PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Understanding the use of email-consultation in primary care using a retrospective observational study with data of Dutch electronic health records
AUTHORS	Huygens, Martine; Swinkels, Ilse; Verheij, Robert A; Friele, Roland; van Schayck, Onno; de Witte, Luc

VERSION 1 – REVIEW

REVIEWER	Ted E. Palen Institute for Health Research Kaiser Permanente Colorado USA No Competing Interest
REVIEW RETURNED	28-Aug-2017

GENERAL COMMENTS	This is a well thought out descriptive analysis of the use of email consultation in the Netherlands. It provides a basis for additional research to understand the limited uptake of email consultation in the Netherlands compared to other countries. I have no major reservation in accepting this manuscript for publication.

REVIEWER	Helen Atherton Warwick Medical School, University of Warwick, UK.
REVIEW RETURNED	04-Sep-2017

GENERAL COMMENTS	Thank you for the opportunity to review this interesting and timely paper. It is very good to see data of this nature reported. I have suggestions for revisions that will improve clarity alongside some more key observations where changes are needed to improve the validity of this paper. Introduction Page 4, Line 11. you describe the shifting of tasks from GP to nurse but not how this is relevant to email consultation. Are email consultations in the Netherlands done by nurses? Can you clarify why it is relevant? This is interesting. Page 4, Line 29. You refer to studies about the behaviour of patients as though your study is about behaviour? As you didn't involve patients at all in this study other than extracting data on consultation number and type as entered by the clinician, you should reword this. Perhaps something along the lines of ' Studies examining the consulting pattern of patients using email consultation are scarce'

	Page 4, Line 42. It would be great to have some background on the national policy in the Netherlands and how this has impacted on the introduction and use of email consultation. Page 4, Line 51. You refer to looking from the perspective of the patient. You are not looking at the patient perspective, you are looking at numbers of consultations as recorded by clinicians. Please change this wording unless I am mistaken and you did ask patients? Methods Page 5, Line 19. Please elaborate on the criteria for including practices. Page 5, Line 46. How is length of consultation measured? Here in the UK it is a very difficult thing to measure because it relies on the clinician stopping and starting in the software. Is your software more reliable? Can you tell us something about it? There are valuable lessons to be learnt from hearing about it. Page 6, Line 4 and line 38. You only included patients with a single condition. Why was this? Was it necessary methodologically. How do you defend it? A large proportion of patients will consult with co-morbid conditions and previous studies have shown that the more conditions people have the more likely they are to have used email for contacting their healthcare provider (Newhouse 2015). This is a major limitation of your study. Page 6, line 33. Why have you only used data from 2014? Page 6, line 37. Please say some more about incomplete consultations. Were these incomplete because they were not recorded properly on the system? Page 7, Line 12 onwards. You could still report mean differences between groups even if you feel a comparison cannot be done. However you could have used regression modelling on this data to explore the relationship between groups, rather than offering basic descriptives and I think this study is really missing some more in depth analysis, which is possible. In Line 16 you state that you present relevant differences between groups, but I can't see any differences presented anywhere in the results section? Results Page 8, Line 14. You state there is no significant difference of NSES between the three groups but provide no figures to support this. Please add these in. Page 8, Table 2. This table could be edited to read more clearly. Please consider reporting the difference between 2010 and 2014 figures so that the reader can see these. I think you could put the subsections for 2014 in a separate table as they do not add anything here as you do not have corresponding data for 2010. Page 9, Line 3. Again please report figures in the text where you make a statement. Page 10, Table 3. It would be helpful to see the differences between groups reported numerically if you are not going to present any comparative

