regard to VDT workstations’ ergonomics and work organisation. By means of standardised questionnaires working conditions and employees’ symptoms were assessed in order to describe approaches for preventive measures.”

3. Materials and methods. This section needs clarification. I suggest the authors use more subheadings and describe in detail what questions were included. For example, on page 6 under identification of symptom-predicting factors, line 8, the factor typing is said to have significant effects on neck symptoms. However, the reader does not know what typing is here. Was it assessed in the check-list or in the questionnaire? How was it operationalized? Used as a continuous or ordinal variable in the model?

   We made essential modifications to this chapter and explained the methods and calculations in more details.

4. Instruments. I would like a description of the check-list here, not only that relevant ergonomic information was gathered, and a reference. Please, provide the reader with a short but informative description of the check-list.

   We added the very information.

5. Results, symptom prevalence. I think it would be more straight forward to present the prevalence of the symptoms instead of the mean prevalence. Mean of what?

   There, we made a mistake in our manuscript. This was just the prevalence and not the “mean” prevalence.

6. Discussion. In general the discussion only relates to the authors own findings. Beside the first paragraph there are only two references in the discussion. For example, have other studies observed the same risk factors for neck symptoms? How does the checklist you have used work in comparison with other checklists? Work-style has been used in the literature, is that something that you could have used?

   This statement is in compliance with the critics of the other reviewer. We made major modifications in the discussion chapter especially in comparing our results with findings in other studies.

7. Discussion.
   In general, references to tables and figures should not be given in the discussion.
   We deleted the references to all tables and figures already mentioned. Yet, the reference given with regard to the newly introduced tables and figures (comparison to BGS and BiFra database) must be retained.
8. Discussion, significance of the results. 1st sentence, What is the main findings from table 1?
   As mentioned above, we added some details to this chapter.
9. Discussion, significance of the results. 3rd sentence, that conclusive statement can not be drawn from the present cross-sectional study.
   That’s true. We deleted this sentence and introduced a discussion about this topic.
10. Conclusions. I do not agree with the authors conclusions. I suggest the authors to limit their conclusions to facts that are supported by their data presented in the paper.
   You are right: we reduced our conclusions.
   Again: thank you for the concise annotations