Author’s response to reviews

Title: Post-Acute Care Referral in United States of America: A Multiregional Study of Factors Associated with Referral Destination in a Cohort of Patients with Coronary Artery Bypass Graft or Valve Replacement

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Author’s response to reviews:

Response to Reviewer(s)' Comments

Dear Editor,

We want to thank the reviewers for their valuable time and insights in reviewing this manuscript. We really appreciate the reviewers’ comments and inputs. We made changes to the manuscript based on the comments, and we feel that the manuscript is much improved as a result. All the changes made are highlighted in the revised manuscript in Yellow color. The responses are detailed below.

We are glad to know that we could address all the concerns from Reviewer 2 with our first revision. In our second revision, we worked on the title, abstract, methods and conclusion sections as requested by general and specific comments from Reviewer 3. Also, all the specific comments are addressed separately in this response letter, containing point-by-point responses to the reviewer’s comments.

We sincerely hope these modifications address the feedback provided by the reviewers. Looking forward to your response.
Reviewer 2:

Reviewer comments: Thanks for authors' effort in revising this paper. My comments have been well addressed. I have no further comments.

Response: We are glad to know this. Thanks.

Reviewer 3:

General Comments:

1. Authors have admitted the limitations of the study raised by previous reviewers and the need to re-write some sections of the manuscript.

Response: Yes, and relevant sections were rewritten to address previous reviewers’ concern in our first revision.

2. The study design is not clear. This is not a cohort study. The use of the word 'cohort' is for descriptive convenience and not a study design.

Response: The study design has been mentioned as a record review instead of cohort study as per the reviewer’s suggestion.

3. Limitations of the study have been expanded to accommodate comments by previous reviewers.

Response: Yes.
4. Single level multinomial logistic analysis is accepted by this reviewer. Admittedly multi-level modelling and analysis would have provided more robust predictors. The analyses in this manuscript based on primary outcome of interest by the authors are acceptable. Authors also admitted that they have other publication/manuscript on the multi-level modelling. Other modelling not covered by the manuscript should be recommended for further studies by the authors.

Response: Multilevel mixed modeling has been recommended for further studies in the last line of the discussion section. (Page 21, Discussion Section, line 9)

5. Authors should organize the results and reports of primary variables of interest for easy comprehension into patient[eg gender, age, etc]-, provider/hospital[hospital size, teaching status, etc]- and regional[census division, etc]- related factors of PAC referral discharges.

Response: The primary variables of interests are organized as recommended and presented in Table 1 (Page 10) and the results are updated as well. The other two tables (Table 3 and Table 4 in Appendix section) containing the results are also organized in a similar way.

6. Authors should interpret appropriately the results of the RRs[RR<1] that didn't cross nullity=1 [null hypotheses] based on percentages. The use of…… for example 0.4 and 0.7 times less likely…… are not accepted for this level of study and didn't convey meaningful statistical inference.

Response: RR Results (when RR<1) are interpreted based on percentages instead of the fractional values 0.4, 0.7 in the revised version of the manuscript.

7. Although this reviewer accepted the use of 9-times……,etc in the results of RRs[RR>1] that are more than the nullity(1); reporting the results as …… HHC, 2.9 times to SNF, 1.8 times to IRF, and 2.1 times are not acceptable. Authors should approximate to whole number or more meaningfully percentages.

Response: The fractional RRs (when RR>1) have been approximated to whole number for meaningful interpretation.
8. Authors should consider providing details in the methods section the referral discharges categorized as 'other locations' in the manuscript or deleting them. The miscellaneous locations designated 'other locations' may be of interest to some readers who would be interested to know 'what and what' constitute 'other locations'. Readers should not be kept in suspense.

Response: The details about the ‘other locations’ have been added in the methods section (Method Section, Definition and Variable Subsection, page 8, line 17)

9. Titles of some tables have to be modified to reflect the contents of the tables.

Response: Titles of Table 2 and Table 3 have been modified as recommended.

11. What were the 29 variables the authors used in multinomial analysis.

PLEASE READ…….Multinomial logistic regression was used to identify associations of 29 variables comprising patient characteristics, hospital profiles, and patient conditions with PAC referral at discharge………

Response: The 29 variables have been mentioned categorically in Table 1.

