Reviewer’s report

Title: Health of Spanish centenarians: a cross-sectional study based on electronic health records

Version: 1 Date: 26 May 2019

Reviewer: Karen Andersen-Ranberg

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Resubmission BMC Geriatrics Spanish centenarians
Reviewer 1
I thank the authors for resubmitting their article despite our demands for major revision. I am happy to see that the authors have removed the comparison with younger old persons. The following remarks may be many (again), but as I always say to my junior fellows, once you cut the worst things away from the original article, other problems pop-up.
And just a comment on the word 'elderly': In general, it is the combination 'the elderly' that should be avoided, not the word 'elderly' by itself. You should always think about how the word is used: does it homogenize are group of older persons with a respect to a specific condition, e.g. dementia, low ADL performance or not. Sorry for stressing this, and I admit that it is my bee in my bonnet!
And to the editor: it would have been nice to have a clean document too, i.e. without the T&C. Or is it just me being unable to identify it among the files?
Review:
Title: The title should mention that data are based on electronic health records! E.g. 'Health of Spanish centenarians: a cross-sectional study based on electronic health records (The EpiChron Cohort) (Mandatory)

Abstract:
Line 45: I do not understand why it is crucial? "Important" would be a better word, to understand the health of the oldest olds in the society, as their numbers increase exponentially.
Line 56: how do you know that the rates are lower, when you cannot compare?
Line 62: I would remove the 'good health status'. You do not know what a good health status is, and again lower than what?

Background:
Line 103: what do you mean by 'inappropriate healthcare'? Do you mean 'insufficient'? Please, be more precise.
Line 108: I think it would be fair to mention that the heterogenous results are likely explained by the various populations and methodologies used in centenarian studies.
Line 110: again, the referenced studies are some of those studies with the least representative populations or biased in other ways. I think it is unfair, just to mention these (ref. 14, 16,19) that are in support of the present study's results. Not academically fair play!
Line 116-120: I think it would be worth mentioning that no previous study on Spanish centenarians has been published in the English literature (if that is true!)
Line 126: Why is it important that it is a south-western European region? I suggest that you just keep the Region of Aragón in Spain.

Line 127: If the reference population is 1,3 million inhabitants, how does this number relate to the total number of inhabitants in Spain? Aren't you over 45 million? So how representative of Spain is your population of Aragón? Not to mention the number of people in the different age strata?

Line 129: 'sometime' - should it be 'at some point in time'?

Line 130: Why did you choose this period? Has the electronic health care records system only existed since 2011? I am alluding to that you may not know PREVIOUS diseases and conditions, e.g. fractures, myocardial infarction if you do not have health records earlier in time, and memory of past medical history may be incomplete, as we know people tend to forget. We need a description of the electronic health record system and clinical-administrative databases. We are not informed about what is registered, and based on what or which information?

Line 141: The sentence 'last full calendar year of follow-up' is unclear to me. Please clarify, maybe by giving an example.

Line 148: dispensations over at 12-month period, but when in relation to the long observation period? It is not clear!

Line 158: to compare with what? Be more explicit. Why use Kruskal-Wallis?

Line 165: which is the reference population here? The entire EpiChron cohort? And how large is the EpiChron cohort?

Line 173: typo? Maximum age 1114 years?

Line 174: never start a sentence with a numerical number.

Line 176-177: it is of no interest where they live, but more the kind of residence, i.e. care home, cohabiting with spouse, or with other family members, or living alone.

Line 180: Please describe in the text what you mean by 'deprived administrative health area' is? Just the lowest deprivation index, but of what???? And what does it mean for health care provision?

Line 187: Shouldn't it be Table 2? And the 6% with no chronic conditions were they without medication too? You mention later that 7% did not receive any medication. Can you see if these are the same persons?

Line 189: The definition of Multimorbidity should be given in the Methods section.

Line 208: I do not think that many clinicians recognizes lipid metabolism disorders in centenarians. Is it just because they are given cholesterol-lowering drugs if they have diabetes, stroke or myocardial infarction?

Line 219-223: This section is somewhat messy. E.g. I do not find that "family and social problems" can qualify for being a disease, nor non-specific signs and symptoms. Please omit.

Also, urinary incontinence is a chronic condition! But not a disease. And what lies behind the genitourinary disorders? Are they chronic or acute? E.g. a prolapse of the uterus may be chronic though it is treated with a ring to keep it in place. But it is still there.

And acute respiratory diseases are of course not chronic, but of no interest here where we are dealing with chronic. The same could be said about lacerations. Please omit.

