PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Using telemedicine to support care for people with type 2 diabetes mellitus: A qualitative analysis of patients' perspectives
AUTHORS	Lee, Jun Yang; Chan, Carina; Chua, Siew Siang; Paraidathathu, Thomas; Lee, Kenneth Kwing-Chin; Tan, Christina; Nasir, Nazrila; Lee, Shaun Wen Huey

VERSION 1 – REVIEW

REVIEWER	Verena Struckmann Department of Health Care Management, University of Technology, Berlin, Germany
REVIEW RETURNED	26-Sep-2018

GENERAL COMMENTS	General: The manuscript aims to explore the experiences of persons with type 2 diabetes mellitus with the use of telemedicine in order to manage their condition. This is a really interesting and important paper about what is relevant for persons who are using telemedicine to manage their diabetes. I have some major and several minor concerns that should be addressed by the authors. 1. Introduction: 2. Can more strengths or limitations be added to the 'Strengths and Limitations' section (page 4)? There are more limitations that are described in the discussion section. As a reminder, this section should contain up to five short bullet points, no longer than one sentence each, that relate specifically to the methods or design of the study reported (see: http://bmjopen.bmj.com/site/about/guidelines.xhtml#articletypes). 3. Can you please improve your description of the study's settings? Consider adding recruitment to the heading. When did the study took place? In the participants and procedure section you describe: "Participants for this qualitative study were patients who received care in one of the eleven clinics which provided diabetes care." Are these the clinics drawn from the nationally representative list of clinics in Klang Valley? This information is not clear at the moment. 3.1. Materials and methods. Participants and procedure: Did you develop a protocol in advance? Did you use this protocol in each focus group? Is this protocol or is the interview guide available as supplementary material? Please revise the following sentence in your manuscript:" A set of open-ended questions was employed as the interview guide to capture the experiences of patients in using telemedicine". How many researchers were present during the interviews? Please elaborate on the participants and procedure

	section in more detail. In particular on the procedure applied as this information is almost completely missing at present. You described that:"Interviews continued until the researcher, in discussion with the wider research team considered data saturation or no new themes or codes could be identified." Did this happen during the focus group? Please explain. Information on the length of use of telemedicine per patient is missing. 3.2 Data analysis: More information is needed in the analysis section. It is unclear to me how exactly the 'inductive' analysis was conducted. 4. In the results section you describe that the 12 focus groups had 3-4 participants per group on average. What was your initial aim? How many participants did you aim to recruit per group? Any aims regarding age or mix of gender? You state that four core themes emerged from our interviews:(..). Does this mean thath the themes only emerged from the 2 interviews and not from the focus group sessions at all? Please revise this sentence in order to be more precise. The translation of your quotes is deficient. For instance the following:"I manually record. I do not understand telephone especially opening. To me manual is easier." The second sentence does not make sense. Please check all quotes used in the results section, review translation and revise them where it is required. 5. Discussion: Unfortunately the discussion primarily iterates the results section, the interperetationof the findings is missing. 5.1. Limitations of the study: The authors talk about generalizability but this is not appropriate language for a qualitative study. The term transferability should be used instead and the extent to which their data are transferable to other populations with type 2 diabetes. I recommend a language check by a native English speaker as the standard of written English is particially insufficient.

REVIEWER	Katharine Press Callahan Columbia University Medical Center, USA
REVIEW RETURNED	30-Sep-2018

GENERAL COMMENTS	-In the introduction, please make it clear what type of studies have been done to draw these baseline conclusions (i.e. Telemedicine produces accurate and reliable data, empowers patients, improves glycemic control) -"However, patients were not included in the design of the study, interview questions or conduct of study"-- I do not think it is necessary to say this -How were transcripts translated to english? please describe. As appropriate please correct translations -Themes need clearer names that more directly reflect content. e.g. "My family and my life" could be "sharing health data" or "accountability and privacy" -There is a lot of overlap between themes. I think you need to organize them more clearly. for example, ""It's time saving" could be titled "Convenience" and could also add in the portion from theme 4 that discusses internet connections. I think it would be more coherent than including this latter part with data security. Other

	themes also need to be cleaned up/clarified. -Needs signifiant revision of english throughout and particularly in conclusions section. I would like to reread this section once the language is revised, as it is currently hard to follow.

REVIEWER	Monica Taylor The University of Queensland, Australia
REVIEW RETURNED	14-Jan-2019

GENERAL COMMENTS	Thank you for the opportunity to review this interesting research. Please see comments in the attached document. Overall: This paper is a straightforward qualitative investigation on the perspectives of patients who used a mobile phone to transmit measurements of their blood glucose. There is some concern over whether certain citations adequately support some statements, and the grammar in the paper is not yet to a standard of written English (e.g. pluralisation such as “an in-depth interviews” and “was some conflicting perspective” – quite a few more of these instances), however, the authors were able to gather useful information from the perspective of a middle income country on patient barriers to telemedicine worth sharing. Minor revisions suggested, and these minor revisions are considered necessary before publication. Abstract: Good summary of the study. I would argue that the acceptability of telemedicine among patients is not necessarily poorly understood as there has been systematic reviews published on the subject. Perhaps change to specifically in the low- and middle-income country context as you mention later in the paper? Introduction: Overall good background on the topic, however concern over one statement made which is mentioned below. Also the Introduction may benefit from finding a time to introduce the term “telemonitoring” into the end of the second paragraph and how it applies or does not apply in this context. 1) Page 5 Line 11/12: How did you arrive at 425 million in 2017 from the source? Could not find this statistic in Ogurtsova et al. 2) Page 5 Lines 44-46: Confusing sentence, consider re-writing for clarity. 3) Page 6 Line 28/29: I do not think you adequately show evidence to support the statement that patients are especially resistant to change in terms of telemedicine. Could you please clarify where in Reference #15 it supports that there is heavy resistance to change as cited? From first glance it states 98% patient satisfaction and the discussion does not focus on resistance. Consider rewording to “there are some examples of patient resistance to change” and provide additional appropriate citations for this. Methods: The methods are clearly stated and transparent. Overall well-written, however missing a bit more detail on the interview guide. Consider including as an Appendix or providing sample questions asked. The COREQ Checklist is a good guide to use for reporting qualitative research methods. An additional point below: 1) Page 8 Line 35: It was said patients could not be given results but with written consent and if patients were contacted by telephone to be recruited they could have had the option to receive results. Perhaps amend to say they were not provided with the results but informed the result would be published, or something

	similar. Results: Overall no major issues with the Results. Clearly organised into themes. Example quotations provided for each theme. However, only up to Patient 14 mentioned but 48 patients participated. Did you relabel each participant in the order that quotations are provided? Would suggest keeping original participant numbers e.g. if quotes are from Participant 3, 9, 21, 33, 34, 42 etc. list it as such. 1) Page 11 Line 40: Label which participant said this quote. Discussion: Concise but effective Discussion section. No suggested changes except for the “Implications for practice” ending – final sentence is a far-reaching recommendation. How does this tie in to the Results or another part of the Discussion? Conclusion: Fine as is. No suggested changes. References: Some concern over whether the appropriate references were selected as evidence of statements made. See Introduction reviewer comments 1 and 3. Tables & Figures: Box 1: Useful addition, however, recommend editing to make it consistently written in the past tense and proofreading to correct grammar errors. Table 1: Good as is.

REVIEWER	Rachael Walker Eastern Institute of Technology, Napier, New Zealand
REVIEW RETURNED	07-Mar-2019

GENERAL COMMENTS	Thank you for the opportunity to review your paper titled "Using Telemedicine to support car for type 2 diabetes mellitus. A qualitative analysis of patient's perspectives". I have a number of comments I believe will improve your manuscript: 1. The grammar throughout needs to be improved - eg. We conducted indepth interviews and focus groups, rather than "an indepth interview and focus group" 2. I am not sure your themes reflect your findings and you do not include any subthemes? What framework was used for analysis - apart from a thematic approach? 3. The themes presented in abstract do not lead to the conclusions made. 4. Sentence page 5 line 12-18 needs a reference 5.First sentence Paragraph 2 page 5 needs referencing 6. More background information about the specific form of telemedicine used is required. 7. Page 6 last paragraph - there is also a lot of data that supports telemedicine in a variety of forms from the patients perspective in diabetes and other chronic conditions that would provide a coutner argument to this discussion point. 8. No interview guide was included? Were focus group interviews the same as the individual interview questions? 9. Why were only two interviews face to face? What was rationale for small numbers in focus groups? Limiations of each of these methods? 10. The authors need to consider the COREQ criteria and elaborate on these, a COREQ checklist should also be included. 11. Results: I dont think your themes represent your quotes and the results needs more analysis and rewording of themes and subthemes to do justice to quotes. There is some overlap currently between themes and I believe reworking these will help to clarify

	results in more detail. IN theme 1 and 2 The quotes reflect - less exposure preference for manual documentation in older adults - the need for more support for older patients - valuing face to face interactions and support from clinical staff - value of storing information, - accessibility of results, - convenience of telemedicine (reducing travel and clinic appointments) - Theme 4 - reliability of telemedicine and internet, connectivity issues particularly for rural patients, concerns of reliability of technology, concern for costs valuing face to face contact Discussion - Page 17 first sentence these seem to be the results ffrom your study but have referenced systematic review?, also same with last sentence in this paragraph - where you are discussing results from this study but reference a different study? Throughout the discussion there are some new results - there should not be new information introduced in the discussion, this needs to be moved to results section and themed. Sample size in discussion needs reframing to align to qualitative methodology.

