

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Job strain and supervisor support in primary care health centres and glycaemic control among patients with type 2 diabetes – a cross-sectional study
AUTHORS	Koponen, Anne; Vahtera, Jussi; Pitkaniemi, Janne; Virtanen, Marianna; Pentti, Jaana; Simonsen-Rehn, Nina; Kivimaki, Mika; Suominen, Sakari

VERSION 1 - REVIEW

REVIEWER	Jens Klein University Medical Centre Hamburg-Eppendorf Department of Medical Sociology and Health Economics Hamburg, Germany There are no competing interests.
REVIEW RETURNED	03-Dec-2012

THE STUDY	<p>Background variables (p. 6): Regarding the rate of sickness absence days in the work unit. Which time period is considered (last year, last 12 months etc.)?</p> <p>Measures (p. 5): Regarding the measurement of social support from the supervisor (4 items). Although a reference is given, compared to the Job Content Questionnaire (1) it is unclear if this is an established and valid instrument that was used and (2) how it was modified for the present study (4 out of 9 items were used) (could also be placed in the Discussion).</p>
RESULTS & CONCLUSIONS	<p>Results (Table 3) and Discussion: The only significant association appears in Model III when adjusting for all variables. That seems to be a kind of a hidden correlation which should be discussed. What does that mean that only in Modell III and not in the other models the association between job strain and poor glycaemic control is significant? Maybe, this association should be interpreted more carefully or more detailed.</p> <p>Results (Table 4) and Discussion: The assumption that support is associated with poor glycaemic control could not be verified. This result is not discussed.</p> <p>As another limitation, the cross-sectional design could be mentioned as no causal inference can be drawn.</p> <p>On page 9, the authors recommend further research regarding interventions aiming at improving psychosocial work environment in health care. In this context, an extensive study by Bourbonnais et al. (2006, 2011) could be mentioned.</p>

	<p>The association between psychosocial stress, burnout and quality of care seemed to me to be the major question of the article.</p> <p>Depending on the objectives and the concept of the article and the journal, this could be discussed (or introduced) more detailed. In the past years, several studies (especially focused on physicians/surgeons) targeted this problem (e.g.: Balch et al. 2011; Wallace et al. 2009; Shanafelt et al. 2002, 2010; Klein et al. 2010, 2011; Williams et al. 2007). If the authors intend a shorter report, it is not mandatory.</p>
GENERAL COMMENTS	<p>Despite some comments, this is an interesting and important study regarding work stress and its associations with health care quality. Especially, the combination of subjective data regarding stress and an objective health outcome of the patients can provide new evidence. Besides some small recommendations, the discussion regarding the topics mentioned above should be reviewed.</p>

REVIEWER	<p>Professor Anne Karen Jenum Institute of Health and Society, Department of general Practice, University of Oslo, Norway.</p> <p>I declare no conflict of interest.</p>
REVIEW RETURNED	14-Dec-2012

REPORTING & ETHICS	<p>Some aspects related to Strobe guidelines are missing.</p> <p>It is unclear whether the use of patient data are approved by the ethics committee, or only the Finnish Public Health Sector Study - related to the health care professionals</p>
GENERAL COMMENTS	<p>General comments</p> <p>This is a cross-section study assessing the associations between glycemic control in 8975 type 2 diabetes patients treated by outpatient units in 18 Health Centres in Finland.</p> <p>The positive findings are very few, and the authors' hypothesis fell. They mention some of the study limitations, but there are more, reflected in some of my comments.</p> <p>Major comments</p> <p>1) Hypothesis and aim Should be stated clearly in the last paragraph before the method section (and the detailed information about the HC clinics and municipalities should be placed in the method section (study context).</p> <p>2) The method section should be restructured.</p> <ul style="list-style-type: none"> • The study was "part of" The Finnish Public Sector Study – What were the aims, study period and the participants (other than health professionals) (N, participation rate etc if relevant) – is there a method paper reference for this study? Does the organization of care and the role of doctors and nurses in the care of subjects with diabetes differ between municipalities? What about the role of specialists at the inpatient department and at secondary care hospitals – differs by HC unit? • It should be explicitly stated that the study used a cross-section design • Who are the participants in this study – the local government personnel or the patients? This should be clearly stated. • As glycemic control seems to be the primary outcome, it could be the patients? Then patient characteristics variables should be

presented in this section, then possibly the HC area characteristics, as they are used as indicators of deprivation of the residential area of the patients.

