## PEER REVIEW HISTORY



## ARTICLE DETAILS

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| **TITLE (PROVISIONAL)** | Understanding Factors affecting 30-day Unplanned Readmissions for Patients undergoing Total Knee Arthroplasty (TKA): The ACT Transition from Hospital to Home Orthopaedics Survey |
| **AUTHORS** | Chhabra, Madhur; Perriman, Diana; Phillips, Christine; Parkinson, Anne; Glasgow, Nicholas; Douglas, Kirsty; Cox, Darlene; Smith, Paul; Desborough, Jane |

## VERSION 1 – REVIEW

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| **REVIEWER** | Mitchell Maltenfort<br>Children's Hospital of Philadelphia, DBHi |
| **REVIEW RETURNED** | 15-Jun-2021 |

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| **GENERAL COMMENTS** | You have a tough situation because you only have 13 events for 380 patients, and 10 or so predictors. For 13/380, the 95% confidence interval for the underlying rate is 1.8% - 5.8%.<br><br>The rule of thumb for good statistical power on logistic regressions for prediction is 10-20 events per predictor. That explains why your confidence intervals for the parameters in Table 3 are very wide.<br><br>Also, can you clarify how the stepwise regression was done? If you have to do stepwise, best is backward stepwise regression on AIC, where you balance model complexity vs its predictive power. That may still retain some "non-significant" terms but a problem with low statistical power is that you may have real effects that will not be "statistically significant."<br><br>A more thorough consideration of the analyses should include:<br>* Predictive power of full and final models. Showing an ROC curve and the associated AUC is a good way to do that.<br>* Bivariate analyses where you consider each possible predictor alone versus the outcome of readmission.<br><br>More speculatively, you might try using a Cox model instead of logistic regression as you may get more statistical power by including time to event as well as whether the event occurs. |

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| **REVIEWER** | Justine Naylor<br>The University of New South Wales |
| **REVIEW RETURNED** | 19-Aug-2021 |

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| **GENERAL COMMENTS** | The authors should be commended for their approach to capture information that may be relevant to readmission.<br>The manuscript content is important, but the message is unclear. Better clarity is required to 1) describe the study and its purpose, 2) |

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| | the methods and then 3) explain the results; 4) link between wait time and readmission<br>As an example, the link of post-hospital syndrome analysis here and everything else is not clear.<br>Feedback is provided to help improve the manuscript in readiness for publication.<br><br>ABSTRACT<br>I) Link between objectives and analysis is not clear. If regression is used to estimate risk, then an objective is to estimate the risk of readmission. Need to state risk is estimated whilst controlling for known confounders.<br>ii) The conclusion does not resonate with the Results. The link between unplanned readmission and surgical wait times is not apparent in Results.<br>iii) Specify if cross- sectional survey was written or interview<br>iv) Clarify that you mean the index/primary hospital experience and subsequent readmission?<br>v) After reviewing the whole paper, it looks like exploring post-hospital syndrome is an aim, but this is not clear in Abstract or manuscript<br>vi) The Abstract says rehabilitation attendance was protective against readmission, but in Results of manuscript, the opposite is stated.<br><br>ARTICLE SUMMARY<br>1. The ability to identify rehabilitation attenders is not really a strength.<br>2. The strength is novel capture of patient accounts of acute admission experience including pain, sleep and nutrition<br>3. A weakness is lack of information on people who declined the survey<br><br>INTRODUCTION<br>1. The paragraph (lines 78-85) about the increasing rate of TKA surgeries can be shortened. Reasons for surgery and public vs private not really relevant to the argument that unplanned readmissions are costly and a quality indicator.<br>2. Perhaps reword increased LOS as a risk factor for readmission - clarify you mean acute LOS affecting risk of readmission.<br>3. Re phrase the paragraph lines 86-91. Distinguish between causal factors eg SSI vs risk factors more clearly. Eg Keep sentence 86-88. Then say. “Beyond the complication as a cause of the readmission, there are patient factors that increase risk of readmission…”<br><br>METHODS<br>1. State this is retrospective ie people were not consented pre-surgery<br>2. Line 122 - change delivering to ‘undertaking’ or ‘performing’<br>3. Patient and public involvement - this section requires more information. Clarify that the survey was piloted.<br>4. State the survey was given to all patients undergoing elective TKA, then remove the statement about only TKA responses included here. That is just confusing. Presumably you intend to publish THA separately. Reference to THA here can be removed. Alternatively, be clearer at the outset the survey was done on both but results here refer to TKA only<br>5. Instrument - are there any psychometric results for the survey. More background about development and testing? Looks like the survey is a combination of existing surveys and some new items? |