	statistics. Page 12, line 18. This section comes entirely out of the blue. You do not mention it in the methods section at all, which leads me to believe it is a post-hoc analysis. You repeatedly state that the highest use of email consultation was for Diabetes but this is not the case - in your own table it shows that psychological conditions are more prevalent by nearly 4% more, and the next category does not relate to diabetes specifically but 'endocrine, metabolic and nutritional.' For me, this section of the paper really undermines my confidence in the work. I can't work out if you always wanted to look at diabetes and so fitted this in, or if you genuinely believe the psychological conditions to be unimportant? In examining the literature you will have read about the perceived benefit that those with psychological conditions can get from using email consultation, so I am unclear as to why you have ignored this finding in favour of diabetes. Additionally, the fact that you include patients whose consultations included just one consultation is completely at odds with diabetic patients who often have a co-morbidity, so I do not feel confident that you have adequately represented these patients. Discussion Page 14, line 22. You state that 'email consultation was most used for the specific disorder of diabetes' - this is not true, your own data shows this. Page 14, Line 31. Please can you add some reflection on the reliability of the consultation recording system? How accurate are they? 100%? Also please note that you restricted to one condition in the consultation - this is a limitation. You do not attempt to link individual patients who may have had more than one of each type of consultation about the same or different things - this is a limitation as your data presents only crude rates. Page 15, Line 44. You refer to diabetes as 'relatively' the most email consultations. It either is or it isn't. Page 15, Line 54. You refer to looking at usage from the patient perspective. I've mentioned before that you are not, so consider using a different phrasing. Page 16, Line 8. You might want to consider referencing the following content analyses that have also looked at what people have consulted about: Anand SG, Feldman MJ, Geller DS, Bisbee A, Bauchner H. A Content Analysis of E-mail Communication Between Primary Care Providers and Parents. Pediatrics 2005;115:1283-8. Mirsky JB, Tieu L, Lyles C, Sarkar U. A mixed-methods study of patient-provider e-mail content in a safety-net setting. Journal of Health Communication 2016;21:85-91. Stiles RA, Deppen SA, Figaro MK, Gregg WM, Jirjis JN, Rothman RL, et al. Behind-the-scenes of patient-centered care: content analysis of electronic messaging among primary care clinic providers and staff. Med Care 2007;45:1205-9. Tang PC, Black W, Young CY. Proposed criteria for reimbursing eVisits: content analysis of secure patient messages in a personal health record system. AMIA Annu Symp Proc 2006:764-8. Sittig D. Results of a content analysis of electronic messages (email) sent between patients and their physicians. BMC Med Inform Decis

	Mak 2003;3:11. Page 16, Line 14. You state that email consultation was most used by patients with diabetes. This completely contradicts your findings. Page 16, Line 50 onwards. You conclude by stating that qualitative research is needed. Do you mean in the Netherlands? Lots of qualitative research about how patients experience email consultation has already been conducted. You reference some of it in your introduction. This is a weak finish and I don't understand how you have gone from low levels of use to needing qualitative research with patients. Wouldn't the policies of the Netherlands have an impact? What about the set up in the practices? How it is promoted and offered to patients? Are there any implications for how we record the consultation? I did not get a sense that you had explored the possibility that this was multifactorial. I enjoyed reading this paper, and hope to see another version which addresses the key concerns.

REVIEWER	Brian McKinstry University of Edinburgh UK
REVIEW RETURNED	11-Sep-2017

GENERAL COMMENTS	Thank you for asking me to review this interesting study of email usage in primary care in the Netherlands between 2010 and 2014. This shows that email has not been mainstreamed as a communication method and even in those practices where it is regularly practiced constitutes a very small amount of workload. Those patients using it tend to be those with long-term conditions for whom asynchronous no urgent communication exchange is probably most appropriate. This may also be a function to an extent of the payment system which pays only for follow up consultations. I generally thought this was a well conducted study and that the authors were fairly clear about its limitations There are a few points which could be clarified. It is not clear from this paper what proportion of consultations in the Netherlands are first and follow-up consultations and that might be useful. We have found in the UK that email consulting is poorly coded and sometimes is either not recorded at all (as the email system is separate from the electronic health record (EHR) and consultations need to be cut and pasted into the main EHR) or by default recorded as a face-to-face or telephone consultation in error. It would be useful to have some description of how email integrates with the EHR and how accurate recording of consultation type is. I was unfamiliar with neighbourhood socioeconomic status measurements and some indication of what the figures mean would be helpful. The authors fully accept that the results provide no explanation for the apparent failure to ‘take off’ of email consulting and indicate that qualitative work might explain this. They could refer to qualitative work (some of which they have cited in other parts of the article) which might explain this in other at least

	in other countries (issues such as fear of increased workload, data security etc). They do not refer to the USA where email seems to have a much larger role and why this may be.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Reviewer Name: Ted E. Palen
Institution and Country: Institute for Health Research, Kaiser Permanente Colorado, USA Please state any competing interests: none

1. This is a well thought out descriptive analysis of the use of email consultation in the Netherlands. It provides a basis for additional research to understand the limited uptake of email consultation in the Netherlands compared to other countries. I have no major reservation in accepting this manuscript for publication.