- Or is the HC the unit of analysis (N=18) (using mean and aggregated data in two level analyses). More relevant information about the health care professionals should be given, including numbers of nurses and doctors, gender and age, as well as rate of sickness absence and percentage of fixed-term personnel (what should this variable primarily indicate more precisely?)
- Primary outcome – glycemic control – HbA1c is probably non-normally distributed. Was the mean or median value of the patients – or for the HCs used? This should be specified. How were the type 2 diabetes patients identified?
- Why was HbA1c used as a dichotomous variable and why was not a second outcome of poorer HbA1c also used at least as a supplementary analysis– results might differ?
- Measures of job strain – is it presumed that they are the same for doctors and nurses?
- The absolute numbers of HC for the four categories of job strain and the three social support groups should be given – in the method section and in the head of the columns of the tables

3) Results

The description and the tables provide relatively sparse information. The Study sample, N and characteristics should be presented first, then details from one table at time. I miss information about the distribution of important variables (like number of patients, doctors and nurses, HbA1c (preferably median/geometric mean (?)) as well as HC personnel characteristics) between centres.

Tables

- Number in columns and SD/ Inter-quartile range should be given when appropriate, table 1 and 2. Could percentage of doctors of the total (nurses and doctors) be relevant and given? Do HC characteristics differ between nurses and doctors?
- I would like to see median HbA1c, not only % with “poor” glycemic control, and a category of poorer control than HbA1c ≥ 7 , table 1 and 2.
- What about numbers of visits pr year/patients and number of diabetes patients pr HC category?
- The definitions of Low strain HC, passive job HC etc should be given as a footnote in the tables.
- Could more HC variables be included in the models in Table 3 and 4.

The models should be analyses also for poorer glycemic control than HbA1c ≥ 7 .

4) Discussion

The positive findings are very few, and the authors’ hypothesis fell. They mention some of the limitations, but there are more, not least related to organizational aspects of care and reflected in some of the comments.

Other aspects

The abstract should be revised accordingly

Article summary:

- The second statement in Key messages would need to be supported from a prospective trial to be placed here.
- More limitations should be mentioned, not least related to organizational aspects of care
- No reference is given for the hypothesis of social support as a

VERSION 1 – AUTHOR RESPONSE

Reviewer: Jens Klein

Point 1. Background variables (p. 6): Regarding the rate of sickness absence days in the work unit. Which time period is considered (last year, last 12 months etc.)?

Our response: The rate of sickness absence days is the mean number of sickness absence days in the work unit in 2006 (page 7).

Point 2. Measures (p. 5): Regarding the measurement of social support from the supervisor (4 items). Although a reference is given, compared to the Job Content Questionnaire (1) it is unclear if this is an established and valid instrument that was used and (2) how it was modified for the present study (4 out of 9 items were used) (could also be placed in the Discussion).

Our response: Aggregated measure of social support from the supervisor (Vahtera et al., 2000; Kivimäki et al., 2000) (4 items) was derived from a standard survey instrument of Statistics Finland (Lehto, 1991). (p. 5-6)

Point 3. Results (Table 3) and Discussion: The only significant association appears in Model III when adjusting for all variables. That seems to be a kind of a hidden correlation which should be discussed. What does that mean that only in Model III and not in the other models the association between job strain and poor glycaemic control is significant? Maybe, this association should be interpreted more carefully or more detailed.

Our response: In Model III, the effects of variables describing socioeconomic composition of the HC service area were controlled for. When the association between quality and outcome of care is studied, it is important to adjust for socioeconomic status of patients due to its association with health behaviour, and healthy lifestyle again is the key factor in management of diabetes and the HbA1c-level. Many unhealthy behaviours like smoking, poor dietary habits and physical inactivity tend to be more prevalent in lower socioeconomic groups (Laaksonen et al. 2007). Therefore, the general health status may be better in high socioeconomic composition areas. In addition, it may be easier to motivate patients to healthy lifestyle in these areas. It is therefore likely that there is a 'suppression effect' meaning that the association appears in Model III when the effect of the socioeconomic composition of the HC service area was controlled for. Suppression is a situation in which the magnitude of the relationship between an independent variable and a dependent variable becomes larger when a third variable is included (please see also MacKinnon et al. 2000).

