Supplemental materials for

Moschogianis S, Darley S, Coulson T, Peek N, Cheraghi-Sohi S, Brown BC. Seven opportunities for artificial intelligence in primary care electronic visits: qualitative study of staff and patient views. *Ann Fam Med*. 2025;23(3):214-222.

Supplemental Appendix 1: Description of the Patchs eVisit system using the TIDieR1 checklist

Item 1: Brief name

Patchs eVisit system.

Item 2: Rationale, theory or goal of the elements essential to the intervention

EVisits enable patients to request help from their GP practice online, and the GP practice to decide how and who is best to respond, with the option to respond remotely via asynchronous messaging, telephone or video. OCSs aim to address the longstanding pressures on English primary care from increased patient demand and decreasing workforce capacity. They were a vital tool in helping GP practices cope with the COVID-19 pandemic - when all patients were dealt with remotely, if possible, to reduce spread of disease.

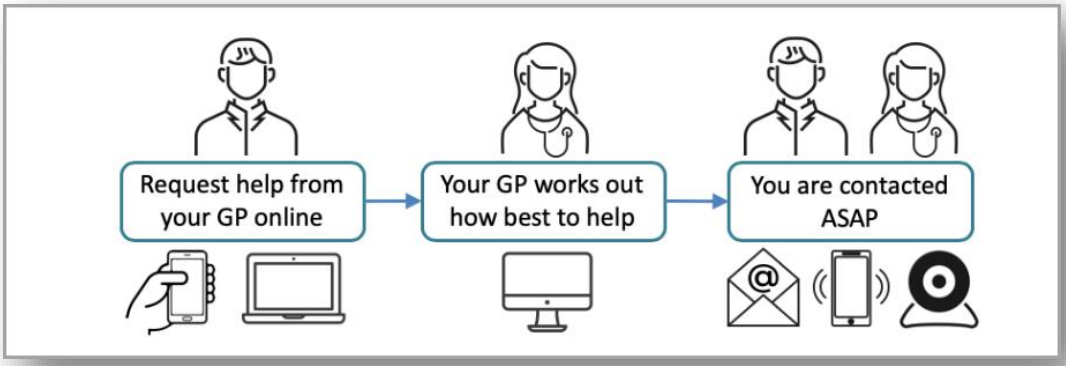
Item 3: Physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers

- **Patchs website** https://patchs.ai where practice staff and patients can log in and use the system for responding to or submitting queries. There are also demonstration sites for both practice and patient groups.
- **Patchs video for patients** https://youtu.be/rvqtjUWhDRw
- **Seminar training:** Group sessions with Subject Matter Experts, delivered to administrative and clinical staff. Provides detailed guidance on eVisit use, best practice, likely impacts on practices, engagement with patients, and other important topics.
- **Training portal:** An eLearning platform provides clinical and non-clinical learning paths relevant to staff roles.
- **Online help:** A repository of information about functionality, best practice, how to guides, FAQs, and videos at https://help.patchs.ai/
- **Webinars:** Monthly webinars to demonstrate new functionality and best practice.
- **Support team:** A dedicated team (telephone and helpdesk) to help with technical problems.
- **Transformation success managers:** Dedicated members of staff to ensure practices use eVisits effectively.

