Reviewer’s report

Title: HOSPITAL PHARMACY WORKFORCE IN BRAZIL

Version: 0 Date: 11 Jul 2017

Reviewer: Pascal Geldsetzer

Reviewer's report:

I think this paper is a well written, interesting analysis that I would assume is of interest to policy makers in Brazil. All my comments are fairly minor except that I would suggest switching to (parametric) regressions to investigate the association between a hospital having a pharmacist and hospital characteristics (as well as state/municipality-level GDP). While I do believe this would make the analysis better, I don't think publication should be contingent on making this (relatively major) change.

Abstract

Please state why it was important to do the analysis you did in the backgroudn section.

Introduction:

"Have" should be changed to "has" in this sentence: "low compliance with these legal requirements and standards have been observed [17]."

Methods:

Please clarify whether the database from which you extracted your variables contains data on all hospitals in Brazil or only a subset. In addition, please clarify how hospital was defined (e.g., does it include nursing homes?).

I believe 'crossover' should be spelt in one word in this sentence: "Medical laboratory scientists were not counted as hospital pharmacists despite some cross over in roles in the country."

"States Gross Domestic Product (GDP) obtained at IBGE [01] were correlated to the 16 total number of pharmaceutical professional in each of the 27 Brazilian states, by
17 Spearman correlation." I think it would be good if you could justify here why you ran a Spearman correlation rather than a simple regression of the number of pharmaceutical professionals (possibly log-transformed) on state GDP.

Results:
I would separate "hence these were excluded" into a stand-alone sentence in this sentence: "From a total of 6,385 registries of hospitals in the National Database of Healthcare 3 Facilities, 908 (13.8%) were duplicates and 687 (10.8%) were missing all data hence 4 these were excluded."

I feel Figure 1 is superfluous given that you have already stated these exclusions in the text.

I have several comments on the analysis presented in Table 4:

- I think the analysis presented in Table 4 would be better shown as a simple logistic regression (regressing 'having a pharmacist (yes/no)' onto each of the hospital characteristics both as uni- and multivariable regressions).

- Should the outcome variable for Table 4 be 'having a pharmacist yes/no' or rather 'having a pharmacist per 50 hospital beds' which I understand is the policy plan in Brazil? If the authors choose to switch to a parametric regression for Table 4, then I would also think about running a regression with the number of pharmacists per 50 hospital beds as the outcome variable (this could be run as a OLS regression, possibly with a log-transformed outcome variable).

- If the authors keep Table 4 as it is, then my comment would be that it is currently not clear to me which numbers/proportions the p-values are comparing. In addition, instead of showing n (%) in the table, I would show % (95% confidence interval).

"Finally, a positive correlation was obtained between GDP and the total number of 2 pharmaceutical professional in each of the 27 Brazilian states (r2: 0.958; p<0.0001)." I believe this would also be more appropriately tested with a parametric regression (you could add GDP as a x-variable in the regressions for Table 4). In fact, this might actually best be modelled as a multi-level model with level 2 being the state and GDP being a state-level predictor. If you had GDP at the municipality rather than the state-level, this would make your analysis more powerful.
Figure 2 is nice but a bit blurry.

Discussion - limitations paragraph:
To what degree is it a limitation that you were not able to capture lab personnel and pharmaceutical technicians, which may adopt the role of pharmacists (is this 'task-shifting' intended by the system or not?)?

Conclusion:
I'm not in any way an expert in the Brazilian health system but I wonder to what degree this conclusion applies: "Law enforcement 1 should be performed to 2 ensure all hospitals have, at least, one pharmacist for each 50 beds, assuring quality 3 in the healthcare process and more success in clinical outcomes". Maybe hospitals/municipalities made the conscious decision to invest limited resources into other hospital components (e.g., equipment, non-pharmacist staff, etc.) or non-hospital expenses in the health system, which they felt would better serve the population's health? If that is the case, should municipalities really be forced to hire pharmacists?

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Quality of written English
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