We have now discussed this suppression effect on p. 11 as follows:

However, we were able to use disadvantage of the patient's residential area as a proxy for individual socioeconomic position. Indeed, the effect of job strain on glycaemic control emerged after adjustment of educational level, income and unemployment rate in the HC catchment area. This result points to suppression, a situation in which the magnitude of the relationship between an independent variable and a dependent variable becomes larger when a third variable (or multiple variables) is included to the analysis (MacKinnon et al. 2000).

Point 4. Results (Table 4) and Discussion: The assumption that support is associated with poor glycaemic control could not be verified. This result is not discussed.

Our response: The following sentences were added on page 8: Contrary to our prediction, social support from supervisor was not associated with the outcome of care. The fact that doctors and nurses in the Finnish HCs work quite independently is a potential explanation for this.

Point 5. As another limitation, the cross-sectional design could be mentioned as no causal inference can be drawn.

Our response: The study design has now been added to the title. This limitation is mentioned in the discussion section on page 11: This was a cross-sectional study and no causal inferences of the associations between independent and dependent variables can be made.

Point 6. On page 9, the authors recommend further research regarding interventions aiming at improving psychosocial work environment in health care. In this context, an extensive study by Bourbonnais et al. (2006, 2011) could be mentioned.

Our response: Thank you for this reference. We have now added it on the Discussion page 12).

Point 7. The association between psychosocial stress, burnout and quality of care seemed to me to be the major question of the article. Depending on the objectives and the concept of the article and the journal, this could be discussed (or introduced) more detailed. In the past years, several studies (especially focused on physicians/surgeons) targeted this problem (e.g.: Balch et al. 2011; Wallace et al. 2009; Shanafelt et al. 2002, 2010; Klein et al. 2010, 2011; Williams et al. 2007). If the authors intend a shorter report, it is not mandatory.

Our response: The results of the studies of Klein et al. (2010; 2011), Williams et al. (2007) and Wallace et al. (2007) are now presented briefly in the discussion section (page 10).

Point 8. Despite some comments, this is an interesting and important study regarding work stress and its associations with health care quality. Especially, the combination of subjective data regarding stress and an objective health outcome of the patients can provide new evidence. Besides some small recommendations, the discussion regarding the topics mentioned above should be reviewed.

Our response: Thank you for this positive feedback.

Reviewer: Professor Anne Karen Jenum

Point 1. Some aspects related to Strobe guidelines are missing.

It is unclear whether the use of patient data are approved by the ethics committee, or only the Finnish Public Health Sector Study - related to the health care professionals.

Our response: The Finnish Public Sector Study was approved by the ethics committee of the Finnish Institute of Occupational Health. In one city, the anonymous collection of HbA1c-values of type 2 diabetes patients combined with data on their sex, age and the postal zip code of area of residence was accomplished as a part of this study. In four other cities, the collection of the aforementioned patient data was on a written application approved by the chief physician of primary care or the Board of Health and Social Affairs/Board of Social Security in the respective municipality. (page 5)

General comments

This is a cross-section study assessing the associations between glycemic control in 8975 type 2 diabetes patients treated by outpatient units in 18 Health Centres in Finland.

The positive findings are very few, and the authors' hypothesis fell. They mention some of the study limitations, but there are more, reflected in some of my comments.

Major comments

Point 1: Hypothesis and aim

Should be stated clearly in the last paragraph before the method section (and the detailed information about the HC clinics and municipalities should be placed in the method section (study context).

Our response: We have now placed the aims and hypotheses in a separate section (please see p. 4). Information about the HC clinics and municipalities is in the method section (study context, p. 4).

Point 2. The method section should be restructured.

? The study was ?part of? The Finnish Public Sector Study ? What were the aims, study period and

the participants (other than health professionals) (N, participation rate etc if relevant) ? is there a method paper reference for this study?