Line 244: Shouldn't it be Table 3?

Line 249: De Beers criteria, reference is missing in the sentence. It should show that you used the updated list from 2015.

Line 283: What is "specialized care"?

Line 284: would be interesting to know which types of specialists?
Yes, but do you have data on former hospitalisations? I.e. before the age of 100?
No data given; unsubstantiated information. Please show the data.
Please enter Table 4 in the text
Please do not delete the sentence mentioning the EpiChron Cohort, and add to the sentence something about the electronic and health administrative data that you use. It is important to discern your study's result from clinical studies. You used a method that is very different from other centenarian studies.
also in very nice German study using electronic health records: Int J Publ Health 2017;62:679-688. (Tetzlaff et al. Expansion or compression of multimorbidity…….)
Just because you find a decrease from over 90% in 90+year olds to 80% is not enough to state that it is an inflection point. As your data are register-based they are very much relying on the fact that the centenarians/and their proxies goes to see the primary care physician. And there may be many reasons for not doing so, but just a 'laissez-faire' attitude or ageism, or dementia or physical and/or environmental difficulties in accessing primary health care physicians. You should be more modest. Moreover, if you showed confidence intervals of the proportions, I guess you would have an overlap due the relatively small numbers of centenarians compared to the other age groups.
Who are the 'several authors'.
Is your study then comparable then to other centenarian studies? And other studies used only a limited number of diseases, not all the registered diseases as in the present study. And how do your results fit with other more elaborated and clinical studies?
Why did you include dementia in the cardio-cerebrovascular disease group? Do you know whether the dementia diagnosis was based on vascular causes? Just because they aren't medicated with anti-dementia drugs, you cannot argue that it is a vascular dementia. A more neglecting attitude is more likely. Please omit the last sentence (line 343-344).
I cannot find that your reference 31 (von Berenberg et al) supports your allegation that vascular dementia is common in centenarians. If I am wrong, please show me where in the reference it can be read. To my knowledge we know very little about this. What is more likely is that there is a substantial vascular component in Alzheimers disease, as shown by Snowdon et al. in his Nun Studies.
what do you mean by this sentence (escape or survive)? Yes, there are not many options for anyone. You get the disease or not, and if you do, you either survive or die! Is it something left from the first manuscript where you compared with younger age groups?
But other studies have different results. You are not discussing this, but seem to be very fund of the theories that some studies support that centenarians are mostly healthy escapers.
You are comparing apple and pears! You cannot compare different birth cohorts at different ages! Please omit. It is more of interest that you find the same prevalence of diabetes in the three mentioned studies (with wrong references though)
You do not know that. The only thing we know is that those who became centenarians were healthier than their birth cohort peers in older age groups, when using hospitalisations as proxy for health (Oksuzyan et al.)
What do you mean by 'relatively lower burden of chronic diseases’? Relatively to what? You state that they are accompanied by low rates of polypharmacy, but have you shown this? I have earlier asked whether the those registered with no diseases are the same that do not receive any
medication?

Line 376: Give your proportion, so that the reader doesn't have to go back and find it in the results section to compare with the 27%. The reference from the UK showing 27% that did not receive any drug is skewed by the long observation time (23 years; from 1990 to 2013). So it is not a fair comparison! And you fail to mention other studies showing much lower proportions, e.g. the Danish study where only 5% did not have any medication prescribed.

Lines 383-385: This sentence is not clear (typo?)

Lines 385-388: Just because a medication belongs to a specific ACT group normally used for specific diseases, the same ACT groups may be used in other conditions as well. E.g. a SNRI may be used for neuropathic pain, but is listed as an antidepressive agent. Be careful with the interpretation.

Line 408: Omit 'real world data', but rather use 'register-based health record data', because that is what you have.

Line 425: You haven't really discussed the influence of the deprivation index, which may explain some of your results. Nor do we know their place of living (residence), which could also have explained the differences.

Table 2: very messy and difficult to read with all the T&C. I try my best: Why not lump all the cancers together? We are more interested in that than the various types. In many studies malignant cancers are divided in two groups: malignant, and low-malignant skin cancers. Also lump together the AMI with Ischemic heart disease, as AMI is just the ultimate sign of ischemia.

Check the reference list for redundancy! Ref. 15 and 28 are the same.

And finally, I cannot see if any of the authors are medical doctors. You need advice from a medical professional!

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Unable to assess

**Are the conclusions drawn adequately supported by the data shown?**
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