PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Characteristics of older adults with back pain associated with choice of first primary care provider: a cross-sectional analysis from the BACE-N cohort study
AUTHORS	Vigdal, Ørjan; Storheim, Kjersti; Munk Killingmo, Rikke; Småstuen, Milada; Grotle, Margreth

VERSION 1 – REVIEW

REVIEWER	Danielle Robinson University of Oxford Nuffield Department of Orthopaedics Rheumatology and Musculoskeletal Sciences
REVIEW RETURNED	28-May-2021

GENERAL COMMENTS	Thank you for inviting me to review the paper titled “Characteristics of older adults with back pain associated with choice of first primary care provider: The Back Complaints in the Elders – Norway (BACE-N) study”. This is a very well written, detailed study of patients in Norway with backpain and the characteristics which determine which primary care provider the patients will see. Multinomial logistic regression was used to assess this question. I would recommend this paper for a minor revision as there are a few small places where improved clarity can be obtained. Please see my suggestions below. Abstract: 1. It would be helpful to add the years of the study to the abstract. 2. What does a Roland-Morris Disability Questionnaire value of 9 mean? Without prior knowledge of the questionnaire this is not obvious. Results: 3. You use the acronym SBT throughout. Please state what this stands for the first time you use it. 4. Can you provide numbers where you state the duration was significantly shorter. 5. Table 1: Whilst you have the total missing, please state the number missing in each of the 3 categories.

REVIEWER	Lewis Kazis Boston University, Department of Health Law, Policy and Management
REVIEW RETURNED	06-Jun-2021

GENERAL COMMENTS	This article is well written and addresses an important problem. I have a few comments based on my reading of this. Overall the authors provide a descriptive cross-sectional analysis of the predictors associated with seeing first a general physician, physiotherapist also called physical therapist or chiropractor for the new occurrence of back pain. The evidence presented gives a good methods section and results that are basically descriptive. Clearly selection bias plays an important role in determining the patient's decision when suffering from back pain in assessing which provider to see initially for this problem. The nature of the health care system also plays an important role and a paragraph's description of Norway's national health care system would be helpful. Does this restrict the generalizability of the results given the specific characteristics of this health care system for other countries? The methods section is well described with a well directed analysis. Would results have been different with a focus on "low back pain." Perhaps to consider a sub-analysis with a focus on "low" back pain. One could also include those that might see a physician first and then go on to see a PT or chiropractor or a chiropractor or PT first and then a physician referral second. What are the patient characteristics that are predictors for those patients being referred to a specific second provider if that occurred? Consider adding a bootstrapping approach to the models that are presented so that one can judge the robustness of the coefficients that are presented. Also for those seeing first a physician versus a chiropractor or a physio-therapist, it would be very helpful to report descriptively the therapies that are given or administered. How are they different? In particular, are the physicians more apt to prescribe medications (opioids for example) versus physiotherapists and chiropractors who might use other non-pharmaco based therapeutic approaches for addressing back pain. The discussion section should consider articulating why evaluating the predictor characteristics are important in assessing the type of provider seen first. Why is this an important question and how will this information be used in the context of improving the quality of care of the elderly patient with back pain? Will the results of this study be used in any particular way for future considerations in the treatment of patients with back pain? Are there any particular guidelines for treatment of back pain that could be woven into this discussion? Are there any health care system characteristics regarding Norway's 20 public hospital trusts, such as access to care, that may influence the type of provider seen first for back pain? In addition, for those with new onset back pain is there a relationship between first provider seen and utilization of services and costs of care? There is a body of literature that is not described that addresses how the first provider seen for occurrence of "low back pain" is associated with the use of controlled substances such as short and long term opioid use. See in particular the articles by: Kazis LE, Ameli O, Rothendler J, Garrity B, Cabral H, McDonough C, Carey K, Stein M, Sanghavi D, Elton D, Fritz J, Saper R. Observational retrospective study of the association of initial

	healthcare provider for new-onset low back pain with early and long-term opioid use. BMJ Open. 2019 Sep 20; 9(9):e028633.View Related Profiles. PMID: 31542740 Garrity BM, McDonough CM, Ameli O, Rothendler JA, Carey KM, Cabral HJ, Stein MD, Saper RB, Kazis LE. Unrestricted Direct Access to Physical Therapist Services Is Associated With Lower Health Care Utilization and Costs in Patients With New-Onset Low Back Pain. Phys Ther. 2020 01 23; 100(1):107-115.View Related Profiles. PMID: 31665461 Carey K, Ameli O, Garrity B, Rothendler J, Cabral H, McDonough C, Stein M, Saper R, Kazis L. Health insurance design and conservative therapy for low back pain. Am J Manag Care. 2019 Jun 01; 25(6):e182-e187.View Related Profiles. PMID: 31211551

