

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (Error! Hyperlink reference not valid.) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Prevalence and factors associated with missed hospital appointments: a retrospective review of multiple clinics at Royal Hospital, Sultanate of Oman
AUTHORS	Alawadhi, Ahmed; Palin, Victoria; van Staa, Tjeerd

VERSION 1 – REVIEW

REVIEWER	Giunta, Diego Hospital Italiano de Buenos Aires, Internal Medicine and Statistics
REVIEW RETURNED	07-Dec-2020

GENERAL COMMENTS	<p>Could you please clarify if the included patients were only adults, or there were children included in the study? The authors state that pediatric appointments were excluded, but it would be more precise to describe the inclusion criteria.</p> <p>It would be informative to specify if the authors used marginal or conditional logistic regression models in statistical methods.</p> <p>The authors state “Figure 1 shows the data cleaning process to obtain the final study population”, but I think the figure provided presents a flow chart for inclusion in the study and does not represent a data cleaning process.</p> <p>Considering the flowchart presented on page 23, I think a clearer specification of inclusion and exclusion criteria would be helpful in the methods section.</p> <p>I find it confusing which text corresponds to what image. Moreover, the images are difficult to see and understand. I think images on pages 24 to 27 and 34 to 38 are difficult to understand and probably a reductional approach to all the rich information related to the database and the analysis the authors have performed.</p> <p>I think it would be more informative to include tables from pages 29 to 33 in the main results section. Since the authors present a large amount of information, it could be useful to select the part of the explored variables to include in the main paper and leave the less important variables as additional material. To perform this selection, I think it is particularly important to use clinical criteria and rationale importance of different variables rather than statistical significance.</p> <p>Since it is one of the main objectives of this study, it would be appropriate to present the non-attendance rate for each outpatient clinic using a bar chart or any other graphic tool.</p> <p>Since data is complex to understand concerning the association between each predictor for nonattendance, I think the authors</p>
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	should provide an additional interpretation of the association measures presented in the tables.
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REVIEWER	Snadden, David The University of British Columbia Faculty of Medicine, Family Practice
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REVIEW RETURNED	05-Jan-2021
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GENERAL COMMENTS	<p>Thank you for giving me the opportunity to review your work. I should state from the outset that my methodological expertise is in qualitative methods so I have approached this review from the perspective of a general reader interested in health systems research.</p> <p>Firstly the research is well laid out, The background and introduction is well written and set within the international literature on missed hospital appointments. The research question is clear and the context description of the setting is very well laid out. I am impressed at the number of records included which has given an enormous data set to work with. The methods are well explained and appear appropriate.</p> <p>The description of the results seems appropriate and the conclusions section is well written.</p> <p>The writing on pages 14 and 15 needs some proof reading as there are many small errors (mostly things like missing "s" in words that would be better pluralised).</p> <p>I did not see a funding statement.</p> <p>Where I had the most difficulty with the article was with the tables and the images. The images on pages 23,24,25, 26, 27 34, 35, 36, 37, 38 and 39 of the proof are of poor quality and pixelated and I couldn't really read them.</p> <p>The images and tables from page 19-27 of the proof appear to be part of the article, the ones from p28 on are supplementary material. For the first images and table they are not adequately labelled and linked to the text.</p> <p>There are so many of these I wonder if there is another way to present this data more succinctly and then have the tables available as supplementary files for those interested.</p> <p>Tables 1 (p22) and items 2 and 3 (p29 and 31) are very comprehensive and contain a lot of data. In item 2 and 3 in particular I found the table a bit overwhelming, probably due to the enormous amount of data. It felt as if this was a raw data description. Again I wonder if there is a better way to present an interpretation of this data in a more succinct way with the raw data being made available as supplementary files - maybe that is what Table 2 (p11) tries to do and it does it quite clearly.</p> <p>I think my confusion is over the relationship between the text and what tables are part of the text and what is in supplementary files. I think the clarity of the research would be improved with some</p>
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	<p>tables like table 2 in the text to illustrate key findings, with references to the supplementary material for those that wish to see the complete data. I think it is the in text referencing to the data that may need to be clarified.</p> <p>This is an interesting piece of work particularly in its main findings of who is most likely not to turn up for appointments, there are some good comparisons with neighboring countries and there may be elements of interest to other health care systems. The limitations are well identified. The methods are clear and the article would be improved by clearer referencing and labelling of tables in the text, by better definition images and by some attention being made to how the key findings are presented and linked to succinct tables and supplementary files.</p>
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REVIEWER	Kumah, Emmanuel Scuola Superiore Sant'Anna, Healthcare Management
REVIEW RETURNED	17-Jan-2021

