

## PEER REVIEW HISTORY

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### ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	Uptake and patient and provider communication modality preferences of virtual visits in primary care: a retrospective cohort study in Canada
<b>AUTHORS</b>	Stamenova, Vess; Agarwal, Payal; Kelley, Leah; Fujioka, Jamie; Nguyen, Megan; Phung, Michelle; Wong, Ivy; Onabajo, Nike; Bhatia, R. Sacha; Bhattacharyya, Onil

### VERSION 1 - REVIEW

<b>REVIEWER</b>	Heather Brant University of Bristol, UK
<b>REVIEW RETURNED</b>	10-Feb-2020

<b>GENERAL COMMENTS</b>	<p>Overall comments</p> <p>I reviewed this article when it was submitted to BMJ Q&amp;S and am pleased to see that the authors have responded to the comments made by myself and the other reviewers. The issue of virtual consultations is clearly an important contribution to the literature considering the attempts made to address increasing demands on primary care. It was also good to have a real time exploration of usage across quite a large pilot project and beneficial to understand what type of requests were made through the virtual visit as presented in table 4 and by whom, that it supported continuity of care and that fears about demand for virtual visits were not realised. However, it struck me that I wasn't sure whether "secure messaging" was an electronic messaging format or SMS texting or both? If it were only one of these formats could the other format provide a similar service provision?</p> <p>I recognise that word count restrictions often limit the amount the authors can present, however, I find that this paper only offers a description on the uptake of virtual consultations during a pilot project in Ontario and lacks the "why". This was exacerbated by the limited data accessible to the researchers restricting any possible comparisons between users and non-users. Although it highlights an interesting point around the preference for asynchronous messaging its contribution is limited without exploring the reasons for this. I appreciate that this is one of a number of articles published by the authors and their reasons for this. The authors refer to qualitative data from interviews with patients and providers that will be "reported separately", that explore some of the reasons behind the choice of visit type, but until these are published it fails to offer a complete picture of the situation.</p> <p>For this reason, I feel that the paper would be better submitted once the other papers are published so the authors can both reference</p>
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	<p>them and include their findings to support the outcomes.</p> <p><b>Abstract</b> I felt that the abstract was well written and produced a clear study objective – “To evaluate the uptake of a platform for virtual visits in primary care, examine patient and physician preferences for virtual communication methods, and report on characteristics of visits and patients experience of care”. However, this was not transferred into the main paper which only stated - This study focused on relative use of different communication modalities, frequency of use, and to what extent virtual visits add to or substitute for in-person visits. The latter section of this statement does not seem to be realised in the results section.</p> <p><b>Introduction</b> The introduction was clear and covered all the relevant literature but failed to present a clear study objective as discussed above.</p> <p><b>Methods</b> The methods provided a clear description of the study setting, the intervention and research methods.</p> <p><b>Results</b> I found the results section confusing – particularly as the 2 platforms offered different services, i.e., “Only patients could request visits on the Novari platform for most of the evaluation period” but the results appear to be pooled. In addition, I was unsure why 2 different methods were used to classify patients and providers into low, moderate and high users. Would it not have been simpler to divide the data into 3 sections as currently it feels like the high users are a sub-section of the moderate users? Finally, regarding the comment “196 visits (3%) occurred through a mix of synchronous and asynchronous communication.” Does the synchronous refer to video? In addition, you say “Furthermore, 8% of the visits did not have an associated synchronous or asynchronous communication and therefore, must have occurred by phone.” But surely phone is synchronous? Did you mean did not have video or secure messaging?</p> <p><b>Discussion</b> The discussion produced some interesting conclusions, particularly around policy, although the authors may be leaning toward the more positive outcomes. You mention that fears over increased demand were not realised in relation to numbers of requests for virtual visits (both in the discussion and in the conclusion), but you do not acknowledge the high number of visits conducted “outside office hours” which I would suggest has a negative impact on the health care providers workload. Further, the authors have alluded to a lack of explanation as to why more patients and providers preferred secure messaging “It is currently unclear why this was the case” in the discussion so it seemed strange to propose a number of possible explanations if these are already presented in their other papers and once published could be referenced here.</p>
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<b>REVIEWER</b>	Edward Donaghy University of Edinburgh
<b>REVIEW RETURNED</b>	11-Feb-2020