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| | 6. Define what is meant by rehabilitation - any type; supervised only? Inpatient only?<br>7. Clarify whether surveys were anonymous and that consent was implied if survey was completed?<br>8. Please provide more explanation about the variable post hospital syndrome and how it was included in the modelling. Was post-hospital syndrome a particular variable of interest as a predictor. Not sure why the extra analysis was done and how it affected what went into the model?<br>9. Clarify whether you are looking to see what predicts readmission or are you performing an adjusted model hoping to ascertain if specific variables are predictors?<br>10. Was there a sample size calculation performed a priori?<br>11. For missing data, clarify that you mean you imputed medication and patient enablement variables if < 10%?<br><br>RESULTS<br>1. Adjust sample size captured if just reporting TKA here (as per suggestion above)<br>2. Lines 254 says after controlling for age and sex, public patients were more likely to be readmitted. Haven't you controlled for many variables? Unless you are interested in a few specific covariates (ie an adjusted model), isn't the wording, 'in the multiple regression model, the following factors remained significant….". See comment about modelling approach in Methods.<br>3. Lines 256 - rehabilitation attendance - is it protective or a risk factor. Contradicts Abstract and Discussion.<br>4. Table 1 – might be easier to read if % of each variable that was readmitted was included eg show that a greater % of public patients were readmitted.<br><br>DISCUSSION<br>1. Lines 262-265. The aim was to investigate factors predicting not impacting.<br>2. The discussion linking wait time and readmission is not clear. This section needs a rewrite. I'm not sure the link is plausible.<br>3. Add lack of information about non-responders as a limitation. Moe non-responders may have been readmitted. A summary of characteristics of the non-responders may have suggested they were sicker hence you found a more optimistic readmission rate |

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| **REVIEWER** | Kirk Easley<br>Emory University, Biostatistics & Bioinformatics |
| **REVIEW RETURNED** | 06-Dec-2021 |

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| **GENERAL COMMENTS** | Authors: Chhabra M et al.<br><br>Abstract, Results: Report the 95% confidence for the primary endpoint, 30-day readmission.<br><br>Abstract Results, revise as follows: After adjusting for age and sex and …<br><br>Since there were only 13 patients with 30-day readmission (13/380, 3.4%) I doubt adjusted analyses can be performed without model overfitting. The focus of this paper should be on the univariable analyses will limited adjusted analyses. The results from univariable logistic regression for the primary outcome (30-day readmission) should be reported in a Table. The table should include the odds ratio, 95% confidence interval and P value. The prevalence of the |

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| | risk factors should be reported. The prevalence of stroke appears to be very low and therefore this risk factor should not be included in modeling. The 95% confidence interval reported in Table 3 for stroke from the full model is extremely wide and not informative.<br><br>Sample size and power considerations for this study should be provided in the manuscript. The power to detect an odds ratio of 3.0 is likely low. For example, assume the prevalence of 30-day readmission is 3% and the prevalence of public patients is 35% in the cross-sectional sample. A logistic regression of 30-day readmission on a binary independent variable (public or private patients) with a sample size of 380 patients (of which 35% are public patients and 65% are private patients) achieves approximately 60% power at a 0.05 significance level to detect a difference in the probability of 30-day readmission from a value of 0.03 to 0.085. This difference corresponds to an odds ratio of 3.0.<br><br>The description of the multiple logistic regression analytic plan needs to be revised. The limitations of stepwise procedures are well documented in the literature, so caution is needed when using these methods for covariate selection. Model fit statistics are not reported. Consider revising as follows to better reflect the multivariable analysis is an exploratory analysis where the goal is to balance the type I and type II errors: Only risk factors with a P value < 0.25 in the univariable analysis were included in the multivariable analyses. Logistic regression with backward stepwise selection was used to choose risk factors for the multivariable model. A significance level of 0.25 was required to allow a risk factor into the model, and a significance level of 0.25 was required for a risk factor to stay in the model. Additionally, risk factor selection for the model may be driven by available knowledge and biological plausibility of potential confounders, taking into consideration the hypothesis of interest. The adjusted odds ratio and its 95% confidence interval were calculated for each risk factor in the presence of others in the final model.<br><br>Very limited information is provided on the exploratory factor analysis and should be eliminated. Table 2 is not mentioned nor summarized in the Results section. Cronbach's alpha is not reported and should be eliminated.<br><br>ROC curves were not provided in the manuscript and therefore should be eliminated from the data analysis plan.<br><br>Please revise Table 1 and include percentages to aid interpretation. How many of the 133 public patients had 30-day readmission? How many of the 247 private patients had 30-day readmission? Report the 95% confidence interval for the difference between the proportion with 30-day readmission among public patients minus the proportion with 30-day readmission among the private patients.<br><br>Tables: One decimal place is adequate when reporting the 95% confidence intervals for the odds ratio.<br><br>Table 3: Due to missing data on sex (and perhaps other risk factors), report the sample size for the final adjusted logistic regression model. Were the results similar with versus without imputation for age?<br><br>Avoid using ± in the text. The use of this notation could imply either |