GENERAL COMMENTS	<p>Prevalence and factors associated with missed hospital appointments: a retrospective review of multiple clinics at Royal Hospital, Sultanate of Oman</p> <p>The above is a simple study determining the rate and predictors of missed appointment in a tertiary care facility in Oman. It is an interesting to read and fills an important gap in the literature. The authors have sufficiently justified the need for the study. The methodology is sound and the write-up flows very well. Readers will enjoy reading it when published.</p> <p>While I commend the authors, I think there are some issues with the paper that need to be addressed to improve its overall quality. I have outlined them below:</p> <p>Abstract:</p> <ol style="list-style-type: none"> Line 29: The authors have stated primary and secondary outcome measures, but failed to indicate what these outcome measures are. Only the definition of a missed appointment has been given. Line 48: ORs should be fully defined as it is the first time it is appearing in the manuscript. Subsequently, the acronym may be used. <p>Strengths and limitations:</p> <ol style="list-style-type: none"> Line 29: "The study period spans was 5 years ..." should be "The study period spans 5 years". The first bullet under Limitations is unclear (line 40-48). The authors may consider rephrasing it. Second bullet of Limitations: Do the authors mean different levels of care? Because primary, secondary and tertiary are levels of care. They may be different primary care settings, different secondary care settings and different tertiary care settings. <p>Background:</p> <ol style="list-style-type: none"> "Patients who miss their hospital appointment is a challenge in health care systems around the world". The authors may consider reconstructing this sentence. The authors state "The aim of this study was to evaluate missed appointments within the Omani health care system" (line 10-12). This is misleading. Although the origin of the study is Oman, it was
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	<p>conducted at a single-center site (the Royal Hospital) and not the entire Omani healthcare system.</p> <p>Methods:</p> <ol style="list-style-type: none">1. Study design: I think “Retrospective cross-sectional design” is more appropriate. This is not a longitudinal study to qualify as a cohort study. Although they considered five years data (2014-2018), the data collection period did not last five years. Also, the participants did not have very similar characteristics to be described as a cohort.2. Readers may understand and enjoy reading it more if the authors first define their study variables before moving on to describe how data was collected. Currently, everything has been lumped together at the Data Collection section. Thus, the following order is recommended:<ul style="list-style-type: none">• Study sample (describe your sample, indicating inclusions and exclusions)• Measures (Define your variables and how they were measured)• Data Collection (Describe how data was extracted)• Statistical Analysis (how the collected data was analyzed)3. “walayat” should be defined for those not familiar with the term to understand <p>Patient and Public Involvement statement</p> <p>“It was not possible to involve patients or the public in the design, conduct, reporting, or dissemination plans of our research but their involvement will be incorporated into future work”. Per the above statement, does it mean they wanted to involve patients and the public in the study design, but could not do so or the nature of the study did not require the involvement of patients and the public? Some clarity is needed.</p> <p>Discussion</p> <ol style="list-style-type: none">1. Page 13, Line 49, Giunta et al. (2013): Delete the date to ensure conformity with the intext citation format.2. Page 14, Line 52-53, The authors state “.....however this hospital is the only hospital in Oman that patients can be referred to for specialised clinics..... Other referral hospitals throughout Oman could be included in a larger study to compare the rate of missed appointments.....” I am a bit confused here. Which other referral hospitals are they referring to in the second sentence as they have stated that the one they studied is the only referral hospital in Oman for specialist care? Or the other referral hospitals, apart from the one they studied, do not provide specialized care.3. Page 15, Line 12-13, “Future work to investigate the reasons behind missed hospital appointment from the patients’ perspective” Incomplete sentence, the authors may revise it. <p>Other comment</p> <ol style="list-style-type: none">1. The use of capitals: The authors may check throughout the manuscript to ensure that all proper nouns are capitalized and the non-proper nouns, which do not begin a sentence, are uncapitalized.2. They may also check for a few typos.
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VERSION 1 – AUTHOR RESPONSE

Reviewer 1 comments:

1. Could you please clarify if the included patients were only adults, or there were children included in the study? The authors state that paediatric appointments were excluded, but it would be more precise to describe the inclusion criteria.