VERSION 1 – AUTHOR RESPONSE

Reviewer 1's comments		
1.	Abstract: It would be helpful to add the years of the study to the abstract	Thank you, we agree, and have included this under the Participants subheading.
2.	Abstract: What does a Roland-Morris Disability Questionnaire value of 9 mean? Without prior knowledge of the questionnaire this is not obvious	This is a valuable comment. There exists, to our knowledge, no consensus as to the interpretation of specific RMDQ-scores. Previously, our interpretation was only included under the Conclusion subheading. We have now also included our interpretation of this RMDQ score under the Results subheading.
3.	Results: You use the acronym SBT throughout. Please state what this stands for the first time you use it.	Thank you for noticing this, this is an oversight on our part. We have now included this on page 7, paragraph 1.
4.	Results: Can you provide numbers where you state the duration was significantly shorter	We agree that this is valuable information. It is now included on page 9, paragraph 3.
5.	Results: Table 1: Whilst you have the total missing, please state the number missing in each of the 3 categories	Thank you for this comment. Missing rates in the primary care provider groups was similar overall. We have now included this information in text, page 9, paragraph 3. To ensure readability of Table 1, we have opted not to include missing for each category in the table, and hope the explanatory text is satisfactory.
Reviewer 2's comments		
1.	The nature of the health care system also plays an important role and a paragraph's description of Norway's national health care system would be helpful. Does this restrict the generalizability of the results given the specific characteristics of this health care system for other countries?	Thank you, this is a valuable comment, and we agree that this description and discussion would be valuable. We have included a paragraph on Norwegian primary care under the Design and setting subchapter, page 5, paragraph 2. We have also included how this may impact the generalizability of our results on page 13, second paragraph.
2.	The methods section is well described with a well directed analysis. Would results have been different with a focus on "low back pain." Perhaps to consider a sub-analysis with a focus on "low" back pain.	This is an appreciated comment. We have included a sensitivity analysis on the low-back pain only subgroup, consisting of 85% of the total cohort, in the supplementary material. Overall, coefficients did not change, but there were a couple of changes in p-values.
3.	One could also include those that might see a physician first and then go on to see a PT or chiropractor or a chiropractor or PT first	We agree that this is an interesting question, especially when framed in a longitudinal study of healthcare utilization. Unfortunately, in our

	and then a physician referral second. What are the patient characteristics that are predictors for those patients being referred to a specific second provider if that occurred?	cohort only 32 patients visited a physiotherapist after visiting a GP first, and 16 patients visited a chiropractor after first visiting a GP. This yields a potential subgroup of 48 patients, which does not yield sufficient power for the multivariate analyses. Therefore, we do not feel we have sufficient data to answer this question.
4.	Consider adding a bootstrapping approach to the models that are presented so that one can judge the robustness of the coefficients that are presented.	Thank you for this valuable comment. We acknowledge that bootstrapping would indeed make inferences regarding the presented coefficients more robust. There is some discussion as to what combination of multiple imputation and bootstrapping yields the most valid results (see Schomaker & Heumann (2018) Bootstrap Inference When Using Multiple Imputation. Statistics in Medicine, 37(14): 2252-2266 http://dx.doi.org/10.1002/sim.7654 and Bartlett & Hughes (2020) Bootstrap inference for multiple imputation under uncongeniality and misspecification. Statistical Methods in Medical Research, 29(12) 3533-3546). While we appreciate that this procedure may yield more robust confidence intervals for the coefficients, it does not seem like a practically viable approach at this point. We will, however, add bootstrapping to the complete case analyses in sensitivity analyses S1, so that the robustness of those coefficients may be judged.
5.	Also for those seeing first a physician versus a chiropractor or a physio-therapist, it would be very helpful to report descriptively the therapies that are given or administered. How are they different? In particular, are the physicians more apt to prescribe medications (opioids for example) versus physiotherapists and chiropractors who might use other non-pharmaco based therapeutic approaches for addressing back pain.	We agree that therapy provided could be valuable information, and that treatment patterns throughout the follow-up period is a worthwhile study in its own right. In fact, this is covered elsewhere in a separate BACE-N study. This study is still unpublished. We have included a reference in the paragraph on Norwegian primary care, page 5, paragraph 2, on what treatment Norwegian back pain patients is most likely to receive from a GP, physiotherapist or chiropractor, respectively. We hope this revision addresses this valuable comment satisfactorily.
6.	The discussion section should consider articulating why evaluating the predictor characteristics are important in assessing the type of provider seen first. Why is this an important question and how will this information be used in the context of improving the quality of care of the elderly patient with back pain? Will the results of this study be used in any particular way for future considerations in the treatment of patients with back pain? Are there any particular guidelines for treatment of back pain that could be woven into this discussion?	This is a very valuable comment, and we agree that these questions should be addressed. By including a paragraph in the Discussion chapter, page 11, paragraph 1, we hope that they are addressed satisfactorily.
7.	Are there any health care system characteristics regarding Norway's 20 public hospital trusts, such as access to care, that may influence the type of provider	We agree that access to care, both geographically, economically and with regards to waiting lists, likely has an important influence on type of provider seen. The patients recruited in