Our response: The following reference has been added on page 5: Kivimäki M, Lawlor DA, Davey Smith G, Kouvonen A, Virtanen M, Elovainio M, Vahtera J. Socioeconomic position, co-occurrence of behaviour-related risk factors, and coronary heart disease: The Finnish Public Sector Study. *Am J Public Health* 2007; 97:874-979.

Does the organization of care and the role of doctors and nurses in the care of subjects with diabetes differ between municipalities? What about the role of specialists at the inpatient department and at secondary care hospitals ? differs by HC unit?

Our response: The following information on the organization of care has been added on page 4: Three of the five research municipalities had a family doctor system in their HCs and all HCs had a diabetes nurse. One city had also a clinic specialized for prevention and care of chronic conditions. Patients from HCs could be referred there for additional advice and care.

Point 3. It should be explicitly stated that the study used a cross-section design

Our response: We have now modified the title so that it includes information on the study design. We also discuss limitations regarding cross-sectional data on p. 11 as follows: This was a cross-sectional study and no causal inferences of the associations between independent and dependent variables can be made.

Point 4. Who are the participants in this study ? the local government personnel or the patients? This should be clearly stated.

? As glycaemic control seems to be the primary outcome, it could be the patients? Then patient characteristics variables should be presented in this section,

Our response: Information on data collection and participants was clarified as follows:

The data to this cross-sectional study were gathered in 2006. Information on job strain and supervisor support in 18 HCs is based on responses of doctors (n=122, mean age 45.5 years) and nurses (n=300, mean age 47.1 years), who took part in the Finnish Public Sector Study, a voluntary-basis survey addressed to local government personnel of the participating towns (response rate 79%). Information on glycaemic control (HbA1c-values) of patients with the diagnosis of type 2 diabetes (N=8975, 51% men, mean age 67 years, SD 11, range 16-106 years) was collected from HC registers by the contact persons who worked in HCs. They delivered anonymous data to researchers. Aggregated variables indicating the levels of job strain and social support (based on survey responses of doctors and nurses) were created for each HC and linked to patient data. Thus, each patient has information in her/his individual data on job strain and supervisor support in the HC that had responsibility of her/his diabetes care. (p. 5)

Point 5. Then possibly the HC area characteristics, as they are used as indicators of deprivation of the residential area of the patients. ? Or is the HC the unit of analysis (N=18) (using mean and aggregated data in two level analyses).

Our response: The statistical data analysis was carried out within individual patient data (N=8975) with HC characteristics on an aggregated level. This information has now been added to the Statistical analysis section (p.7).

Point 6. More relevant information about the health care professionals should be given, including numbers of nurses and doctors, gender and age, as well as rate of sickness absence and percentage of fixed-term personnel (what should this variable primarily indicate more precisely?)

Our response: Numbers, gender and age of nurses and doctors are presented on page 5. We changed the term 'fixed-term personnel' to 'temporary employees' which is a more accurate term in this context. Rate of sickness absence and the proportion of temporary employees are presented in tables 1-2.

Point 7. Primary outcome ? glycemic control ? HbA1c is probably non-normally distributed. Was the mean or median value of the patients ? or for the HCs used? This should be specified.

Our response: In the descriptive analyses we used the mean HbA1c-values of patients. Mean, minimum and maximum values, median and quartiles are presented on page 8.

Point 8. How were the type 2 diabetes patients identified?

Our response: They were identified from HC registers by the contact person who worked in the HC. This information is found on page 5.

Point 9. Why was HbA1c used as a dichotomous variable and why was not a second outcome of poorer HbA1c also used at least as a supplementary analysis? results might differ?

Our response: We followed standards of medical care in diabetes given by the American Diabetes Association (Diabetes Care 2011, 34 (suppl. 1). According to these standards a reasonable A1c goal for adults is <7%. It is reasonable to compare HCs in success of achieving this goal in diabetes care.

Point 10.? Measures of job strain ? is it presumed that they are the same for doctors and nurses?