Response: Thank you for the comment. We fitted one overall model excluding observations from both the paediatric clinic (<18 years only) and the obstetrics and gynaecology clinic (females only). This overall model therefore included both children and adults for all other medical specialities and was stratified by clinic in the analysis (for the remaining 21 clinics). We excluded observations from paediatric and obstetric clinics in the overall model but then fitted seven separate models for clinics with the highest rate of missed appointment. As you can see from Table 1, 22.1 % of the overall population (i.e. included in the overall model) were ≤18 years old. The reason for excluding paediatrics and obstetrics from the overall model was because of the additional stratification by clinic. The obstetric clinic would not have had observations for males and the paediatric clinic would not have observations for all the age categories used. We have added details to explain the sub-setting of the data in the methods section, page (7), on lines 71-79.

2. It would be informative to specify if the authors used marginal or conditional logistic regression models in statistical methods.

Response: The study performed a case-control analysis for patients who attended or missed their appointments, but the cases were not matched to controls. This is because we were keen to look at the analysis by clinic to identify any variability in outcome and there were too few observations by sub clinics to match all cases to controls. Therefore we performed an unconditional logistic regression model and details of this have been amended, page (8), on line 102.

3. The authors state “Figure 1 shows the data cleaning process to obtain the final study population”, but I think the figure provided presents a flow chart for inclusion in the study and does not represent a data cleaning process.

Response: Thank you for your comment, this has been changed to Figure 1: Inclusion and exclusion criteria for the study population.

4. Considering the flowchart presented on page 23, I think a clearer specification of inclusion and exclusion criteria would be helpful in the methods section.

Response: Thank you for the suggestion, the inclusion and exclusion criteria was added under the ‘Study sample’ section of the Methods -page (6, 7)

5. I find it confusing which text corresponds to what image. Moreover, the images are difficult to see and understand. I think images on pages 24 to 27 and 34 to 38 are difficult to understand and probably a reductional approach to all the rich information related to the database and the analysis the authors have performed.

Response: Apologise for the confusion. Images on pages (34-38) were part of the supplementary information in the original submission. This has now been submitted as a separate document with the

legends clearly labelled 'Supplementary Table/Figure'. To avoid confusion, we have revised the main text figures to show the most significant predictors only, presented as forest plots and summarized in table 2. All other findings of the statistical analysis are presented as tables and figures for each of the predictors used in the analysis in the supplementary documents provided.

6. I think it would be more informative to include tables from pages 29 to 33 in the main results section. Since the authors present a large amount of information, it could be useful to select the part of the explored variables to include in the main paper and leave the less important variables as additional material. To perform this selection, I think it is particularly important to use clinical criteria and rationale importance of different variables rather than statistical significance.

Response: Thank you for your comment. We have performed an extensive data analysis in our study which produced a lot of findings/results that would be hard to present all in the main text since we are limited to the journal specification related to the number of tables and figures in the main text. However; all the findings/results generated from the analysis will be included in the supplementary document of this paper where tables were revised to represent the findings of the statistical analysis of each predictor. In the main text we have represented the significant findings from the models that varied by clinic only, these are presented as OR in a table (table 2) from the overall model, but as forest-plots by clinic to so the variability more clearly. We feel these figures are easier to understand visually as forest plots.

7. Since it is one of the main objectives of this study, it would be appropriate to present the non-attendance rate for each outpatient clinic using a bar chart or any other graphic tool.

Response: Thank you for your comment. We have generated a bar chart of missed appointment rate by clinic and added to the main manuscript as 'Figure 2: Rate of missed appointment in the top seven clinics'. We made reference to this new figure page (9), on lines 128-120.

8. Since data is complex to understand concerning the association between each predictor for nonattendance, I think the authors should provide an additional interpretation of the association measures presented in the tables.

Response: Thank you for your comment. We agree that additional interpretation should be provided to understand the association between different predictors. We have added extra information in the supplementary document.