Response: Thank you for reviewing our paper and for your compliments.

Reviewer: 2
Reviewer Name: Helen Atherton
Institution and Country: Warwick Medical School, University of Warwick, UK.
Please state any competing interests: None declared

Comment: Thank you for the opportunity to review this interesting and timely paper. It is very good to see data of this nature reported. I have suggestions for revisions that will improve clarity alongside some more key observations where changes are needed to improve the validity of this paper.

Response: Thank you for reviewing our paper and for the suggestions.

Introduction
1. Page 4, Line 11. you describe the shifting of tasks from GP to nurse but not how this is relevant to email consultation. Are email consultations in the Netherlands done by nurses? Can you clarify why it is relevant? This is interesting.

Response: We included this sentence as illustration what the benefit of email-consultation could be. In the Netherlands practice nurses could do an email-consultation. However, in the dataset it was difficult to discriminate between email-consultations done by the practice nurse or general practitioner. We would like to suggest not changing the text, because the aim of the paper was not to investigate this.

2. Page 4, Line 29. You refer to studies about the behaviour of patients as though your study is about behaviour? As you didn't involve patients at all in this study other than extracting data on consultation number and type as entered by the clinician, you should reword this. Perhaps something along the lines of ' Studies examining the consulting pattern of patients using email consultation are scarce'.
Response: Thank you for this suggestion. We reworded this sentence as follows: “Studies examining the consulting pattern of patient groups using email consultation, in comparison with office consultations, are scarce.“

3. Page 4, Line 42. It would be great to have some background on the national policy in the Netherlands and how this has impacted on the introduction and use of email consultation.

Response: In 2006 the Committee of Tariffs in Health care (CTG, since 2006 called the Dutch Healthcare Authority, NZa) introduced the possibillity to declare email-consultations. The Dutch Healthcare Authority (NZa) is an autonomous administrative authority, falling under the Dutch Ministry of Health, Welfare and Sport (VWS) (https://www.nza.nl/organisatie/sitewide/english/). The Dutch Ministry of Health, Welfare and Sport acknowledges the potential benefits of eHealth. However, they also acknowledge the lack of implementation of eHealth. In the last decade there have been many national initiatives to get insight in the use of eHealth and to promote and stimulate the use of it, for example using the National implementation agenda eHealth (2012), the annually national eHealth monitor (since 2013) and organising a national eHealth week (since 2016). However, these initiatives are not specifically focused on email-consultation but on eHealth in general. Hence, it could also have an impact on the use of email-consultation. In addition, the Dutch College of General Practitioners published several (Dutch) articles in which they mention to stimulate the use of email-consultation (when this is properly used according to the CTG rules). To briefly mention some background on the Dutch national policy regarding email-consultation we added the following in the manuscript: “In contrast to many other countries, since 2006 the costs of email-consultation in primary care can be reimbursed by the health insurance in the Netherlands. The Dutch Ministry of Health, Welfare and Sport acknowledges the potential benefits of eHealth and stimulates the use of online communication in health care [19]. In addition, the Dutch College of General Practitioners set up guidelines for the use of email-consultation and stimulates the use of it [20]. Nevertheless, the actual use of email-consultation seems low [2].”

4. Page 4, Line 51. You refer to looking from the perspective of the patient. You are not looking at the patient perspective, you are looking at numbers of consultations as recorded by clinicians. Please change this wording unless I am mistaken and you did ask patients?

Response: You are correct that we did not ask patients. To make this clear we reworded this sentence as follows: “This study aims to acquire insights into the current status of email-consultation usage in the Netherlands, by using data from electronic health records of Dutch primary care practices. In particular, the focus is on the number of email-consultations done by different patient groups (in terms of age, gender, socioeconomic status and health conditions) as registered by primary care professionals.”

Methods
5. Page 5, Line 19. Please elaborate on the criteria for including practices.

Response: We added the following to make the criteria for including practices more clear: “We used only data from practices that met certain criteria regarding data quality; only general practices were included that recorded more than 70% of their consultations with International Classification of Primary Care (ICPC) codes and provided data for the entire calendar year. Primary care practices voluntarily participate in NIVEL Primary Care Database.”