REVIEWER	Kirsten Lomborg Aarhus University, Denmark
REVIEW RETURNED	20-Mar-2019

GENERAL COMMENTS	Thank you for letting me review your manuscript on a qualitative focus group and interview study nested in a RCT. In my opinion you need to qualify the manuscript, especially concerning the following: Abstract The results are twisted compared to the subheadings in the main text. I would prefer them to be identical. There are some spelling mistakes, e.g. 'data were' and 'an in-depth interviews'. Second bullet is unclear - insert 'as these 'perspectives''. Introduction You set the scene alright but need to do some rewriting to establish an interesting and relevant focus. You state that the existing literature on telemedicine lacks the examination of patients from a low-middle income country. I believe this is true, but why is it important to gain exactly this knowledge? I would have liked to see the argument and maybe some hypotheses of what you would expect to find different in comparison to the studies already published on telemedicine. You might benefit from digging into the literature on e-literacy. Again there are spelling mistakes. Study design Include RCT when referring to 'the study' on p 7, line 18. Explain how you determined the set of open-ended questions for the interview guide. Where they based on relevant literature, theoretical concepts, pilot studies and/or other considerations? You have a statement on 'data saturation' and the fact that 'no new themes or codes could be identified'. What is the difference? PPI On p 8, line 35 you mention 'study participants'. I'm not sure who they are? Data analysis I find your description to superficial. You must open up the black box of analysis as fare as possible, e.g. by use of a flow chart of the

	coding/analysis process. Results Where some of the focus groups in fact dyadic interviews with only two participants? Please explain in further details. Be careful with the proof reading. I think the last of the three quote on page 12 relates stronger to Theme 2. Discussion You touch upon some very interesting issues concerning lack of emotional support, and reservation on the feeling of being watched by HCP or family. I would have liked to see much more in-depth discussion on these issues with a stronger connection to what is already known and some elaboration on e-literacy. Consider also to include some literature-based appetizers to these findings and discussions in the introduction section. Box 1 Needs careful proof reading (present and past tense)

VERSION 1 – AUTHOR RESPONSE

Reviewer #1 had 13 comments

Comment #1. The manuscript aims to explore the experiences of persons with type 2 diabetes mellitus with the use of telemedicine in order to manage their condition. This is a really interesting and important paper about what is relevant for persons who are using telemedicine to manage their diabetes.

We thank the reviewer for the encouragement.

Comment #2. Can more strengths or limitations be added to the 'Strengths and Limitations' section (page 4)? There are more limitations that are described in the discussion section. As a reminder, this section should contain up to five short bullet points, no longer than one sentence each, that relate specifically to the methods or design of the study reported.
We agree. We have revised the statements on strengths and limitations of this study as follows:

- Article followed the Standards for reporting qualitative Research (SRQR) recommendations on reporting
- Focus group discussion allowed the exchange of opinions about telemedicine, leading to richer information
- View and experiences of using telemedicine from patients were captured rather than that of healthcare providers
- The study was conducted in an urban setting in Malaysia and its applicability and transferability to other population remains unknown

Comment #3. Can you please improve your description of the study's settings? Consider adding recruitment to the heading. When did the study took place? In the participants and procedure section you describe: "Participants for this qualitative study were patients who received care in one of the eleven clinics which provided diabetes care." Are these the clinics drawn from the nationally representative list of clinics in Klang Valley? This information is not clear at the moment.

We agree. We have edited and revised our description of methodology. The revised section reads as follows:

Study design

The present qualitative study was part of a larger multi-centre cluster randomized controlled study, IDEAS conducted between April 2015 to June 2017 which aimed to examine the impact of a telemedicine program for people with type 2 diabetes (Box 1).24 This nested study design allowed the investigators to explore the facilitators and barriers to using telemedicine, as well as participants' view if telemedicine was implemented in routine practice.

Participants
Participants were recruited from eleven primary care clinics located within the Klang Valley, which is part of the Ministry of Health Malaysia's primary care clinic network. These clinics serves the districts of Klang and Petaling, which provides care for approximately 2.56 million individuals and can be considered to be nationally representative of primary care clinics in Malaysia.

On completion of the IDEAS trial, participants from the trial were invited to participate in the current qualitative study. All potentially eligible participants were contacted by telephone and invited to participate in the qualitative study. Participants were briefed regarding the purpose, procedure and nature of the study and allowed to clarify their doubts. A separate information sheet and written informed consent were obtained prior to participation. All focus groups interviews were conducted at the respective health clinic, when participants visited the clinics for their follow-up sessions with their physicians to accommodate participants' schedule. In the event that a participant was not able to attend a focus group session, an individual in-depth interview was conducted at their own home. Study participants were incentivized with a RM50 (approximately USD$12) voucher for their participation.

Interview schedule

A semi-structured interview was used in all the focus groups, which was based on an interview guide. Table 1 outlines the topic areas and key questions which were used during the discussions. The topic guide aimed to capture the experiences of patients in using telemedicine and was developed based on relevant literature.

The interviews were conducted either in the Malay or English language, which was facilitated by the first author (JYL). The interviews usually lasted between 35 - 44 minutes in an undisturbed room in the clinic. All interview sessions were digitally recorded, transcribed verbatim immediately after the interview and checked for accuracy by SWHL. Interviews were conducted to explore for emerging themes with simultaneous analysis of data until data saturation was achieved, when no new themes or codes were identified.

Comment #4. Materials and methods. Participants and procedure: Did you develop a protocol in advance? Did you use this protocol in each focus group? Is this protocol or is the interview guide available as supplementary material? Please revise the following sentence in your manuscript:" A set of open-ended questions was employed as the interview guide to capture the experiences of patients in using telemedicine". How many researchers were present during the interviews? Please elaborate on the participants and procedure section in more detail. In particular on the procedure applied as this information is almost completely missing at present.

We thank the reviewer for the suggestion. We have revised the methodology section and added additional details on the participants' recruitment, as well as procedure.

Participants

Participants were recruited from eleven primary care clinics located within the Klang Valley, which is part of the Ministry of Health Malaysia's primary care clinic network. These clinics serves the districts of Klang and Petaling, which provides care for approximately 2.56 million individuals and can be considered to be nationally representative of primary care clinics in Malaysia.

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Comment #5. You described that:"Interviews continued until the researcher, in discussion with the wider research team considered data saturation or no new themes or codes could be identified." Did this happen during the focus group? Please explain.
We agree this was unclear in our initial submission. We have added additional details under interview schedule as follows:

The interviews were conducted either in the Malay or English language, which was facilitated by the first author (JYL). The interviews usually lasted between 35 - 44 minutes in an undisturbed room in the clinic. All interview sessions were digitally recorded, transcribed verbatim immediately after the interview and checked for accuracy by SWHL. Interviews were conducted to explore for emerging themes with simultaneous analysis of data until data saturation was achieved, when no new themes or codes were identified.

We also added additional details regarding data analysis as follows:
All transcripts were read several times to familiarize with the data. Transcripts were translated from Malay language to English by an independent research assistant. The translated English transcripts were double checked by one of the authors (JYL) and any discrepancies were resolved via discussion with another of the authors (SWHL). The data were subsequently coded, based upon keywords or phrases that appeared to convey an opinion or perception regarding telemedicine. These initial codes were further examined and refined, with codes combined to be main themes if they had similar

contexts or split into subthemes. The final codes were summarized, cross checked and iteratively refined using paired analysis of transcripts by two researchers (JYL and SWHL). In the event that there was a divergent interpretation, the transcripts were reviewed again and discussed until consensus was achieved.