Reviewer 2 comments:

1. The writing on pages 14 and 15 needs some proof reading as there are many small errors (mostly things like missing "s" in words that would be better pluralised).

Response: Thank you, this manuscript has been thoroughly reviewed by all authors to correct errors.

2. I did not see a funding statement.

Response: The funding statement is stated under Funding section in Declarations page (15), on line 287.

3. Where I had the most difficulty with the article was with the tables and the images. The images on pages 23, 24, 25, 26, 27 34, 35, 36, 37, 38 and 39 of the proof are of poor quality and pixelated and I couldn't really read them.

Response: Thank you for your comments. The images in pages 23-27, 34-39 were created with 300 dpi as part of the journal specification requirement for images, but appreciate your comment that they could be better. We have attempted to improve the quality from 300 dpi to 600 dpi resolution with this resubmission.

4. The images and tables from page 19-27 of the proof appear to be part of the article, the ones from p28 on are supplementary material. For the first images and table they are not adequately labelled and linked to the text.

Response: Thank you for the comment. The following tables and figures are now part of the main article.

- Table 1: Characteristics of the final study population,
- Figure 1: Inclusion and exclusion criteria for the study population,
- Table 2: Predictors of missed hospital appointment for all clinics combined (except Obstetrics and Gynaecology and Paediatric clinics),
- Table3: Distance between the Royal Hospital and each governorate and OR for missing appointment, Figure2: Rate of missed appointment in the top seven clinics,
- Figure 3: Age category as predictors of missed appointment stratified by clinic, are part of article.
- Figure4: Appointment waiting days as predictors of missed appointment stratified by clinic. All other tables, images (figures) are part of the supplementary material.

The article has been reviewed, revised by all authors to ensure that all tables, images, supplementary materials are accurately labelled and linked.

5. There are so many of these I wonder if there is another way to present this data more succinctly and then have the tables available as supplementary files for those interested.

Response: Thank you for the comment. We have improved the presentation of the results to increase readability. Data was presented in small tables corresponding to each variable in the supplementary. One table was created for each predictor, with some grouped together. We believe this makes the tables are more clear and easy to read now.

6. Tables 1 (p22) and items 2 and 3 (p29 and 31) are very comprehensive and contain a lot of data. In item 2 and 3 in particular I found the table a bit overwhelming, probably due to the enormous amount of data. It felt as if this was a raw data description. Again I wonder if there is a better way to present an interpretation of this data in a more succinct way with the raw data being made available as supplementary files - maybe that is what Table 2 (p11) tries to do and it does it quite clearly.

Response: Table 1: Characteristics of the final study population has been reduced. The characteristics of the study population related to the main predictors of missed hospital appointment were kept as part of the article. The remaining characteristics of the study population were moved to the supplementary tables. We made reference to this in page (9), on lines (127-128) and in page (10), on lines (148-149).

Reviewer 3 comments:

Abstract:

Line 29: The authors have stated primary and secondary outcome measures, but failed to indicate what these outcome measures are. Only the definition of a missed appointment has been given.

Response: Thank you for the comment. We have made the relevant changes in the manuscript by stating the primary and secondary outcome measures under the Primary and secondary outcome measure section of the abstract, page (2).

Line 48: ORs should be fully defined as it is the first time it is appearing in the manuscript. Subsequently, the acronym may be used.

Response: OR was defined as Odd Ratio, page (2).

Strengths and limitations:

Line 29: "The study period spans was 5 years ..." should be "The study period spans 5 years".

Response: This point related to the strengths of the study was changed to the following statement "Provides information about the frequency and drivers of missed hospital appointments in non-Western country (Oman) over a 5 year period", page (3)

The first bullet under Limitations is unclear (line 40-48). The authors may consider rephrasing it.

Response: This point related to limitations of the study was changed to the following statement "Substantial missing data for some of the risk factors (not missing at random); a missingness indicator variable was used in the logistic models", page (3).

Second bullet of Limitations: Do the authors mean different levels of care? Because primary, secondary and tertiary are levels of care. They may be different primary care settings, different secondary care settings and different tertiary care settings.

Response: Thank you for the comment. We were referring to the different levels of care. The point was changed to "The study examined one hospital from the tertiary care level and results may not be generalisable to other care levels", page (3).