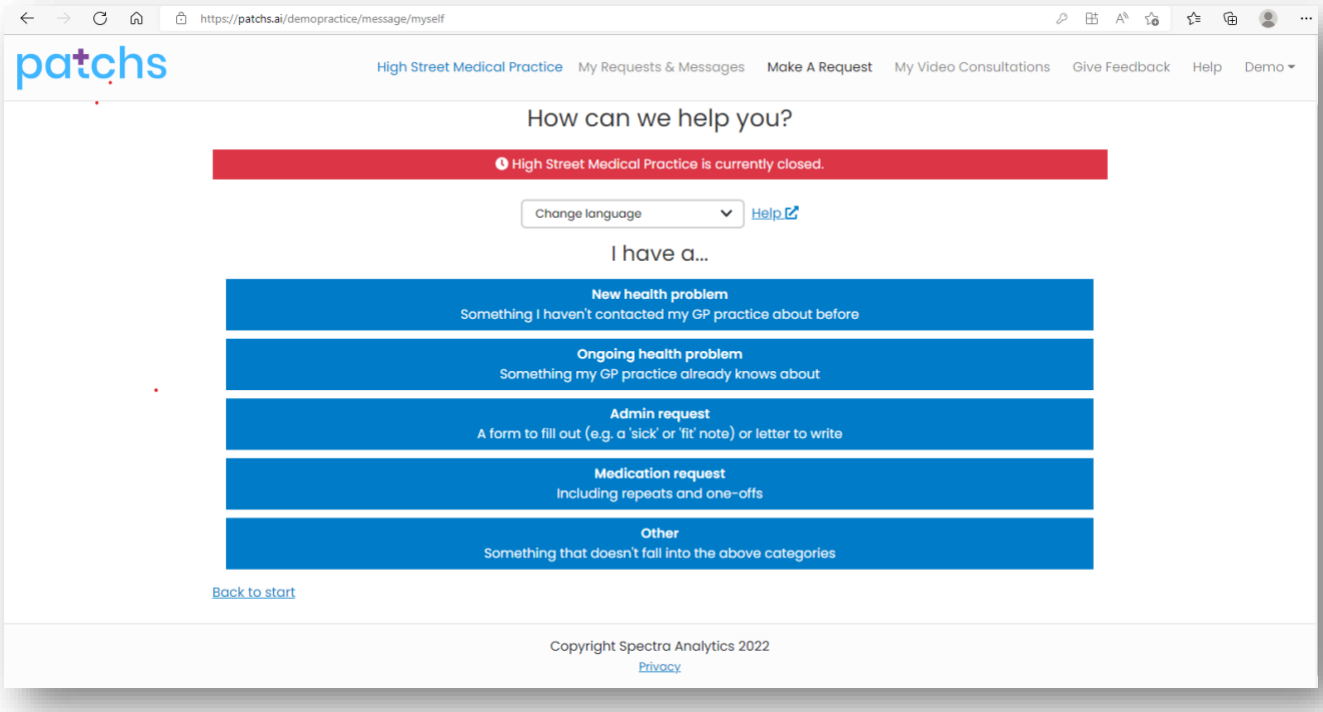
Item 4: Procedures, activities, and/or processes used in the intervention, including any enabling or support activities

Patients

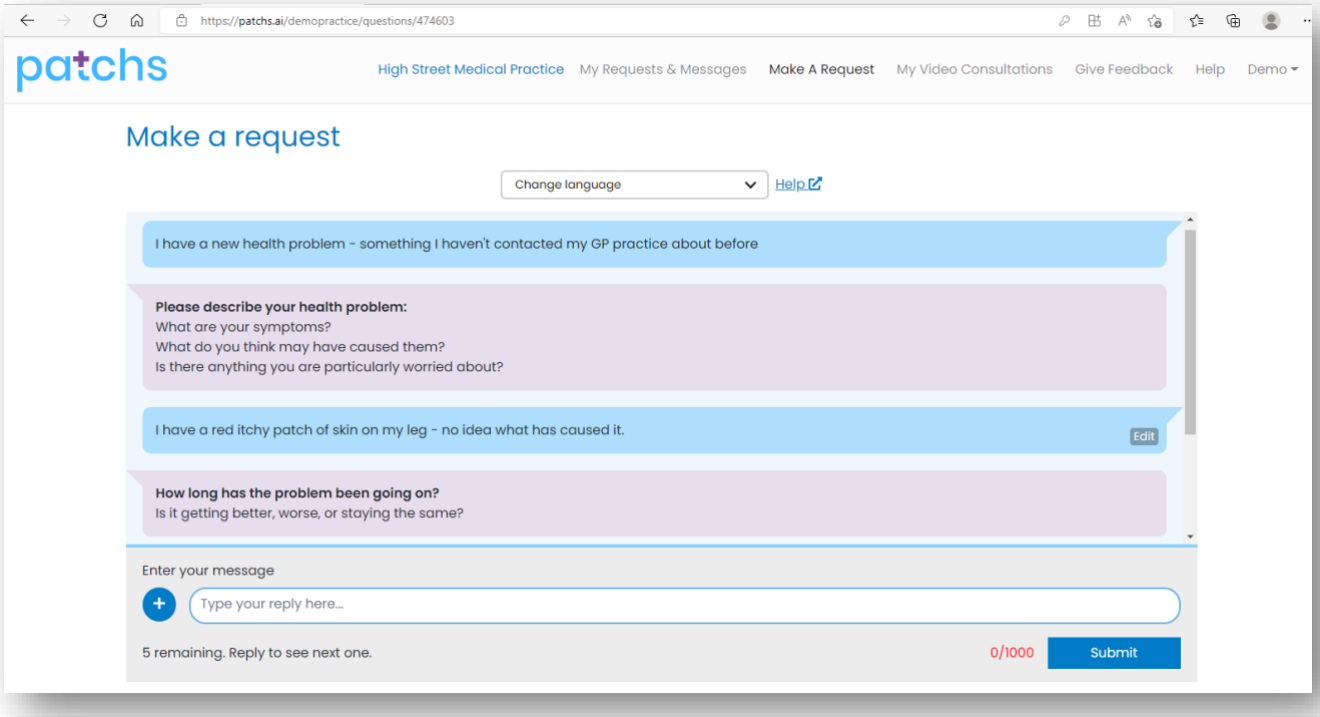
Patients can access Patchs for themselves or for someone they care for via through the website of their GP practice to submit health queries or administrative requests. Patients register for Patchs (using name, date of birth, email address, gender, home address, telephone number) and create an account. Once registration is completed and verified by their GP practice, they are able to use Patchs to submit requests to their GP surgery via a 'chatbot'.



