PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

Title (Provisional)

Utilization of outpatient care immediately before emergency admission for ambulatory care-sensitive conditions in Japan: A retrospective observational study

Authors

Nagashima, Ryotaro; Kato, Hirotaka; Matsuzaki, Tatsuya; Nagahama, Takayoshi; Goto, Rei

VERSION 1 - REVIEW

Reviewer	**1**
Name	**Lang, Eddy**
Affiliation	**University of Calgary, Emergency Medicine**
Date	**30-May-2024**
COI	**I have no competing interests.**

Thank you for the opportunity to review this manuscript which describes 15 years of claims data in Japan looking both at emergency department visits and hospitalizations as well as outpatient contacts. The primary question underlying the study is whether patients admitted to hospital with ambulatory care sensitive conditions had lost opportunity for intervention by having an outpatient visit prior to their acute turn this presentation to hospital. The study findings demonstrate that in fact a large proportion of patients admitted for ambulatory care sensitive conditions did not have contact with primary care prior to their acute episode necessitating admission.

While I think this paper poses an important and interesting question I am concerned that claims data alone can inform the research question in a wholesome manner. The authors conclude that had there been more contact in the pre admission period with outpatient services that there would have been mitigation in the number of hospitalizations. This is of course somewhat speculative and requires some degree of leap of faith.

Contributing to this limitation is the history and validity of ambulatory care sensitive conditions. While this list of ICD 10 diagnoses was developed to highlight conditions that could be optimally cared for outside of an inpatient setting the distinctions are far from black and white. For example exacerbations of chronic respiratory conditions are often triggered

by acute viral infections and will result in a precipitous deterioration in health requiring emergency department visits and hospitalizations.

I think this manuscript could be improved by providing more granular detail as to which specific ambulatory care sensitive conditions resulting in hospitalization could more likely have been avoided with a visit to primary care in the two weeks prior. A more cautious conclusion about how increased access would have reduced admissions is warranted because in essence the study design and the data set used while robust and interesting cannot inform such an important policy question in a direct manner.

Reviewer	**2**
Name	**Atkin, Catherine**
Affiliation Research Group	**University of Birmingham, Birmingham Acute Care**
Date	**28-Jun-2024**
COI	**None**

This article describes an analysis of retrospective data in Japan, assessing the proportion of patients who had an emergency admission for an ambulatory care sensitive condition that received outpatient care immediately preceding the admission.

The question that the authors have aimed to answer is likely to be relevant to a wide audience, and adds to our understanding of how reducing emergency admissions may be impacted by changes to outpatient care.

I would suggest some changes to the manuscript, including to address issues with interpretation of findings, and for clarity.

Introduction:

- The aims would benefit from being more succinctly summarised. It would benefit from mentioning the comparison performed using simulation data within the initial aims, for example explaining the aim to compare to a predicted/expected level of outpatient attendance.

Methods:

- It may be useful to include how many patients were excluded from analysis for each given reason, for example in a supplemental diagram.

- The statistical analysis section could be clearer. Some terms were unclear – 'explored' is not a very specific term when outlining how statistical analysis was performed. Using more concise language, with less superfluous and conjoining phrases may also make this section

clearer. Adding explanation regarding your specific aims earlier in the manuscript may also aid clarity.

Results

- Table 1: the row headings could be improved grammatically to make it clearer.

- Throughout, the language used would benefit from being more concise, to aid readability. There are multiple filler and conjoining phrases that could be removed, for example 'we found that', 'this indicates that', or on page 12 line 36 'the pattern of having an outpatient…'.

- Figure 1 legend should be amended to be shorter and more concise (for example the legend for eFigure 1 is much clearer).

- The subheading on page 13 should be shortened; it could just be 'patient and regional characteristics'

- The paragraphs within the results that describe the odds ratios (and associated statistics) by age are very difficult to read. I would suggest either reordering the information so that the age groups are next to their associated statistics, or incorporating all information into the tables (that isn't already in the tables) and not repeating the table information, but keeping the explanation of where the differences were found.

Discussion

- The discussion outlines the main finding, however immediately jumps to an interpretation of the result, which is not necessarily fully supported by the data. That a proportion of patients did not receive outpatient care before emergency admission does not equate to showing that improved access to outpatient care would reduce emergency admissions.

