Reviewer's report

Title: Waiting times for hospital admission: the impact of introducing patient choice in a decentralized NHS

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Reviewer: Ansgar Wuebker

Reviewer's report:

This is an interesting article that asks an important question: How have patient choice and an increased opportunity for geographical mobility reduced waiting times for elective hospital care? However, in summary, both conceptual and empirical, the authors have not convinced me of their argument.

Major compulsory concerns

Methods/Study design
I am not convinced that the design chosen by the authors can answer the question to be answered and it is not sufficient to state this limitation in one sentence within the conclusion section.

Indeed the main problem is that the authors use cross-sectional data aiming to analyse the “impact” of choice and mobility on waiting times. To identify causal impacts generally a pre-post-design with control group is necessary. Because the authors use a cross sectional design they should basically argue more cautiously (i.e. the conclusion in the abstract cannot hold in my opinion) and avoid the word “impact”. The result that patients who bypass the hospital have shorter waiting times cannot be interpreted in the way the authors do. Maybe patients choose another hospital because the nearest hospital had too long waiting times. So, the decision to bypass could be a consequence of to high waiting times of the next hospital and the negative correlation between choice and waiting times is due to reverse causality. Clearly, from a patient perspective, waiting time is lower for patients who are more mobile and which have more choice. However, from a system wide perspective: choice would decrease waiting time of the nearest hospital and increase waiting time of the chosen hospital. Thus, we cannot conclude on the basis of the data at hand that choice reduces waiting times overall. If the authors aim to analyse the “causal impact” of choice and mobility on waiting times within a cross sectional design they should use special methods like an IV-approach or a “natural experiment”. Maybe the authors could compare hospitals from a region where the patients had no opportunity for choice (i.e. because it is a very rural area) with similar hospitals from a region where is opportunity for choice in order to create a natural control group.

Methods/Estimation Method:
You should describe more precisely your estimation method. I suppose that you use OLS. What are the theoretical arguments to use OLS? From the descriptive
results in table 1 it seem obvious that you cannot assume a normal distribution of waiting times. The data seem positively skewed. Did you test for the adequate specification [i.e. Test of the functional form (Reset test), heteroskedasticity test (i.e. Breush-Pagan-test)]? It seems for me that the data are Poisson distributed. Maybe you should use a logarithmized dependent variable. In sum, please provide a better justification of the method applied. In any case, please calculate and present robust standard errors. This is especially important at the hospital level or ICD-level (cluster robust standard errors), since waiting times should be correlated within a hospital or ICD-group (compare page 8 – chapter 15 compared to chapter 17).

Methods/Data presentation:
How many observations are in each regression model? I suppose that the number of observation differs between the model specifications, because - from table 2 - you can derive that the number of observations changes for the different variables. That is a problem for comparison of the models, if there are some systematic dropouts. In that case you compare apples with oranges. Please indicate in table 3 the numbers of observations and explain whether there are systematic dropouts.

Interesting would be information on waiting time differentiated by IDC10 chapter and choice and mobility. I would suggest that you extend table 1 with this information. The reader would get information whether the impact of choice is ICD-chapter specific and whether the inclusion of dummy variables for ICDs in the regression analysis is justifiable. Moreover you get information of the relevance of the choice-options in dependence of the ICD-chapters. In your specification you assume linear effects over the ICD-chapters. I am not sure whether this assumption holds. Please provide descriptive data to support your argument.

In table 2 you present some descriptive data. I have problems to interpret the data adequately, because the data are not consistently presented in line with the information in the technical appendix. For example, in table 2 you include 4 dummies for “Choice and Mobility”. These dummy variables do not correspondent with the description in the appendix. There you have a variable “Patient choice and mobility” ranging from 0 to 3. Moreover, I do not understand the values of the dummy variables. For example, the dummy variable “Non choice & non-mobile patients” has a mean of 0.17. What does that mean? 17 percent out of which sample have no choice and are not mobile? I read the data in a way that they are out of the sample of the 778 patients; or do you mean that the 0.17 are 778 observations. That makes also no sense, because the dummy variable “No choice & Mobile patients” has also a value of 0.17 and there are 291 patients. Please clean up and give some explanation.

Minor essential concerns

Regarding introduction
In the introduction the authors should motivate a little bit more, why it is important
to analyze the impact of choice and mobility on waiting times? Please, describe more precisely the causal mechanisms that could lead to reduced waiting times and the theoretical ground about choice being a vehicle for efficiency improvement. (competition?, providers with high waiting times lose patients?)

Regarding data
The naming of some variables should be improved. Do not call a variable “gender”. Please name it male or female to make the analysis better understandable.

You state on page 5 that the variables were randomly selected. Please provide some information on the selection process. Are the hospitals selected representative regarding hospital size, etc.? How have the data been weighted (top of page 6)? Please deliver some more precise information on that.

The paper includes no sensitivity analysis. I am not sure that the results are robust, because there are some extreme waiting times of over 1650 days. How do these outliers have impact on the results?

Regarding limitations:
The authors should hint more critically on the limitations of the study due to the data set and methodological limitations.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.