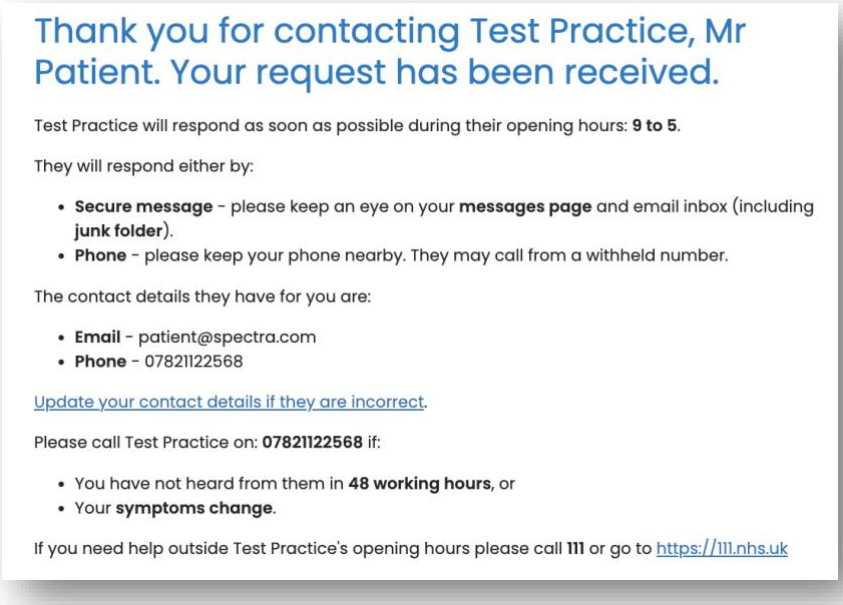
Patients select the type of request they want to submit and choose from five options: new health problem, ongoing health problem, admin request, medication request, or other.



Patients answer up to six fixed questions (how many depends on the type of query they are submitting) in a free-text box. Images and documents can be attached to queries if required. Chatbot questions cover topics that would be covered in a typical traditional primary care consultation and aim to emulate a natural conversation. For example, the health problem questions focus on description of symptoms, treatments tried so far, and ideas, concerns, and expectations e.g. What are your symptoms? What do you think may have caused them? Is there anything you are particularly worried about?



Prior to submitting their request, patients must confirm that the information they have entered is correct and that they agree for it to be added to their GP record. Once submitted, the transcript of their interaction with the Patchs chatbot enters the Patchs 'Unassigned' inbox for the GP surgery to process (see below). After submission, the patient sees a confirmation message in the web browser and in an email. It tells them what to expect next in terms of receiving contact from the GP practice, and what to do if they have not been contacted by the GP practice in a certain amount of time – this time period is set by the GP practice themselves.



Thank you for contacting Test Practice, Mr Patient. Your request has been received.

Test Practice will respond as soon as possible during their opening hours: **9 to 5**.

They will respond either by:

- **Secure message** - please keep an eye on your **messages page** and email inbox (including **junk folder**).
- **Phone** - please keep your phone nearby. They may call from a withheld number.

The contact details they have for you are:

- **Email** - patient@spectra.com
- **Phone** - 07821122568

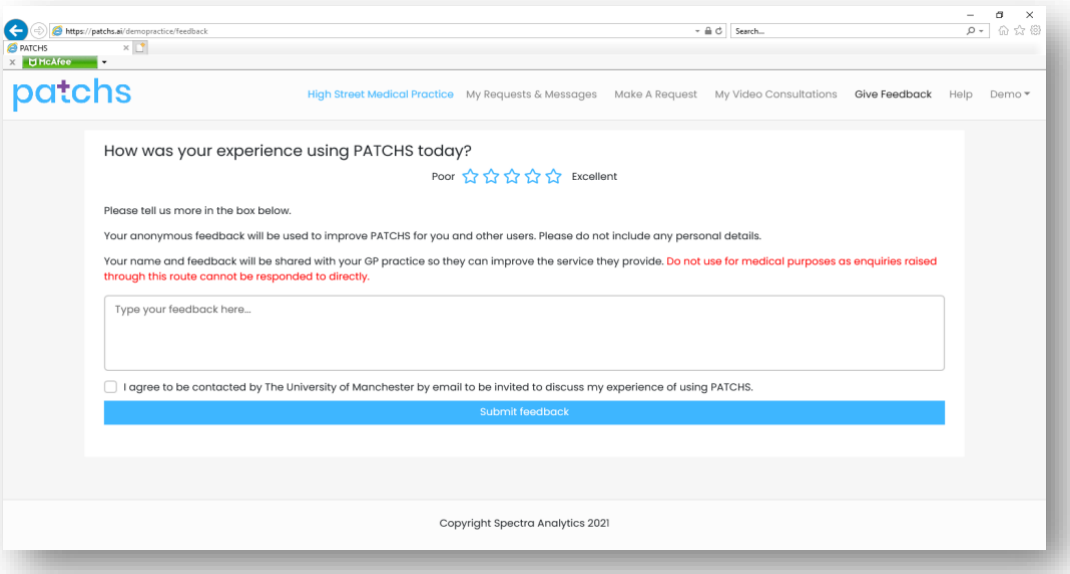
Update your contact details if they are incorrect.

