Author's response to reviews

Title: Geographical Variation Analysis of All-Cause Hospital Readmission Cases in Winnipeg, Canada

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Version: 4 Date: 27 December 2014

Author's response to reviews: see over
December 19, 2014

Dr. May Nawal Lutfiyya  
Associate Editor  
Journal of BMC Health Services Research

Dear Dr. Lutfiyya,

**RE: Submission of Revised Manuscript [MS:7750584381431131]**

Please find enclosed the revised version of our manuscript (MS:7750584381431131) entitled “Geographical Variation Analysis of All-Cause Hospital Readmission Cases in Winnipeg, Canada”. We would like to thank you and reviewers for the careful and constructive comments. We have made changes of the manuscript in accordance with reviewers’ advice.

Based on your comments, we provided descriptions of how interprofessional teams work together to provide the health care services in homes for persons with a history of readmissions to hospital or long stay (page 2-3). We also added information (evidence from the literature) that the interdisciplinary team approach could reduce hospital readmissions (page 7).

In this study, we focused on the examination of the cluster variation of hospital readmissions (spatial analysis for the readmissions). Whether or not the interprofessional team approach in the virtual ward service could reduce the readmissions will need further study/evaluation to explore. More work is needed to determine whether virtual wards actually address the issue adequately or well. This paper was designed to make the use of them feasible by identifying clusters, and so we’ve decided not to present the full range of the literature on virtual wards because it will divert the paper into an entirely new direction.

We hope that this revision has succeeded in allaying the reviewers’ concerns. We look forward to your decision.

Sincerely,

Yang Cui on behalf of the authors

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Letter to Reviewer #1

Dear reviewer:

We really appreciate your thoughtful and valuable comments. Based on your comments, we revised the manuscript in accordance with your advice.

1. Grammatical Errors: The manuscript contains multiple grammatical errors and this makes it challenging at times to read and review.

Response: Thank you for this comment. To correct grammatical errors of this manuscript, we have had a proof reading and editing from a skilled and qualified professional.

2. Neighborhood Characteristics: While the analysis identified neighborhood clusters in which patients are more likely to be hospitalized, they do not provide any data or offer any explanations as to why this may be. It would strengthen the manuscript if additional contextual data or information was provided about these neighborhoods. This information would be important to consider in the planning of the virtual ward program teams.

Response: Thanks very much for your suggestion. We added paragraphs below to the revised manuscript (page 2-3) to provide additional information about the neighbourhood cluster:

“Neighborhood Clusters were defined by the Winnipeg Regional Health Authority and the City's Community Services department, in partnership with associated community groups. The Clusters follow neighbourhood boundaries and are defined based on population and natural community boundaries. The Neighbourhood Clusters are grouped together to make up the larger Community Areas. More detailed analysis and comparison of health and social information is possible at the Neighbourhood Cluster level. There are 25 Neighbourhood Clusters in the Winnipeg Health Region, each with a population of approximately 27,000 people. The population health status and healthcare service needs among 25 Neighbourhood Clusters are different (Winnipeg Regional Health Authority, 2010). The Winnipeg Health Region provides health services to meet a variety of needs for the population in these areas.”

“In order to inform health services planning regarding the development of virtual ward services for the entire Winnipeg Health Region, it is important to identify the geographic distribution of persons at risk for hospital readmission, so that resources can then be used effectively to and meet the needs if residents.”

Thank you for reviewing our manuscript. We are really grateful for your helpful comments.

Sincerely
Letter to Reviewer #2

Dear reviewer:

We greatly appreciate your comments to our manuscript. Your thoughtful and valuable comments have helped us a lot in clarifying our paper. We also revised the manuscript in accordance with your advice.

1. I think it would be helpful to provide a bit more info on the virtual wards in the intro, eg how often do they make home visits, now effective are they, how costly are they. Since the importance of identifying clusters is predicated on this intervention it is important to include that a virtual ward is effective at reducing readmission.

Response: Thank you for your suggestion. We added the following information on the Winnipeg virtual ward services in the introduction (page 2).