Comment #6. Information on the length of use of telemedicine per patient is missing.
We did not collect the information on the length of use of telemedicine per patient. However, all patients were provided with the same web-enabled glucometer for the duration of study, which would be between 1 to 3 years.

Comment #7. Data analysis: More information is needed in the analysis section. It is unclear to me how exactly the 'inductive' analysis was conducted.
We agree. We have revised our data analysis section to include additional details as follows:
Data analysis
The NVivo software version 11 (QSR International Pty Ltd) was used to organized and code the data for thematic analysis.25 All transcripts were read several times to familiarize with the data. Transcripts were translated from Malay language to English by an independent research assistant. The translated English transcripts were double checked by one of the authors (JYL) and any discrepancies were resolved via discussion with another of the authors (SWHL). The data were subsequently coded, based upon keywords or phrases that appeared to convey an opinion or perception regarding telemedicine. These initial codes were further examined and refined, with codes combined to be main themes if they had similar contexts or split into subthemes. The final codes were summarized, cross checked and iteratively refined using paired analysis of transcripts by two researchers (JYL and SWHL). In the event that there was a divergent interpretation, the transcripts were reviewed again and discussed until consensus was achieved.

Comment #8. In the results section you describe that the 12 focus groups had 3-4 participants per group on average. What was your initial aim? How many participants did you aim to recruit per group? Any aims regarding age or mix of gender?

Our aim was to recruit up to 15 focus groups with 4 participants in each group. We believe that this would have provided us with sufficient information and data saturation. We had also deliberately attempted to recruit individuals of different age groups and gender to ensure the views are properly represented.

Comment #9. You state that four core themes emerged from our interviews:(..). Does this mean that the themes only emerged from the 2 interviews and not from the focus group sessions at all? PIease revise this sentence in order to be more precise.

We agree. We have revised the sentence to denote that these themes were derived from the focus groups and in-depth interviews. The revised text can be found as follows:

Four core themes emerged from the focus groups and the two in-depth interviews

Comment #10. The translation of your quotes is deficient. For instance the following:"I manually record. I do not understand telephone especially opening. To me manual is easier." The second sentence does not make sense. Please check all quotes used in the results section, review translation and revise them where it is required.

We agree. We have revised and edited our quotes throughout the whole manuscript. For example, we have edited the quote as follows:

I [prefer to] manually record [my blood glucose readings]. I do not understand [how to operate the mobile] telephone especially opening [the software]. To me manual [recording] is easier. [Patient 4, 59/F].

Comment #11. Discussion: Unfortunately the discussion primarily iterates the results section, the interpretation of the findings is missing.
We agree. We have revised and added additional details to the discussion as suggested by the reviewer.

Comment #12. Limitations of the study: The authors talk about generalizability but this is not appropriate language for a qualitative study. The term transferability should be used instead and the extent to which their data are transferable to other populations with type 2 diabetes.

We thank the reviewer for the suggestion. We have revised the sentence as follows:

While published literature suggest that these trends are likely to be transferable to other regions in Malaysia, the context may differ in other countries and settings.

Comment #13. I recommend a language check by a native English speaker as the standard of written English is particially insufficient.

We have requested authors who are native English speakers to revise and improve the quality of English for the whole manuscript.

Reviewer # 2 had 4 comments

Comment #1. In the introduction, please make it clear what type of studies have been done to draw these baseline conclusions (i.e. Telemedicine produces accurate and reliable data, empowers patients, improves glycemic control)

We thank the reviewer for pointing this out. We have referenced these statements in our revised submission.

Comment #2 -How were transcripts translated to english? please describe. As appropriate please correct translations

We agree this was unclear. We have revised the manuscript and added details of the translation as follows:

Transcripts were translated from Malay language to English by an independent research assistant. The translated English transcripts were double checked by one of the authors (JYL) and any discrepancies were resolved via discussion with another of the authors (SWHL).

Comment #3. Themes need clearer names that more directly reflect content. e.g. "My family and my life" could be "sharing health data" or "accountability and privacy". There is a lot of overlap between themes. I think you need to organize them more clearly. for example, ""It's time saving" could be titled "Convenience" and could also add in the portion from theme 4 that discusses internet connections. I think it would be more coherent than including this latter part with data security. Other themes also need to be cleaned up/clarified.

We agree. We have renamed the themes to better reflect these results as suggested by the reviewer. We have also moved the content from different themes as suggested by the reviewer. The revised results read as follows:

Four core themes emerged from the focus groups and the two in-depth interviews: (1) Generational difference (2) Independence and convenience, (3) Sharing health data and privacy; and (4) Concerns and challenges

In addition, theme 3 has been revised to read as follows:

Theme 3 – Sharing health data and privacy
Our analysis showed that there was some conflicting perspective with data sharing. Several participants expressed that they were willing to share their monitoring results with family members, as they felt that the family member would make them accountable for their diabetes management, which was a significant motivation for them to meet their daily goals.

The use of this what you call it (web-telemonitor)…… my health is good especially when family members want to monitor your sugar control can monitor as well. [Patient 11, 54/F]

The good part (of telemedicine is) you can do it at home. If (you check your blood glucose levels) at the clinic you get pricked (but) nobody knows (the results)… but when you do it at home you children will be informed as well. [Patient 5, 57/F]

Conversely, some participants expressed concern that the sharing of medical information with their family members might infringe on their personal space and could potentially cause conflicts between family members.

That thing is okay but what I am afraid of is (that the use of telemonitoring may) sometimes (cause) conflicts because it feels like you are being monitored by others. But it is beneficial, at least there is somebody remind you. [Patient 1, 45/M]

Participants expressed concern they had about the presence of malware in telemonitoring devices that could compromise their personal information.

(What happens when we have a) problem with the Internet (connection). Occasionally we (may) receive the reading, but occasionally (we will be) unable to (do so). (This can be) very inconvenient. [Patient 11, 54/F].

Some participants felt that meeting or contacting their health care providers was a simpler and faster way to solve their queries as the health care practitioners would be able to explain their clinical measures in a more concise manner. As explained by one participant “Face-to face (consultation) is more important (as) its better. (With) face-to face (consultation), information is clearer and more satisfying to me. [Patient 2, 67F].”

Comment #4. Needs signifiant revision of english throughout and particularly in conclusions section. I would like to reread this section once the language is revised, as it is currently hard to follow.

We have requested authors who are native English speakers to revise and improve the quality of English for the whole manuscript.

Reviewer #3 had 12 comments

Comment #1. Overall, this paper is a straightforward qualitative investigation on the perspectives of patients who used a mobile phone to transmit measurements of their blood glucose. There is some concern over whether certain citations adequately support some statements, and the grammar in the paper is not yet to a standard of written English (e.g. pluralisation such as “an in-depth interviews” and “was some conflicting perspective” – quite a few more of these instances), however, the authors were able to gather useful information from the perspective of a middle income country on patient barriers to telemedicine worth sharing.
We agree. We have revised the introduction to provide additional supporting references as suggested by reviewer #2.

Comment #2. Abstract: Good summary of the study. I would argue that the acceptability of telemedicine among patients is not necessarily poorly understood as there has been systematic reviews published on the subject. Perhaps change to specifically in the low- and middle-income country context as you mention later in the paper?

Thank you very much for the suggestion. We have revised the statement, under abstract, objective to read as follows:
Telemedicine has been promoted as an economical and effective way to enhance patient care but its acceptability among patients in low and middle income countries are still poorly understood. This study aimed to explore the experiences and perspective of people with type 2 diabetes mellitus patients who use telemedicine to manage their condition

Comment #3. Introduction: Overall good background on the topic, however concern over one statement made which is mentioned below. Also the Introduction may benefit from finding a time to introduce the term “telemonitoring” into the end of the second paragraph and how it applies or does not apply in this context. In particular, how did you arrive at 425 million in 2017 from the source? Could not find this statistic in Ogurtsova et al.

I agree. This was unclear. The figure was obtained from the IDF atlas in 2017. To avoid any confusion, we have revised the figure and updated it from a single source as suggested. The revised statement reads as follows:

Diabetes is a major health concern worldwide, and according to a recent report by the International Diabetes Federation, the global prevalence of diabetes will increased from 415 million in 2015 to 642 million in 2040.

Comment #4. In Page 5 Lines 44-46. The sentence is confusing. Please consider re-writing for clarity.