Our response: Job strain levels were to some degree different among doctors and nurses. We have now added the following text on page 6:

“Job strain and supervisor support indicators for each HC were created based on the responses of doctors and nurses because doctors and nurses work independently in HCs and equally affect the quality of care. Aggregated job demands of doctors were higher (mean 3.9, range 3.0-4.4) than job demands of nurses (mean 3.5, range 2.8-4.3). Aggregated job control of doctors was also somewhat higher (mean 3.9, range 3.7-4.3) than job control of nurses (mean 3.8, range 3.6-4.2). In aggregated supervisor support there was no difference between doctors (mean 3.6, range 2.5-5.0) and nurses (3.6, range 2.9-4.5). “

Point 11. The absolute numbers of HC for the four categories of job strain and the three social support groups should be given ? in the method section and in the head of the columns of the tables.

Our response: Absolute numbers of HCs were added to the method section (p. 6) and to the head of the columns of the tables.

Point 12. Results

The description and the tables provide relatively sparse information.

The Study sample, N and characteristics should be presented first, then details from one table at time.

Our response: The result section was rewritten and more information was added to tables 1-2.

Point 13. I miss information about the distribution of important variables (like number of patients, doctors and nurses, HbA1c (preferably median/geometric mean (?)) as well as HC personnel characteristics) between centres.

Our response: Numbers of patients, means of HbA1c-values, the percentage of temporary employees and personnel's sickness absence days are now presented in tables 1-2. Unfortunately we do not have absolute numbers of doctors and nurses per inhabitants in the HC service area. We have added this as a limitation on p. 11:

Neither did we have information on other aspects of the quality of care, such as numbers of doctors or nurses per inhabitants in the HC service area indicating the sufficiency of staff. This is an important question to be further studied. However, job strain can be seen as one indicator of sufficiency of staff.

Point 14. Tables

? Number in columns and SD/ Inter-quartile range should be given when appropriate, table 1 and 2.

Our response: Numbers and SD:s have now been added.

Point 15. Could percentage of doctors of the total (nurses and doctors) be relevant and given? Do HC characteristics differ between nurses and doctors?

Our response: Unfortunately we do not have this information. Please, see the point 13.

Point 16. I would like to see median HbA1c, not only % with 'poor' glycemic control, and a category of poorer control than HbA1c > 7, table 1 and 2.

Our response: Mean HbA1c-values of patients as well as minimum and maximum values, median and quartiles are presented on page 8.

Point 17. What about numbers of visits pr year/patients and number of diabetes patients pr HC category?

Mean number and range of measurements is presented on page 6.

Point 18. The definitions of Low strain HC, passive job HC etc should be given as a footnote in the tables.

Our response: Footnotes were added as suggested.

Point 19. Could more HC variables be included in the models in Table 3 and 4.

The models should be analyses also for poorer glycemic control than HbA1c > 7.

Our response: The primary aim of the study was to investigate success in reaching the goal of good glycemic control (HbA1c <7%) in diabetes care and we think that analysis of a group smaller than that would involve lack of statistical power. In the present study we had to rely on data that were available from administrative sources and survey responses, therefore it was not possible to include any more variables than there are at present. However, the number of staff sickness absence days and the percentage of temporary employees are the HC variables that very likely are associated with success and therefore quite good in terms of control variables.

Point 20. Discussion

The positive findings are very few, and the authors' hypothesis fell. They mention some of the limitations, but there are more, not least related to organizational aspects of care and reflected in some of the comments.

Our response: The hypotheses of the study were derived from the demand-control-support model of Karasek & Theorell (1990). The principal job-hypothesis fell but the difference that we found between low-strain job HCs and high-job strain HCs is in line with the original model of Karasek (1979) although extended later by Karasek and Theorell (1990).

Limitation of a cross-sectional study is now mentioned in the discussion section as well as the limitation mentioned in the point 13 (p. 11).

Point 21. Other aspects

The abstract should be revised accordingly

Our response: The abstract has now been revised according to the points raised buy the Reviewer.

Point 22. Article summary:

' The second statement in Key messages would need to be supported from a prospective trial to be placed here.

Our response: The second statement was revised as follows: " Perceived job strain of health care personnel and health centres' success in achieving glycaemic control of patients with diabetes might be good quality indicators of patient care.

Point 23. More limitations should be mentioned, not least related to organizational aspects of care

Limitations have been added to the discussion section, p.11.