- The second paragraph of the discussion has some issues. The phrasing of the second sentence is not clear. Until this point in the manuscript, it was not entirely clear that physician density and regional income were included as factors because they were being used as surrogate markers of potential access barriers. This should be explained in the methods. The sentence on page 17, line 45 discussing barriers could be more clearly phrased, to explain that there was no difference demonstrated when using the markers that you chose, therefore not supporting that these are barriers to access impacting outpatient care uptake. The second paragraph of the discussion also jumps across two topics areas – there is a brief discussion of barriers to access, however the topic then jumps to patient health seeking behaviour. These topics would benefit from some expansion, with discussion of any supporting evidence.

- The methods explain that patients can choose to access outpatient care, however there is little discussion of wider literature relevant to the interpretation of results regarding why patients choose to access outpatient care, or the barriers to this. There is a possible reason for avoiding outpatient care postulated by the authors, however no supporting evidence is given for this. There are also alternative explanations not considered, for example that

deterioration may have occurred to rapidly, or with such acuity, that patients present directly to hospital services, which is appropriate for a subgroup of ACSCs, such as asthma.

- Paragraph 3 has similar issues and requires rewriting – the phrasing is unclear, and hard to follow. The implications and interpretation would benefit from being more clearly explained.

- The limitations section is missing a major limitation when applying to a general population – patients aged over 75 years were not included, as they were not in the dataset, however they form a substantial proportion of admissions overall.

- The discussion overall (and therefore the conclusion and abstract) does contradict itself in parts. The overall conclusion given is that improving access to outpatient care may reduce emergency admissions, however this has not been demonstrated, and the discussion at points states that it is not access barriers that are the issue.

Additional comments

- The manuscript overall would benefit from proofreading for writing style. The results could be made more concise and readable by rephrasing, for example stating results clearly, rather than phrasing as 'we found that..'.

- I would suggest considering the phrasing of 'not receiving admission related outpatient care'. Within the text, your meaning is clear in most places, but at points and in the figures, it is less clear. Patients who have not had an outpatient attendance have also not received admission related outpatient care. It may be clearer to consider alternative phrasing, for example 'receiving outpatient care unrelated to admission'.

VERSION 1 - AUTHOR RESPONSE

Reviewer 1(Dr. Eddy Lang)

Thank you for the opportunity to review this manuscript which describes 15 years of claims data in Japan looking both at emergency department visits and hospitalizations as well as outpatient contacts. The primary question underlying the study is whether patients admitted to hospital with ambulatory care sensitive conditions had lost opportunity for intervention by having an outpatient visit prior to their acute turn this presentation to hospital. The study findings demonstrate that in fact a large proportion of patients admitted for ambulatory care sensitive conditions did not have contact with primary care prior to their acute episode necessitating admission.

While I think this paper poses an important and interesting question I am concerned that claims data alone can inform the research question in a wholesome manner. The authors conclude that had there been more contact in the pre admission period with outpatient services that there would have been mitigation in the number of hospitalizations. This is of course somewhat speculative and requires some degree of leap of faith.

Contributing to this limitation is the history and validity of ambulatory care sensitive conditions. While this list of ICD 10 diagnoses was developed to highlight conditions that could be optimally cared for outside of an inpatient setting the distinctions are far from black and white. For example exacerbations of chronic respiratory conditions are often triggered by acute viral infections and will result in a precipitous deterioration in health requiring emergency department visits and hospitalizations.

I think this manuscript could be improved by providing more granular detail as to which specific ambulatory care sensitive conditions resulting in hospitalization could more likely have been avoided with a visit to primary care in the two weeks prior. A more cautious conclusion about how increased access would have reduced admissions is warranted because in essence the study design and the data set used while robust and interesting cannot inform such an important policy question in a direct manner.