12. Conclusion is verbose. This should be recast to reflect the significant findings of the study. Considering apriori set clear objectives.

Response: The conclusion section has been recast and updated to reflect the significant findings.

SPECIFIC COMMENTS

TITLE SECTION

1. The title should be recast to reflect the contents of the manuscript and also minimize limitations of the study.

Response: Title has been recast to address this concern.
2. From the content of the manuscript, authors studied PAC referral destinations and patient-, hospital/provider and regional-related factors of interest. This should be reflected in the title in order to guide the scientific community appropriately.

Response: Title has been recast to address this concern.

3. The study design is not clear. This is not a cohort study. The use of the word 'cohort' is for descriptive or thematic convenience and not a study design. This is a record review.

Response: Title has been recast to address this concern.

4. Include site of the study for epidemiological completeness

Response: Title has been recast to address this concern.

SUGGESTED TITLE

POST-ACUTE CARE REFERRAL IN UNITED STATES OF AMERICA: A MULTIREGIONAL STUDY OF FACTORS ASSOCIATED WITH REFERRAL DESTINATIONS IN A COHORT OF PATIENTS WITH CORONARY ARTERY BYPASS GRAFT OR VALVE REPLACEMENT

Response: Title has been changed to the suggested one.

ABSTRACT SECTION:

1. Write Abstract section under Background; Aim or Objective(s); Methods; Results; Conclusion, keywords.

Response: Abstract has been updated.
2. Background: Accepted

3. Aim or Objective[s]: Re-cast the aim/objective(s) to reflect the suggested title.

NB- There is a difference between aim and objectives of a study. Use aim or objectives appropriately based on the recommended pattern by the journal of submission.

Response: As per the submission guideline of the journal, the abstract section should have four subsections- Background; Methods; Results; Conclusion. There is no separate section for Aim or Objectives. However, the authors observed the standard pattern of the previously published papers from this journal and following that the authors have updated the background section adding one more sentence (Abstract, background section, last line) stating the objective of this study clearly. The statement is highlighted in yellow color for the reviewer’s convenience.

4. Methods. Re-write this section in other to focus the study appropriately. Re-write to reflect Study design, study subjects, study period, sampling and then methods.

Response: Methods section has been rewritten to reflect the study design, study subjects, study period, sampling and then methods. The updated sentence is highlighted in the methods section of the abstract section.

5. Results:

i. Start result section with age and sex distribution and any other relevant bio-demographic determinants of referral destinations.

Response: The result section has been started with age, gender, and race distribution of the patients for referral destination. The updated sentence is highlighted in yellow in the result section of the abstract.
ii. PLEASE RECHECK THIS STATISTICS: Total of referral destination = 100.1%

\[
H+HHC+SNF+IRF+LTCH+OTHER\ \text{LOCATIONS} \\
=41+36.8+12.1+8.2+1.2+0.8= 100.1
\]

Response: The statistics have been updated in the revised manuscript. Mainly, the approximation of the percentage values created this incoherence. We provided the exact values up to two decimal places and now the summation is 100%

iii. RECAST THIS SENTENCE BELOW. THE RESULTS OF THE LOGISTIC REGRESSION HAVE TWO OUTCOMES. KINDLY INTERPRETE THE TWO RESULTS OF LOGISTIC REGRESSION APPROPRIATELY BASED ON NULL HYPOTHESIS FOR RRs. PROVIDE FOR EACH PREDICTOR FACTOR [RRs; AOR; 95% CI; P-value=]

PLEASE READ THIS

Highly significant factors (p-values &lt;0.001) were census division, hospital size, teaching hospital status, gender, age, marital status, length of stay, and Charlson comorbidity index.