Please call Test Practice on: **07821122568** if:

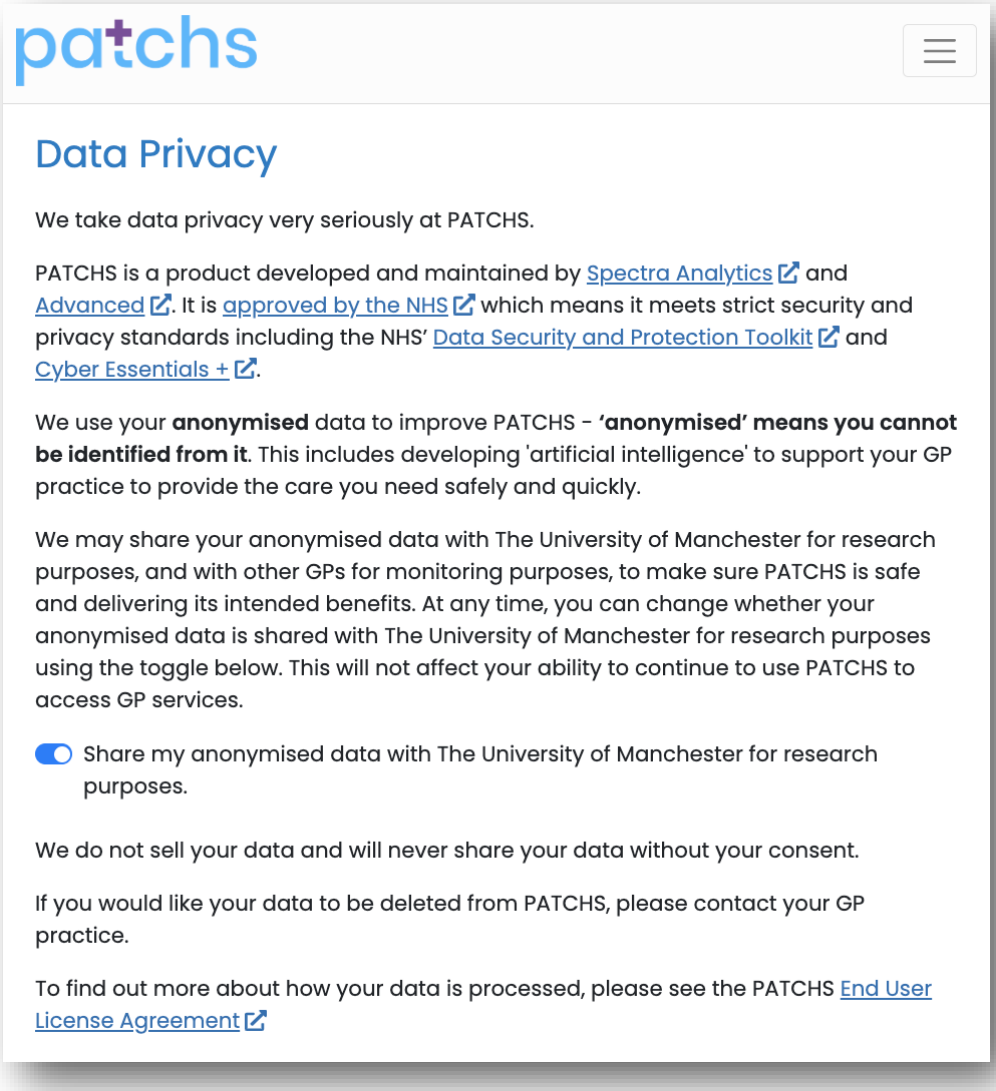
- You have not heard from them in **48 working hours**, or
- Your **symptoms change**.