Point 24. No reference is given for the hypothesis of social support as a possible predictor for glycemic control

Our response: We have now added the reference, please see the page 4.

VERSION 2 – REVIEW

REVIEWER	Professor Anne Karen Jenum Institute of Health and Society, Department of General Practice, University of Oslo, Norway
REVIEW RETURNED	20-Feb-2013

THE STUDY	Key messages: The second key message is imprecise and in my opinion not supported by the data, and should either be deleted or restructured.
REPORTING & ETHICS	Ethics: It is still not clear whether the use of anonymous patient data was approved by those authorized to give such permissions for all municipalities.
GENERAL COMMENTS	<p>General comments The paper has improved considerably, but there are still points to clarify or improve.</p> <p>Major comments</p> <ol style="list-style-type: none"> 1) The positive findings are very few, and the authors' hypothesis fell. The only significant finding of poorer glycemic control was in high job strain jobs in Model III, after adjusting for area-level, and not individual level socio-economic characteristics. They miss data on comorbidities. Together with limitations due to the cross-sectional design, the authors should be very careful when drawing conclusions, in Key message, abstract conclusion and last part of discussion. Mean HbA1c level were identical across job strain categories, and the absolute differences in % with poor control was minor, indicating that factors not measured are more important. Could the authors provide the explained variance by their model? 2) How were the type 2 diabetes patients identified? Was it performed by searches in Electronic Medical Records (EMR) or manually by patient lists? How can you be sure to have captured all patients with type 2 diabetes? And not type 1 (The age span of patients was 16-106 years). Was the type 2 diagnosis of the 16 year old patient verified? 3) See also comments about ethics in score sheet 4) Why was HbA1c used as a dichotomous variable and why was not a second outcome of poorer HbA1c also used at least as a supplementary analysis– results might differ? (Question from first review not addressed properly) The reference to ADA guidelines from 2011 is strange as the study used data from 2006. What was the HbA1c target at the time, know and used by the clinicians? I suppose it was higher. Of greater clinical relevance is the proportion of patients with much poorer HbA1c. I would still suggest at least secondary analyses to see if the results are the same. <p>Minor comments</p> <ul style="list-style-type: none"> • Page 22 Line 22: suggest: from 2006 • Page 22 L 31: introduce Electronic Medical Records (EMR) if

	<p>appropriate here or in methods and rest of paper?</p> <ul style="list-style-type: none"> • Page 23 L 27: if speaking of health personnel in plural: “have possibility” • Page 23 L 38 onwards: use HC as appropriate, now Health centres/HC inconsistently • Page 23 L 49: “research??? municipalities” – delete “research” if you just mean included municipalities. You say something about 4 of 5, what about the fifth municipality? • Page 27 L 44-35. “Doctors and nurses work independently...” – no overlap even in a family doctor system? How can you be sure that they equally affect the quality of care when you have no data to prove this statement? There are more nurses than doctors..... • Page 28 L 21 and more: Have you used individual patient postal zip codes or HC catchment area postal zip code information about socio-economic characteristics to define HC catchment area aggregated socio-economic characteristics • Page 29 L 41: mean proportion with low education would confer better with table information. • Page 29 L 49 and rest of paragraph, and next paragraph: This information is given in the table – and could either be deleted or more focused on heterogeneity between different HC groups, with significant differences reported or significance level given. • P values in tables: give absolute numbers except when $p < 0.001$) • Page 30 L 43: 1 sentence in discussion: Do you mean “patient exposure”? Worse outcome should be specified (poorer HbA1c – could be other outcomes of care) • Page 30 L 54: Several studies (plural) have <i>found strong associations</i> • Page 30 L 41: Is the point that doctors do not work in partnership with nurses – or that both nurses and doctors work independently and presumably with less social support than if part of a team? • Page 33 L 12. “interventions” – could you eventually specify – do you mean RCTs or cluster-RCTs with health personnel or HCs as unit? Based on literature and this study, what would be the best strategy to improve HbA1c for type 2 diabetes patients – could you give any suggestions? • Page 33 L 21: You mean good <i>glycemic</i> control – not job control?
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VERSION 2 – AUTHOR RESPONSE

Reviewer: Professor Anne Karen Jenum

Institute of Health and Society, Department of General Practice, University of Oslo, Norway

Key messages:

The second key message is imprecise and in my opinion not supported by the data, and should either be deleted or restructured.