“a pilot study pursuing the establishment of virtual ward services is underway in the Northeast and West sectors of the Winnipeg Health region. These sectors comprise four community (administrative) areas or about 33% of Winnipeg’s population. Persons with a history of readmissions to hospital or long stay have been selected for complex case management at home. One of the goals of developing virtual wards for these four geographic areas is to assist patients after discharge from hospital to identify clinical problems before they become serious and to improve the quality and efficiency of healthcare services for individuals at high risk for (re-)hospitalization. Interdisciplinary teams including primary care physicians, nurse practitioners, dieticians, pharmacists, occupational therapists, social workers, case coordinators, clinical resource nurses, multi-skilled workers and other services in the community area (e.g. community mental health) agree on referrals to the virtual ward services (now called hospital home teams or HHTs), elicit the patient’s primary goals and then determine how best to meet these goals. Regular meetings amongst team members and provision of care in the home are key to reducing readmissions to hospital. A project manager and measurement specialist continually monitor the HHTs population, needs and service provision. The HHTs service is now seen as intensive primary care offering “intensive case management which leverages existing resources”. An evaluation of HHTs is pending.”

Since the work of the evaluation and implementation of the “virtual wards” is still on going, no final findings/reports regarding how cost-effective of the HHTs’ (virtual wards’) intervention in the WHR are available.

2. Need to explain the rationale for selecting the 25 geographic areas. It would appear that they are all the postal codes. Were any omitted? It would appear to be a convenient way of looking at this rather than another reason.

Response: Thanks for this question. We selected the 25 neighborhood clusters (NCs) because the Winnipeg Health Region has historically been divided geographically into 25 NCs for the purpose of delivering health services and planning. The population health status and healthcare
service needs among 25 Neighbourhood Clusters are different. The Winnipeg Health Region provides health services to meet a variety of needs for population in these areas. In order to inform health services planning regarding the development of virtual ward services for the entire Winnipeg Health Region, it is important to identify the geographic distribution of persons at risk for hospital readmission, so that the service’s resources can then be used effectively and meet the needs in health services. We added above information on page 2-3.

To define the Neighbourhood Clusters, we used the Postal Code Conversion File (PCCF) to match to postal codes in the population health file. PCCF provide a link between the six-character postal code and the standard geographic areas, such as Neighbourhood clusters. The PCCF are updated on a semi-annual basis by the Manitoba Centre for Health Policy. None were omitted. The Winnipeg Health Region boundary is generally defined based on the municipal code provided by Manitoba Health on the population health records, and NCs are defined based on postal code.

3. Figure 1 is hard to follow. Might need to be in color or use some cross hatches.

Response: Thanks for this comment. We modified Figure 1 using color and cross hatches.

4. In discussion, wondered if there was a way of potentially drilling down even more than by postal code. In my home city, the police use a similar analysis about crime to be able to effectively deploy police. They drill down to a block by block analysis. The discussion might also benefit from including literature in the social sciences about the importance of deploying limited resources based on a spatial analysis.

Response: Thanks very much for this comment. We agree with you that it will be more informative if this spatial analysis could examine the cluster variation in much smaller areas than Neighbourhood clusters, such as a block by block analysis. However, currently we don’t have data that allow us to geocode to a much smaller area segment, such as street or block. We examined the spatial variation of hospital readmission in 25 Winnipeg Neighborhood clusters because the Winnipeg Health Region is divided geographically into 12 Community Areas (CAs) and 25 Neighbourhood Clusters (NCs) to plan and provide health care services. Based on the data availability and the purpose of planning virtual ward services within the entire Winnipeg Health Region, this spatial analysis of hospital readmission for the small geographic areas such as NCs can still provide useful information for the virtual ward service planning.

5. Also not surprising that those who are older, sicker and do not have a primary care doc and an emergent initial hospitalization more likely to be readmitted. Are the geographic clusters different than just identifying neighborhoods of low SES residents? Can somehow this be controlled for?

Response: Thanks for this question. Manitoba, a central Canadian province, has a universal health care plan without premiums that covers all residents irrespective of their age or socioeconomic status (SES). The health service is provided on the basis of needs, rather than the ability to pay. In addition, we also included the SES variable, such as income quintiles, in our
spatial model, but the result shows that it was an insignificant factor associated with potential cluster of readmissions.

Neighbourhoods do differ on the basis of SES and, to some extent, geographic clusters do pick up that effect. Since the purpose of this analysis is to assist the Winnipeg Health Region to provide services where necessary, a geographic cluster analysis does that more directly than would an analysis linking need to SES and then a further analysis linking SES to neighbourhood.

Thank you for reviewing our manuscript. We are really grateful for your helpful comments.

Sincerely