<b>GENERAL COMMENTS</b>	Having previously reviewed this paper for another journal it was positive to see that the authors have addressed a number of issues raised by the reviewers. This re- draft is an improvement. This paper is a welcome and important contribution to the literature.
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	<p>My concern with this paper is that there are some bold claims regarding the generalisability of the results without the necessary caveats stemming from the results of the study. I think some consideration and comment is required on the sample from which the results and conclusions flow.</p> <p>Of the 30,753 patients invited between September 1st 2017 and February 15th 2019, 14, 291 patients were registered. More than half of the patients invited did not register. Could this have influenced the study's results? Have the authors considered who is most likely to have registered and not registered?</p> <p>The omission of groups of lower socioeconomic status from public health and medical research has been noted for some time, regardless of type of research study (NIH Guide, 1994). In most Western developed countries white, middle class, educated males tend to be over-represented in health and medical research and people from socially disadvantaged groups under-represented (Heiat et al, 2002; NIH Guide, 1994).</p> <p>The uptake and outcomes in a research study and/or health intervention will be influenced by a range of health and social characteristics of the patients' involved such as the patient's general health status, socio-economic circumstances, gender, ethnicity and educational status.</p> <p>Have the authors considered why over 50% of invitees did not register and the impact non-registration may have had on your results?</p> <p>Patel et al (2003) note that low response rates are criticised for non-response bias, i.e., the views and life experiences of non-responders may significantly differ from those in the recruited group. Depending on the target audience and subject of the research, some respondents may be harder to involve in research than other segments of the population. These include black and minority ethnic patients, patients with a low educational status, unemployed or low occupational status, low family income, recent illness or poor health and high users of medical care (Patel et al, 2003).</p> <p>High users of medical care are an increasingly important population cohort that have received attention in Canadian primary care (see Stone et al, 2014) and internationally. In a report released by the Toronto Central Local Health Integration Network in Ontario, the top 5% of health care users accounted for 58% of health expenditure in 2007 and required complex, resource-intensive care (Toronto Central Local Health Integration Network, 2012). Canadian studies find this population is more likely to have multiple chronic illnesses, have serious psychological illnesses and addiction, come from disadvantaged population groups, be unemployed, and have limited social support (Reid et al, 2003; Toronto Central Local Health Integration Network, 2012).</p> <p>You need to consider and discuss who is likely to have registered in your study. On page 10, last sentence, it is noted, "out of those with at least one visit, 52% had only a single visit". Does this perhaps suggest patients with the least morbidity?</p> <p>This could mean that messaging is popular within a specific patient cohort, i.e., those with the least morbidity. However, what about</p>
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those patients with high morbidity levels who are heavy users of health services? They are likely to have had more than a single visit if using the service over the allotted time-frame of the study. Not obtaining medical research data which accurately reflects the breadth of the whole population presents drawbacks including threats to external validity and ability to generalise (Johnson, 1990), denying excluded groups from any health benefits of trial participation (Rogers, 2004), to check the safety of health innovations with sub-groups in the population (Albain et al, 2009), and failing to identify groups that have the highest burden of illness and developing an understanding of why differences exist (Singh et al, 2012).

Further comment from the authors is also required on the level of content of text messaging in the context of literacy levels. A 2010 Canadian Council on Learning report warned that low-literacy adults would increase 25% by 2031. What was the level of content in the messaging? Was it extensive, or very short exchanges of text? For patients with literacy problems messaging might be problematic. Have you considered this? People who struggle with numeracy and literacy are likely to be socio-deprived who are most likely to experience a chronic illness.