--It is not clear authors meant by HIGHLY significant……

Response: We emphasized the significance of the variables using the word ‘HIGHLY’ because the p-values of those variables were very low (p &lt;0.001). We reported other variables as significant in the manuscript (not highly significant though) if the p-values fall in this range (0.001&lt; p &lt;0.05). Our cut off value for identifying significant variable was 0.05 and we considered highly significant if the p-value is less than 0.001
As per our null hypothesis, highly significant factors mean that the variables/factors have more than enough statistical evidence (p-values < 0.001) that the changes in these factors/variables influence the decision of referral destination, i.e., Home vs SNF/HHC/IRF/LTCH. This sentence has been recast in the revised abstract to clearly convey the interpretation. Because we have a large number of factors (29 variables) used in the analytical model, it was not possible to include the values (RR, CI, P-value) for each predictor in the abstract result section and therefore we reported the overall model performance result indicating the model accuracy and multiclass Area Under the Curve (AUC) value in the abstract result section. However, we have provided the RR, CI, P-values for all the predictor factors in Table 3.

Authors should organize the results and reports of primary variables of interest for easy comprehension into patient[eg gender, age, etc]-, provider/hospital[hospital size, teaching status, etc]- and regional[census division, etc]- related factors of PAC referral discharges.

Response: The primary variables of interests are organized as recommended and presented in Table 1 (Page 10), and the result section is updated as well. The other two tables (Table 2 and Table 3 in Appendix section) containing the results are also organized in similar way.

Authors should interpret appropriately the results of the RRs[RR<1] that didn't cross nullity=1 [null hypotheses] based on percentages. The use of…… for example 0.4 and 0.7 times less likely…… are not accepted for this level of study and didn't convey meaningful statistical inference.

Response: RR Results (when RR<1) are interpreted based on percentages instead of fractional value 0.4, 0.7 in the revised version of the manuscript.

Although this reviewer accepted the use of 9-times……,etc in the results of RRs[RR>1] that are more than the nullity(1); reporting the results as for examples …… HHC, 2.9 times to SNF, 1.8 times to IRF, and 2.1 times are not acceptable. Authors should approximate to whole number or more meaningfully percentages.
Response: The fractional RRs (when RR>1) has been approximated to the whole number for meaningful interpretation.

6. Conclusion

i. Conclusion is verbose and is replete with reporting of results

Response: The conclusion has been recast to minimize words and reporting of results. Now it has focused more on the significant findings of this study and further exploration opportunity.

ii. Please focus conclusion thematically to reflect the statistically significant results of the study considering the aim/objectives of the study.

Response: The conclusion has been recast to focus on the statistically significant results and key insights of the study considering the aim/objectives of the study.

KEYWORDS:

i. Provided keywords are verbose.

Response: Keywords are changed.

ii. Authors should focus keywords on the pertinent study variables

Response: Keywords are changed to address this concern.

iii. Delete 'Multinomial logistic regression'. It is inappropriate.

Response: Done
iv. Re-cast based on journal specification or use MeSH guideline.

Response: Done, the keywords are recast using the MeSH guideline.

METHODS

1. Authors should justify why was discharge to out-patient care excluded and regarded as inappropriate location?

PLEASE READ THIS…..

…………Patients who expired (n= 185), left against medical advice (LMA) or discharged for outpatient service (considered as inappropriate discharge location) were excluded……..

Response: The outpatient service was considered as inappropriate for this study because this study focuses on the referral to post-acute care facilities of the patient who got admitted and stayed in the acute care hospital for some days to get the required procedure done. This sentence has also been added in the manuscript and highlighted yellow color (Page 7, Methods Section, Study Population subsection, line 20)

2. Authors should justify why procedures performed after discharge date considered as incoherent data and excluded from the study?

PLEASE READ……
Patients who had procedures performed before the admission date or after the discharge date (considered as incoherent data) were also excluded.

Response: These entries were considered incoherent data indicating data collection error because, clearly, it is not possible to have a procedure performed before admitting the hospital or after the discharge from the hospital. This sentence has also been added in the manuscript and highlighted yellow color (Page 8, Methods Section, Study Population subsection, line 4)

3. What were the 29 variables you studied.

Please read this.

Multinomial logistic regression was used to identify associations of 29 variables comprising patient characteristics, hospital profiles, and patient conditions with PAC referral at discharge.

Response: The 29 variables have been mentioned categorically in Table 1.

Table 1:

1. The title is inappropriate. Please recast the title to reflect the contents of the table. The title contains test statistics (Chi-square test)

Please read from the table.
p-values are generated from bivariate chi-square test).

Response: Title has been recast to reflect the contents of the table. Please note that Table 1 in the appendix section of the previous draft has been named as Table 2 for inclusion of a new table in the manuscript. The updated title is highlighted in yellow color.