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| | the sample standard deviation (SD) of the data or the standard error (SE) of the mean. Revise as follows: The mean age of the patients was 67.4 years (standard error of the mean or standard deviation 0.5 years). |

**VERSION 1 – AUTHOR RESPONSE**

| **Reviewer 1 Comments** | **Response from authors** |
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| You have a tough situation because you only have 13 events for 380 patients, and 10 or so predictors. For 13/380, the 95% confidence interval for the underlying rate is 1.8% - 5.8%.<br><br>The rule of thumb for good statistical power on logistic regressions for prediction is 10-20 events per predictor. That explains why your confidence intervals for the parameters in Table 3 are very wide.<br><br>Also, can you clarify how the stepwise regression was done? If you have to do stepwise, best is backward stepwise regression on AIC, where you balance model complexity vs its predictive power. That may still retain some "non-significant" terms but a problem with low statistical power is that you may have real effects that will not be "statistically significant." | Thank you for acknowledging this. We agree that the number of events in this study compared to the sample size is small and would therefore result in a weak statistical power. We agree that the confidence intervals are very wide for the parameters due to the low number of events.<br><br>For our regression analysis, we did a backward stepwise regression. A full model was created with all the variables that had a $p<0.25$. These were then removed step wise. We acknowledge the problem with low statistical power leading to real events which will not be statistically significant. This has been captured as a limitation of this study. |
| A more thorough consideration of the analyses should include:<br>* Predictive power of full and final models. Showing an ROC curve and the associated AUC is a good way to do that.<br>* Bivariate analyses where you consider each possible predictor alone versus the outcome of readmission.<br><br>More speculatively, you might try using a Cox model instead of logistic regression as you may get more statistical power by including time to event as well as whether the event occurs. | We have added the associated ROC curve. The AUC for this analysis was 0.79 indicating a good model.<br><br>We also conducted a bivariate analysis where each variable was considered in relation to the outcome of readmission.<br><br>We had considered doing a Cox regression but decided on logistic regression as most of our outcomes were binary.<br><br>Thank you for this suggestion. This will be useful for any future studies which we undertake to understand readmission. |

| **Reviewer 2** | |
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| The authors should be commended for their approach to capture information that may be relevant to readmission.<br>The manuscript content is important, but the message is unclear. Better clarity is required to<br><br>1) describe the study and its purpose,<br><br>2) the methods and then<br><br>3) explain the results;<br><br>4) link between wait time and readmission<br>As an example, the link of post-hospital syndrome analysis here and everything else is not clear.<br>Feedback is provided to help improve the manuscript in readiness for publication. | Thank you for these encouraging words and feedback. We have made following changes to be included in the study. |
| ABSTRACT<br>I) Link between objectives and analysis is not clear. If regression is used to estimate risk, then an objective is to estimate the risk of readmission. Need to state risk is estimated whilst controlling for known confounders.<br><br>ii) The conclusion does not resonate with the Results. The link between unplanned readmission and surgical wait times is not apparent in Results. | We have modified the design, setting and participants section of the abstract to include the following:<br><br>*"Multiple logistic regression analyses were used to measure associations between patient, hospital and transitional care factors with unplanned 30-day readmissions, whilst controlling for known confounders."*<br><br>Thank you for pointing this out. We have amended the conclusion as follows:<br><br>*"Reasons underlying the difference in unplanned readmission rates for public versus private patients need to be explored, including differences in surgical waiting times. Strategies to foster increased participation post-surgical rehabilitation programs need to be developed as an avenue to mitigate the burden of unplanned 30-day readmissions on individuals and health systems."* |