A couple of other issues. Issues of rolling out this service to scale, what are the challenges? Particularly in the context, as noted on page 12, that 58% of visits were created and 71% completed outside typical office hours (8am-5pm). You suggest that this may be because "at this stage most providers had not incorporated virtual visits into their regular work flow". Might this also be influenced by patient preference?

Do you have any data on impact of this new service re time saving? Was it time neutral, less/more consuming for GPs. Time for GPs being a key issue in primary care. Are there any extra administration costs if it remains mainly out-with typical office hours?

#### References

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	<p>2003;8(4):215-24.</p> <p>Rogers WA: Evidence based medicine and justice: a framework for looking at the impact of EBM upon vulnerable or disadvantaged groups. J Med Ethics 2004, 30:141–145. doi: 10.1136/jme.2003.007062.</p> <p>Singh GK, Azuine RE, Siahpush M: Global Inequalities in Cervical Cancer Incidence and Mortality are Linked to Deprivation, Low Socioeconomic Status, and Human Development. Int J MCH AIDS 2012, 1(1):17–30.</p> <p>Stone C et al (2014) Population health perspective on high users of health care. Role of family physicians. Can Fam Physician 2014; 60:781-3</p> <p>Toronto Central Local Health Integration Network. Fact sheet: high-needs populations. Toronto, ON: Toronto Central Local Health Integration Network; 2012. Available from: <a href="http://www.torontocentrallhin.on.ca/uploadedFiles/PublicCommunity/Strategic_Plan_2012-2014/Fact%20Sheet%20High%20Needs.pdf">www.torontocentrallhin.on.ca/uploadedFiles/PublicCommunity/Strategic_Plan_2012-2014/Fact%20Sheet%20High%20Needs.pdf</a>.</p>
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### VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name

Heather Brant

Institution and Country

University of Bristol, UK

1.	<p>I reviewed this article when it was submitted to BMJ Q&amp;S and am pleased to see that the authors have responded to the comments made by myself and the other reviewers. The issue of virtual consultations is clearly an important contribution to the literature considering the attempts made to address increasing demands on primary care. It was also good to have a real time exploration of usage across quite a large pilot project and beneficial to understand what type of requests were made through the virtual visit as presented in table 4 and by whom, that it supported continuity of care and that fears about demand for virtual visits were not realised. However, it struck me that I wasn't sure whether "secure messaging" was an electronic messaging format or SMS texting or both? If it were only one of these formats could the other format provide a similar service provision?</p>
	<p>We have added a qualifier that states "Secure messaging" is "usually through a secure web-based messaging platform)". We believe SMS communication could offer a similar provision of care, but the downside is that it may not be as secure as when one uses a secure platform.</p>
2.	<p>I recognise that word count restrictions often limit the amount the authors can present, however, I find that this paper only offers a description on the uptake of virtual consultations during a pilot project in Ontario and lacks the "why". This was exacerbated by the limited data accessible to the researchers restricting any possible comparisons between users and non-users. Although it highlights an interesting point around the preference for asynchronous</p>

