Author’s response to reviews

Title: Aspirations to become an anaesthetist: longitudinal study of historical trends and trajectories of UK-qualified doctors’ early career choices and of factors that have influenced their choices.

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Author’s response to reviews:

The Editor, BMC Anesthesiology.

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Dear Dr Tu,

Manuscript ID: BANE-D-17-00125

Title: Aspirations to become an anaesthetist: longitudinal study of historical trends and trajectories of UK-qualified doctors’ early career choices and of factors that have influenced their choices.

Response to reviewers

We are grateful for the opportunity to revise our manuscript. We would like to thank the reviewers for their helpful comments and suggestions. We have responded to the comments of reviewers as follows. We reproduce in bold below each reviewer’s comment, followed by our response. We include two versions of our revised manuscript, for your convenience: We uploaded the untracked version as the main manuscript, and the version with tracked changes as a supplementary file.

We look forward to hearing from you in due course.

Yours sincerely,
Beatrice Emmanouil

and on behalf of co-authors Trevor Lambert and Michael Goldacre

UK Medical Careers Research Group, Nuffield Department of Population Health, University of Oxford

Reviewer reports and Authors’ responses:

Timothy Long (Reviewer 1):

General: This is an interesting topic for anesthesia providers.

Response: Thank you very much for your kind comment.

I believe the manuscript could be structured to present the findings in a more cohesive way. For example, the reader gets lost thinking anesthesia over time, differences in attrition rates, factors important to men vs women in selecting anesthesia that it's a manuscript comparing percentages of men vs women pursuing, or factors important in selecting anesthesia compared to other specialties. I think the aims need clarification and the results and discussion need to focus on these aims.

Response: We have moved the statement of aims to the end of the Background section, which has been reorganised to improve clarity. The paper has the primary aim of examining trends in choices for anaesthesia and the relationship between choice and later career outcomes. Factors affecting career choices, for anaesthesia and for other specialties, are secondary to this primary aim but are included because they seek to explain motivations for some of the observed differences.

Abstract

Results: Ensure that you are highlighting your most important results and that they correspond to the results presented in the full manuscript (i.e. in the same order). You can probably accomplish this in one or two paragraphs rather than four.

Response: We have resequenced the start of Results in the Abstract to reflect the sequence of Main Findings in the Discussion. The Results in the Abstract reflect the findings referred to in the Aims for the paper.

P2 L45-47: This is misleading and implies that men are more influenced by a career with acceptable hours than women, which is not what your findings demonstrate. Comparisons were done separate for men and women comparing anesthesia vs other specialties.

Response: The sentence has been amended to read
Men anaesthetists were more influenced than men in other hospital specialties by ‘wanting a career with acceptable hours’: the corresponding difference among women was not significant.

Background

Please restructure to more succinctly provide background and end with the aims of the study. The aims are hidden in the middle of this section.

Response: We have re-structured and re-written parts of the background. As mentioned above, the aims are now more clearly defined and at the end of the section.

P3 L45: It's not clear that you actually assessed factors leading "out of anesthesia"
Response: Thank you for your comment, this was erroneous and we have removed it.

P3 L51: You are providing results here
Response: We have amended part of that text – the information is covered in Results.

Results

P6 L24: Please clarify "Additional information 1 Table shows the numbers on which figure 1 is based."
Response: We have reworded this sentence.

P6 L28: "Throughout the years…." Please clarify - does this refer to the period from 1974 to 2012?
Response: Yes it does - we have reworded this sentence.

P8 L6-8: "Men were significantly more likely…." There are not statistics to support this - do you mean this is statistically significant? "….but differences between them were generally small." Please clarify, this is confusing.
Response: Differences were not statistically significant so we have amended the text to clarify.

P9 L15-17: "Men (but not women) anesthetists were more influenced than those….." - this is slightly misleading as no comparison is done men vs women. Is there a difference between the percentage of men vs women that find this factor important? This would be a more relevant comparison.
Response: We compared men anaesthetists to other hospital specialty doctors and women anaesthetists to other hospital specialty doctors to investigate if the factors that differentially influence anaesthetists relative to other specialty doctors differ by gender. We have added a comparison of men and women anaesthetists directly and amended the results section to clarify content and add information on gender comparison.

Table 3: Although interesting comparing factors vs other specialties, it may be equally interesting to compare men vs women on each of the factors listed for anesthesiology only.

Response: Results on this have now been added to table 3.