We agree. We have revised the sentence to clarify this point. The revised sentence reads as follows:

Studies have shown that the use of enhanced SMBG (where there are high levels of engagement between patients and clinicians to interpret the SMBG values) resulted in larger HbA1c reduction compared to regular SMBG.

Comment #5. Page 6 Line 28/29: I do not think you adequately show evidence to support the statement that patients are especially resistant to change in terms of telemedicine. Could you please clarify where in Reference #15 it supports that there is heavy resistance to change as cited? From first glance it states 98% patient satisfaction and the discussion does not focus on resistance.

Consider rewording to “there are some examples of patient resistance to change” and provide additional appropriate citations for this.
We agree that the reference may not be the most appropriate to articulate this point. We have revised and used a systematic review as suggested by the reviewer which describes the literature better and more thoroughly. The new reference is as follows:
Scott Kruse, C., Karem, P., Shifflett, K., Vegi, L., Ravi, K., & Brooks, M. (2016). Evaluating barriers to adopting telemedicine worldwide: A systematic review. Journal of telemedicine and telecare, 24(1), 4–12. doi:10.1177/1357633X16674087

We have also revised the statement as follows:

Studies have shown that while telemedicine can expand the boundaries of care to a larger population and offer person-centred care, there are, however, examples of patient resistance to change.

Comment #6 Methods: The methods are clearly stated and transparent. Overall well-written, however missing a bit more detail on the interview guide. Consider including as an Appendix or providing sample questions asked. The COREQ Checklist is a good guide to use for reporting qualitative research methods.
We thank the reviewer for the suggestion. We have added additional details in the methods, and also included a completed SRQR checklist as suggested by the reviewer. We have also cross-checked with the COREQ checklist to ensure we have included all the recommended details for reporting qualitative research methods.

Comment #7. Page 8 Line 35: It was said patients could not be given results but with written consent and if patients were contacted by telephone to be recruited they could have had the option to receive results. Perhaps amend to say they were not provided with the results but informed the result would be published, or something similar.

We agree this was unclear. We have revised the sentence to read as follows:

The current study was designed to understand the patients’ views, perception and experience of using telemedicine for type 2 diabetes management. Patients were not involved in the initial design of the study, development of interview questions or conduct of study. All participants who participated in this qualitative study were not provided with the results but were informed that the results will be published in a peer-review journal.

Comment #8. Results: Overall no major issues with the Results. Clearly organised into themes. Example quotations provided for each theme. However, only up to Patient 14 mentioned but 48 patients participated. Did you relabel each participant in the order that quotations are provided? Would suggest keeping original participant numbers e.g. if quotes are from Participant 3, 9, 21, 33, 34, 42 etc. list it as such.

Thank you for the comment. We have only picked out relevant quotes which were clearly illustrative of each theme only and participants were numbered according to the sequence when the focus group or interviews were conducted.

Comment #9. Page 11 Line 40: Label which participant said this quote.
We thank the reviewer for pointing this out. We have labelled which participant which mentioned this quote. The revised sentence reads as follows:

As one explained it, “Maybe for the young ones (lah). Technology (is) for youngsters (and) is more suitable since they like to sit at home and like the thing called Internet. [Patient 41, 67/M]”

Comment #10. Discussion: Concise but effective Discussion section. No suggested changes except for the “Implications for practice” ending – final sentence is a far-reaching recommendation. How does this tie in to the Results or another part of the Discussion?

We agree that this may have been overambitious. We have revised and deleted the sentence. We have also added additional details to our discussion and edited the implication for practice section to read as follows:

The continual improvements in technology will facilitate the use of telemedicine in future. The largest implication will be its ability to reduce logistical barriers and time saving potential. However, it is important that any telemedicine programs consider the economic standing of patients, especially those living in rural areas, who may have limited internet connectivity. As such, health care professionals and policy makers need to take into consideration these aspects prior to introducing any telemedicine technology for their patients to ensure that patients’ expectations are met. Another theme that emerged from this interview was the need to invest in capacity building especially in human resources. Specifically, the creation of training programs for both public as well as health workers are particularly important, especially among the non-IT savvy groups.

Comment #11. References: Some concern over whether the appropriate references were selected as evidence of statements made. See Introduction reviewer comments 1 and 3.
We agree. We have revised these references and added additional references as suggested by both reviewers

Comment #12. Box 1: Useful addition, however, recommend editing to make it consistently written in the past tense and proofreading to correct grammar errors.

We have revised the information on box 1 as suggested. The revised information reads as follows:

The Intervention for Diabetes with Education, Advancement and Support (IDEAS) study is a cluster randomized controlled study to evaluate the use of telemedicine to improve diabetes care. Participants in the telemedicine group were instructed to measure their blood glucose at least twice weekly (one fasting and one non-fasting) or more frequent as recommended by physician. These blood glucose readings will be transmitted via a Bluetooth technology to the participants’ mobile phone to a remote secure server. Participants and their physicians were able to access the records on the server. Advice on lifestyle modification, any potential changes in medication, who and how to contact their healthcare providers were also given monthly during the study. A researcher also checked participants’ results weekly and initiate intervention if needed (e.g. medication changes, counselling) with the consent of the attending physician.

Reviewer # 4 had 15 comments.

Comment #1. The grammar throughout needs to be improved - eg. We conducted indepth interviews and focus groups, rather than "an indepth interview and focus group"

We have requested authors who are native English speakers to revise and improve the quality of English for the whole manuscript.

Comment # 2. I am not sure your themes reflect your findings and you do not include any subthemes? What framework was used for analysis - apart from a thematic approach?

In our study, we only used a thematic approach in our analysis.

Comment #3. The themes presented in abstract do not lead to the conclusions made.

We agree. We have revised our results in the abstract as follows:

Results: Twelve focus groups and two in-depth interviews with 48 adults were conducted and four themes emerged from the analysis. (1) Generational difference (2) Independence and convenience, (3) Sharing health data and privacy; and (4) Concerns and challenges. The main barriers to using telemedicine were related to the user friendliness of the devices as well as internet connectivity. Cost was also another significant concern raised by participants. However, participants generally were positive about the benefits of telemedicine, including reduction in clinic visits, ability to provide real time data and disease monitoring.

Comment #4. Sentence page 5 line 12-18 needs a reference

We thank the reviewer for pointing this out. We have added the reference to support the statement. The data was obtained from the 2017 IDF Diabetes Atlas. The new reference added is as follows:

- International Diabetes Federation. IDF Diabetes Atlas. 8th ed. Brussels, Belgium: International Diabetes Federation 2017.

Comment #5. First sentence Paragraph 2 page 5 needs referencing

We thank the reviewer for pointing this out. We have added the following references to support the statement:

- Zhu H, Zhu Y, Leung S-w. Is self-monitoring of blood glucose effective in improving glycaemic control in type 2 diabetes without insulin treatment: a meta-analysis of randomised controlled trials. BMJ Open 2016;6(9):e010524. doi: 10.1136/bmjopen-2015-010524
- Cox DJ, Gonder-Frederick L, Ritterband L, et al. Prediction of Severe Hypoglycemia. Diabetes Care 2007;30(6):1370. doi: 10.2337/dc06-1386
- Malanda UL, Bot SD, Nijpels G. Self-Monitoring of Blood Glucose in Noninsulin-Using Type 2 Diabetic Patients. Diabetes Care 2013;36(1):176. doi: 10.2337/dc12-0831

Comment #6. More background information about the specific form of telemedicine used is required. We agree this was unclear. We have added additional information on the various forms of telemedicine as suggested by the reviewer. The revised introduction, paragraph 3 reads as follows:

The application of telemedicine, or technology to deliver various aspects of health information, prevention, monitoring and medical care in diabetes management has been suggested as an innovative solution to improve diabetes care. Increasingly, telemedicine is being viewed as a promising technology in assisting patients to manage their diabetes, as it produces accurate and reliable data, empowers patients, improves glycaemic control and influences their attitude and behaviours, potentially leading to a better quality of life. Additionally, telemedicine has the potential to reduce the barrier to adherence of self-management through real-time data transfer between patient and provider, the review of blood glucose measurement trends, and a reduction in opportunity costs. These telemedicine services can be categorized to either synchronous (real-time), asynchronous (whereby data is stored and forwarded subsequently) and continuous (remote monitoring). In diabetes care, all forms of telemedicine services have been examined and include using mobile phones, texting, emails, e-health portals, videoconferencing as well as devices.