2. Delete 'predictors' from the title. It is inappropriate.

Response: Done

TABLE 2:

1. The title is inappropriate. Please recast the title to reflect the contents of the table.

Response: Title has been recast to reflect the contents of the table. Please note that, Table 2 in the appendix section of previous draft has been named as Table 3 for inclusion of a new table in the manuscript. The updated title is highlighted in yellow color.

2. The notations are confusing. Kindly use asterisks[*; **; ***] to denote significant factors

Response: Done

2. There is no information on 'home' and 'other location' discharge destinations
Response: Home was our reference category and hence the model does not provide any results for reference category (The RR value is considered as 1 for reference category). We didn’t provide the result of other locations because we wanted to confine our analysis and discussion on the appropriate post-acute care facilities (i.e. SNF, IRF, LTCH, HHC). Discharge location ‘others’ does not represent any specific PAC type. Therefore, the discharge location category ‘others’ is ignored while discussing the model insights with the results shown in tables and figures.

3. Although this reviewer accepted the use of 9-times……,etc in the results of RRs[RR>1] that are more than the nullity(1); reporting the results as for examples …… HHC, 2.9 times to SNF, 1.8 times to IRF, and 2.1 times are not acceptable. Authors should approximate to whole number or more meaningfully percentages. PROVIDE APPROPRIATE PRIMARY REPORTING OF THE RESULTS IN THE RESULTS SECTION.

For example

Variables HHC

Census Division: East South Central (Reference)

East North Central 1.52 (1.33, 1.74)

ETC, ETC, ETC [See other variables with RR>1]
4. Authors should interpret appropriately the results of the RRs that didn't cross nullity=1 [null hypotheses] based on percentages. The use of, for example 0.4 and 0.7 times less likely, are not accepted for this level of study and didn't convey meaningful statistical inference. PROVIDE APPROPRIATE PRIMARY REPORTING OF THE RESULTS IN THE RESULT SECTION.

For example

Variables HHC

Census Division: East South Central (Reference)

Mountain 0.26 (0.15, 0.46)

ETC, ETC, ETC [See other variables with RR<1]

Response: RR Results (when RR<1) are interpreted based on percentages instead of fractional value 0.4, 0.7 for meaningful interpretation in the results and discussion section of the revised manuscript. However, the values in Table 3 (in appendix) are approximated up to one decimal value to indicate the precision of the results.

5. Review this result with superscript c and other significant factors with inappropriately superscripted c ....[c: p > 0.05]

Posthemorrhagic Anemia 0.72c (0.64, 0.8)

Response: This was a mistake in reporting the results. It has been corrected in the revised manuscript.
1. Detail out what discharge destination classified as 'others'

Response: The ‘others’ discharge destination includes several miscellaneous discharge locations and the number of patients discharged to these locations are very low. The locations are as follows:

1. Discharged to another short-term hospital
2. Discharged within this institution to Medicare-approved swing bed
3. Discharged to Court/ Law Enforcement/Jail
4. Discharged to a designated cancer center or children’s hospital
5. Discharged to a federal health care facility
6. Discharged a psychiatric hospital
7. Unknown

All of the above miscellaneous locations are binned into one category ‘others’ and the details are not mentioned in the figure to keep the figure clean. However, the details about ‘others’ have been included in the text of the revised version of the manuscripts and highlighted in the yellow shade (Page 8, Methods section, Definition and Variables subsection, Line 17)

1. Why was 'home' and 'other location' discharge destination not represented?
Response: Home was our reference category for discharge destination variable, and multinomial logistic regression does not provide any result for the reference category (the result for the reference category is implicit- RR is 1 for reference category). Therefore, Home was not represented in the figure. We also did not represent the result of ‘others’ location because we wanted to confine our analysis and discussion on the appropriate post-acute care facilities (i.e., SNF, IRF, LTCH, HHC). Discharge location ‘others’ does not represent any specific PAC type. Therefore, discharge location category ‘others’ is ignored while discussing the model insights and figures as well.