Discussion

P10 L38-40: "A higher percentage of women than men rated opportunities for career progression highly." This is not accurate as it was 32.9% for men and 30.4% for women and there were no statistics performed. You can only say that compared to other specialties, women in anesthesia listed this as an important factor.

Response: We have amended this and clarified the meaning of the comparisons we had made:

“There were two noteworthy differences between men and women in factors influencing career choice that differentiated anaesthetists from other hospital doctors. Men working in anaesthesia had been significantly more interested in working conditions than men in other hospital specialties; for women this was not a distinguishing factor for anaesthetists. Also, a higher percentage of women anaesthetists than women in other specialties rated opportunities for career progression highly, whereas all men doctors rated this factor comparably regardless of specialty.”

P10 L 40-42: Same as above. You cannot say a higher percentage of men than women rated this as an important factor.

Response: We have added gender comparisons with anaesthesia in table 2 in the results text and in the discussion:

“Gender comparisons amongst anaesthetists revealed a higher percentage of women than men anaesthetists rated wanting acceptable hours and working conditions as well as a career that fits with their domestic situation as important and fewer women than men were motivated by financial prospects.”

P10 L57: It appears that the attrition rates are inferred from table 2. Can you clarify in the results? Any comparisons between men and women in attrition?

Response: We have not derived attrition rates. This was not within the scope of the paper. As such, we also did not make comparisons between men and women in attrition.
Women anesthetists in our study were positively influenced by career promotion... Men were too - the implication with the way this is worded is that women were influenced and men were not, which is inaccurate.

Response: We have clarified this earlier on and in this instance. Please see above. Women anaesthetists were more positively influenced compared to women in other hospital specialties, whereas for men there were no differences compared to doctors outside of anaesthesia. This is an important note in discussing what attracts doctors specifically to anaesthesia.

"In attracting women doctors to anaesthesia, compared with other hospital specialties, we found that women anaesthetists in our study were positively influenced by career and promotion prospects in the specialty, more so than women who pursued other specialties."

Conclusions:

Summarize key findings in 3-4 sentences.

It's not clear that the factors that attract men and women to the specialty are any different.

Response: Please see above for clarifications. We hope that we have now clarified that by comparing factors that attract doctors in anaesthesia more than in other hospital specialties we observed differences between men and women doctors.

Figure 1:

Not clear what comparisons were done that are statistically significant. Can you make it more clear in the figure? Also, can you clarify the three sections? I'm assuming the first pair in year 1, the 2nd pair is year 3, and the third pair is year 5.

Response: Thank you for your comment. We have amended figure 1 axes titles to and the section titles above each graph. One might study the figure in two ways: 1. look down the graphs to see how trends varied across survey years from year 1 to year 5 post qualification and 2. Look across to compare trends in different responses in the same survey year.

Figure 2:

I don't think this figure adds much. Are there statistically significant differences in these responses?

Response: There were statistically significant differences, outlined in the results text. We have also made that clearer on the figure itself. We think that the figure provides a quick visual representation of the results and avoids having more numerical information in the text.

Phillippa Poole (Reviewer 2):
Interesting, well-written paper from a leading group. Good literature review, novel, rigorous and generalisable.

Response: Thank you very much for your kind comment.

My suggestions are few but may improve your paper:

Background:

1. Line 4 I did not understand what is meant by 'holistic hospital specialty' - please expand on this. What about general medicine or geriatrics which consider the whole patient??

Response: We have improved and enriched this paragraph to explain what we mean by the term ‘holistic’ in this context:

“Anaesthesia has been described as one of the most ‘holistic’ specialties in medicine, in the sense that it is involved in almost all clinical areas in hospital practice [1, 2]. It covers work in pre-, post- and intra-operative care in the majority of clinical procedural areas in hospital [3, 4], a burgeoning involvement in pre-hospital emergency and trauma care [5], as well as expertise in the management of critically ill patients and those with otherwise intractable acute and chronic pain.”

2. Suggest a bit more context either in the background or the discussion, e.g. Is there a shortage of doctors choosing anaesthesia in the UK? What proportion of current specialists in the UK are anaesthetists? What are the projected trends?

Response: We indicate in paragraph 2 of the Background, with references, that there is considerable debate in the UK about the adequacy of the future supply of consultants in anaesthesia, and some evidence of concern about attrition rates in the specialty in the later stages of training. It is difficult for us to say more without going into some depth about what appears to be a complex picture with conflicting opinions.

Results:

3. Page 6 Line 24 "Additional information 1 Table shows the numbers on which Figure 1 is based." This Sentence seems to be missing some words.

Response: We have reworded this sentence.