Background: plagiarism

"Patients who miss their hospital appointment is a challenge in health care systems around the world". The authors may consider reconstructing this sentence.

Response: Thank you. We have modified to: 'Missed hospital appointments are a challenge to health care systems around the world.' page (4) on lines (3-4).

The authors state “The aim of this study was to evaluate missed appointments within the Omani health care system” (line 10-12). This is misleading. Although the origin of the study is Oman, it was conducted at a single-center site (the Royal Hospital) and not the entire Omani healthcare system.

Response: We agree that because the study looked at one single referral hospital this is misleading. The sentence was changed to “The aim of this study was to evaluate the rate and predictors of missed hospital appointments in the main tertiary referral hospital in Oman (Royal Hospital).” page (5), on lines (26-27).

Methods:

Study design: I think “Retrospective cross-sectional design” is more appropriate. This is not a longitudinal study to qualify as a cohort study. Although they considered five years data (2014-2018), the data collection period did not last five years. Also, the participants did not have very similar characteristics to be described as a cohort.

Response: The study design was changed to “Retrospective case-control study.” We are using information/data related hospital appointment from previous years (retrospective) and we are comparing group of patients who missed their hospital appointment (cases) to patients who attended their hospital appointment (control),page(2).

Readers may understand and enjoy reading it more if the authors first define their study variables before moving on to describe how data was collected. Currently, everything has been lumped together at the Data Collection section. Thus, the following order is recommended:

- Study sample (describe your sample, indicating inclusions and exclusions)
- Measures (Define your variables and how they were measured)
- Data Collection (Describe how data was extracted)
- Statistical Analysis (how the collected data was analyzed)

Response: Thank you for your comment. We have added the additional sections to the methods and moved the description of each variable to a new ‘Measures’ section , page(7),on line (81-93). Study sample section described the study sample and explained the inclusions and exclusions criteria used in our study pages (6-8), on lines (65-114).

“walayat” should be defined for those not familiar with the term to understand

Response: Thank you for the comment. Walayat means city and was defined in the manuscript, page (5), on line 42

Patient and Public Involvement statement

“It was not possible to involve patients or the public in the design, conduct, reporting, or dissemination plans of our research but their involvement will be incorporated into future work”. Per the above statement, does it mean they wanted to involve patients and the public in the study design, but could not do so or the nature of the study did not require the involvement of patients and the public? Some clarity is needed.

Response: The statement was changed to “The study did not require the involvement of patients and the public, but our future research will survey the patients for reasons of missed hospital appointments”, page (8, 9), on lines (116-118).

Discussion

Page 13, Line 49, Giunta et al. (2013): Delete the date to ensure conformity with the intext citation format.

Response: Thank you, this modification has been implemented.

Page 14, Line 52-53, The authors state “.....however this hospital is the only hospital in Oman that patients can be referred to for specialised clinics..... Other referral hospitals throughout Oman could be included in a larger study to compare the rate of missed appointments.....” I am a bit confused here. Which other referral hospitals are they referring to in the second sentence as they have stated that the one they studied is the only referral hospital in Oman for specialist care? Or the other referral hospitals, apart from the one they studied, do not provide specialized care.

Response: The above statement was changed to “The current study has limitations as it included just one tertiary referral hospital in the capital city of Muscat. Although most specialist care is conducted at the Royal Hospital, future work may include other referral hospitals located in the capital city of Muscat and throughout Oman to compare the rate of missed appointments across different governorates to see if this varies and if there is driving factors specific to different regions and individual hospitals”, page(13), on lines (223-227).

Page 15, Line 12-13, “Future work to investigate the reasons behind missed hospital appointment from the patients’ perspective” Incomplete sentence, the authors may revise it.

Response: Thank you, we have modified the sentence to “Work is currently ongoing to interview patients who missed their hospital appointment to identify the reasons for missing their hospital appointment from the patient’s perspective.” page (13), on lines (230-232).

Other comment

The use of capitals: The authors may check throughout the manuscript to ensure that all proper nouns are capitalized and the non-proper nouns, which do not begin a sentence, are uncapitalized.

Response: This manuscript has been thoroughly reviewed by all authors to check for any mistakes and to improve the final version of the manuscript for the re-submission.