6. Page 5, Line 46. How is length of consultation measured? Here in the UK it is a very difficult thing to measure because it relies on the clinician stopping and starting in the software. Is your software more reliable? Can you tell us something about it? There are valuable lessons to be learnt from hearing about it.

Response: As we mentioned at page 5, Line 50, the different consultations types that we analysed (email-consultations, short face-to-face consultations (20 minutes or less), long face-to-face consultations (more than 20 minutes), short home visits (less than 20 minutes), long home visits (more than 20 minutes) and telephone consultations) are consultation types according to

reimbursement codes determined by the Dutch Healthcare Authority [21]). The difference between short and long consultations is not based on the time the software is used per patient; the GP should register this with different codes. In our analyses we just included the different reimbursement codes.

7. Page 6, Line 4 and line 38. You only included patients with a single condition. Why was this? Was it necessary methodologically. How do you defend it? A large proportion of patients will consult with co-morbid conditions and previous studies have shown that the more conditions people have the more likely they are to have used email for contacting their healthcare provider (Newhouse 2015). This is a major limitation of your study.

Response: To be clear, we did not exclude patients with multiple conditions, but we excluded consultations that were done for two or more conditions. We agree that this is a limitation of our study. However, this was indeed necessary to do due to methodological reasons. Operation types (including consultation types) and conditions (up to a maximum of three conditions) were reported in different files at day level. When more than one operation happened at the same day for one patient, we could not trace what operation was done for which condition(s). To be sure that a consultation was done for a condition we excluded consultations with two or more conditions. By considering doing this we already checked the difference in number and percentage of email-consultations in the total data set. By excluding email-consultation with none or more than two ICPC codes (conditions) the difference were negligible.
- In the Strengths and weaknesses section of the discussion (page 15) we added: “A limitation is that we excluded consultations with none or two or more conditions, due to methodological reasons. However, by redoing the analyses with these consultations included, results did not highly differ.”

8. Page 6, line 33. Why have you only used data from 2014?

Response: We’ve considered reporting information about the patients groups that did an email-consultation vs another GP consultation in 2010. However, these figures did not highly differ from results in 2014 concerning all analysed patient characteristics. Because this article already contains much information we have chosen not reporting these results. The biggest difference between 2010 and 2014 is the number of general practices that offer email-consultations, which we describe in paragraph 3.2 (Data set 1: the use of email-consultation in 2010 and 2014). However, as can be seen in table 2, the actual number of email-consultations does not highly differ.

9. Page 6, line 37. Please say some more about incomplete consultations. Were these incomplete because they were not recorded properly on the system?

Response: Consultations were seen as incomplete when no condition was reported or when two or more conditions were reported by the GP. We added the following in paragraph 2.3 (statistical analysis), page 6: Patients and consultations with incomplete datasets were excluded. This included observations with missing patient characteristics or consultations with none or two or more ICPC codes. 31.6% of the observations were excluded, of which 28.6% due to consultations with none or two or more ICPCs).

10. Page 7, Line 12 onwards. You could still report mean differences between groups even if you feel a comparison cannot be done. However you could have used regression modelling on this data to explore the relationship between groups, rather than offering basic descriptives and I think this study is really missing some more in depth analysis, which is possible. In Line 16 you state that you present

relevant differences between groups, but I can't see any differences presented anywhere in the results section?

Response: We considered the use of regression modelling. However, this is complex as the same patients could have done different types of consultations (e.g. a patient could have done an email-consultation and a telephone consultation). In addition, we think that for the scope of this paper the descriptive analyses provide adequate insight in the use of email-consultation. This is also in line with the feedback of reviewer 1 and 3. To make the relevant differences more clear, we reported the mean numbers in paragraph 3.5.1 (Dataset 3: Characteristics of patients with diabetes who had a consult by email, telephone, or face-to-face) and paragraph 3.3 (Data set 2: characteristics of email, telephone and face-to-face consultation user) (see comment 13).

Results

11. Page 8, Line 14. You state there is no significant difference of NSES between the three groups but provide no figures to support this. Please add these in.

Response: These mean figures can be found in Attachment 1. We added the following in the text: "Examination of the differences in general practice characteristics between these three groups showed differences in number of registered patients per general practice ($F=7.11$, $p<0.01$), level of urbanization ($F=11.81$, $p<0.1$) and age ($F=4.40$, $p=0.01$). General practices that registered email-consultations had a higher number of registered patients per general practice, were located in more urban areas and had a younger patient population. No significant difference of NSES was found between these three groups ($F=1.94$, $p=0.14$)."

