What do people with asthma want to see in an asthma self-management app?

What do people with asthma want to see in an asthma self-management app? A review of views expressed in online social discussion forums

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Self-management improves asthma outcomes. Mobile apps are an option for self-management though engaging users is challenging. The features that patients want in an app are unclear. We aimed to identify 'wanted' app features from online forums. We systematically searched (November 2013-January 2017) Google for 'asthma' 'forums', retrieved posts in which patients discussed app features, and synthesised the perceptions thematically using a framework approach. We included 29 threads from nine forums. 59 patients commented on 33 different features in four categories: self-monitoring, feedback/advice, professional/carer support, reminders. Most patients 'wanted' self-monitoring features (logging peak flow, medication and symptoms, personal indoor/outdoor monitoring for triggers) but did not explicitly mention action plans. Fitness tracking, smart device provoked a wide range of responses. The lack of discussion about action plans, suggests today's apps are limited to self-monitoring rather than self-management. Further research is needed to understand this limitation as well as the adoptive and adherent features which encourage self-management.

Keywords: Asthma self-management, Mobile Phone App, Online social forum

1. Introduction

Asthma is common and associated with significant morbidity (Mukherjee 2016). Self-management (as opposed to passive self-monitoring), incorporating a personalised asthma action plan, reinforced by education and supported by regular professional review, reduces morbidity (BTS/SIGN 2016; Pinnock 2016). Using a mobile application (app) to support self-management is an option which is at least as effective as traditional care (Hui 2017).

Apps are widely used for health management (Imison 2016, Deloitte 2015); in 2013, there were 191 apps for people with asthma in English (Huckvale 2015). However, encouraging on-going engagement with apps is challenging (Paul 2015). Users frequently typically stop using a healthcare app within 30 days of downloading, (Localytics 2014; Appboy 2016), reducing the potential benefits of using an app to support self-management. Making the app something people want to use should increase engagement. In general, healthcare apps with features that save time and provide an efficient way of managing care are valued by users (Mendiola 2015) and likely to promote usage. However, in the specific context of asthma self-management, the features that users' value remains unknown.

Clinical research typically focuses on the health-related effectiveness and safety of technology, rather than providing evidence on the valued features of apps (Harrison 2013). In contrast, on-line discussion forums provide a real time communication platform from which to collect people's experiences and opinions (Moorhead 2013). We therefore reviewed the conversations in forums to identify the mobile technology features discussed and valued by people with asthma.

2. Method

We used the Google search guide (Google 2015) to perform forum searches on 17 November 2015 (updated 8 January 2017) using the key terms 'asthma' AND 'forum'. The first 20 results were reviewed from each search and the name of and links to the forums were extracted. Local searches were performed within each of the included forums. If a local search facility was not provided in the site, the Google search engine was used to perform the local forum search by using the recommended universal syntax (site:[url] [search term]). 'Asthma' AND ('app' AND/OR 'gadget' AND/OR 'smartphone') were used as the key search terms for the threads which were assessed by the inclusion/exclusion criteria:

- Inclusion criteria: Threads (query or comment) mentioning any feature a) to support asthma self-management or b) made by someone with asthma, related to smartphone or tablet app features including standalone or web-based apps, apps connected with smart devices (smart inhalers, peak expiratory flow (PEF) meters, indoor air monitors, pedometers).
- Exclusion criteria: a) Discussions which did not mention features of asthma apps and/or asthma; b) No replies to the thread ('simplex communications'); c) App features directed at children; d) New app announcements by developers e) Information without a view on the app features f) Forums not in English.
- Data range: The last post on the thread was less than two years before our search date.