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| iii) Specify if cross- sectional survey was written or interview | Amended and included the word “written”. |
| iv) Clarify that you mean the index/primary hospital experience and subsequent readmission? | Amended this to below.<br>*“Of the 380 participants who completed the survey (n=380, 54% of TKAs undertaken over the study period), 4% (n=13) were subsequently readmitted within 30 days of discharge after a primary hospitalization.”* |
| v) After reviewing the whole paper, it looks like exploring post-hospital syndrome is an aim, but this is not clear in Abstract or manuscript. | Amended this to below.<br>*“The aim of this study was to investigate factors associated with unplanned 30-day readmissions following a TKA, including association with post-hospital syndrome, patient enablement, and transition from hospital to home.”* |
| vi) The Abstract says rehabilitation attendance was protective against readmission, but in Results of manuscript, the opposite is stated. | Thank you for picking this up. We have amended this in the result section of the manuscript as below.<br>*“After controlling for age and sex, public patients were significantly more likely to be readmitted within 30 days compared to private patients (OR=6.87, 95% CI:1.71-27.54, p=0.007), and patients who attended rehabilitation were significantly less likely to be readmitted within 30 days of discharge than those who did not (OR=0.17, 95% CI: 0.05-0.59, p=0.006).”* |
| ARTICLE SUMMARY<br><br>1. The ability to identify rehabilitation attenders is not really a strength.<br><br>2. The strength is novel capture of patient | Thank you for these valuable insights. We have modified the article summary to capture these points and with a focus on methods as suggested |

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| accounts of acute admission experience including pain, sleep and nutrition<br><br>3. A weakness is lack of information on people who declined the survey. | by the editor. |
| INTRODUCTION<br><br>1. The paragraph (lines 78-85) about the increasing rate of TKA surgeries can be shortened. Reasons for surgery and public vs private not really relevant to the argument that unplanned readmissions are costly and a quality indicator.<br><br>2. Perhaps reword increased LOS as a risk factor for readmission - clarify you mean acute LOS affecting risk of readmission.<br><br>3. Re phrase the paragraph lines 86-91. Distinguish between causal factors eg SSI vs risk factors more clearly. Eg Keep sentence 86-88. Then say. "Beyond the complication as a cause of the readmission, there are patient factors that increase risk of readmission…" | Thank you for pointing this out. We have reduced the length of this paragraph, removing commentary that is not directly relevant to this study. It now reads as follows:<br><br>*"The rate of knee replacement surgery has more than doubled over the past 15 years both in Australia and internationally [7] with the highest rate of increase seen in the private sector [3, 5, 8]. This growing demand has placed increased logistical and financial strain on the healthcare system, including associated unplanned 30-day readmissions [5]."*<br><br>Amended as suggested.<br><br>Thank you for these suggestions. We have amended as suggested as follows:<br><br>*"Beyond the complications as a cause of the readmission, there are patient factors related to the hospital stay that increase risk of readmission [11]."* |
| METHODS<br>1. State this is retrospective ie people were not consented pre-surgery | Amended this.<br><br>*"Data was collected retrospectively at the six-* |

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| | *week follow-up appointment post-surgery."* |
| 2. Line 122 - change delivering to 'undertaking' or 'performing' | Amended as suggested. |
| 3. Patient and public involvement - this section requires more information. Clarify that the survey was piloted. | Amended this to include the following.<br><br>*"The ACT Transition from Hospital to Home Survey was developed and piloted by researchers at the Australian National University, Canberra Hospital, Academic Unit of General Practice ACT Health, Capital Health Network, Health Care Consumer Association ACT, and people who had previously experienced TKA.* |
| 4. State the survey was given to all patients undergoing elective TKA, then remove the statement about only TKA responses included here. That is just confusing. Presumably you intend to publish THA separately. Reference to THA here can be removed. Alternatively, be clearer at the outset the survey was done on both but results here refer to TKA only | Thank you for this suggestion. We have amended as follows to improve clarity:<br><br>*"Data was collected retrospectively at the six-week follow-up appointment post-surgery for both total knee and hip replacement (THA). The responses for patients having undergone elective TKA are presented in this paper."* |
| 5. Instrument - are there any psychometric results for the survey. More background about development and testing? Looks like the survey is a combination of existing surveys and some new items? | Thank you for pointing this out. We have added details regarding this – confirming which scales are validated and the refinement of new sections in the pilot study. The post-hospital syndrome scales are tested in this current study – see analysis and results.<br><br>In relation to Medication enablement, we have added the following sentence:<br><br>*"The internal consistency of this scale (α = 0.80) was established in the pilot study (unpublished results)."*<br><br>In relation to the transition to general practice |