If you need help outside Test Practice's opening hours please call **111** or go to https://111.nhs.uk

Patients are invited to leave anonymised free text feedback comments and a star rating out of 5 after each time they interact with Patchs e.g. after submitting a request or respond to a message from their GP practice. They also receive an email after their request is resolved by their GP practice with a link to the feedback form. Patients indicate whether they agree to be contacted by the research team via email to be invited to an interview.

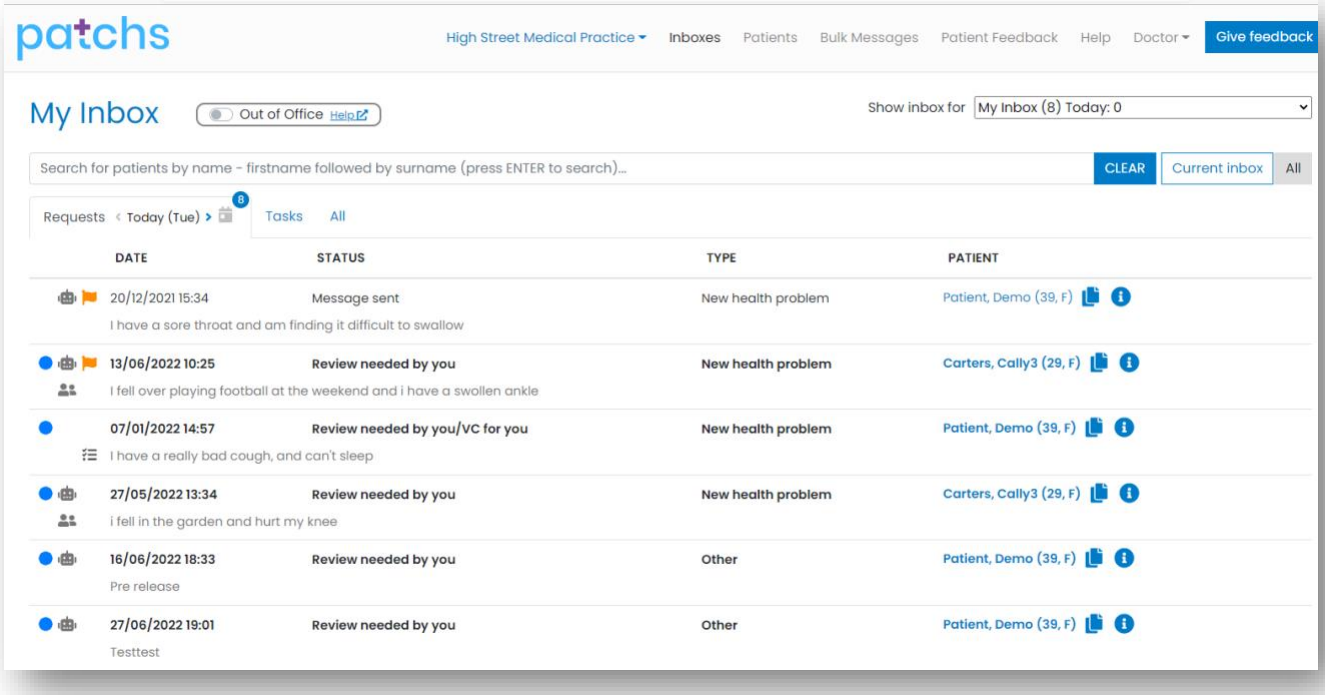


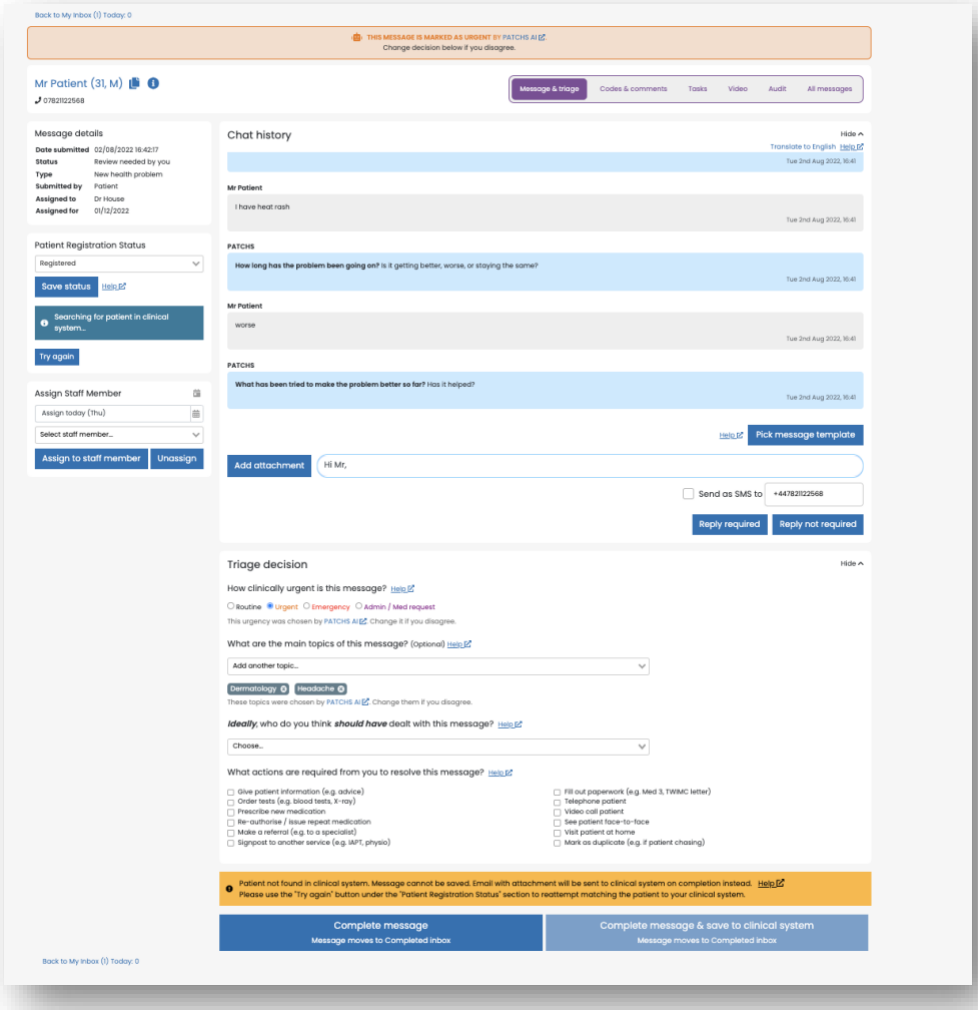
When patients register for Patchs they are informed their anonymised data may be shared with The University of Manchester for research purposes. Patients can opt out of sharing their anonymised data at any point using a toggle button in the Patchs system.



GP practice staff

Staff access Patchs in a web browser. Patient requests initially enter an 'Unassigned' inbox where nominated staff in the practice (usually reception staff) read all submissions and decide who is best to deal with each one (e.g. themselves, GP, nurse, pharmacist, or the patient themselves in self-care scenarios). If the request requires input from another member of staff in the practice (e.g. a GP or nurse), the receptionist will assign the query to their personal inbox in Patchs. Staff can mark requests as urgent or emergency with orange and red flags respectively to highlight them within the system to aid triage. Staff view the details of the patient query in the 'Chat history', and can respond via written message (within Patchs), telephone call, video call (within Patchs), or by arranging an in-person appointment. If patients are sent a secure message Patchs they receive an email or SMS notification with a link to read the message.


patchs
High Street Medical Practice
Inboxes
Patients
Bulk Messages
Patient Feedback
Help
Doctor
Give feedback
My Inbox
Out of Office
Help
Show inbox for
My Inbox (8) Today: 0
Search for patients by name - firstname followed by surname (press ENTER to search)...
CLEAR
Current inbox
All
Requests
Today (Tue)
8