- Regarding the diabetes sample we added the following in paragraph 3.5 (Data set 3: email-consultations for diabetes): Characteristics of the general practices in the total dataset 3, and of the general practices that registered none, a few (<25) and many (≥25) email-consultations for diabetes, can be found in Attachment 2. Examination of the differences in general practice characteristics between these three groups showed differences in number of registered patients per general practice ($F=17.44$, $p<0.01$) and level of urbanization ($F=5.72$, $p<0.01$). General practices that registered email-consultations for diabetes had a significantly higher average number of registered patients and were located in more urban areas. No significant difference was found in mean age ($F=1.17$, $p=0.31$) and NSES ($F=1.99$, $p=0.14$).

12. Page 8, Table 2. This table could be edited to read more clearly. Please consider reporting the difference between 2010 and 2014 figures so that the reader can see these. I think you could put the subsections for 2014 in a separate table as they do not add anything here as you do not have corresponding data for 2010.

Response: We considered reporting the consultation rate differences between 2010 and 2014. However, because the differences are rather small so we think this does not add much to the paper. The most important difference is the increase in the number of general practices that declare email-consultation and this was already mentioned in the text. In addition, we considered to put the subsections of 2014 in a separate table. However, BJM open requires a maximum number of 5 tables per article, and we already have 5 tables (excluding the 2 tables in the attachment). When requested, we will separate the tables.

13. Page 9, Line 3. Again please report figures in the text where you make a statement.

Response: We added the following numbers in paragraph 3.3 (Data set 2: characteristics of email, telephone and face-to-face consultation user): "In general practices that registered email-

consultations, relevant differences were found in age between patients who had an email versus a telephone or face-to-face consultation; patients that had an email-consultation seemed to be older. In general practices that registered a few email-consultations, the mean age of patients that did an email-consultation was 46.4. This was 45.7 and 42.0 for patients that did a telephone and face-to-face consultation respectively. In general practices that registered many email-consultations the mean age of patients that did an email-consultation was 46.4. This was 45.2 and 42.1 for patients that did a telephone and face-to-face consultation respectively".
- Regarding the diabetes sample we added the following in paragraph 3.5.1 (Dataset 3: Characteristics of patients with diabetes who had a consult by email, telephone, or face-to-face): "In general practices that registered email-consultations for diabetes, relevant differences were found in age of patients with diabetes who had an email-consultation versus a telephone and face-to-face consultation; patients that had an email-consultation seemed to be younger. In general practices that registered a few email-consultations for diabetes, the mean age of patients with diabetes that did an email-consultation was 62.0. This was 65.8 and 65.6 for patients with diabetes that did a telephone and face-to-face consultation respectively. In general practices that registered many email-consultations for diabetes the mean age of patients with diabetes that did an email-consultation was 61.2. This was 66.2 and 64.7 for patients with diabetes that did a telephone and face-to-face consultation respectively".

14. Page 10, Table 3. It would be helpful to see the differences between groups reported numerically if you are not going to present any comparative statistics.

Response: We presented the mean numbers of the most important relevant differences in the text (see comment 13). This table already consist of much information. We think that the table will become unclear and difficult to read when we also add the differences. If you have any suggestions how we can report the differences in this table in a clear way, we will change the table.

15. Page 12, line 18. This section comes entirely out of the blue. You do not mention it in the methods section at all, which leads me to believe it is a post-hoc analysis. You repeatedly state that the highest use of email consultation was for Diabetes but this is not the case - in your own table it shows that psychological conditions are more prevalent by nearly 4% more, and the next category does not relate to diabetes specifically but 'endocrine, metabolic and nutritional.' For me, this section of the paper really undermines my confidence in the work. I can't work out if you always wanted to look at diabetes and so fitted this in, or if you genuinely believe the psychological conditions to be unimportant? In examining the literature you will have read about the perceived benefit that those with psychological conditions can get from using email consultation, so I am unclear as to why you have ignored this finding in favour of diabetes. Additionally, the fact that you include patients whose consultations included just one consultation is completely at odds with diabetic patients who often have a co-morbidity, so I do not feel confident that you have adequately represented these patients.