<p>messaging its contribution is limited without exploring the reasons for this. I appreciate that this is one of a number of articles published by the authors and their reasons for this. The authors refer to qualitative data from interviews with patients and providers that will be “reported separately”, that explore some of the reasons behind the choice of visit type, but until these are published it fails to offer a complete picture of the situation. For this reason, I feel that the paper would be better submitted once the other papers are published so the authors can both reference them and include their findings to support the outcomes.</p>
<p>We have added now the following detail on p. 15:  “Past studies have reported that secure messaging is seen as a convenient and fits with patients’ and physicians’ schedules and it provides physicians with time to review the patient’s case [22]. Additional qualitative data from interviews with patient and provider users was collected in the context of this study and will be reported in detail separately. Briefly, the feedback from both patients and providers was that they preferred the convenience of asynchronous messaging (being able to respond when they can). Additional benefits included more time to think about questions and responses, as well as having a written record of the visit.”</p>
<p>3. Abstract</p> <p>I felt that the abstract was well written and produced a clear study objective – “To evaluate the uptake of a platform for virtual visits in primary care, examine patient and physician preferences for virtual communication methods, and report on characteristics of visits and patients experience of care”. However, this was not transferred into the main paper which only stated - This study focused on relative use of different communication modalities, frequency of use, and to what extent virtual visits add to or substitute for in-person visits. The latter section of this statement does not seem to be realised in the results section.</p> <p>Introduction</p> <p>The introduction was clear and covered all the relevant literature but failed to present a clear study objective as discussed above.</p>
<p>We have now used the same objective in the introduction. P.5:  “The purpose of the pilot was to evaluate the uptake of a platform for virtual visits in primary care, examine patient and physician preferences for virtual communication methods, and report on characteristics of visits and patients experience of care.”</p>
<p>4. Results</p> <p>I found the results section confusing – particularly as the 2 platforms offered different services, i.e., “Only patients could request visits on the Novari platform for most of the evaluation period” but the results appear to be pooled.</p> <p>The platforms offered the same functionalities with the exception that both patient and providers could request visits on one of the platforms and only patients could on the other. The reasons for that are largely political, as the ministry was concerned about allowing providers to request visits might create a lot of induced demand and increased cost, so it chose to test out this approach on a single region initially.</p> <p>We do not believe the results of the study are impacted significantly by this. The major downside is that the sample of physician-requested visits is smaller than it would have been if it were available everywhere. We pooled the data across the two platforms, in order to allow for a larger sample size. Though virtual care policy is evolving in Ontario, it seems that providers will have the ability to choose which platform they want to use for virtual visits (as many will be components of their Electronic Medical Record (EMR) and we have multiple EMR systems in use in the province). Since there will be multiple platforms in place, reporting on both platforms likely improves the generalizability of the results.</p>
<p>5. In addition, I was unsure why 2 different methods were used to classify patients and providers into low, moderate and high users. Would it not have been simpler to divide the data into 3 sections as currently it feels like the high users are a sub-section of the moderate users?</p>
<p>We used the same method to classify patients and providers as low, moderate and high users. The</p>

<p>median was used to subdivide low from moderate and the outlier border was used to separate moderate from high users. Visits per month were used in both instances. The absolute numbers between patients and providers are different as providers naturally have more visits than patients. Please let us know if this is still unclear.</p>
<p>6. Finally, regarding the comment “196 visits (3%) occurred through a mix of synchronous and asynchronous communication.” Does the synchronous refer to video?</p>
<p>Thank you. Synchronous means video in this case. We have noted that in brackets now on p. 12</p>
<p>7. In addition, you say “Furthermore, 8% of the visits did not have an associated synchronous or asynchronous communication and therefore, must have occurred by phone.” But surely phone is synchronous? Did you mean did not have video or secure messaging?</p>
<p>Great point! We have changed that now to say: “8% of the visits did not have an associated video or secure messaging communication and therefore, must have occurred by phone”</p>
<p>8. Discussion The discussion produced some interesting conclusions, particularly around policy, although the authors may be leaning toward the more positive outcomes. You mention that fears over increased demand were not realised in relation to numbers of requests for virtual visits (both in the discussion and in the conclusion), but you do not acknowledge the high number of visits conducted “outside office hours” which I would suggest has a negative impact on the health care providers workload.</p>
<p>Agreed. We have now added the following into the discussion on p.16: “At such low volumes, providers completed most visits outside regular office hours, but that is expected to change if volumes are higher. Failure to incorporate virtual visits into regular office hours as the use of virtual care grows may have a negative impact on providers’ workloads and successful adoption of virtual care services.”</p>
<p>9. Further, the authors have alluded to a lack of explanation as to why more patients and providers preferred secure messaging “It is currently unclear why this was the case” in the discussion so it seemed strange to propose a number of possible explanations if these are already presented in their other papers and once published could be referenced here.</p>
<p>We have added more details to our qualitative findings. See our response to your second comment above.</p>

Reviewer: 2

Reviewer Name

Edward Donaghy

Institution and Country

University of Edinburgh

Having previously reviewed this paper for another journal it was positive to see that the authors have addressed a number of issues raised by the reviewers. This re- draft is an improvement. This paper is a welcome and important contribution to the literature.