Tasks
All
DATE
STATUS
TYPE
PATIENT
20/12/2021 15:34
Message sent
New health problem
Patient, Demo (39, F)
I have a sore throat and am finding it difficult to swallow
13/06/2022 10:25
Review needed by you
New health problem
Carters, Cally3 (29, F)
I fell over playing football at the weekend and i have a swollen ankle
07/01/2022 14:57
Review needed by you/VC for you
New health problem
Patient, Demo (39, F)
I have a really bad cough, and can't sleep
27/05/2022 13:34
Review needed by you
New health problem
Carters, Cally3 (29, F)
i fell in the garden and hurt my knee
16/06/2022 18:33
Review needed by you
Other
Patient, Demo (39, F)
Pre release
27/06/2022 19:01
Review needed by you
Other
Patient, Demo (39, F)
Testtest



Item 5: Description of the expertise, background and specific training given to intervention providers

Clinicians (e.g. GPs and nurses) and administrative staff with training provided as described in Item 3.

Item 6: Modes of delivery (such as face to face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group

Patchs is a web-based intervention. Patient users access Patchs either via their GP website on a computer or smartphone. Practice staff access Patchs via the website to process requests. Training for both staff and patients as described in Item 3 is delivered in groups.

Item 7: Type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features

For GP practice staff the intervention typically occurs in their place of work, though staff can also use it from home. For patients the intervention takes place online, wherever they are based. As Patchs is an online tool, necessary technical equipment such as a computer (or smartphone for patients) is required and an internet connection

Item 8: Number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity, or dose

This study covers the period May 2020 – September 2021. Patchs was used on a daily basis by GP practices as part of their daily workflow in 51 practices. The most frequently submitted requests by patients were for new health problems (32.2%), followed by ongoing health problems (28.7%), medication requests (17.7%), admin requests (10.8%) and other (10.5%).