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| | section, we have added the following sentence:<br><br>*"These questions were refined as a result of the pilot study to eliminate covariance and repetition."* |
| 6. Define what is meant by rehabilitation - any type; supervised only? Inpatient only? | We have specified in the manuscript that this question related to referral and attendance to physiotherapy post-discharge. All public and private patients in the ACT have access to post-surgery rehabilitation and are referred to this on discharge.<br><br>*"Referral and attendance to outpatient physiotherapy rehabilitation post-discharge was examined with one item."* |
| 7. Clarify whether surveys were anonymous and that consent was implied if survey was completed? | Thank you for this comment. We have added two sentences to the manuscript to clarify these aspects:<br><br>*"Patients were not required to include their name or identifying information on the survey."*<br><br>*"Completion of the survey implied written consent."* |
| 8. Please provide more explanation about the variable post hospital syndrome and how it was included in the modelling. Was post-hospital syndrome a particular variable of interest as a predictor. Not sure why the extra analysis was done and how it affected what went into the model? | Post-hospital syndrome was a particular variable of interest, due to Krumholz's proposition (referred to in the introduction) that this acquired, transient state is responsible for unplanned 30-day readmissions. However, up until now, this state of being has not been quantified or measured as an independent variable in association with unplanned 30-day readmission. We have attempted to do this through developing variables describing the phenomenon, and then examining |

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| | the underlying theoretical structure of the variables and relationships between them. We have added to our introduction of this phenomenon to clarify our interest in this variable as follows:<br><br>*"While this hypothesis is supported by evidence that increasing patient capacity for self-care is effective at reducing 30-day readmissions [10],* , *as far as we are aware, post-hospital syndrome has not been quantified or measured as an independent variable in association with unplanned 30-day readmission."* |
| 9. Clarify whether you are looking to see what predicts readmission or are you performing an adjusted model hoping to ascertain if specific variables are predictors? | Our aim was to ascertain which variables were significantly associated with unplanned 30-day readmission. |
| 10. Was there a sample size calculation performed a priori? | We did not conduct sample size calculations as our aim was to conduct a cross-sectional survey of all patients having THA or TKA in a 12-month period. The sample size was therefore determined by the number of patients attending the clinics during this time period. |
| 11. For missing data, clarify that you mean you imputed medication and patient enablement variables if < 10%? | We have amended the text to below.<br><br>*"The criteria used for acceptability of non-response to all survey questions was 10% or lower, including for medication and patient enablement scale."* |
| RESULTS<br>1. Adjust sample size captured if just reporting TKA here (as per suggestion above) | Thank you – amended as suggested. |
| 2. Lines 254 says after controlling for age and sex, public patients were more likely to be readmitted. Haven't you controlled for many variables? Unless you are interested in a few specific covariates (ie an adjusted model), isn't | While we tested a number of variables, we retained the variables age and sex in the model as |

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| the wording, 'in the multiple regression model, the following factors remained significant….". See comment about modelling approach in Methods. | a priori confounders. Hence, unlike the other variables, they were retained regardless of significance. It is due to this that we state that we controlled for these variables, as we believe this is the correct terminology. |
| 3. Lines 256 - rehabilitation attendance - is it protective or a risk factor. Contradicts Abstract and Discussion. | Thank you for pointing this out. We have added this sentence to report the results for the final model (Line 269) |
| 4. Table 1 – might be easier to read if % of each variable that was readmitted was included eg show that a greater % of public patients were readmitted. | Thank you once again for picking this up. We admit this is contradictory and have amended this to be consistent with the abstract.<br><br>Thank you for this suggestion. We have amended Table 1 so that the number and percentage of readmissions is clear for each variable and in relation to public and private patient. |
| DISCUSSION<br>1. Lines 262-265. The aim was to investigate factors predicting not impacting. | Thank you for this comment. We have modified this sentence. |
| 2. The discussion linking wait time and readmission is not clear. This section needs a rewrite. I'm not sure the link is plausible. | Thank you for this comment. We have included the comment confirming that causation cannot be implied, although we believe that our discussion regarding the possibility that increased waiting times for public patients is plausible, particularly given the known differences in waiting times in the jurisdiction where the study was conducted. |
| 3. Add lack of information about non-responders as a limitation. More non-responders may have been readmitted. A summary of characteristics of the non-responders may have suggested they were sicker hence you found a more optimistic readmission rate | We have included this using the following:<br><br>"*The lack of information about non-responders is another limitation of this study. More non-responders may have been readmitted and it possible that they may have been sicker than responders, which would also influence the readmission rate."* |