FIGURE 5

1. Why was 'home' and 'other location' discharge destination not represented?

Response: Home was our reference category for discharge destination variable, and multinomial logistic regression does not provide any result for reference category (the result for the reference category is implicit- RR is 1 for reference category). Therefore, Home was not represented in the figure. We also did not represent the result of ‘others’ location because we wanted to confine our analysis and discussion on the appropriate post-acute care facilities (i.e., SNF, IRF, LTCH, HHC). Discharge location ‘others’ does not represent any specific PAC type. Therefore, the discharge location category ‘others’ is ignored while discussing the model insights and figures as well.

Reviewer: 2

1. Abstract: You may spell out USA when first appears in the article. Add full stop after Charlson comorbidity index (page 1, line 33).

Response: Done

2. Background: a well-written study background and comprehensive literature review of relevant studies with clear identification of study gaps. The statistical data provided in paragraph one of background should be the USA data. You may specify that these are USA data.
Response: Thank you for your comment. In the revised manuscript, the background section has been updated to accommodate the suggestion. Yes, the statistical data provided in paragraph one of the background section is USA data, and it has been specified in the revised manuscript.

3. Methods: The study methods in term of data source, study population and variables are generally clearly described. You may add the study design such as a retrospective cohort study, and a little information on data collection procedure, who extracted the data, and in what way. Why patients with length of stay \textgreater 75 days were excluded. Elaborate a bit on what do you mean that "patients with missing predictive variables (n=2685) were excluded." Do these patients miss all predictive variables or some variables?

Response: In the revised manuscript, study design has been added (section 2.2). Patients with length of stay \textgreater 75 days were excluded because this is a very high and unusual prolonged stay and from our exploratory analysis, we identified this as an outlier. This indicates a potential data reporting error or very rare event. Therefore, to maintain data integrity, we excluded those patients. Patients with a missing variables refer to those patients who had a missing variable in our selected or sorted variables to include in the model. No, these patients do not miss all the predictor variables. For example, in our dataset we excluded 1022 patients who had ‘Discharge location’ information missing, 195 patients who had ‘race’ information missing and 1468 patients who had information missing about marital status. However, this breakdown is mentioned in the flow diagram of the final sample cohort processing through data analysis (Figure 1)

4. Normally, we include data analysis methods under the section of "Methods". You may move your "Descriptive Analysis and Model Development" to the "Methods" section. Please specify which statistical software you used for data analysis, e.g. SPSS.

Response: ‘Descriptive Analysis and Model Development’ has been moved to Methods section in the revised manuscript. The data analysis and all the statistical tests were carried out in R version 3.2.3 and this was mentioned in the last line of the ‘Descriptive Analysis and Model Development’ (section 2.4 in the revised manuscript).

5. If possible, please add your IRB reference number.

Response: The IRB reference number is IRB2016-0453M and it has been added in the revised manuscript in the last line of data source (section 2.1) portion.
6. "Variables with p-value less than 0.1 in the bivariate test were included as candidates in the multinomial logistic regression model." Please add a reference for this. Because the cut-off of 0.2 is also sometimes used by the researchers to select explorative independent variables being included in the model.

Response: Yes, the authors agree that the cut-off can be 0.2 also. In fact, we noticed three cut off values frequently used in the relevant existing literature for variable selection (0.05, 0.1 and 0.2). It was our choice to consider the cut off as 0.1 and in the revised manuscript, we have added a reference that also used cut off value 0.1.

7. May not need to explain in so detail about the "relative risk ratio" (page 10, line 50 to page 11, line 18), because this is a common knowledge known to the researchers. Just simply go straight to interpret your results will be good enough.

Response: The detail of “relative risk ratio” has been removed as per reviewer’s suggestion in the revised manuscript.

8. The results are generally well-discussed. I am not sure whether the authors have found similar studies being conducted in other countries, and it would be good if you can do some kind of cross-cultural comparison so that the paper can be more interested to the international readers.

Response: Thank you for your thoughtful comment and suggestion. Yes, we noticed there are some studies on cardiac patient’s rehabilitation referral based Canadian data set. We have included one study in the discussion section and highlighted some cross-cultural comparison.

9. Good conclusion, maybe a few lines of the study limitations.

Response: Study limitations were mentioned in the last paragraph of the discussion section. Still, we have included a few more lines of comprehensive limitation to the conclusion as the reviewer suggested.