Thank you for your thoughtful comments. We did not directly investigate whether improving access to outpatient care can reduce emergency hospitalization. Instead, we investigated how patients with emergency admissions for ambulatory care-sensitive conditions were managed in outpatient settings before admission. To clarify this point, we have revised the entire discussion section, with a particular focus on the first paragraph as follows: (page15, paragraph1)

"Our findings revealed three types of emergency admission patients, each accounting for approximately the same proportion. The first group consists of patients who did not have an outpatient visit before admission. The second group had an outpatient visit but did not receive admission-related care. The final group had an outpatient visit and received admission-related care. For the first group, improving access to outpatient care may be effective in reducing emergency admissions, although not for all cases. However, for the other groups, simply improving access to outpatient care is unlikely to reduce emergency admissions, and enhancing the effectiveness of outpatient care may be more effective in reducing admissions. This suggests that a combined approach may be necessary when considering strategies to reduce admission."

Reviewer 2 (Dr. Catherine Atkin)

Introduction

* The aims would benefit from being more succinctly summarised. It would benefit from mentioning the comparison performed using simulation data within the initial aims, for example explaining the aim to compare to a predicted/expected level of outpatient attendance.

Thank you for your advice. As per your suggestion, I have included the objective of comparing to predicted outpatient attendance using simulation data. Additionally, I have revised the text in the second paragraph of the introduction. (page5, paragraph 2)

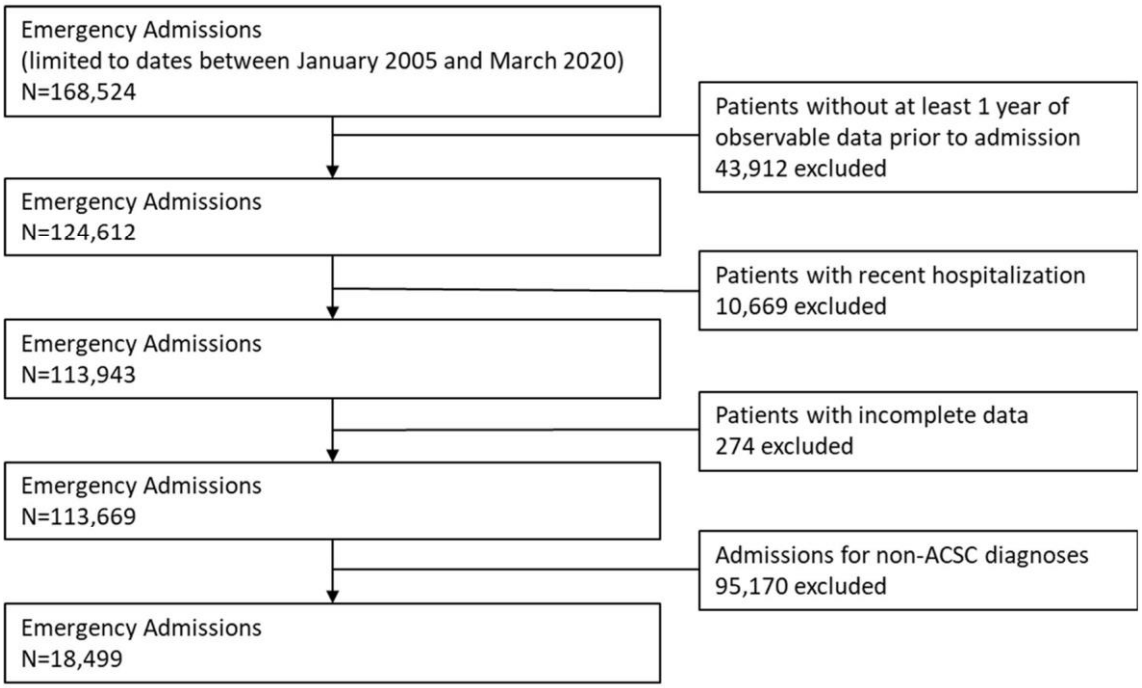
"Despite efforts to prevent emergency admissions through outpatient care, recent evidence shows that improving access (e.g., increasing open hours or reducing financial barriers) has achieved limited or mixed effects on reducing emergency admissions.[9-13] This raises important questions about whether patients with potentially preventable emergency admissions face limited access to outpatient care and whether they receive appropriate outpatient care if they had an outpatient visit. Little is known about whether these patients had an outpatient visit before admission and how they were treated. Existing studies on ambulatory care-sensitive conditions (ACSC), defined as conditions for which hospitalization could be avoided through timely and effective outpatient care,[2,14,15] and found that 10-20% of emergency admissions were ACSC admissions (e.g., admissions for congestive heart failure, chronic obstructive pulmonary disease, and asthma).[4-6] However, beyond interview research with a limited sample size,[16] no study has examined whether and how patients with emergency ACSC admissions were treated immediately prior to admission in the outpatient settings. This lack of research makes it difficult for health policymakers to distinguish whether patients lacked an outpatient visit or received inadequate care before admission. It is important to distinguish which possibility is correct because it shows where opportunities for reduction exist and has different policy implications (i.e., improving access to outpatient care in the former case may be effective, but it may not be effective in the latter case). We conducted a simulation analysis to assess whether outpatient visit prior to emergency admission differed from the usual pattern."