| **Reviewer 3** | |
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| Since there were only 13 patients with 30-day readmission (13/380, 3.4%) I doubt adjusted analyses can be performed without model overfitting. The focus of this paper should be on the univariable analyses will limited adjusted analyses. The results from univariable logistic regression for the primary outcome (30-day readmission) should be reported in a Table. The table should include the odds ratio, 95% confidence interval and P value. The prevalence of the risk factors should be reported.<br><br>The prevalence of stroke appears to be very low and therefore this risk factor should not be included in modelling. The 95% confidence interval reported in Table 3 for stroke from the full model is extremely wide and not informative.<br><br>Sample size and power considerations for this study should be provided in the manuscript. The power to detect an odds ratio of 3.0 is likely low. For example, assume the prevalence of 30- day readmission is 3% and the prevalence of public patients is 35% in the cross-sectional sample. A logistic regression of 30-day readmission on a binary independent variable (public or private patients) with a sample size of 380 patients (of which 35% are public patients and 65% are private patients) achieves approximately 60% power at a 0.05 significance level to detect a difference in the probability of 30-day readmission from a value of 0.03 to 0.085. This difference corresponds to an odds ratio of 3.0.<br><br>The description of the multiple logistic regression analytic plan needs to be revised. The limitations of stepwise procedures are well documented in the literature, so caution is needed when using these methods for covariate selection. Model fit statistics are not reported. Consider revising as follows to better reflect the multivariable analysis is an exploratory analysis where the goal is to balance the type I and type II errors:<br><br>Only risk factors with a P value < 0.25 in the univariable analysis were included in the multivariable analyses. Logistic regression with | We thank you for your explanation of the limitations with respect to power due to a low sample size. This is included in our limitations paragraph.<br><br>The results of the univariable logistic regression analysis have been included in the paper as Table 3. The table includes the odds ratio, 95% confidence interval and p-value for all the variables.<br><br>Thank you for this valuable suggestion and the generous feedback. We have modified the analytic plan to incorporate your feedback. The model was run again to remove stroke. The results of the new model have been updated. |

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| backward stepwise selection was used to choose risk factors for the multivariable model. A significance level of 0.25 was required to allow a risk factor into the model, and a significance level of 0.25 was required for a risk factor to stay in the model. Additionally, risk factor selection for the model may be driven by available knowledge and biological plausibility of potential confounders, taking into consideration the hypothesis of interest. The adjusted odds ratio and its 95% confidence interval were calculated for each risk factor in the presence of others in the final model.<br><br>Very limited information is provided on the exploratory factor analysis and should be eliminated. Table 2 is not mentioned nor summarized in the Results section. Cronbach's alpha is not reported and should be eliminated. ROC curves were not provided in the manuscript and therefore should be eliminated from the data analysis plan. | |
| | Thank you for considering this. We believe the exploratory factor analysis adds value to the results of this paper, particularly as this is the first study to attempt to quantify 'post-hospital syndrome'. These results might be useful for other researchers who are interested in this phenomenon. We have amended the manuscript so that Table 2 has now been mentioned in the results, and the ROC curve and the AUC have been provided in the manuscript as requested by Reviewer 1. Cronbach's alpha has been removed from the manuscript. |
| Please revise Table 1 and include percentages to aid interpretation. How many of the 133 public patients had 30-day readmission? How many of the 247 private patients had 30-day readmission? Report the 95% confidence interval for the difference between the proportion with 30-day readmission among public patients minus the proportion with 30-day readmission among the private patients. | |
| Tables: One decimal place is adequate when reporting the 95% confidence intervals for the odds ratio. | Thank you for pointing this out. This information is provided in Table 3, which reports the univariate logistic regressions results as requested by Reviewer 1. |
| Table 3: Due to missing data on sex (and perhaps other risk factors), report the sample size for the final adjusted logistic regression model.<br><br>Were the results similar with versus without | |

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| imputation for age? Avoid using ± in the text.<br><br>The use of this notation could imply either the sample standard deviation (SD) of the data or the standard error (SE) of the mean. **Revise as follows:** The mean age of the patients was 67.4 years (standard error of the mean or standard deviation 0.5 years). | Amended as suggested.<br><br>Thank you for pointing this out. We have stated the final sample size (n =328 in the results.<br><br>We did not impute for age as missing data was <10% for this variable.<br><br>This has been rectified and made consistent throughout the two tables reporting confidence intervals.<br><br>Thank you for this suggestion. This has been modified. |

**VERSION 2 – REVIEW**

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| **REVIEWER** | Mitchell Maltenfort<br>Children's Hospital of Philadelphia, DBHi |
| **REVIEW RETURNED** | 01-Feb-2022 |

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| **GENERAL COMMENTS** | You've addressed my concerns. Good luck! |