Our response: The second key message has been deleted.

Ethics:

It is still not clear whether the use of anonymous patient data was approved by those authorized to give such permissions for all municipalities.

Our response: Because all patient data included only a very limited set of variables without any identification code it was totally anonymous. Thus, no informed consent was needed. Instead, a written approval based on a brief description of the study was applied for and granted by all chief physicians responsible for the organization and administration of primary care in the involved municipalities. The chief physician is directly responsible to the Board of Health or Health and Social Welfare or Basic Welfare depending of the organizational model of the municipality for her/his decisions.

General comments

The paper has improved considerably, but there are still points to clarify or improve.

Major comments

Point 1) The positive findings are very few, and the authors' hypothesis fell. The only significant finding of poorer glycemic control was in high job strain jobs in Model III, after adjusting for area-level, and not individual level socio-economic characteristics. They miss data on comorbidities. Together with limitations due to the cross-sectional design, the authors should be very careful when drawing conclusions, in Key message, abstract conclusion and last part of discussion. Mean HbA1c level were identical across job strain categories, and the absolute differences in % with poor control was minor, indicating that factors not measured are more important. Could the authors provide the explained variance by their model?

Our response: In the revised abstract conclusion we only state that the level of job strain among the health care personnel may play a role in achieving good glycaemic control among patients with type 2 diabetes. In addition, we deleted the second key statement and added the following sentence to the end of the discussion section: "Further studies including all relevant confounding factors are needed. They may be equally or more strongly associated with patients' glycaemic control than the organization of care."

The outcome was binary in the multilevel logistic regression models studied. From these models, we have reported the odds ratios (95% CI) for the job strain categories and the level 2 (health center) variance for the outcome. As we used multilevel logistic regression models, we used McFadden's pseudo-R² to estimate "explained variance" (McFadden D. Quantitative methods for analysing travel behavior of individuals: Some recent developments. In: Hensher DA, Stopher PR, eds. Behavioural travel modeling. London: Croom Helm 1979: 279-318.)

We estimated pseudo R squared by comparing deviances of the model without any covariates to the one with random effects and main effects of the variables of interest.

In table 3, R² –values of the models varied from 0.004 (unadjusted model) to 0.005 (model III). In table 4, R² –values of the models varied from 0.007-0.012. In table 5, R² –values were 0.004 in all models. However, we do not give these results in the tables, because we prefer to follow the typical way in the literature to report the findings derived from multilevel logistic regression models.

Point 2) How were the type 2 diabetes patients identified? Was it performed by searches in Electronic Medical Records (EMR) or manually by patient lists? How can you be sure to have captured all patients with type 2 diabetes? And not type 1 (The age span of patients was 16-106 years). Was the type 2 diagnosis of the 16 year old patient verified?

We relied on information stored in HC registers (Electronical Medical Records) delivered anonymously by contact persons. Registers contain information on diagnosis of all patients. Type 2 diabetes was identified by the ICD-10-code E11. It is very rare but possible also in young people. There were 30 persons (out of 8975) under the age of 30 years with type 2 diabetes in our data.

Point 3) See also comments about ethics in score sheet

Our response: Our study fulfills ethical requirements.

Point 4) Why was HbA1c used as a dichotomous variable and why was not a second outcome of poorer HbA1c also used at least as a supplementary analysis– results might differ? (Question from first review not addressed properly)

Our response: We have now used a second outcome of poorer HbA1c-value ($\geq 8\%$) in a supplementary analysis. This analysis confirmed the previous results of the study (Table 4).

The reference to ADA guidelines from 2011 is strange as the study used data from 2006.

What was the HbA1c target at the time, known and used by the clinicians? I suppose it was higher. Of greater clinical relevance is the proportion of patients with much poorer HbA1c. I would still suggest at least secondary analyses to see if the results are the same.