Methods:

* It may be useful to include how many patients were excluded from analysis for each given reason, for example in a supplemental diagram.

Thank you for your helpful suggestion. I have added a diagram as eFigure 1 in the Appendix to illustrate the number of patients excluded for each reason.

eFigure 1. Flowchart of emergency admissions used for analysis



This flowchart illustrates the exclusion process for emergency admissions due to ACSCs from the database for analysis. The selection was based on the completeness of the required data, recent hospitalization history, and the presence of ACSC diagnoses.

* The statistical analysis section could be clearer. Some terms were unclear – 'explored' is not a very specific term when outlining how statistical analysis was performed. Using more concise language, with less superfluous and conjoining phrases may also make this section clearer.

Adding explanation regarding your specific aims earlier in the manuscript may also aid clarity.

Thank you for your helpful suggestion. I have revised the statistical analysis section, replacing the term "explored" with more specific terminology.

Results

* Table 1: the row headings could be improved grammatically to make it clearer.

Thank you for your feedback. I have made the following changes to Table 1 as suggested.

Outpatient care before admission	No. (%)
All admissions	18,499 (100)
Patients did not have an outpatient visit	6,918 (37.4)
Patients received admission-unrelated outpatient care	5,513 (29.9)
Patients received admission-related outpatient care	6,068 (32.8)

* Throughout, the language used would benefit from being more concise, to aid readability. There are multiple filler and conjoining phrases that could be removed, for example ‘we found that’, ‘this indicates that’, or on page 12 line 36 ‘the pattern of having an outpatient…’.

Thank you for your feedback. I have removed or revised expressions such as 'we found that' throughout not only the results section but the entire paper, as suggested.

* Figure 1 legend should be amended to be shorter and more concise (for example the legend for eFigure 1 is much clearer).

Thank you for your advice. I have revised the Figure 1 legend to be more concise, as shown below.

“The red line shows the proportion of patients with an outpatient visit before admission. We simulated whether this pattern differed from the usual before emergency admissions. For each patient, we randomly generated a “pseudo-admission-date” for each patient within a year before their emergency ACSC admission. We then analyzed the percentage of patients with an outpatient visit in the two weeks prior to these “pseudo-admission-dates” in 100 simulation trials. The blue line shows these results, with error bars showing 95% confidence intervals.”

* The subheading on page 13 should be shortened; it could just be ‘patient and regional characteristics’

Thank you for your advice. I have revised as suggested.

* The paragraphs within the results that describe the odds ratios (and associated statistics) by age are very difficult to read. I would suggest either reordering the information so that the age groups are next to their associated statistics, or incorporating all information into the tables (that isn’t already in the tables) and not repeating the table information, but keeping the explanation of where the differences were found.

Thank you for your feedback. I have reordered the information so that the age groups are placed next to their associated statistics, and I have removed the detailed information already included in the tables. (page12, paragraph 1 and page13, paragraph 1)

“The predicted probabilities of not having an outpatient visit before admission were 31.5% for patients aged 19 and younger, 36.4% for patients aged 20–29, 36.0% for patients aged 30–39, 40.8% for patients aged 40–49, 41.2% for patients aged 50–59, and 36.1% for patients aged 60 and older (Table 2 and Figure 2). Patients aged 40–49 and 50–59 were less likely to have an outpatient visit

before admission compared with patients aged 20–29, and this difference was statistically significant."