2. They may also check for a few typos.

Response: We have proof read the manuscript thoroughly for this re-submission.

VERSION 2 – REVIEW

REVIEWER	Giunta, Diego Hospital Italiano de Buenos Aires, Internal Medicine and Statistics
REVIEW RETURNED	24-Mar-2021

GENERAL COMMENTS	<p>Study design. The authors describe the study as a case control study. I think it would be more clear in this part to clarify what defines cases and what defines controls, considering the analytical unit. I am not sure the case control design is an appropriate description for this study. This should be reviewed. I think the authors included all appointments that fulfilled selection criteria during the study period. This approach is not consistent with a case control study in my opinion. Moreover, the results are not presented as a case control study. A case control study would not be able to estimate the prevalence of missed appointments that the authors estimated.</p> <p>This part describing the inclusion process is still confusing. I think it would be more appropriate to state the inclusion and exclusion criteria. After reading this description, I still do not understand if pediatric appointments are or are not included in the study. The same comment with Obstetrics and Gynaecology appointments 70 excluded because of the missing information for age, medical specialties, service cost, 71 governorates, and appointment waiting days. The remaining observations were divided 72 into eight datasets: all clinics (except Paediatric and Obstetrics and Gynaecology), and 73 a dataset for the each of the top seven clinics with a large sample size and a higher rate 74 of missed appointments including Paediatric, Obstetrics and Gynaecology, Diabetes 75 and Endocrine, Surgery, Oncology, Urology and Gastroenterology. The reason for not 76 including Paediatric and Obstetrics and Gynaecology into the overall dataset was that 77 the age and sex structure was different from other clinics. The Obstetrics and 78 Gynaecology clinic included female patients only and the Paediatric clinic only 79 included children ≤ 18 years</p> <p>What is the meaning of "Walayat parameter" in this context? I think the authors need to add a description and/or a reference for this.</p> <p>A common problem in the study of missed appointments, is the clustering of the appointments in patients. This is because all appointments of the same patient are not independent from each other. A common solution for this problem may be the use of conditional regression predictive models, to allow for this natural</p>
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	<p>clustering of the appointments in each patient. I think this is an important problem with a very easy solution. In a previous comment I suggested the use of conditional regression models to allow clustering at the patient level. If the authors decided to use marginal models, this should be discussed as a limitation in the discussion.</p> <p>In table 1, the addition of p values may be informative and useful</p> <p>In table 2, I am not sure what "fully adjusted" means. The addition of a footnote may be clarifying and appropriate.</p> <p>I think that probably figures on pages 27, 28, 38, 39, 40, 41, and 42 are excessive and could be replaced by a short note considering the interpretation of all this figures together.</p>
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REVIEWER	Snadden, David The University of British Columbia Faculty of Medicine, Family Practice
REVIEW RETURNED	29-Mar-2021

GENERAL COMMENTS	<p>Thank you for your revisions to this document. They meet the concerns I had and I feel the article is now ready for publication. The figures are clearer and the table descriptions and new explanations in the text make the article much clearer. There remain some tiny grammatical errors which I corrected in the marked version and attach as a word file. As I am not a quantitative researcher I have recommended the article has statistical review if it has not already been carried out.</p> <p>The reviewer provided a marked copy with additional comments. Please contact the publisher for full details.</p>
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REVIEWER	Kumah, Emmanuel Scuola Superiore Sant'Anna, Healthcare Management
REVIEW RETURNED	28-Mar-2021

GENERAL COMMENTS	<p>I am grateful for the opportunity to review the revised version of this interesting paper.</p> <p>I must say that the authors have been able to address all the issues I raised earlier. The current version is a much more improvement over the earlier version. Great work done by the authors.</p> <p>My only comment is still got to do with the Study Design, which I think the authors may relook at. Earlier I recommended a "Retrospective cross-sectional design". However, the authors have chosen a "Retrospective case control study". I still think this may not be the appropriate study design. By themselves, case-control studies are retrospective in nature. They normally have two groups at the start: one with a particular outcome/disease, and the other without. These studies then look back to assess whether there is a statistically significant difference between the groups in terms of exposure to the outcome/disease.</p> <p>Looking at the data set (2014-2018) and the analysis done by the authors, the study is retrospective in nature. I added "Cross-</p>
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	<p>sectional design” to my earlier review comments because data was collected at one point in time and not over the five-year period (2014-2018). If the authors do not find “Retrospective cross-sectional design” appropriate, they may consider simply RETROSPECTIVE ANALYSIS or look for a more appropriate study design for the paper.</p>
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VERSION 2 – AUTHOR RESPONSE