Comment #7. Page 6 last paragraph - there is also a lot of data that supports telemedicine in a variety of forms from the patient's perspective in diabetes and other chronic conditions that would provide a counter argument to this discussion point.
We agree. We have edited this based upon the comments from reviewer #2 and #3 to clarify that there is limited information from a low-middle income country. The revised abstract, under introduction reads as follows:

Telemedicine has been promoted as an economical and effective way to enhance patient care but its acceptability among patients in low and middle income countries are still poorly understood. This study aimed to explore the experiences and perspective of people with type 2 diabetes mellitus patients who use telemedicine to manage their condition.

Similarly, we have also edited last paragraph of the introduction, to read as follows:

Nevertheless, one of the major limitation of existing literature is the lack of studies which has examined the perspective of patients from a low-middle income country, where telemedicine is now increasingly being used.

Comment #8. No interview guide was included? Were focus group interviews the same as the individual interview questions?

We agree. We have edited and revised the methodology in the revised manuscript. We have added the interview guide as Table 1. The same questions were used in both focus groups and individual interviews.

Comment #9. Why were only two interviews face to face? What was rationale for small numbers in focus groups? Limitations of each of these methods?
As described in our methodology, all participants were invited to participate in the focus group discussion during the clinic follow up to minimize any inconvenience to the participants. However, if participants were not able to attend the focus group and would like to participate, we conducted a face-to face interview at the participants home instead. This point is clarified in the revised method, under participants, paragraph 2 as follows:

All potentially eligible participants were contacted by telephone and invited to participate in the qualitative study. Participants were briefed regarding the purpose, procedure and nature of the study and allowed to clarify their doubts. A separate information sheet and written informed consent were obtained prior to participation. All focus groups interviews were conducted at the respective health clinic, when participants visited the clinics for their follow-up sessions with their physicians to accommodate participants' schedule. In the event that a participant was not able to attend a focus group session, an individual in-depth interview was conducted at their own home. Study participants were incentivized with a RM50 (approximately USD$12) voucher for their participation.

Comment #10. The authors need to consider the COREQ criteria and elaborate on these, a COREQ checklist should also be included.

We thank the reviewer for the suggestion. We have included the checklist as an appendix.

Comment #11. Results: I dont think your themes represent your quotes and the results needs more analysis and rewording of themes and subthemes to do justice to quotes. There is some overlap currently between themes and I believe reworking these will help to clarify results in more detail. In

Studies have shown that while telemedicine can expand the boundaries of care to a larger population and offer person-centred care, but there are examples of patient resistance to change. and 2 The quotes reflect - less exposure preference for manual documentation in older adults - the need for more support for older patients - valuing face to face interactions and support from clinical staff - value of storing information, - accessibility of results, - convenience of telemedicine (reducing travel and clinic appointments) –
We thank the reviewer for the suggestion. We have revised both themes as suggested by the reviewers as follows:

Theme 1 – Generational differences
We noted that there were generational differences with regards to their preference on how to record their blood glucose reading. In general, older participants (those aged 50 years and above) preferred to record their glucose readings manually, using pen and paper. They found that using a telemonitoring device required a lot of technical know-how and this was a challenging and complex process. As explained by the participants:

I (prefer to) manually record (my blood glucose readings). I do not understand (how to operate the mobile) telephone especially opening (the software). To me manual (recording) is easier. [Patient 4, 59/F].

But I am an old person (and so) I like it (blood glucose results) to be written. I'm old (and) I need to write (the results) down. Anyway as long as someone shows me how to do it I can do it. Of course (using telemedicine) is easier because you bring your hand phone everywhere you go. [Patient 5, 57/F]

These participants felt that the use of telemedicine was more suitable for younger people with diabetes who were more technology savvy. As explained by one participant, “Maybe for the young ones (lah). Technology (is) for youngsters (and) is more suitable since they like to sit at home and like the thing called Internet. [Patient 41, 67/M]” Some participants also expressed their preference to meet their health care providers in person and reported that travelling to the clinic was not an onerous task.

I don't mind coming to the clinic and have a chat with the doctor. We (can) discuss (my medical condition) and sometimes we can ask questions and doctors can show (my problem to me) physically. For me to use the Internet is difficult to learn (as) my children are not here. [Patient 6, 60/M].

Conversely, younger participants were more inclined to learn and use new technologies if sufficient training and guidance were given. Additionally, they were optimistic about using telemedicine to manage their conditions, as they knew the various benefits that technology would provide, including data tracking ability and convenience.

Theme 2 – Independence and convenience
Participants expressed that the use of a mobile phone which is connected to a glucometer is a convenient alternative for the management of diabetes. Participants viewed that it is a more convenient option in the event of time constraints and a lack of transportation to the clinic. Participants also revealed that having a telemonitoring device encouraged them to monitor their glucose levels regularly compared to the quarterly check-ups at the clinic. As expressed by one participant “It’s good to use especially over the Internet. It’s so much easier we do not have to come to the clinic and can stay at home (Patient 12, 60/M)”.

Digitals way [is the preferred choice]. Everyday you can see [your blood glucose results, so] in the software so no need to record like manual. Sometime even you record manual the paper will go wherever [or] missing. [Using] digital you have a backup. [Patient 8, 35/F]

I like this because you can transfer [your blood glucose results] directly to your phone. It's useful to me as an indication. I prefer [using technology so] that I can use it to check how my medicine affects my glucose. I think that this is the best tools because you can monitor by the Internet everywhere you go. [Patient 9, 44/M]

It's even more convenient since we do not have the time to come [to the clinic] and sometimes some people do not have transport. [Patient 10, 44/F]

Most participants were generally enthusiastic as they saw the potential benefits of telemedicine. Participants described how the use of a web-based glucometer was useful as it could provide them with reminders and alerts as well as the ability to connect with their healthcare providers without going to the clinic. Nevertheless, they expressed the desire and need to have more training and assistance, especially when they had not used the device for some time, since they would have forgotten how it functions and to use.

For me it's not difficult … just need to teach [me] that's all. See the learning condition first [and perhaps I need more training] maybe need two or three times. I'm over fifty [years old] so [the] first time will be a problem ……need to teach a few times before I understand. First time might be difficult to understand. [Patient 7, 56/M]

Comment #12. Theme 4 - reliability of telemedicine and internet, connectivity issues particularly for rural patients, concerns of reliability of technology, concern for costs valuing face to face contact
We thank the reviewer for the suggestion. We have revised our theme and renamed it as concerns and challenges to better reflect this point. The revised paragraph reads as follows:

Theme 4 – Concerns and challenges

Participants in this study emphasized the importance of having a user-friendly technology. Most participants in this study reported minor technical difficulties especially with internet connectivity and availability especially in rural areas, which limited their ability to utilize the telemonitoring device effectively. Participants also expressed concerns regarding the stability of Internet connection at their homes.

I think depend on the situation.. whether you live in a village where it will be very difficult….. because [in] certain villages you don't have (Internet) line so you still need have [to record the blood glucose results] manually. [Patient 8, 35/F]

Participants suggested the need to have a robust system which is user-friendly, has good technical support which they felt was essential to ensure that the implementation of telemedicine was successful.

"Okay (lah) but what happens when there is a virus? It is a problem for one week my handphone "hang". After one week it hang [again]….that is a problem" (Patient 13, 54/F).

Another aspect which participants were worried of was the costs involved compared to conventional care and that telemonitoring would only be suitable for affluent patients.

All this (telemedicine) is for people who are wealthy. Of course this is a good system. [Patient 14, 63/M]

Comment #13. Discussion - Page 17 first sentence these seem to be the results ffrom your study but have referenced systematic review?, also same with last sentence in this paragraph - where you are discussing results from this study but reference a different study?
We agree. We have deleted these references as suggested.

Comment #14. Throughout the discussion there are some new results - there should not be new information introduced in the discussion, this needs to be moved to results section and themed.

We thank the reviewer for the suggestion. We have edited the discussion, and included these in the results, as suggested, into the themes identified.

Comment #15. Sample size in discussion needs reframing to align to qualitative methodology.

We take note of the suggestion. We have revised the limitation of this study and revised the statement to state the following:

Finally, our results cannot draw definitive conclusion regarding differences in provider practices, patient knowledge as well as attitudes from different clinic sites other than those examined in this study.

Reviewer# 5 had 8 comments.

Comment #1. In the abstract, results are twisted compared to the subheadings in the main text. I would prefer them to be identical. There are some spelling mistakes, e.g. 'data were' and 'an in-depth interviews'. Second bullet is unclear - insert 'as these 'perspectives''.