Response: Reading our paper again, we understand your uncertainties. Before doing the analysis, we certainly did not have the intention to look into the diabetes group. Our intention was to look in which patient group email-consultations were used most often. Our research did show that this is the group of patients with diabetes. However, we now see that we did not make that clear in the paper. So we have reworded some sentences. In table 4 the diagnosis categories are presented. However, each diagnosis category consisted of specific diagnoses (such as hypertension, diabetes etc.). We repeated the analyses and looked to the specific diagnosis for which email-consultations have been done.
As mentioned at page 11 "Considering specific diagnoses, most email-consultations were done for hypertension (5.3%, n=873 consultations), diabetes (5.0%, n=835 consultations) and depression (2.5%, n=409 consultations)". In addition, we were interested in the percentage of email-consultations within each specific diagnosis in comparison with other GP consultations within the specific

diagnoses. We found that email-consultations involved “1.8% (diabetes), 1.6% (depression), and 1.0% (hypertension) within the total number of GP consultations for diabetes, depression and hypertension, respectively, in general practices that registered email-consultations”. Because the percentage of email-consultations was most high for diabetes (compared to other GP consultations within diabetes patients) we analysed this further. At the end of the introduction and in the methodology section we already described these analyses as follows (page 7): “Third, data from patients with the diagnosis identified in the previous analyses as being (relatively) most frequently used for email-consultations were used for further analysis.”
In the new version we reworded it as follows:
- Paragraph 1 (introduction), page 6: Third, for the patient group who had the most email-consultations (as percentage of al GP consultations in that group), characteristics will be investigated together with the impact of email-consultation (in terms of its percentage of use in comparison with telephone and face-to-face consultations) within this patient group.
- Paragraph 2.3 (Statistical analyses), page 7: “Every diagnosis category consisted of specific diagnoses. In the third dataset we included the patient group in which email-consultations, as percentage of all GP consultations in that group, were most often used.The following consultation types were analysed: email-consultation, face-to-face consultation (short + long) and telephone consultation etc…”
- Paragraph 3.4.(Data set 2: diagnosis categories of email-consultations vs telephone and face-to-face consultations), page 11: “Considering specific diagnoses, the highest number of email-consultations were done for hypertension (5.3%, n=873 consultations), diabetes (5.0%, n=835 consultations) and depression (2.5%, n=409 consultations). This involved 1.8% (diabetes), 1.6% (depression), and 1.0% (hypertension) of the total number of GP consultations within diabetes, depression and hypertension consultations, respectively, in general practices that registered email-consultations.”
- Paragraph 3.5 (Data set 2: diagnosis categories of email-consultations vs telephone and face-to-face consultations), page 12: “As described in the previous paragraph, the highest percentage of email-consultations was performed within diabetes consultations (1.8% of all GP consultations for diabetes). Therefore, in-depth analyses were carried out for this diagnosis group.”

Discussion
16. Page 14, line 22. You state that 'email consultation was most used for the specific disorder of diabetes' - this is not true, your own data shows this.

Response: - Hopefully we made this clear in comment 15. We reworded this sentence as follows: “The highest percentage of email-consultations in comparison with all GP consultations within one specific disorder was related to diabetes.”

17. Page 14, Line 31. Please can you add some reflection on the reliability of the consultation recording system? How accurate are they? 100%? Also please note that you restricted to one condition in the consultation - this is a limitation. You do not attempt to link individual patients who may have had more than one of each type of consultation about the same or different things - this is a limitation as your data presents only crude rates.

Response: About the reliability of the consultation recording system: as there are clear financial incentives we assume that email consultations that fit the claims requirements, will be claimed, and thus recorded in the electronic health record systems. Combining this comment with comment 2 of reviewer 3

(We have found in the UK that email consulting is poorly coded and sometimes is either not recorded at all (as the email system is separate from the electronic health record (EHR) and consultations need to be cut and pasted into the main EHR) or by default recorded as a face-to-face or telephone consultation in error. It would be useful to have some description of how email integrates with the EHR and how accurate recording of consultation type is), we added the following in the Strengths and Limitation section of the Discussion (page 14): “Email-consultations are recorded just as any other consultation in the Dutch electronic health record systems and thus are fully integrated. As there are clear financial incentives we assume that email consultations that fit the claims requirements, will be claimed, and thus recorded in the electronic health record systems.”
- As we already mentioned, in the Strengths and weaknesses section of the discussion (page 15) we added: “A limitation is that we excluded consultations with none or two or more conditions, due to methodological reasons. However, by redoing the analyses with these consultations included, results did not highly differ.”