Reviewer 1 comments:

1. Study design. The authors describe the study as a case control study. I think it would be more clear in this part to clarify what defines cases and what defines controls, considering the analytical unit. I am not sure the case control design is an appropriate description for this study. This should be reviewed. I think the authors included all appointments that fulfilled selection criteria during the study period. This approach is not consistent with a case control study in my opinion. Moreover, the results are not presented as a case control study. A case control study would not be able to estimate the prevalence of missed appointments that the authors estimated.

Response: 1. Thank you for your comments regarding the study design. The study design was changed to “Retrospective cross-sectional analysis”. The study included a population of all patients who had scheduled outpatient appointment at Royal hospital during the period of five years. We looked at patients who did attend their appointment (controls) and patients who did not attend their appointments (cases). We calculated the rate of missed appointment for the study period and identified the factors associated with missed appointments. Changes have been made to the study design section in the Abstract: “Study Design: Retrospective cross-sectional analysis”. A change was also made in the methods section, line 35, page (5) to reflect this.

2. This part describing the inclusion process is still confusing. I think it would be more appropriate to state the inclusion and exclusion criteria. After reading this description, I still do not understand if paediatric appointments are or are not included in the study. The same comment with Obstetrics and Gynaecology appointments excluded because of the missing information for age, medical specialties, service cost, governorates, and appointment waiting days. The remaining observations were divided into eight datasets: all clinics (except Paediatric and Obstetrics and Gynaecology), and a dataset for the each of the top seven clinics with a large sample size and a higher rate of missed appointments including Paediatric, Obstetrics and Gynaecology, Diabetes and Endocrine, Surgery, Oncology, Urology and Gastroenterology. The reason for not including Paediatric and Obstetrics and Gynaecology into the overall dataset was that the age and sex structure was different from other clinics. The Obstetrics and Gynaecology clinic included female patients only and the Paediatric clinic only included children ≤ 18 years. (Line70-79)

Response: Apologise for the confusion. In our study we have included all patients who had scheduled appointment with any outpatient clinics at Royal hospital. Our ‘overall’ dataset and analysis excluded any appointment from the Paediatrics clinic and the Obstetrics and Gynaecology clinic but included all other medical specialities. Our study did include an analysis of Paediatric appointments and Obstetrics and Gynaecology appointments, however; we performed separate analyses for the two clinics because of the following reasons:

The age category variable in the Paediatric clinic includes only patients who are less than 18 years. So, if we included the Paediatric clinic appointments with appointments from other clinics we would come across empty age categories when running the regression model because the paediatrics clinic will not have patients who are in age categories 19-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81-90 and >90 years old. So, we had to run separate model for the paediatric clinic.

Similarly, the Sex variable in the Obstetrics and Gynaecology clinic appointment includes females only. If we include the Obstetrics and Gynaecology clinic appointments in the overall analysis with other clinics we would come across a problem when running the regression model. So, we had to run separate model for the Obstetrics and Gynaecology clinic.

Therefore; we performed separate regression analysis models as follow:

Regression analysis for all outpatient appointments from different clinics (not including appointments for Paediatric and Obstetrics and Gynaecology clinics)

One regression analysis for appointment made within the Paediatric clinic.

One regression analysis for appointment made within the Obstetrics and Gynaecology clinic.

A separate regression analysis for each one of the top five clinics with a) a large sample size (and therefore reasonable numbers of cases and controls) and b) a higher rate of missed appointments compared with all other medical specialities. These top five clinics included Diabetes and Endocrine clinic, Surgery clinic, Oncology clinic, Urology clinic and Gastroenterology clinic.

This means a total of eight datasets were created and eight regression models were performed.

We have revised the methods section to make this more clear. Please see the changes in the main manuscript line 66-89.

3. What is the meaning of "Walayat parameter" in this context? I think the authors need to add a description and/or a reference for this.