We agree. We have revised the abstract as suggested. We have also requested for our colleagues and authors who are native English speakers to edit the manuscript. The revised abstract under results reads as follows:

Results: Twelve focus groups and two in-depth interviews with 48 adults were conducted and four themes emerged from the analysis. (1) Generational difference (2) Independence and convenience, (3) Sharing health data and privacy; and (4) Concerns and challenges. The main barriers to using telemedicine were related to the user friendliness of the devices as well as internet connectivity. Cost was also another significant concern raised by participants. However, participants generally were positive about the benefits of telemedicine, including reduction in clinic visits, ability to provide real time data and disease monitoring.

Comment #2. You set the scene alright but need to do some rewriting to establish an interesting and relevant focus. You state that the existing literature on telemedicine lacks the examination of patients from a low-middle income country. I believe this is true, but why is it important to gain exactly this knowledge? I would have liked to see the argument and maybe some hypotheses of what you would expect to find different in comparison to the studies already published on telemedicine. You might benefit from digging into the literature on e-literacy. Again there are spelling mistakes.

We thank the reviewer for the comment. We have revised the last paragraph of the introduction and included additional references as follows:
However, implementation of a telemedicine service in conventional care is a complex process. Studies have shown that while telemedicine can expand the boundaries of care to a larger population and offer person-centred care, but there are examples of patient resistance to change. Nevertheless, one of the major limitation of existing literature is the lack of studies which has examined the perspective of patients from a low-middle income country, where telemedicine is now increasingly being used. Therefore, the goal of this study was to explore patients' views and experiences of telemedicine for diabetes management in Malaysia.

Comment #3. Include RCT when referring to 'the study' on p 7, line 18. Explain how you determined the set of open-ended questions for the interview guide. Where they based on relevant literature, theoretical concepts, pilot studies and/or other considerations? You have a statement on 'data saturation' and the fact that 'no new themes or codes could be identified'. What is the difference?

We agree these were unclear in the initial submission. We have revised the methods section as suggested by the reviewers to incorporate these changes as follows:

The present qualitative study was part of a larger multi-centre cluster randomized controlled study, IDEAS conducted between April 2015 to June 2017 which aimed to examine the impact of a telemedicine program for people with type 2 diabetes (Box 1). This nested study design allowed the investigators to explore the facilitators and barriers to using telemedicine, as well as participants' view if telemedicine was implemented in routine practice.

Participants
Participants were recruited from eleven primary care clinics located within the Klang Valley, which is part of the Ministry of Health Malaysia's primary care clinic network. These clinics serves the districts of Klang and Petaling, which provides care for approximately 2.56 million individuals and can be considered to be nationally representative of primary care clinics in Malaysia.

On completion of the IDEAS trial, participants from the trial were invited to participate in the current qualitative study. All potentially eligible participants were contacted by telephone and invited to participate in the qualitative study. Participants were briefed regarding the purpose, procedure and nature of the study and allowed to clarify their doubts. A separate information sheet and written informed consent were obtained prior to participation. All focus groups interviews were conducted at the respective health clinic, when participants visited the clinics for their follow-up sessions with their physicians to accommodate participants' schedule. In the event that a participant was not able to attend a focus group session, an individual in-depth interview was conducted at their own home. Study participants were incentivized with a RM50 (approximately USD$12) voucher for their participation.

Interview schedule

A semi-structured interview was used in all the focus groups, which was based on an interview guide. Table 1 outlines the topic areas and key questions which were used during the discussions. The topic guide aimed to capture the experiences of patients in using telemedicine and was developed based on relevant literature.

The interviews were conducted either in the Malay or English language, which was facilitated by the first author (JYL). The interviews usually lasted between 35 - 44 min in an undisturbed room in the

clinic. All interview sessions were digitally recorded, transcribed verbatim immediately after the interview and checked for accuracy by SWHL. Interviews were conducted to explore for emerging themes with simultaneous analysis of data until data saturation was achieved, when no new themes or codes were identified.

Data analysis
The NVivo software version 11 (QSR International Pty Ltd) was used to organized and code the data for thematic analysis.25 All transcripts were read several times to familiarize with the data. Transcripts were translated from Malay language to English by an independent research assistant. The translated English transcripts were double checked by one of the authors (JYL) and any discrepancies were resolved via discussion with another of the authors (SWHL). The data were subsequently coded, based upon keywords or phrases that appeared to convey an opinion or perception regarding telemedicine. These initial codes were further examined and refined, with codes combined to be main themes if they had similar contexts or split into subthemes. The final codes were summarized, cross checked and iteratively refined using paired analysis of transcripts by two researchers (JYL and SWHL). In the event that there was a divergent interpretation, the transcripts were reviewed again and discussed until consensus was achieved.

Comment #4. On p 8, line 35 you mention 'study participants'. I'm not sure who they are?

We agree this was unclear in our initial submission. We have revised the statement to read as follows:

Patient and public involvement
The current study was designed to understand the patients' views, perception and experience of using telemedicine for type 2 diabetes management. Patients were not involved in the initial design of the study, development of interview questions or conduct of study. All participants who participated in this qualitative study were not provided with the results but were informed that the results will be published in a peer-review journal

Comment #5. Data analysis. I find your description to superficial. You must open up the black box of analysis as fare as possible, e.g. by use of a flow chart of the coding/analysis process.

We agree. We have revised the methods, under data analysis to state the following:

Data analysis
The NVivo software version 11 (QSR International Pty Ltd) was used to organized and code the data for thematic analysis.25 All transcripts were read several times to familiarize with the data. Transcripts were translated from Malay language to English by an independent research assistant. The translated English transcripts were double checked by one of the authors (JYL) and any discrepancies were resolved via discussion with another of the authors (SWHL). The data were subsequently coded, based upon keywords or phrases that appeared to convey an opinion or perception regarding telemedicine. These initial codes were further examined and refined, with codes combined to be main themes if they had similar contexts or split into subthemes. The final codes were summarized, cross checked and iteratively refined using paired analysis of transcripts by two researchers (JYL and SWHL). In the event that there was a divergent interpretation, the transcripts were reviewed again and discussed until consensus was achieved.

Comment #6. Results Where some of the focus groups in fact dyadic interviews with only two participants? Please explain in further details. Be careful with the proof reading. I think the last of the three quote on page 12 relates stronger to Theme 2.

We thank the reviewer for the suggestion. We have edited and moved these 3 quotes to Theme 2 as suggested by the reviewer. The revised results for theme 2 reads as follows:

Theme 2 – Independence and convenience
Participants expressed that the use of a mobile phone which is connected to a glucometer is a convenient alternative for the management of diabetes. Participants viewed that it is a more convenient option in the event of time constraints and a lack of transportation to the clinic. Participants also revealed that having a telemonitoring device encouraged them to monitor their glucose levels regularly compared to the quarterly check-ups at the clinic. As expressed by one participant "It's good to use especially over the Internet. It's so much easier we do not have to come to the clinic and can stay at home (Patient 12, 60/M)".

Digitals way [is the preferred choice]. Everyday you can see [your blood glucose results, so] in the software so no need to record like manual. Sometime even you record manual the paper will go wherever [or] missing. [Using] digital you have a backup. [Patient 8, 35/F]

I like this because you can transfer [your blood glucose results] directly to your phone. It's useful to me as an indication. I prefer [using technology so] that I can use it to check how my medicine affects my glucose. I think that this is the best tools because you can monitor by the Internet everywhere you go. [Patient 9, 44/M]

It's even more convenient since we do not have the time to come [to the clinic] and sometimes some people do not have transport. [Patient 10, 44/F]

Most participants were generally enthusiastic as they saw the potential benefits of telemedicine. Participants described how the use of a web-based glucometer was useful as it could provide them with reminders and alerts as well as the ability to connect with their healthcare providers without going to the clinic. Nevertheless, they expressed the desire and need to have more training and assistance, especially when they had not used the device for some time, since they would have forgotten how it functions and to use.

For me it's not difficult … just need to teach [me] that's all. See the learning condition first [and perhaps I need more training] maybe need two or three times. I'm over fifty [years old] so [the] first time will be a problem ……need to teach a few times before I understand. First time might be difficult to understand. [Patient 7, 56/M]

Comment #7. Discussion . You touch upon some very interesting issues concerning lack of emotional support, and reservation on the feeling of being watched by HCP or family. I would have liked to see much more in-depth discussion on these issues with a stronger connection to what is already known and some elaboration on e-literacy. Consider also to include some literature-based appetizers to these findings and discussions in the introduction section.