<p>1. My concern with this paper is that there are some bold claims regarding the generalisability of the results without the necessary caveats stemming from the results of the study. I think some consideration and comment is required on the sample from which the results and conclusions flow. Of the 30,753 patients invited between September 1st 2017 and February 15th 2019, 14, 291 patients were registered. More than half of the patients invited did not register. Could this have influenced the study’s results? Have the authors considered who is most likely to have registered and not</p>
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registered?

The omission of groups of lower socioeconomic status from public health and medical research has been noted for some time, regardless of type of research study (NIH Guide, 1994). In most Western developed countries white, middle class, educated males tend to be over-represented in health and medical research and people from socially disadvantaged groups under-represented (Heiat et al, 2002; NIH Guide, 1994).

The uptake and outcomes in a research study and/or health intervention will be influenced by a range of health and social characteristics of the patients' involved such as the patient's general health status, socio-economic circumstances, gender, ethnicity and educational status.

Have the authors considered why over 50% of invitees did not register and the impact non-registration may have had on your results?

Patel et al (2003) note that low response rates are criticised for non-response bias, i.e., the views and life experiences of non-responders may significantly differ from those in the recruited group.

Depending on the target audience and subject of the research, some respondents may be harder to involve in research than other segments of the population. These include black and minority ethnic patients, patients with a low educational status, unemployed or low occupational status, low family income, recent illness or poor health and high users of medical care (Patel et al, 2003).

High users of medical care are an increasingly important population cohort that have received attention in Canadian primary care (see Stone et al, 2014) and internationally. In a report released by the Toronto Central Local Health Integration Network in Ontario, the top 5% of health care users accounted for 58% of health expenditure in 2007 and required complex, resource-intensive care (Toronto Central Local Health Integration Network, 2012). Canadian studies find this population is more likely to have multiple chronic illnesses, have serious psychological illnesses and addiction, come from disadvantaged population groups, be unemployed, and have limited social support (Reid et al, 2003; Toronto Central Local Health Integration Network, 2012).

You need to consider and discuss who is likely to have registered in your study. On page 10, last sentence, it is noted, "out of those with at least one visit, 52% had only a single visit". Does this perhaps suggest patients with the least morbidity?

We absolutely agree with you. Our sample is self-selected and also studies need to examine what the differences are between those that elect to participate and those that do not. Unfortunately, at this time, we don't have the data to describe the impact of this. This may be the result of variations in preferences for virtual vs. in-person communication, variations in need for care (those who didn't think they would need care probably didn't bother to register), and variations in how organized or proactive patients are (registration required some basic computer literacy and going through a verification process). It is therefore unclear what the mix of high need and low need would be among those who did not register and how they would differ on average from those who did. We really appreciate your comments as they make us think about some of the changes we can recommend to government organizations in future implementations. To your point, we have added some further comments in the limitation section to highlight this limitation to generalizability:

"More than half of the invited patients did not register and as such it is not clear how generalizable the findings are to the entire patient population. It is very likely that the demographic, socioeconomic and health characteristics of patients who did not elect to use virtual care are distinct from those that chose to participate and future studies should examine these differences."

2. This could mean that messaging is popular within a specific patient cohort, i.e., those with the least morbidity. However, what about those patients with high morbidity levels who are heavy users of health services? They are likely to have had more than a single visit if using the service over the allotted time-frame of the study.

Not obtaining medical research data which accurately reflects the breadth of the whole population



presents drawbacks including threats to external validity and ability to generalise (Johnson, 1990), denying excluded groups from any health benefits of trial participation (Rogers, 2004), to check the safety of health innovations with sub-groups in the population (Albain et al, 2009), and failing to identify groups that have the highest burden of illness and developing an understanding of why differences exist (Singh et al, 2012).