Item 9: What, why, when, and how the intervention was planned to be personalised, titrated or adapted

Practices could choose how to implement Patchs into their daily workflow – for example:

- If they used it for all incoming patient requests or if they offered it alongside other forms of access such as telephone and in-person.
- Which members of staff used the system.
- How they responded to patients e.g. via written message, telephone, video, or by arranging an in-person appointment.
- What the advertised response times patients should anticipate from them after they submitted a query (e.g. 48 working hours).
- How many queries patients could submit on a daily basis.
- Whether Patchs could be used solely for clinical or admin queries, or both.

Patients could choose whether or not to use Patchs, and what types of queries to use Patchs for.

Item 10: What, why, when, and how the intervention was modified during the course of the study

Patchs was updated throughout the study. Of relevance to this study were changes to the wording of chatbot questions based on feedback from patients and GP practice staff during interviews, to ensure they were more easily understood by patients and elicited the appropriate information.

Item 11: How and by whom intervention adherence or fidelity was assessed, and any strategies that were used to maintain or improve adherence or fidelity

Members of the Patchs team (not the research team) monitored usage by GP practices and uptake by patients. Where this was deemed to be low, additional training and support was offered as described in Item 3.

Item 12: The extent to which the intervention was delivered as planned in terms of adherence and fidelity

Other studies are quantitatively evaluating fidelity, which will be reported separately.

References

[1]Hoffmann TC, Glasziou PP, Boutron I, Milne R, Perera R, Moher D, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. BMJ. 2014;348:g1687. doi: 10.1136/bmj.g1687.

Supplemental Appendix 2: Interview and focus group topic guide

All participants were given a study information leaflet and provided written or recorded verbal consent prior to their interview or focus group. Transcripts or notes were not shared with participants, however, a summary of what their interview or focus group discussed was provided at the end with opportunity for participants to add more or change anything they had said.

Introduction main points

- Thank you - Purpose of interview is to explore thoughts and experiences of contacting your GP in general, using eVisits and how eVisits may develop in the future.
- Interview will last no longer than one hour but can be flexible around participant availability
- Check study information leaflet has been received in advance and understood. Any questions?
- Run through consent form and take written consent if face-to-face or verbal consent
- Switch on tape.

Opening questions:

- **Practice Staff:** What role do you do within your GP practice? How long have you been doing it?
- **Patients:** How long have you been registered at ---- practice?

<u>Initial AI questions:</u>

- Did you notice in the information sheet that the long term plan of [eVisit system] is to develop an automated feature using Artificial Intelligence (AI)?
- Can you describe what your initial thoughts are about that?
- Can I ask what you understand by 'AI' or what AI means to you - can you think of any examples of AI you are already using in every day life? How frequently do you think you encounter AI applications in your everyday life? How do you feel about using these AI applications? Do you generally feel positive or negative about the use of 'AI'?
- Do you have any thoughts around the use of AI in healthcare? (why do you think you feel that way? Compare and contrast with opinion on use in other areas of life – if different, why?)
- Do you have any thoughts around the use of AI in the eVisit system?
- We are interested to find out how you think eVisit system may use AI…In what way do you think AI might change your experience of using the eVisits? (What do they expect to see - e.g. do they think it will provided tailored questions/have a robot talking to them?)
- Thinking about the possible use of AI in eVisits… What aspects of eVisits do you feel could be automated? Is there anything you would like/not like to see automated?
  (Probes: possible uses might include: automated triage or responses for self-care)

Plain English explanation:

Machine Learning is a type of Artificial Intelligence (AI) computer algorithm that can 'learn' to do tasks we normally associate with human intelligence from examples they have been given i.e. they have not been programmed by a human to perform the tasks.

Examples include; Netflix recommending movies for you to watch based on your viewing history, Google being able to translate languages from text its analysed, and your email system identifying spam. AIs can handle more information than humans, have less variation, and may often be faster at these tasks. However, they are only as good as the examples they have learned from so can have problems such recommending you movies you don't like if someone's been using your Netflix account, Google being unable to translate a local dialect if it's not heard it before, and your email system marking a message from your friend as spam because they sent you a link to a video.