Our response:

Diabetes care in Finland is guided by care guidelines defined by the working group appointed by the Finnish Medical Society Duodecim, the Finnish Society of Internal Medicine and the Medical Advisory Board of the Finnish Diabetes Society. Care guidelines offer recommendations for the diagnosis, screening, prevention and treatment of diabetes and its complications. Care guidelines are based and updated on the basis of systematically collected research evidence. HbA1c-target in 2006 was $<7\%$ (Valle, T. & Tuomilehto, J. Diabeetikkojen hoitotasapaino Suomessa vuosina 2000-2001. [Glycaemic control in patients with diabetes in 2000-2001]. DEHKO-reports 2004;1. Tampere: Suomen Diabetesliitto ry. Because the HbA1c-target has not been changed we used ADA guidelines from 2011 as a reference. We have now added the report by Valle & Tuomilehto as a second reference.

We have now used a second outcome of poorer HbA1c-value in a supplementary analysis (Table 4).

Minor comments

- Page 22 Line 22: suggest: from 2006

Our response: The suggested correction has been made.

- Page 22 L 31: introduce Electronic Medical Records (EMR) if appropriate here or in methods and rest of paper?

Our response: Electronic Medical Records has been added on page 5.

- Page 23 L 27: if speaking of health personnel in plural: “have possibility”.

Our response: The suggested correction has been made.

- Page 23 L 38 onwards: use HC as appropriate, now Health centres/HC inconsistently

Our response: Required changes have been made.

- Page 23 L 49: “research??? municipalities” – delete “research” if you just mean included municipalities. You say something about 4 of 5, what about the fifth municipality?

Our response: The suggested correction has been made and the following sentence has been added: Two other municipalities had the traditional model in which appointments can be made with any doctor in the HC.

- Page 27 L 44-35. “Doctors and nurses work independently...” – no overlap even in a family doctor system? How can you be sure that they equally affect the quality of care when you have no data to prove this statement? There are more nurses than doctors.....

Our response: We changed the sentence as follows: ...doctors and nurses work quite independently in HCs and these two professional groups both affect the quality of care.

- Page 28 L 21 and more: Have you used individual patient postal zip codes or HC catchment area postal zip code information about socio-economic characteristics to define HC catchment area aggregated socio-economic characteristics

Socioeconomic characteristics of the HC catchment area were calculated as the population-weighted

means for residents in the specific areas that each HC served (area information was obtained from the HCs). This HC level information was then linked to individual patient data.

- Page 29 L 41: mean proportion with low education would confer better with table information.
Our response: This correction has been made.

- Page 29 L 49 and rest of paragraph, and next paragraph: This information is given in the table – and could either be deleted or more focused on heterogeneity between different HC groups, with significant differences reported or significance level given.
Our response: The paragraphs have been deleted.

- P values in tables: give absolute numbers except when $p < 0.001$)
Our response: Absolute numbers are now presented.

- Page 30 L 43: 1 sentence in discussion: Do you mean “patient exposure”? Worse outcome should be specified (poorer HbA1c – could be other outcomes of care)
Our response: The first sentence reads now: This study showed that perceived job strain of health care personnel may be associated with the outcome of diabetes care.

- Page 30 L 54: Several studies (plural) have found strong associations
Our response: We have corrected the grammatical error noted by the referee.

- Page 30 L 41: Is the point that doctors do not work in partnership with nurses – or that both nurses and doctors work independently and presumably with less social support than if part of a team?
Our response: The following sentences have been added: Doctors and nurses consult patients alone in separate appointments. Therefore, supervisor support may not play a great role in daily appointments with patients and the outcome of care.

- Page 33 L 12. “interventions” – could you eventually specify – do you mean RCTs or cluster-RCTs with health personnel or HCs as unit? Based on literature and this study, what would be the best strategy to improve HbA1c for type 2 diabetes patients – could you give any suggestions?
Our response: Our study was not an intervention study. In our opinion, detailed analysis on effective interventions to improve HbA1c for type 2 diabetes patients would be a subject of a new project. Our study gives observational evidence for further interventions to examine whether lowering job strain among health care personnel is associated with better glycaemic control in patients with type 2 diabetes.

- Page 33 L 21: You mean good glycemic control – not job control?
Our response: We mean glycaemic control.