Response: Thank you for the comment. Walayat is the Arabic term for Cities. The term was referred to on line (42) page 5, in the setting section of the method, as 'Cities'. However, as these were grouped into Governorate regions (group of cities) detailed on line 100 of the methods section there should be very little confusion for the remaining manuscript and interpretation of the results. Additionally, we have provided a map of Oman in the supplementary materials to show where each governorate used in the analysis is located, as well as a table that describes the governorates in term of distance from the capital of Oman (Muscat).

4. A common problem in the study of missed appointments, is the clustering of the appointments in patients. This is because all appointments of the same patient are not independent from each other. A common solution for this problem may be the use of conditional regression predictive models, to allow for this natural clustering of the appointments in each patient. I think this is an important problem with a very easy solution. In a previous comment I suggested the use of conditional regression models to allow clustering at the patient level. If the authors decided to use marginal models, this should be discussed as a limitation in the discussion.

Response: Thank you for the comment and suggestion regarding the use of conditional regression in this paper. We agree with your comment about clustering effect and ran additional analysis stratified by the

number of repeated appointments for each; although the results were similar, we have updated the results tables and figures accordingly.

5. In table 1, the addition of p values may be informative and useful

Response: Thank you for the comment. The p values have been added to Table 1.

6. In table 2, I am not sure what "fully adjusted" means. The addition of a footnote may be clarifying and appropriate

Response: Thank you for the comment. A footnote was added to Table 2 to clarify the meaning of "fully adjusted".

"A fully adjusted OR measures how the change in one predictor affect the odds of a response variable when all other predictors in the model are controlled."

7. I think that probably figures on pages 27, 28, 38, 39, 40, 41, and 42 are excessive and could be replaced by a short note considering the interpretation of all this figures together.

Response: Thank you for the comment. Figures in page 27 - 42 are part of the supplementary materials of the study. We have reduced the number of Supplementary files. The changes indicated in line (162), page (10).

Reviewer 2 comments:

1. Thank you for your revisions to this document. They meet the concerns I had and I feel the article is now ready for publication. The figures are clearer and the table descriptions and new explanations in the text make the article much clearer. There remain some tiny grammatical errors which I corrected in the marked version and attach as a word file. As I am not a quantitative researcher I have recommended the article has statistical review if it has not already been carried out.

Response: Thank you for correcting the grammatical errors in our manuscript. Additional revision and corrections for any minor errors have been made by the authors.

Reviewer 3 comments:

1. My only comment is still got to do with the Study Design, which I think the authors may relook at. Earlier I recommended a "Retrospective cross-sectional design". However, the authors have chosen a "Retrospective case control study". I still think this may not be the appropriate study design. By themselves, case-control studies are retrospective in nature. They normally have two groups at the start: one with a particular outcome/disease, and the other without. These studies then look back to assess whether there is a statistically significant difference between the groups in terms of exposure to the outcome/disease. Looking at the data set (2014-2018) and the analysis done by the authors, the study is retrospective in nature. I added "Cross-sectional design" to my earlier review comments because data was collected at one point in time and not over the five-year period (2014-2018).

If the authors do not find "Retrospective cross-sectional design" appropriate, they may consider simply RETROSPECTIVE ANALYSIS or look for a more appropriate study design for the paper.

Response: Thank you for the comment. We have looked at similar published studies with the same objectives and aim and changed the study design according to your recommendation. We found that similar published studies described their study design as "Cross-sectional study, descriptive analysis, or

retrospective analysis". We agreed with your comment and changes have been made to our revised version of the manuscript in page 2 (Abstract section) and line 35 page 5, (Method Section, Study Design).Where these now read "Retrospective cross-sectional analysis"

VERSION 3 – REVIEW

REVIEWER	Giunta, Diego Hospital Italiano de Buenos Aires, Internal Medicine and Statistics
REVIEW RETURNED	20-Jun-2021

GENERAL COMMENTS	Thank you very much for reviewing your paper. I think now is ready to be published.
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REVIEWER	Kumah, Emmanuel Scuola Superiore Sant'Anna, Healthcare Management
REVIEW RETURNED	22-Jun-2021

GENERAL COMMENTS	Dear Editor, Thank you for the opportunity to review the revised version of this paper. For my part, the authors have addressed all the issues I raised. Thus, I have no further comments. Thank you
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