	seen first for back pain?	this study had fairly equal access to the three provider groups. However, through Norwegian healthcare legislation, only GP and PT services are mandatory by law for the municipalities. This means that there may be some municipalities where access is even more important. Further, patient's expectations of treatment/referrals may be an important influence. For example, patients may not be aware that chiropractors and musculoskeletal physiotherapists (a subgroup of PTs named manual therapists in Norway) can provide imaging referrals and sick leave. Another example is that patients may not be aware of the newly implemented direct access to physiotherapy, and thus may visit the GP in order to get a referral for PT. Healthcare systems characteristics and how it relates to generalizability of our findings is addressed on page 13, paragraph 2.
8.	In addition, for those with new onset back pain is there a relationship between first provider seen and utilization of services and costs of care? There is a body of literature that is not described that addresses how the first provider seen for occurrence of "low back pain" is associated with the use of controlled substances such as short and long term opioid use. See in particular the articles by: Kazis LE, Ameli O, Rothendler J, Garrity B, Cabral H, McDonough C, Carey K, Stein M, Sanghavi D, Elton D, Fritz J, Saper R. Observational retrospective study of the association of initial healthcare provider for new-onset low back pain with early and long-term opioid use. BMJ Open. 2019 Sep 20; 9(9):e028633.View Related Profiles. PMID: 31542740 Garrity BM, McDonough CM, Ameli O, Rothendler JA, Carey KM, Cabral HJ, Stein MD, Saper RB, Kazis LE. Unrestricted Direct Access to Physical Therapist Services Is Associated With Lower Health Care Utilization and Costs in Patients With New-Onset Low Back Pain. Phys Ther. 2020 01 23; 100(1):107-115.View Related Profiles. PMID: 31665461 Carey K, Ameli O, Garrity B, Rothendler J, Cabral H, McDonough C, Stein M, Saper R, Kazis L. Health insurance design and conservative therapy for low back pain. Am J Manag Care. 2019 Jun 01; 25(6):e182-e187.View Related Profiles. PMID: 31211551	This is a relevant question, thank you, and a relevant follow-up to this study with regards to the consequences of healthcare utilization. These issues are being addressed elsewhere, in a separate study in the BACE-N cohort. Thank you for helpful identification of relevant papers. Kazis et al (2019) has been included in the second paragraph of page 4 and the first paragraph of page 13, and is highly relevant to the claims stated. Garrity et al (2020) and Carey et al (2019) has been included in the second paragraph of page 13.

VERSION 2 – REVIEW

REVIEWER	Lewis Kazis Boston University, Department of Health Law, Policy and Management
REVIEW RETURNED	06-Aug-2021

GENERAL COMMENTS	This is the second time I am reviewing this article as a resubmission. The authors have responded to all of my concerns and done a credible job. Two small points remain: 1. General health variables SF-36 is a standardized measure based upon a t-score transformation with a mean of 50 and a standard deviation of 10. I have modified the description as follows. "Health-related quality of life (HR-QoL) was measured using the Short-Form Health Survey 36-item (SF-36) physical and mental summary measures (standardized with a mean of 50 and a standard deviation of 10 according to a general US population with higher scores denoting better health) [31]." 2. Small grammatical corrections for the following sentence in the methods section: I have included quotes changing the word "is" to "are" Treatments provided usually differ between the healthcare providers. For example, patients visiting a GP "are" more likely to receive pharmacological therapy, patients visiting a PT "are" more likely to receive exercise therapy, and patients visiting chiropractors "are" more likely to receive manipulation therapy [15].

VERSION 2 – AUTHOR RESPONSE

	Reviewer 2's comments	
1	General health variables SF-36 is a standardized measure based upon a t-score transformation with a mean of 50 and a standard deviation of 10. I have modified the description as follows. "Health-related quality of life (HR-QoL) was measured using the Short-Form Health Survey 36-item (SF-36) physical and mental summary measures (standardized with a mean of 50 and a standard deviation of 10 according to a general US population with higher scores denoting better health) [31]."	Thank you, this modification yields a useful clarification for the readers. It has been implemented on page 6, under *General health variables*.
2	Small grammatical corrections for the following sentence in the methods section: I have included quotes changing the word "is" to "are" Treatments provided usually differ between the healthcare providers. For example, patients visiting a GP "are" more likely to receive pharmacological therapy, patients visiting a PT "are" more likely to receive exercise therapy, and patients	Thank you for your keen observation! This oversight has been corrected on page 5, paragraph 2.

	visiting chiropractors "are" more likely to receive manipulation therapy [15].	