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| **REVIEWER** | Justine Naylor<br>The University of New South Wales |
| **REVIEW RETURNED** | 09-Feb-2022 |

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| **GENERAL COMMENTS** | The authors have done well addressing reviewer comments.<br><br>I remain sceptical that wait time affects readmission. All else being equal between public and private patients, people who wait longer (public) are likely to be more impaired, older and have greater medical deterioration by the time they reach surgery. So I would argue it is these factors, noit wait time, that prediposes readmission.<br><br>I'll leave it to the editors to decide whether this argument (the wait time one) needs refining. |

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| **REVIEWER** | Kirk Easley<br>Emory University, Biostatistics & Bioinformatics |
| **REVIEW RETURNED** | 06-Feb-2022 |

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| **GENERAL COMMENTS** | Authors: Chhabra M et al.<br><br>Abstract, Results: Report the 95% confidence interval for the primary endpoint, unplanned 30-day readmission. Revise as follows: Of the 380 participants who completed the survey (n=380, 54% of TKAs undertaken over the study period), 3.4% (n=13; 95% confidence |

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| | interval; 1.8 – 5.8) were subsequently readmitted within 30 days of discharge after a primary hospitalization.<br><br>Abstract, revise as follows to reflect the reported estimated odds ratios are adjusted odds ratios.<br>Public patients were significantly more likely to be readmitted within 30 days compared to private patients (adjusted OR=6.87, 95% CI:1.71-27.54, p=0.007), and patients who attended rehabilitation were significantly less likely to be readmitted within 30 days of discharge than those who did not (adjusted OR=0.17, 95% CI: 0.05-0.59, p=0.006). I would not also attempt to adjust for sex and age in the primary reduced multivariable logistic regression model due to the low prevalence of unplanned 30-day readmission (3.4%). Only 3 males had an unplanned 30-day readmission and only two patients between the ages of 45-65 had an unplanned 30-day readmission. Controlling for sex and age in addition to 'public vs. private' and attendance to rehabilitation is not a reasonable expectation for this data (perhaps say 'attempt to take into account the effects of age and sex' or 'attempt to adjust for age and sex in a four-covariate reduced model'). The authors report in their response 'While we tested a number of variables, we retained the variables age and sex in the model as a priori confounders. Hence, unlike the other variables, they were retained regardless of significance. It is due to this that we state that we controlled for these variables, as we believe this is the correct terminology'. I disagree with the authors stated justification for a priori controlling for age and sex. What a priori data was used to justify 'controlling' for age and sex for the primary outcome regardless of the observed data?<br><br>Please report in the Results or Supplemental Table 1 the simple summary data (simple fractions and percentages) for the outcome (unplanned 30-day readmission) and the risk factor participation in a post-surgical rehabilitation program. The reported odds ratio in Supplemental Table 1 (OR = 0.1 for attendance to rehab program) is not enough information to allow the reader to calculate the simple 2by2 table statistics.<br><br>Supplemental Table 1: Please be clear on the increment used to calculate the odds ratio for continuous predictors.<br><br>Page 10, line 190 revise as follows: The full multiple logistic regression model …<br><br>Figure 1, Page 89: Report the 95% confidence interval for the estimated area under the ROC curve. Provide an informative Figure legend and Title. The area under the ROC curve is interpreted as the probability that a subject with unplanned 30-day readmission is given a higher probability of the outcome by the logistic model than a randomly chosen subject without unplanned 30-day readmission. An AUC value of 0.50 indicates that the model has no discriminatory ability (the diagonal line corresponds to random change). Goodness of fit/calibration is not addressed. |

**VERSION 2 – AUTHOR RESPONSE**

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| **Reviewer 1** | |
| You've addressed my concerns. Good luck! | Thank you for accepting our amendments |
| **Reviewer 2** | |