18. Page 15, Line 44. You refer to diabetes as 'relatively' the most email consultations. It either is or it isn't.

Response: We mentioned ‘relatively’ because in absolute numbers email-consultations is not most frequently used for diabetes. However, in comparison with other GP consultations within one specific diagnosis, the percentage of email-consultation was most high for diabetes (1.8% of all GP consultations for diabetes were email-consultations). Hopefully we made this clear in comment 15. We skipped ‘relatively’ in this sentence.

19. Page 15, Line 54. You refer to looking at usage from the patient perspective. I've mentioned before that you are not, so consider using a different phrasing.

Response: We reworded this sentence as follows: “This study focuses on the consulting pattern of patient groups using email-consultation, in comparison with other GP consultations. The use of email-consultation by patients, however, highly varies among general practices.”

20. Page 16, Line 8. You might want to consider referencing the following content analyses that have also looked at what people have consulted about:
- Anand SG, Feldman MJ, Geller DS, Bisbee A, Bauchner H. A Content Analysis of E-mail Communication Between Primary Care Providers and Parents. Pediatrics 2005;115:1283-8
- Mirsky JB, Tieu L, Lyles C, Sarkar U. A mixed-methods study of patient-provider e-mail content in a safety-net setting. Journal of Health Communication 2016;21:85-91.
- Stiles RA, Deppen SA, Figaro MK, Gregg WM, Jirjis JN, Rothman RL, et al. Behind-the-scenes of patient-centered care: content analysis of electronic messaging among primary care clinic providers and staff. Med Care 2007;45:1205-9.
- Tang PC, Black W, Young CY. Proposed criteria for reimbursing eVisits: content analysis of secure patient messages in a personal health record system. AMIA Annu Symp Proc 2006:764-8.
- Sittig D. Results of a content analysis of electronic messages (email) sent between patients and their physicians. BMC Med Inform Decis Mak 2003;3:11.

Response: Thank you for these literature suggestions. We added the article of Mirsky et al. (2016) and Sittig et al. (2003) in the section ‘comparison with existing literature’ of the discussion section at page 16. “In addition, it has been noted that patients use email to report a change in their condition or to discuss laboratory results, new conditions, changes in prescription dose, the need for new

prescriptions or other requests for actions regarding medications or treatments [37-39]; all of these are frequently seen in diabetes management."

21. Page 16, Line 14. You state that email consultation was most used by patients with diabetes. This completely contradicts your findings.

Response: Hopefully we made this clear in comment 15.

22. Page 16, Line 50 onwards. You conclude by stating that qualitative research is needed. Do you mean in the Netherlands? Lots of qualitative research about how patients experience email consultation has already been conducted. You reference some of it in your introduction. This is a weak finish and I don't understand how you have gone from low levels of use to needing qualitative research with patients. Wouldn't the policies of the Netherlands have an impact? What about the set up in the practices? How it is promoted and offered to patients? Are there any implications for how we record the consultation? I did not get a sense that you had explored the possibility that this was multifactorial.

Response: We understand that recommending qualitative research is a weak ending. We agree that we did not clearly explain our recommendations. Because we found big differences in the use of email-consultation among general practices we think it is important to investigate why it is highly used in some practices and less frequently in others. Like we explained at page 16, this could be explained by differences in how general practices offer, promote or use it. However, besides aspects related to general practices, the way how patients experience the introduction and use of it could also impact the use of email-consultation. In addition, we found differences in patient groups that use email-consultation. In this study we did not have information about implementation aspects, which could be best investigated using qualitative studies. We reworded our recommendations as follows:
- Implications for research and practice, page 17: "Moreover, the use of email-consultation by patients highly varies among general practices. It is recommended to qualitatively study the use of email-consultation in general practices that use many email-consultations and in general practices that offer it, but use it less frequently. Investigating why it works in 'good practices' and why it is less frequently used in others will give more insight in the process that is needed to successfully implement and use email-consultation. These studies should be focused on the two-layered issue; from both perspectives of patients and providers."