4. Please consider whether you need all the tables, figure and results and P values in the text. There's quite lot to digest. For example, could you add the P values to the tables?

Response: we have added p-values to the tables.

5. More consistency needed to make it easier to read -order of men / women
-use of year 1, 3, or 5 cf. year one, three or five in figures

-y axis labels in Fig 1 - make the left one 1st choice, and the right one 1st, 2nd or 3rd choice

Response: We have amended both figures and revised tables.

General:

6. Perhaps have another re-read as phrasing is sometimes a bit awkward because of use of commas / long sentences

Response: We have made judicious changes to the text to address this, in various places in the manuscript.

Asha Tyagi (Reviewer 3):

It is an interesting study.

It adds to the perceptible concern that anaesthesiology as a subject/speciality does not manage to evoke adequate interest and enthusiasm amongst medical students. Primarily this is related to the conduct of the learning environment offered; and the way speciality is presented/perceived.

Response: Thank you very much for your kind comment. I have some minor observations/suggestions added in the annotated manuscript.

Response: thank you for your in text corrections. We have edited the two typos.

Comment: The finding of 8% practicing anesthesiologists never having opted for the speciality needs some discussion. It is worrisome if we have people opting for the speciality without an inclination. would the authors like to address it too. It should also be noted that amongst the other speciality doctors, 4% had opted for anaesthesiology (100-96%) but did not take it up. This would mean we are losing out motivated people; or that the speciality failed to sustain their interest? Would the authors like to discuss this too?

Response: This is a very useful and valid comment. Thank you. Our table was not very clear and we have amended the label “never” to “never as unique first choice”. We have clarified that in the results section. In this context, of the 8% of doctors who never made a first choice for anaesthesia the majority have chosen it as second or third choice and only 15 people never chose it at all and yet worked as anaesthetists. Of these 15, 10 had made earlier choices for surgery or accident and emergency. We feel the numbers are too small and that it might detract from the paper to discuss this in the main text. Also, the 4% of doctors in other specialties who had made an earlier untied first choice for anaesthesia is broken down by choice in the table.
half of them (2.1%) had made their first choice in year 1 only and less than 1% in any other combination of years.

Paloma Toledo (Reviewer 4): The manuscript by Emmanouil et al evaluates historical trends and trajectories of UK qualified doctors entering into anesthesiology. The authors found that there has been an increase in the number of doctors entering anesthesia, with a higher number of men than women entering the field. Furthermore, the authors evaluated preferences for career choice and found differing rationales for men vs. women.

Overall, this is an interesting paper on a provocative topic.

Response: Thank you very much for your kind comment.

I have several methodological questions about the work, which I will outline below.

General comments:

1. There is a lot of data, and I have two major data related issues, which may require the attention of the statistical editor:

   a. It appears that each time point is being treated as independent data (there was a Bonferroni correction applied, but the authors did not specify the P value that would be significant for each analysis).

   However, should this not be a repeated measures analysis of group vs. time?

   Response: The data in this paper are not suited to a repeated measures analysis for two reasons. Firstly, we have two types of time influences, one across the cohorts (which are independent of one another) and one of time since graduation (within each cohort). We are fortunate in this study in being able to report on both.

   Our data are categorical and not ordinal so better suited for trend analysis. For more details see for example Agresti’s seminal text on categorical data analysis (1990). We report on the responding doctors in each cohort and report percentages in each year. Our analysis is suited to that. When comparing men and women, or groups of doctors in different specialties, we are not working with repeated measures, as each comparison is done at a defined time point since graduation.

   In accordance with usual practice, Bonferroni corrected p-values were reported throughout, when we were conducting simultaneous tests, rather than amending significance level.

   b. It appears that several people may have taken the survey in multiple years. Should there not be a correction for this paired data?

   Response: Please see above response. There is nowhere in the paper in which we compare the same group of doctors at year 1 and year 3, or year 3 and year 5 etc. If we were to do so, it would
bring in its train other problems due to missing data items in some of the pairs i.e. we would have to reduce the data to those who replied on all occasions.

2. In the introduction the authors state that they want to evaluate the factors that influence career choice and exit from anesthesia. However, this seems to be based on much of the data that is in table 3. Is that table exhaustive, or were categories collapsed by the authors? It seems relatively limited in scope and there may be a framing effect.

Response: We have carefully selected factors that are more general and can apply to all specialty doctors. This allows for generalisations, continuity and comparisons across specialties, affording the identification of factors that are more attractive to anaesthetists compared to other doctors. There are limitations to this, which we have mentioned in the discussion.

