Author's response to reviews

Title: Factors associated with physiotherapy provision in a population of elderly nursing home residents; a cross sectional study.

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Author's response to reviews:

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Liz Hoffman
Assistant Editor
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Subject: resubmission Manuscript 3994979891190279: "Determinants of physiotherapy provision in a population of elderly nursing home residents; a cross sectional study"

Dear Liz Hoffman,

First of all, we would like to thank both reviewers for their time spent on our paper, their useful comments and recommendations for improvement. I think we have been able to pay attention to most of the issues mentioned, and we would like to re-submit our revised paper for publication in your journal. We have listed our response point-by-point in the appendix. The comments of the reviewers are given in bold and the revised text is presented in italics.

For any questions you can turn to Ms. Chantal Leemrijse.

On behalf of all authors,
Yours sincerely,
Chantal Leemrijse

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Appendix 1

1) Both reviewers asked for a more detailed description of the sampling strategy and sample size determination. Furthermore, taking into account that the results are extrapolated from the sample of 600 patients and 15 nursing homes to the entire population, representativeness of the sample and
generalizability of results should be discussed.

We have adapted the methods section (p.6) accordingly:

Sample
A cross-sectional design was used. Randomisation took place on two levels. Firstly, a random and weighted sample of 15 nursing homes was obtained from a list of all Dutch nursing homes [22]. These 15 nursing homes represent 5% of all Dutch nursing homes providing care exclusively for somatic residents (somatic nursing homes; N=44) and nursing homes with both somatic and psycho-geriatric wards (combined nursing homes; N=242). Stratification was made by the type of nursing home (somatic versus combined) and by the size of the nursing home. For this latter, somatic nursing homes were divided into homes with 100 beds or less (N= 21) and homes with more than 100 beds (N= 23). Combined nursing homes, which are generally larger, were divided into homes with 200 beds or less (N= 142) and homes with more than 200 beds (N= 100). Two somatic nursing homes were randomly selected, one with less and one with more than 100 beds. Thirteen combined nursing homes were randomly selected, 6 with less, and 7 with more than 200 beds (table 1).

Secondly, from these 15 nursing homes a random and weighted sample of 600 residents was taken, representing 1 % of all 51.174 beds available in Dutch (somatic and combined) nursing homes [22]. The residents were randomly selected by the researcher from a (anonymous) list of all residents. The number of selected residents per nursing home was weighted by the total number of beds destined for rehabilitation and long-term care in the involved nursing home. Only residents over 55 years of age were included, because the study was designed to focus on health-care for the elderly. Furthermore, residents had to be admitted to the nursing home for either rehabilitation services or for long-term institutional care. Patients consent was not needed according to the Dutch 'Regulations on medical research involving human subjects', since data were collected anonymously (using residents' numbers), and residents were not subjected to any treatment. As a consequence, there was no decline to participate.

The number of nursing homes and residents that could be included in the study had its practical and financial limitations. However, we think that a sample of 15 nursing homes representing 5% of the nursing home population is adequate to generalise our results, especially since the sample was stratified for size and type of nursing home, and represented all parts of the country with both urban and non-urban regions. The sample is also large enough to adequately use multilevel analysis, for which a rule of thumb is that for every level, a minimum of 10-15 observations are necessary.

This latter issue is also addressed in the discussion of the paper (p.13):

2) The second reviewer missed labels on figures and clarification of some abbreviations.

We have checked the text for this omissions and extended the labels on the figures.

3) The second reviewer correctly states that a cause-effect relationship cannot be determined from a cross-sectional study, and thought that our hypotheses should be revised.

For that reason we have changed the title of the manuscript from:
Factors associated with physiotherapy provision in a population of elderly nursing home residents; a cross sectional study

Accordingly, we have changed our hypothesis in the introduction (p.5) into:

Although health-care provision should be based on residents' needs, we hypothesise that the provision of treatment is associated with the characteristics of the residents, for example need for care or age, and too with characteristics of the nursing home, for example the type of nursing home and the supply of care. Therefore, the aim of the study is twofold. Firstly, to study the variation in the provision of PT among nursing homes and the factors that are associated with this variation. Secondly, to study the variation in the amount of PT both among nursing homes and among residents, and to identify factors that are associated with this variation.

Furthermore, the text of the abstract (p.2) has been changed:

Multilevel analysis was used to define the variation in the provision of PT and the factors that are associated with the question whether a resident receives PT or not. Furthermore, the amount of PT provided was analysed and the factors that are associated with this.

Throughout the whole text we have tried to avoid the use of the words that might suggest a causal relation, such as 'predictive factors', 'determine' and 'explain'.

4) The description of the data collection is expanded, since the second reviewer asked for specific parts of the RAI that were used. Furthermore, physicians and physiotherapists participating in the study were indeed the clinicians assigned to the patient as was assumed by the reviewer:

Revised text (p.7):

Data from these residents were collected through interviews with the nursing home physician and the physiotherapist assigned to the resident. As part of these highly structured interviews, a questionnaire was filled out by the researcher for each resident, in the presence of the physician and therapist, enabling them to consult the medical file of the resident simultaneously. The domains in the questionnaire were based on the Minimum Data Set of the Residents Assessment Instrument (RAI)[23], and determined in mutual agreement with a number of nursing home physicians and physiotherapists. The following areas of the RAI were addressed: communication and hearing patterns, physical functioning and structural problems, mood and behaviour patterns, disease diagnoses, oral and nutritional status, skin conditions, cognitive patterns, vision patterns, and continence.