"The predicted probabilities of not receiving admission-related outpatient care before admission were 63.6% for patients aged 19 and younger, 60.9% for patients aged 20–29, 64.1% for patients aged 30–39, 68.9% for patients aged 40–49 , 69.8% for patients aged 50– 59, and 69.5% for patients aged 60 and older(Table 3 and Figure 2). Patients aged 40 and older were less likely to receive admission-related outpatient care before admission compared with patients aged 20–29, and this difference was statistically significant."

Discussion

* The discussion outlines the main finding, however immediately jumps to an interpretation of the result, which is not necessarily fully supported by the data. That a proportion of patients did not receive outpatient care before emergency admission does not equate to showing that improved access to outpatient care would reduce emergency admissions.

Thank you for your thoughtful comments. We did not directly investigate whether improving access to outpatient care can reduce emergency hospitalization. Instead, we investigated how patients with emergency admissions for ambulatory care-sensitive conditions were managed in outpatient settings before admission. To clarify this point, we have revised the entire discussion section, with a particular focus on the first paragraph as follows: (page15, paragraph1)

"Our findings revealed three types of emergency admission patients, each accounting for approximately the same proportion. The first group consists of patients who did not have an outpatient visit before admission. The second group had an outpatient visit but did not receive admission-related care. The final group had an outpatient visit and received admission-related care. For the first group, improving access to outpatient care may be effective in reducing emergency admissions, although not for all cases. However, for the other groups, simply improving access to outpatient care is unlikely to reduce emergency admissions, and enhancing the effectiveness of outpatient care may be more effective in reducing admissions. This suggests that a combined approach may be necessary when considering strategies to reduce admission."

* The second paragraph of the discussion has some issues. The phrasing of the second sentence is not clear. Until this point in the manuscript, it was not entirely clear that physician density and regional income were included as factors because they were being used as surrogate markers of potential access barriers. This should be explained in the methods. The sentence on page 17, line 45 discussing barriers could be more clearly phrased, to explain that there was no difference demonstrated when using the markers that you chose, therefore not supporting that these are barriers to access impacting outpatient care uptake. The second paragraph of the discussion also

jumps across two topics areas – there is a brief discussion of barriers to access, however the topic then jumps to patient health seeking behaviour. These topics would benefit from some expansion, with discussion of any supporting evidence.

Thank you for your feedback. First, I have added a note in the methods section to clarify that physician density and regional income were used as surrogate markers. Additionally, I have clarified that the lack of difference seen with these markers in Japan may be due to the structure of the Japanese healthcare system. Since we observed age-related differences in outpatient visits, I have included a discussion on this aspect in the discussion section, along with relevant literature to support each point. (page16, Paragraph 2)

"Our estimates indicate that approximately one in three patients did not have an outpatient visit immediately before emergency ACSC admission. While previous studies have reported an association between prior outpatient visits and factors such as regional physician density or income, our findings did not demonstrate significant evidence supporting this relationship. However, a correlation with age was observed in our data. The results concerning physician density or income may have been influenced by Japan's universal health coverage, which maintaining equity in healthcare access[20,21]. It has been noted that middle-aged and older adults tend to delay seeking medical treatment and advice[22,23], and a similar tendency was observed in this study. Individuals in their 40s and 50s, who are at higher risk for work-related illnesses[24], may face challenges in accessing outpatient care. Given that this age group often plays a crucial role in the workforce, it is essential to consider targeted interventions for this demographic from both a medical and societal perspective."

* The methods explain that patients can choose to access outpatient care, however there is little discussion of wider literature relevant to the interpretation of results regarding why patients choose to access outpatient care, or the barriers to this. There is a possible reason for avoiding outpatient care postulated by the authors, however no supporting evidence is given for this. There are also alternative explanations not considered, for example that deterioration may have occurred to rapidly, or with such acuity, that patients present directly to hospital services, which is appropriate for a subgroup of ACSCs, such as asthma.