We thank the reviewer for the suggestion. We have revised our discussion as suggested by the reviewer and added some details to the discussion as follows:

Our study also noted that not all participant perceive enhanced SMBG as a positive tool to help achieve good glycaemic control. Some participants in this study expressed reservation on the feedback and monitoring feature, which they felt intruded into their personal space. They also expressed some tension between achieving good glycaemic control and quality of life, especially with the involvement of health care providers and family members whom they felt were acting as a "police". As a results, some of these patients opted not to take part in the randomized controlled trial,

for fear that this could further amplify the tension and strain the relationship, an outcome which they definitely did not want. Findings of this study identified several issues which are salient in the literature. For example, our study like many others noted that patients were acceptable to telemedicine due to its ability to reduce travel time, increase self-awareness and access to care. However, our study also found several additional barriers that have never been reported in literature, such as the tensions between operational practicality versus patient's privacy and health security.

Comment #8. Box 1. Needs careful proof reading (present and past tense)

We agree. We have revised and edited the content in Box 1 as suggested. The revised manuscript reads as follows:

The Intervention for Diabetes with Education, Advancement and Support (IDEAS) study is a cluster randomized controlled study to evaluate the use of telemedicine to improve diabetes care. Participants in the telemedicine group were instructed to measure their blood glucose at least twice weekly (one fasting and one non-fasting) or more frequent as recommended by physician. These blood glucose readings will be transmitted via a Bluetooth technology to the participants' mobile phone to a remote secure server. Participants and their physicians were able to access the records on the server. Advice on lifestyle modification, any potential changes in medication, who and how to contact their healthcare providers were also given monthly during the study. A researcher also checked participants' results weekly and initiate intervention if needed (e.g. medication changes, counselling) with the consent of the attending physician.

VERSION 2 – REVIEW

REVIEWER	Verena Struckmann Technische Universität Berlin, Germany
REVIEW RETURNED	07-May-2019

GENERAL COMMENTS	Dear authors, you have extensively revised your manuscript and it consequerntly improved. However, some minor revisions are still tequired before publication with respect to the following aspects: Introduction:You state that the existing literature on telemedicine lacks the examination of persons from a low-middle income country. This is true, but is the rationale for gaining more knowledge about these countries in particular. Please provide more arguments for your own research and based on existing literature what you expect to find. At the moment the objective of your study is not concretely defined. What specifically do you add with this paper? Methods: Data analysis: The authors state to use a thematic analysis. Information about the analysis is currently not detailed enough. It seems as if the authors have used an inductive approach. Why did they not use a deductive approach? Did the athors not base their analysis as well on existing scientific knowledge about the application of Telemedicine to support care for people with diabetes type 2? Please explain why you have chosen an inductive approach. What framework and or literature was used apart from inductive analysis? Results: The authors describe that the 12 focus groups had 3-4

	participants per group on average. What was your initial aim? How many participants did you aim to recruit per group? Any aims regarding age or mix of gender? Why are the participant numbers in the focus groups so small? Please add this information. References: The references would benefit from adding additional up-to date literature about the topic, as there are more scientific publications available dealing with e.g.mobile phone-based health interventions for non-communicable disease management in other low and middle income countries, e.g. at BMC medicine or BMC Public Health. I recommend a language check by a native English speaker as the standard of written English is still partially insufficient.

REVIEWER	Monica Taylor The University of Queensland, Australia
REVIEW RETURNED	30-Apr-2019

GENERAL COMMENTS	Thank you to the authors for the thoughtful edits and for resubmitting. Some minor revisions before publication are suggested below: Overall - 1. The manuscript could still benefit from another proofread as grammar mistakes are present (e.g. pluralising or lack thereof) and one of the participant quotes is in quotation marks but the rest are not. Methods - 2. "Eligible participants" are referenced but no details on eligibility criteria are provided. Consider including any specific inclusion or exclusion criteria. Discussion- 3. A section was added with phrases such as "...like many other studies..." but then there were no references provided for that sentence. Please add studies you are referencing with those statements. 4. There is still some confusion when reading over what statements are results from your study and which are from the literature. A statement might start with "...our study..." but end with a citation to another research study. Please make your statements clearer as to what your study found and what another study found.

VERSION 2 – AUTHOR RESPONSE

Reviewer #2 had the following comments

Comment #1. You have extensively revised your manuscript and it consequently improved.

We thank the reviewer for the encouragements.

Comment #2. You state that the existing literature on telemedicine lacks the examination of persons from a low-middle income country. This is true, but is the rationale for gaining more knowledge about these countries in particular. Please provide more arguments for your own research and based on existing literature what you expect to find. At the moment the objective of your study is not concretely defined. What specifically do you add with this paper?

We thank the reviewer for the suggestion. We have added our rationale and revised our objective statement as suggested. The revised section of the introduction, paragraph 4 and 5 reads as follows:-

However, implementation of a telemedicine service in conventional care is a complex process. Studies have shown that while telemedicine can expand the boundaries of care to a larger population and offers person-centred care,23 there are examples of patients' resistance to change.24 25 Nevertheless, one of the major limitations of existing literature is the lack of studies which have examined the perspective of patients from a low and middle income country, where telemedicine is now increasingly being used. Earlier work on this topic have mostly focused on the views of physicians and fewer studies have at looked the patient's perspective.26 27 In most of these studies, there was limited understanding on the drivers and barriers that were faced by patients using telemedicine; and have mostly focused on the telemedicine technology as well as utilization rates of telemedicine.28 29 Furthermore, very little is known as to how empirically supported interventions can be transferred or implemented in resource-constraint countries, i.e., in most developing countries. Understanding the behaviors among various levels of stakeholders is an important component of successful implementation research.30

As patients' experience with telemedicine may be one of the reasons that will determine the success or failure of any intervention, we conducted a qualitative study to explore patients' views and experiences of telemedicine for diabetes management in Malaysia. The study focused on the end users' perspective in context which were necessary to ensure the successful delivery and implementation of a telemedicine program for diabetes.

Comment # 3. Methods: Data analysis: The authors state to use a thematic analysis. Information about the analysis is currently not detailed enough. It seems as if the authors have used an inductive approach. Why did they not use a deductive approach? Did the authors not base their analysis as well on existing scientific knowledge about the application of Telemedicine to support care for people with diabetes type 2? Please explain why you have chosen an inductive approach. What framework and or literature was used apart from inductive analysis?

We agree this was unclear. We had used a combination of both inductive and deductive approach in our study. We initially developed a set of categories based upon themes derived from literature. However, as these studies we had identified were from Western settings as well as high income countries, we developed questions which were extremely broad and were not based on any theoretical framework. We have revised this in our methodology under data analysis to further explain our rationale for the methodology. Our revised methods section reads as follows:

Firstly, transcripts were coded into an initial set of themes based on keywords or phrases that appeared to convey an opinion or perception regarding telemedicine guided by themes identified previously from previous literature10 12 25. These initial codes were further examined and refined, with codes combined to be main themes if they had similar contexts or split into subthemes via an inductive process. The final codes were summarized, cross checked and iteratively refined using paired analysis of transcripts by two researchers (JYL and SWHL). In the event that there was a divergent interpretation, the transcripts were reviewed again and discussed until consensus was achieved.

Comment #4. Results: The authors describe that the 12 focus groups had 3-4 participants per group on average. What was your initial aim? How many participants did you aim to recruit per group? Any aims regarding age or mix of gender? Why are the participant numbers in the focus groups so small? Please add this information.

We agree this was unclear. We had adopted a non-probabilistic sampling approach in our study and thus included participants from all the clinics which were randomised to receive intervention. There was no specific aim to recruit a mix of gender or age but we attempted to broadly cover as many spectrum of participants as possible. All focus groups had only 3-4 participants as we felt this was the most optimal number since our previous experience suggested that group size of 5 and above was counterproductive. We have added this information into the methods as suggested. The revised methods reads as follows

In line with the qualitative nature of our study, we adopted a non-probability sampling approach, in which sampling was not guided by the idea of random selection or statistical representativeness. Nevertheless, we aimed to cover as broad a spectrum of participants who had experience using telemedicine, as possible. As such, we invited participants who had completed the IDEAS study to participate in the current qualitative study. Briefly, participants included those who: 1) had been diagnosed with type 2 diabetes for at least 6 months; 2) aged between 18-75 years; 3) had regular access to the internet; 4) had HbA1c levels of between 7.5% and 11.0; and 5) were randomized into the intervention arm of the IDEAS study32.

Comment #5. References: The references would benefit from adding additional up-to date literature about the topic, as there are more scientific publications available dealing with e.g.mobile phone-based health interventions for non-communicable disease management in other low and middle income countries, e.g. at BMC medicine or BMC Public Health.