- Have your feelings/thoughts about AI in eVisits changed after discussing the above? In what way?
- Can you think of any advantages to automation/AI in eVisits?
- Can you think of any disadvantages to automation/AI in eVisits?
- Would it make you more or less likely to use[eVisit system], or would it not affect your decision to use it?
- **Staff:** how do you think patients would respond to the thought of AI enhanced features in[eVisit system]? How do you think the use of AI might be best communicated to patients? (phrases to avoid/include, what to emphasise) etc? How would the introduction of AI compared to the introduction of eVisits in general? How do you think other staff may feel at the thought of AI in [eVisit system]?
- **Patients:** How do you think other patients might respond to the thought of AI enhanced features? How do you think practice staff may feel about the use of AI? Do you think they will have a similar opinion to you?
- Would you be interested/open to learning more about AI if you had the opportunity e.g. on data security? Would patient group involvement help embed at practice?

Closing question: *Summarise interview / focus group discussions*: Is there anything you'd like to add that we haven't covered regarding eVisits or AI?

Supplemental Appendix 3: Further information on data collection and analysis

This study was part of a larger project, whose protocol was registered on the Open Science Framework[1].

Research team: individuals conducting data collection

- Sarah Darley (PhD): Research Associate, University of Manchester (female)
- Susan Moschogianis (PhD): Research Associate, University of Manchester (female)
- Tessa Coulson (MD): General Practitioner (GP), Salford CCG (female)

All had PhD (SD and SM) and Masters (TC) level training in qualitative research methods. SD and SM had extensive experience of conducting qualitative data collection and analysis in health care settings.

Participants:

Practices were approached to obtain variation in characteristics thought to impact their adoption of health technologies: Practice size (via number of registered patients), rurality, and levels of socio-economic deprivation. Fourteen practices were recruited in north-west England (n=11) and London (n=3) who were targeted to represent different geographical areas, patient population sizes, and levels of socioeconomic deprivation. All staff in these practices (n=14) were invited to participate in an interview either directly (via email) or indirectly (via research team's named contact at the practice). Recruitment however was purposeful to ensure staff with both clinical and non-clinical roles were included from all practices. Active recruitment stopped upon thematic saturation when themes were fully developed with clear definitions and no new information emerging after at least three interviews. Staff interviews took place between May 2020 and September 2021.

Patients using Patchs were prompted by the eVisit system to leave anonymised feedback (of unlimited character count) at the end of each interaction with the system. This feedback was not analysed as part of this data set, and was used only to identify patients who were willing to be contacted by the research team. All patients submitting feedback were asked if they consented to be contacted by a member of the research team to take part in an interview about their experience and thoughts about eVisits. Invitations to participate, via email, were sent to a selection of these patients to ensure maximum diversity for factors that may influence eVisit experience and views on AI including; age, gender and ethnicity. Patients were recruited from a spread of GP practices (n=9) using the eVisit system, to include maximum variation on practice size, deprivation, location and ethnicity mix. In total 230 patients were invited to participate and 25 responded positively. interviews were conducted on all those who responded positively except 1 who was unable to finish the interview and was excluded prior to analysis. Patient interviews took place between May 2020 and September 2021.

Participants were aware of the research aims, and that the researchers were employed by The University of Manchester and were independent of the eVisit system developers. Interviews were transcribed by a professional company. Transcripts were not returned to participants following interview but a summary of what their interview had discussed was provided at the end of each interview with opportunity for participants to add more or change anything they had said.

Focus groups:

Our initial topic guide and explanation of AI was based on our recent review of the eVisit literature[2] and refined based on feedback from a Patient and Public Involvement in Research Group (eight members). A more complex explanation of AI was simplified following discussion with the group, as participants reported it to be too complex and a barrier to meaningful discussion in the interviews. This meeting was held in June 2020, and was also used to test emerging findings from early interviews. A further focus group was conducted with in May 2021 with a different patient group (5 participants) to discuss and interpret the findings of the interviews. Discussions were led by SM whilst SD took detailed notes.

Data analysis

Disagreements were resolved through discussion, with the wider study team consulted as necessary. Coders developed a coding framework, which was both emergent from the data (inductive) and guided by findings from our recent systematic review (deductive). Codes were refined during weekly meetings with the entire study team. Findings were triangulated between interviews and focus groups, and compared and contrasted between patients, staff and GP practices. Data analysis was conducted alongside interviews; both ceased at saturation when themes were fully developed with clear definitions, and no new information emerging after at least three interviews.

References

[1] Darley S, Brown B. A multi-site process evaluation of online consultations and triage in English primary care 2020 [Available from: https://osf.io/btrgy]

[2] Darley S, Coulson T, Peek N, et al. Understanding How the Design and Implementation of Online Consultations Affect Primary Care Quality: Systematic Review of Evidence With Recommendations for Designers, Providers, and Researchers. *J Med Internet Res*. 2022/10/24 2022;24(10):e37436. doi:10.2196/37436

[3]Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative research in psychology*. 2006;3(2):77-101. doi:10.1191/1478088706qp063oa