Thank you for your advice. As noted in my previous response, I have expanded the discussion to include literature on the reasons patients may face barriers to accessing outpatient care.
I appreciate your suggestion on alternative explanations as well. As you mentioned, acute exacerbations can occur, so improvements in outpatient care may not prevent all ACSC admissions. However, our data has limitations, as we are unable to distinguish specific details about patient conditions. I have included this point in the limitations section. (page17, paragraph 3)

"Second, we were unable to examine whether the outpatient care received by individual patients was clinically effective because of the lack of detailed clinical information in the claims data. Due to the lack of clinical information, verifying the presence of unpredictable acute exacerbations was impossible. For example, while it is known that appropriate daily management of asthma can reduce emergency admissions[24], these unpredictable exacerbations are not entirely preventable and may be present in a certain number within our dataset."

* Paragraph 3 has similar issues and requires rewriting – the phrasing is unclear, and hard to follow. The implications and interpretation would benefit from being more clearly explained.

Thank you for your feedback. I have combined the third paragraph with the ex-fourth paragraph and revised the content to enhance clarity. (page16, paragraph 3)

"Next, we discussed why approximately one in three patients did not receive admissionrelated outpatient care despite having had an outpatient visit immediately before admission. This may be influenced by Japan's healthcare system. In Japan, there are two mechanisms for providing delayed admission-related specialty care. First, patients can consult a specialist directly of their choice. Patients often visit specialists; however, in doing so, they may sometimes choose an inappropriate specialty for their condition. Second, doctors may be unable to determine the suitability of hospitalization for patients with medical conditions outside of their own field of expertise. In such cases, it may take longer for patients to visit the appropriate specialist, potentially leading to a deterioration in their condition to the point where hospitalization is required. It may be necessary to establish a system similar to that of the coordinators or general practitioners in other countries who assign patients to appropriate specialists or outpatient clinics."

*The limitations section is missing a major limitation when applying to a general population patients aged over 75 years were not included, as they were not in the dataset, however they form a substantial proportion of admissions overall.

Thank you for your feedback. I have added the exclusion of patients aged over 75 years from the dataset to the limitations section. (page18, paragraph 1)

"Fourth, in Japan, individuals aged 75 and over are covered by the Late-Stage Elderly Healthcare System, so this important age group, which represents a large share of hospital admissions, was not included in our data."

* The discussion overall (and therefore the conclusion and abstract) does contradict itself in parts. The overall conclusion given is that improving access to outpatient care may reduce

emergency admissions, however this has not been demonstrated, and the discussion at points states that it is not access barriers that are the issue.

Thank you for your feedback. As you noted, there were some contradictions throughout this paper. I have therefore made significant revisions to the first, second, third, and seventh paragraphs of the discussion to address these inconsistencies.

Additional comments

* The manuscript overall would benefit from proofreading for writing style. The results could be made more concise and readable by rephrasing, for example stating results clearly, rather than phrasing as ‘we found that..’.

Thank you. I have removed or revised expressions such as 'we found that' throughout the entire manuscript, as well as addressed the phrasing in the results section as suggested.

* I would suggest considering the phrasing of ‘not receiving admission related outpatient care’. Within the text, your meaning is clear in most places, but at points and in the figures, it is less clear. Patients who have not had an outpatient attendance have also not received admission related outpatient care. It may be clearer to consider alternative phrasing, for example ‘receiving outpatient care unrelated to admission’.

Thank you for your helpful suggestion. I have revised the phrasing in the figure to "receive admission-unrelated outpatient care.

Additional Revisions

In the descriptions for the bar charts in Figure 2 and eFigure 3 in the Appendix, the red and blue bars were mistakenly reversed. We have corrected them as follows. We apologize for the oversight.

“The blue bars represent the predicted probabilities of not having an outpatient visit. The red bars represent the predicted probabilities of not receiving admission-related outpatient care.”

VERSION 2 - REVIEW

Reviewer 1

Name	**Lang, Eddy**
Affiliation	**University of Calgary, Emergency Medicine**
Date	**07-Dec-2024**
COI	

Thank you for your attention to reviewer comments. I think that all of the concerns have been adequately addressed.

Reviewer	**2**
Name	**Atkin, Catherine**
Affiliation	**University of Birmingham, Birmingham Acute Care Research Group**
Date	**10-Dec-2024**
COI	

Thank you for the opportunity to review your revision of this paper. You have made changes that have addressed the suggestions from my initial review.