We do have were close to 1500 patients with multiple visits (about 10% of registered patients) and about 300 patients (2 %) with 7 or more visits. We also report that higher use patients used the service almost immediately as opposed to lower use patients who waited longer to use the service. This may suggest that higher users of the healthcare system incorporated virtual care into their services and potentially replaced some of the multiple face to face visits they had to make. We do not have the necessary data to make that claim, but we do not believe that the program was used only by patients with a better health status. That being said, we do think overall patients are likely at a better health status than the general patient population (that being supported by the fact that younger people were more likely to register when invited).

To remind the reader about these drawbacks we now state on p.15:

“It is very likely that the demographic, socioeconomic and health characteristics of patients who did not elect to use virtual care are distinct from those that chose to participate and future studies should examine these differences”

If users of the service had the least morbidity, then practices would have to proactively manage access to virtual and face to face care to improve in-person access to those with the greatest morbidity or actively support them to use the service effectively. This is a focus of our future work as this program expands.

3. Further comment from the authors is also required on the level of content of text messaging in the context of literacy levels. A 2010 Canadian Council on Learning report warned that low-literacy adults would increase 25% by 2031. What was the level of content in the messaging? Was it extensive, or very short exchanges of text? For patients with literacy problems messaging might be problematic. Have you considered this? People who struggle with numeracy and literacy are likely to be socio-deprived who are most likely to experience a chronic illness.

-To your point, we have now added on p.15 the following:

“Literacy levels will also be especially important for text communication, as low literacy levels can impact patients’ ability to use this medium and there are estimates that 42% of Canadians between the ages of 15 and 65 fail to achieve high school level literacy.”

4. A couple of other issues. Issues of rolling out this service to scale, what are the challenges? Particularly in the context, as noted on page 12, that 58% of visits were created and 71% completed outside typical office hours (8am-5pm). You suggest that this may be because “at this stage most providers had not incorporated virtual visits into their regular work flow”. Might this also be influenced by patient preference?

Excellent point, which we have incorporated, and as per the comment of the previous author, we have now added the following into the discussion on p.16:

“The majority of visits were created outside of work hours, which is likely influenced by patient preference, especially for those who work. Furthermore, given the low volume of visits, providers completed most visits outside regular office hours, but that is expected to change if volumes are higher. Failure to incorporate virtual visits into regular office hours as the use of virtual care grows will likely have a negative impact on providers’ workloads and potentially decrease provider adoption of virtual care services.”

5. Do you have any data on impact of this new service re time saving? Was it time neutral, less/more consuming for GPs. Time for GPs being a key issue in primary care. Are there any extra administration costs if it remains mainly out-with typical office hours?

Unfortunately, we do not have an objective measure of whether the visits took longer. We do know

that with new technologies, especially early in implementation, technology does not necessarily save time. From our qualitative interviews, we know that some providers reported that the time and energy it took to complete a virtual visit was on par with those completed in person. Details of these findings will be reported in a separate paper on impacts on workflow and we prefer to report them in the other paper where we would have more space to give them justice and describe all of the nuances affecting workflow and time.

Administration costs are mostly associated with onboarding of patients on the platform. Additional administration costs may vary depending on the way the provider decided to incorporate virtual care into their practice. For example, if they decide to include a triaging system that will be managed by administrative staff.

#### VERSION 2 – REVIEW

<b>REVIEWER</b>	Heather Brant University of Bristol, UK
<b>REVIEW RETURNED</b>	30-Mar-2020

<b>GENERAL COMMENTS</b>	The authors have addressed each of the comments well and I commend them.
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<b>REVIEWER</b>	Dr Eddie Doanghy University of Edinburgh, Scotland, UK.
<b>REVIEW RETURNED</b>	07-Apr-2020

<b>GENERAL COMMENTS</b>	I believe the authors have addressed my review comments on their previous submission and that the article should now be accepted for publication.
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