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| The authors have done well addressing reviewer comments.<br><br>I remain sceptical that wait time affects readmission. All else being equal between public and private patients, people who wait longer (public) are likely to be more impaired, older and have greater medical deterioration by the time they reach surgery. So I would argue it is these factors, not wait time, that predisposes readmission.<br><br>I'll leave it to the editors to decide whether this argument (the wait time one) needs refining. | Thank you for this argument. We agree with the reviewer on the effect of wait times. The added wait times alone cannot be implied to be responsible for the 30-day readmissions. We also agree that other factors such as old age and medical deterioration contribute more than the wait times.<br><br>We have amended our results as follows:<br><br>*"Reasons underlying the difference in unplanned readmission rates for public versus private patients need to be explored, including differences in surgical waiting times and the consequences for impairment and disease complexity."* |
| **Reviewer 3** | |
| Abstract, Results: Report the 95% confidence interval for the primary endpoint, unplanned 30- day readmission. Revise as follows: Of the 380 participants who completed the survey (n=380, 54% of TKAs undertaken over the study period), 3.4% (n=13; 95% confidence interval; 1.8 – 5.8) were subsequently readmitted within 30 days of discharge after a primary hospitalization. | We would like to thank Reviewer 3 for their generosity in feedback and for guiding us through these amendments.<br><br>Thank you. We have amended this. |
| Abstract, revise as follows to reflect the reported estimated odds ratios are adjusted odds ratios. Public patients were significantly more likely to be readmitted within 30 days compared to private patients (adjusted OR=6.87, 95% CI:1.71-27.54, p=0.007), and patients who attended rehabilitation were significantly less likely to be readmitted within 30 days of discharge than those who did not (adjusted OR=0.17, 95% CI: 0.05-0.59, p=0.006). I would not also attempt to adjust for sex and age in the primary reduced multivariable logistic regression model due to the low prevalence of unplanned 30-day readmission (3.4%). Only 3 males had an unplanned 30- day readmission and only two patients between the ages of 45-65 had an | Thank you we have amended this in the abstract results. We agree that controlling for age and sex with such a small number of events makes an attempt to control for age and sex rather than fully controlling for these variables. We have amended the manuscript accordingly. This is especially valid since recent research by Shapiro et al* advises against controlling for age and sex. In our multiple logistic models, the odds ratio for public vs private and attendance at rehab was higher and the confidence interval was further from one when age and sex were excluded from the model. When age and sex were excluded from the model, the final model remained the same. We decided to report the results that with an attempt to control for age and sex as this is the model where the ORs |

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| unplanned 30-day readmission. Controlling for sex and age in addition to 'public vs. private' and attendance to rehabilitation is not a reasonable expectation for this data (perhaps say 'attempt to take into account the effects of age and sex' or 'attempt to adjust for age and sex in a four-covariate reduced model'). The authors report in their response 'While we tested a number of variables, we retained the variables age and sex in the model as a priori confounders. Hence, unlike the other variables, they were retained regardless of significance. It is due to this that we state that we controlled for these variables, as we believe this is the correct terminology'. I disagree with the authors stated justification for a priori controlling for age and sex. What a priori data was used to justify 'controlling' for age and sex for the primary outcome regardless of the observed data? | mentioned above are closer to one.<br><br>We recognise that our use of the term "a priori" in the response was not entirely appropriate as the decision was not based on literature. The term does not appear in the paper, we have used the phrase "attempting to control for age and sex" as a truer indication of what was done.<br><br>*Shapiro JR, Klein SL, Morgan R. Stop 'controlling' for sex and gender in global health research. BMJ Global Health 2021;6:e005714. doi:10.1136/bmjgh-2021-005714 |
| Please report in the Results or Supplemental Table 1 the simple summary data (simple fractions and percentages) for the outcome (unplanned 30-day readmission) and the risk factor participation in a post-surgical rehabilitation program. | Thank you. We have added the summary statistics for attendance to rehabilitation program in Table 1 within the manuscript and added the raw data to aid the reader to create 2x2 statistics of each variable with a outcome of 30-day readmission. |
| The reported odds ratio in Supplemental Table 1 (OR = 0.1 for attendance to rehab program) is not enough information to allow the reader to calculate the simple 2by2 table statistics. | The result section now includes these fractions. |
| Supplemental Table 1: Please be clear on the increment used to calculate the odds ratio for continuous predictors. | Apologies for the confusion, there are no continuous predictors. OR for all levels of the categorical variables are now shown in Supplemental Table 1. |
| Page 10, line 190 revise as follows: The full multiple logistic regression model … | Amended |
| Figure 1, Page 89: Report the 95% confidence interval for the estimated area | Thank you we have added this in the manuscript and also to the figure legend. |

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| under the ROC curve. Provide an informative Figure legend and Title. The area under the ROC curve is interpreted as the probability that a subject with unplanned 30-day readmission is given a higher probability of the outcome by the logistic model than a randomly chosen subject without unplanned 30-day readmission.<br><br>An AUC value of 0.50 indicates that the model has no discriminatory ability (the diagonal line corresponds to random change). Goodness of fit/calibration is not addressed. | *"The area under the ROC curve is 0.80 (95% CI 0.66, 0.94)*<br><br>*The Pearson chi-sq GOF test statistic is 11.64 and since p = 0.7682 we conclude that there is no evidence against the model fitting the data well."* |