In the paragraph 'Outcome variables' and 'independent variables' (p. 7 & 8) items that were used in the analysis were already described in detail.

5) The second reviewer asked for the process of recruiting and consenting patients for the study.

We refer to the new text given at point 1)

6) The reviewer asks whether the second outcome (amount of PT) is the amount of weekly therapy provided during the past week or during the past 6 months?

To avoid misunderstanding, we have changed this text (p.7) into:

The second, continuous, outcome variable was the amount of PT provided to the resident during the last 6 months, estimated by the PT in minutes per week.

7) The second reviewer stated that if the "other" diagnosis includes a diverse group of patients, it may not be the best choice as the reference group for analyses".

"Other" diagnoses (p.8) was indeed a heterogeneous group of patients. However, analyses were also run with any other of the five diagnostic groups as reference, and results remained the same.

8) It was asked whether we have considered the fact that some 'predictive variables' were not always normally distributed. The reviewer mentioned 'time since admission' as an example.
However, variables used as predictive factors in linear or logistic regression do not need to be normally distributed. As a matter of fact, many binary factors were used as predictors, for example: the ward the resident is staying. Scatterplots of residuals were indeed inspected to test for normality.

9) The second reviewer asked for minimum and maximum values and interquartile range when variance in therapy provision across setting is mentioned in the results.

These were given:

How nursing homes differ in the percentage of residents receiving physiotherapy
On average 69% of the residents of the participating 15 nursing homes received PT (min-max: 39%-93%; interquartile range: 34.2).

The amount of PT provided to a resident was not significantly different across nursing homes, although differences were considerable (min-max: 34-88 minutes; interquartile range: 15).

10) The second reviewer asks for a clarification on the following sentence: "Page 11 - According to the text, adding the predictor variables did not explain the variance in therapy provision, and the facility-level factors reduced the variance by 85%. However, Table 4 shows that key resident-level predictors had odds ratios of 32.69 (rehabilitation resident), 1.65 (sex), 1.11 (comorbidity), 0.94 (LOS) and 3.07 (ward) and the facility-level odds ratio was 1.19 (FTE). The odds ratios seem to suggest that the patient-level factors are more important than the facility-level factors. Please clarify".

In this study we used multilevel analysis in order to make a distinction between differences between nursing homes and differences between individual residents. The text the reviewer is referring to, relates to the differences between nursing homes, while table 4 gives the factors that are associated with therapy provision on the level of the individual resident. We realise that this difference can be confusing and we have tried to elucidate our text (p.11) by repeating "between nursing homes" a few times:

Provision of physiotherapy

How nursing homes differ in the percentage of residents receiving physiotherapy
On average 69% of the residents of the participating 15 nursing homes received PT (min-max: 39%-93%; interquartile range: 34.2). The percentage of residents receiving PT differed significantly across the 15 nursing homes, and this variance between nursing homes did not decrease after adding the predictor variables on the residents' level. Adding the characteristics of the nursing homes itself, however, reduced the variance between nursing homes by 85%, the remaining difference being no longer significant. Apparently, the characteristics of the 15 nursing homes themselves contribute the most to the significant difference in the percentage of PT recipients among nursing homes.

11) Reviewer 2 states again in page 11, that a causal relationship cannot be determined in a cross-sectional study.

Therefore, the sentence that "the amount of available PT personnel had its influence on the chance of receiving treatment" has been replaced by (p.12) "the amount of available PT personnel was associated with the chance of receiving treatment", in order to avoid the suggestion of a causal relationship.

12) Reviewer 2 asked whether we had run multicollinearity diagnostics (dementia and PG ward).

The diagnosis "PG ward" and "dementia" correlated significantly, as was determined with Pearson correlation coefficient (0.76). For this reason we did run 3 different multilevel analyses: 1) with both factors PG ward and dementia in the model (represented in the text), 2) with only PG ward in the model, leaving out the diagnosis dementia and finally 3) with dementia in the model, leaving out the ward. Results from 1 and 2 were exactly the same. In analysis 3 (leaving out the ward), residents with dementia are less likely to receive PT, leaving all other associated variables unchanged.

We chose to use the model with all factors included.

13) The second reviewer questions what result supports the following statement from our discussion "the pattern found in our study also reflects the belief that especially residents with good cognitive functioning are more likely to benefit from treatment".
We have changed that sentence (p.15) into:

The pattern found in our study, that residents living at a psycho-geriatric ward receive PT less often (table 6), also reflects the belief that especially residents with good cognitive functioning are likely to benefit from treatment, whereas several studies demonstrate that geriatric patients with cognitive dysfunction show similar gains in functional status following specialised rehabilitation [4,28,29].

13) Of course referent two is completely right when she states that randomisation does not suggest that the nursing homes were similar.

The sentence referring to this issue in the discussion (p.16) has been removed.

14) The second reviewer writes: “The limitation of very limited functional status is an important limitation in this study. Only PT use is studied, yet the interview questions ask for both ADL and mobility limitations”

We really do not understand this sentence and think this is a matter of misunderstanding.

15) Conclusion

According to reviewer two, the statement that the chance of receiving PT is largely explained by the supply of PTs (discussion) is not supported by the resulted presented in the tables.

We think that this is the same confusion as mentioned in comment nr.9. What we have been trying to state in the first two sentences of our discussion, is that the difference between nursing homes is largely explained by the supply of PT's. In an attempt to clarify this, we have added "between nursing homes" in the second sentence (p.16):

The chance of nursing home residents receiving PT differs significantly among nursing homes. This difference between nursing homes is largely explained by the difference in supply of physiotherapists.