3. In reading the introduction, I thought that there was going to be some sort of regression model evaluating the factors associated with entry into anesthesiology. It appears that the demographics available are limited to gender. Do the authors have access to any other information about the candidate pool? Where they did their training? Number of anesthesiologists at each site (e.g. potential mentors)? Time spent training in anesthesia?

Response: We believe that by re- phrasing the background section and stating the objectives more clearly we have addressed this issue. The methods section also mentions that we investigated factors influencing career choice as items in the survey. This has been done before and we cite relevant papers. It is not within the scope of the paper to do a regression model but it would be an interesting follow-up.

Introduction

1. The introduction seems to repeat itself at time, in paragraphs 2 and 4, you restate the objective of the study. Please address.

Response: We have re-structured and re-written parts of the background section to make it flow better. The aims of the study are now clearer and at the end of the section.

2. P3 line29. This sentence is confusing as presently written. Consider rewording/ simplifying it.

Response: We have re-worded slightly to clarify content.

3. P3 line 34. You refer to the UKMCRG without defining what the organization is (it is spelled out in the paragraph that begins on line 47/48. Please define the abbreviation the first time that it is used.

Response: This is amended. We define the UKMRCG in the first instance of use in the text now. Thank you for bringing it to our attention.
4. P3 Lines 51-55, this seems like information that would belong in the methods section. Consider restating that this is a longitudinal cohort of UK graduates or something to that effect, without introducing the individual numbers and percentages in each year.

Response: We have amended part of that text.

5. The last paragraph of the discussion seems like it belongs best in the discussion, not the introduction of your paper.

Response: We have amended the background section to strengthen the purpose of the study. Part of the justification of the paper is previous work and therefore we have kept the literature overview because it is important in providing the background of the study.

Methods:

1. I think that it would be useful to the non-UK trained readers to explain when these exams are taken, when students are exposed to different specialties, and when specialty selection needs to be made.

Response: We have added a relevant paragraph (paragraph 4 of Method) to explain why we do not report according to the medical training pathway and also provide sources that provide more information for the reader, which would be out of the scope of the current paper:

“Analysis of trends across different graduate cohorts and of differences in time passing from qualification (1, 3, or 5 years) is purely chronological to ensure exactitude and for ease of comparability with studies that may be done elsewhere. We do not relate results to specific timings in the training of anaesthetists because training pathways tend to be revised at regular intervals and the timings of key training events (such as postgraduate examinations) do not necessarily remain constant over time Details of recent career pathways in the UK for all doctors [11] and for anaesthesia specifically [12] as well as a brief historical perspective on training in the UK are described elsewhere [13].”

Results:

1. The results section is quite numbers heavy. In general, if a number is available in a table or figure, I do not suggest presenting it in the written text of the results section as well. If one or two of these are important for emphasis, that is fine, but the volume of numbers in the results section make this section difficult to read.

Response: The Results section is necessarily somewhat numerical for a topic such as this. We have removed some percentages from Results which appear in table 3. Other percentages in Results do not appear in tables and figures, either because the figure (in the case of Figure 1) cannot be annotated with all the percentages due to its size, or because the text of Results describes a breakdown (by gender) which does not appear in a table or figure.
Conclusions:

1. The authors put a great deal of emphasis on the definitiveness of interest in anesthesia, yet, perhaps this reflects exposure to anesthesia. It would be difficult for a student that is not exposed to anesthesia to be definitely interested. If a focus is placed only on those that are fairly certain that they want to enter the field, then a large number of interested students may not be developed.

Response: Certainty of choice would be indeed expected to correlate well with experience and as such we have noticed an increase in certainty from year 1 to year 5 post-qualification (we have done Friedman’s tests to that effect but we thought the result was perhaps not so surprising for the reason you have outlined and we omitted it from the paper). What our data show is that for a comparable experience in time since graduation, there are differences between doctors choosing anaesthesia to doctors choosing other specialties, and investigated trends throughout many years. This may indeed partly reflect changes in curricula that have affected the level of exposure. A detailed study of this is beyond the scope of the paper.

Fauzia Khan (Reviewer 5):

Thank you for giving me an opportunity to evaluate this interesting paper which is a longitudinal study of historical trends of UK doctors and their career choice of anaesthesia. Although the study suffers from the limitations of such historical surveys, the response rates are acceptable and the paper does highlight some important points and trends. It also provides directions for future research and a methodology that can be replicated to compare results.

Response: Thank you very much for your kind comments.