We agree. We have included additional references as suggested by the reviewer.

Comment #6 I recommend a language check by a native English speaker as the standard of written English is still partially insufficient.

We agree. We have requested that the manuscript be proof-read by all our authors again to ensure that there are no grammatical errors.

We trust that you will find the article acceptable for publication and thank all the reviewers and editor for their suggestions which had vastly improved our manuscript

VERSION 3 – REVIEW

REVIEWER	Verena Struckmann Technical University Berlin, Department of Health Care Management
REVIEW RETURNED	19-Jul-2019

GENERAL COMMENTS	Dear authors, you have again extensively revised your manuscript and it consequerntly improved. However, some minor revisions are still required before publication with respect to the following aspects: - Discussion and in particular language check! Discussion: The part starting with:Our study also noted that not all participant (...)and ending with: an outcome which they definitely did not want. Please explain whether this is in line with other findings or further connect them with what is already known in the literature or critically discuss the findings as you currently just summarise your findings. This is generally problematic in the entire discussion. As stated before already, please include a interpretation of your result

	and not just iterate the results section. Please further discuss, compare and explain your findings further, especially for your context and which factors might influence them. As recommended several times before already, please conduct a language check by a native English speaker as the standard of written English is still partially insufficient, in particular within the newly written and added sections.

REVIEWER	Monica Taylor\ The University of Queensland, Australia
REVIEW RETURNED	27-Jun-2019

GENERAL COMMENTS	Thank you for addressing the comments previously provided by reviewers after the first revision. This manuscript has improved considerably. I still have a few suggestions for minor edits: Results: Perhaps state more clearly why focus groups were limited to 3 people in some cases (was it because they were in line with the physician appointments?) and whether they were mixed by age, gender, etc. or separated in any particular way. Readers will think normally focus groups are with more individuals. Overall: This manuscript would benefit from another thorough proofread. Noun pluralisation errors are still present, e.g. "…not all participant perceive…" and many others. Some grammar issues with possessive words (e.g. "…patients'… ") and tense (e.g. "…NVivo was used to organized and code the data…") also still remain. If those points are addressed, I would support this manuscript being accepted.

VERSION 3 – AUTHOR RESPONSE

Reviewer #1 had the following comments

Comment #1:- Thank you for addressing the comments previously provided by reviewers after the first revision. This manuscript has improved considerably

We thank the reviewer for the encouragement.

Comment #2. Results: Perhaps state more clearly why focus groups were limited to 3 people in some cases (was it because they were in line with the physician appointments?) and whether they were mixed by age, gender, etc. or separated in any particular way. Readers will think normally focus groups are with more individuals.

We agree this may be confusing. We have now revised our results, paragraph 1, line 1 to provide additional clarification as follows:

A total of 48 participants were interviewed in the 12 focus group and 2 individual interview sessions. Each focus group had an average of between 3 and 4 participants, as we had difficulty in arranging for larger discussion groups due to different timing of clinic visits.

Comment #3 This manuscript would benefit from another thorough proofread. Noun pluralisation errors are still present, e.g. "…not all participant perceive…" and many others. Some grammar issues with possessive words (e.g. "…patients'… ") and tense (e.g. "…NVivo was used to organized and code the data…") also still remain.

If those points are addressed, I would support this manuscript being accepted.

We have requested for all our authors to proofread our manuscript as suggested.

Reviewer #2 had the following 3 comments

Comment #1. You have again extensively revised your manuscript and it consequently improved.

We thank the reviewer for the encouragement.

Comment #2. Discussion: The part starting with: Our study also noted that not all participant (...)and ending with: an outcome which they definitely did not want. Please explain whether this is in line with other findings or further connect them with what is already known in the literature or critically discuss the findings as you currently just summarise your findings. This is generally problematic in the entire discussion. As stated before already, please include a interpretation of your result and not just iterate the results section. Please further discuss, compare and explain your findings further, especially for your context and which factors might influence them.

As recommended by the reviewer, we have revised our discussion to further discuss and explain our findings.

Our revised discussion reads as follows

In our study, we present the conditions for the success of a telemonitoring health device for the management of managing type 2 diabetes, from the perspective of patients. We identified a set of distinctive but interrelated conditions which were and would be central to the success of such programs in the context of a developing country. Firstly, participants' demographic characteristics were crucial factors in ensuring the acceptability of telemedicine. We noted that younger participants between the ages of 29 and 50 years old preferred to use a web-based glucometer compared to older participants who preferred to record their results manually. Such outcome is not surprising, as younger individuals who grew up in this digital era were usually more technologically savvy compared to their older counterparts. This was noted in the IDEAS study where the average SMBG uploads were only 1 reading a week instead of the recommended 6 readings a week in the study.30 Participants cited various reasons for being not being able to use a web-based glucometer. This included the lack of Internet connectivity especially in the rural areas. Concerns about the stability of Internet connections were the main barrier in using telemedicine in the management of diabetes in this study. The need for a simple, user friendly technology was also consistently highlighted, to encourage acceptability among participants on the use of a remote telemonitoring system.

As technology continues to advance, participants expressed enthusiasm on the potential added value of telemedicine. Potential benefits which ignited participants' enthusiasm towards telemedicine included the ability to receive alerts, access to SMBG readings with advice from a health care professional; as well as reduced opportunity cost incurred. Most participants were willing to incorporate technology as part of their diabetes management, but only if they were confident in using the device or if they can seek help and support easily. Our study also offers an additional perspective and insight into the importance of patient-provider relationship. Our results support previous research which indicated that personal interaction with health care practitioners was important to support people with type 2 diabetes, especially when it involved SMBG.14 32 These views were also expressed by most participants in the present study, and the lack of emotional support especially when communicating through remote telemonitoring led to participants dropping out of the study.

Living with diabetes can be difficult, especially with the need to comply with a demanding and often confusing set of self-care directives. Many individuals encounter diabetes-related conflict with family members, which results in strained relationships. As noted in this study, some participants expressed reservation on the feedback and monitoring features of the telemonitoring device, as they felt that the device intruded into their personal space, as well as gave them the feeling of being "watched". Consequently, some patients opted not to participate in the IDEAS29 randomized controlled trial. Findings of this study identified several issues which are salient in the literature. For example, like many others noted that patients accepted telemedicine due to its ability to reduce travel time33-35, increase self-awareness36 37 and increase access to care38 39.

The present study also found several additional barriers that have not been reported in literature, such as tension between operational practicality versus patient's privacy and health security. As privacy and security risk may undermine the potential of telemedicine, it is important that software developers consider this aspect as information security is crucial to support a trusting relationship between patients and providers. Therefore, collaboration with researchers in the field of security, especially those specializing in network security and cryptography.

Our study offers several strengths. By exploring the insights of patients, we illustrate how family values and technology literacy could influence participants' opinion on telemonitoring. This method also allowed us to gain an in-depth understanding and broader views of participants' behaviours when managing diabetes. Our study was also culturally specific to an Asian context. There were some limitations to our study. Firstly, although we had included a diverse sample of participants and reached thematic saturation in our focus groups and in-depth interviews, these participants were only limited to one geographical location in Malaysia. Participants in this current study were recruited from suburban districts in Selangor where connectivity and technology literacy were moderate. Future studies should include patients from both urban as well as rural locations and among participants with high technology literacy, as this could potentially influence the uptake and acceptability of telemedicine. While published literature suggests that these trends are likely to be transferable to other regions in Malaysia, the context may differ in other countries and settings. The views expressed here are solely from the patients' point and does not represent the views of health care providers or policy makers. Finally, our results cannot draw definitive conclusion regarding differences in provider practices, patient knowledge as well as attitudes from different clinic sites other than those examined in this study.

Implications for practice

The continual development and improvement in technology will facilitate the use of telemedicine in the future. The largest potential of telemedicine will be its ability to reduce logistical barriers and hence saves time. However, before any telemedicine programs are introduced, there is a need to consider the economic standing of patients and their access to technology. Those living in rural areas may have limited internet connectivity and hence efforts must be made to ensure that the expectations of patients are met. In addition, there is also a need to invest in capacity building, especially in human resource. Specifically, the creation of training programs on the functionalities of telemedicine for both the general public as well as health care workers, are particularly important, especially among the non-IT savvy groups.

Comment #3. As recommended several times before already, please conduct a language check by a native English speaker as the standard of written English is still partially insufficient, in particular within the newly written and added sections.

We have requested for all our authors to proofread our manuscript as suggested.