Reviewer: 3
Reviewer Name: Brian McKinstry
Institution and Country: University of Edinburgh, UK Please state any competing interests: none declared.

Comment: Thank you for asking me to review this interesting study of email usage in primary care in the Netherlands between 2010 and 2014. This shows that email has not been mainstreamed as a communication method and even in those practices where it is regularly practiced constitutes a very small amount of workload. Those patients using it tend to be those with long-term conditions for whom asynchronous no urgent communication exchange is probably most appropriate. This may also be a function to an extent of the payment system which pays only for follow up consultations.

I generally thought this was a well conducted study and that the authors were fairly clear about its limitations. There are a few points which could be clarified.

Response: Thank you for reviewing our paper and for the suggestions.

Comment 1. It is not clear from this paper what proportion of consultations in the Netherlands are first and follow-up consultations and that might be useful.

Response: We do not know the proportion of first and follow-up consultations in the Netherlands. Although this could be useful because email-consultation cannot be used for first consultations, it did not fit within the scope of this study.

Comment 2. We have found in the UK that email consulting is poorly coded and sometimes is either not recorded at all (as the email system is separate from the electronic health record (EHR) and consultations need to be cut and pasted into the main EHR) or by default recorded as a face-to-face or telephone consultation in error. It would be useful to have some description of how email integrates with the EHR and how accurate recording of consultation type is.

Response: As mentioned in comment 17 of reviewer 2 we added the following in the Strengths and Limitation section of the Discussion: “Email-consultations are recorded just as any other consultation in the Dutch electronic health record systems and thus are fully integrated. As there are clear financial incentives we assume that email consultations that fit the claims requirements, will be claimed, and thus recorded in the electronic health record systems.”

Comment 3. I was unfamiliar with neighbourhood socioeconomic status measurements and some indication of what the figures mean would be helpful.

Response: The average NSES in the Netherlands is 0.0. We already mentioned the range in paragraph 2.2.3, page 6: Scores ranged from -6.75 to 3.06. We added in paragraph 2.2.3 (Patient characteristics) at page 6: “The average NSES in the Netherlands is 0.0.”

Comment 4. The authors fully accept that the results provide no explanation for the apparent failure to ‘take off’ of email consulting and indicate that qualitative work might explain this. They could refer to qualitative work (some of which they have cited in other parts of the article) which might explain this in other at least in other countries (issues such as fear of increased workload, data security etc). They do not refer to the USA where email seems to have a much larger role and why this may be.

Response: As we mentioned in comment 22 of reviewer 2, we agree that we did not clearly explain our recommendation for qualitative research. We hope that we described this more clearly in the revised manuscript. In addition, we already explained issues regarding workload, privacy and safety in the introduction section. We added two references of the USA in de discussion section at page 16 (suggestions of reviewer 2, comment 20: Mirsky JB, Tieu L, Lyles C, Sarkar U. A mixed-methods study of patient-provider e-mail content in a safety-net setting. Journal of Health Communication 2016;21:85-91; Sittig D. Results of a content analysis of electronic messages (email) sent between patients and their physicians. BMC Med Inform Decis Mak 2003;3:11)

Again, we would like to thank the reviewers and editor for their feedback that has helped us to improve and clarify the manuscript. We hope that we have provided satisfying responses to their comments. We hope the editor and reviewers will find this manuscript eligible for publication.

Thank you very much in advance.

VERSION 2 – REVIEW

REVIEWER	Helen Atherton Warwick Medical School, UK
REVIEW RETURNED	09-Oct-2017

GENERAL COMMENTS	Thank you for responding to the comments on your manuscript, this has made the manuscript much clearer. I'm happy for this to be accepted and appreciate the extra description and explanation. It is regrettable that you do not feel that doing any sort of comparative analysis would be helpful - even if you do not do logistic regression you can present a comparison between groups. Reviewers 1 and 3 are not statisticians and so I don't think this paper has had a statistical review - but if the editors are happy to proceed with the descriptive data then that is a decision I think can be left to them. All best wishes.

REVIEWER	Brian McKinstry University of Edinburgh UK
REVIEW RETURNED	10-Oct-2017

GENERAL COMMENTS	The authors have addressed the concerns expressed by the reviewers as well as they can with the data they have. They have added appropriate limitations. I believe it is now suitable for publication. The level of English language is high but some of the corrections might be phrased better, however, they could be easily fixed at a sub-editor stage