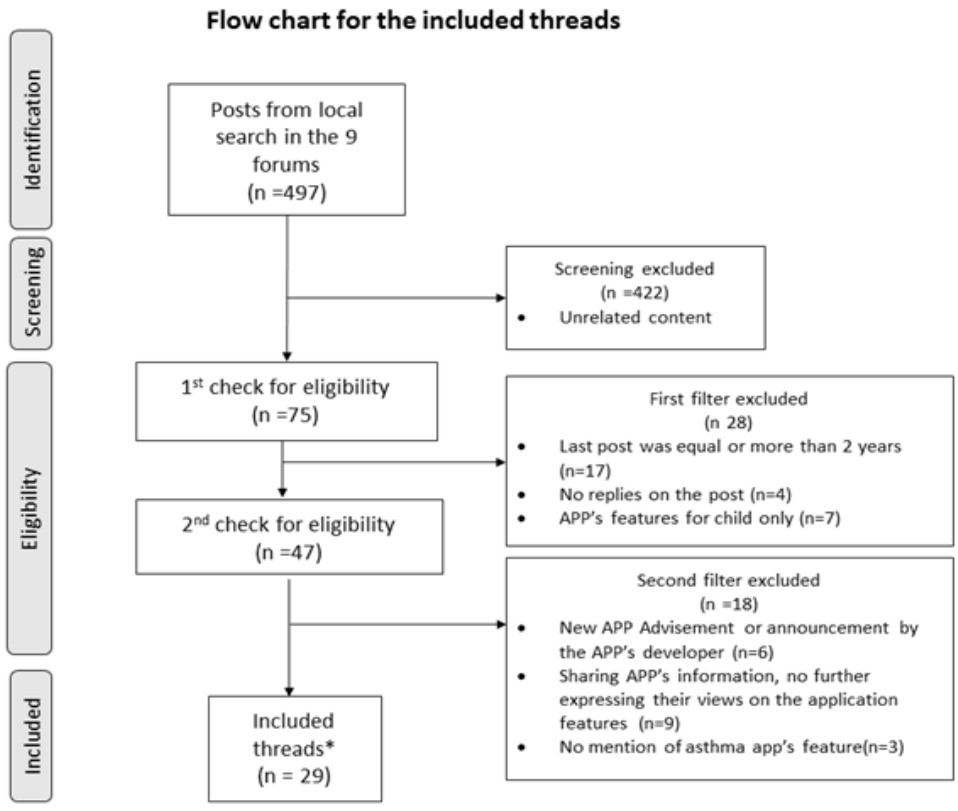
Threads were screened and assessed against the inclusion criteria by one reviewer (CyH), with 30% checked by a second reviewer (VE) (100% agreement achieved). Both reviewers extracted data using a piloted data extraction table under the headings of 'app features' and 'feelings about features'. Comments about a specific mobile product were extracted to a separated table. Disagreements were resolved by discussion.

The two reviewers (CyH and VE) coded the threads iteratively in NVivo. Application features were categorised with reference to previously described features (Hui 2017) and strategies for supporting self-management (Pearce 2016). Emerging themes were developed iteratively and discussed within the multidisciplinary study team. Mentions of specific products (app, smart device gadget or website) were extracted into a separate table and comments mapped to the features to gain an understanding of which product features were considered important.

Results

2.1. Characteristics of the included social discussion forums, threads and people

Nine social discussion forums were identified as having threads on asthma apps/ smart devices. The threads identified, the screening process and the final numbers of threads included, are detailed in the flowchart (Figure 1). In total, 29 threads with opinions from 59 people, were included for analysis. Only eight people were from a forum specifically for asthma; the majority from Reddit (http://www.reddit.com/search?q=%22asthma+app%22&restrict_sr=&sort=relevance&t=all). More than half of the people (58%) stated that they had experience with digital tools, such as smartphone, app and excel spreadsheet. Fewer than 5% of the people stated that they used paper-based diaries for self-management (n=2) or had not used an app before (n=2).



Key: *the 29 threads were extracted from nine social forums, they were Reddit(n=14), Patient.co(n=4), Dailystrength(n=3), Asthma UK(n=3), Running bug(n=2), Patientlikeme(n=1), Healthboard(n=1), eHealth(n=1)and Carenitv[26] (n=1)

Figure1: *Flow chart for the included threads*

2.2. Application features

We identified 33 different features that we grouped into four categories. Figure 2 illustrates the categories and features, the frequency of comments and perceptions of respondents. Four themes emerged: self-monitoring, fitness/health, self-management, emerging technology.

2.3. Application features associated with self-monitoring

Features in the self-monitoring category were the most frequently discussed (79/106 comments: 74.5%). Of all the monitoring features, logging PEF rate (n=18), logging medication usage (n=11), logging symptoms (n=8), monitoring for indoor or outdoor triggers and pollutants (n=8) were the top four features about which respondents felt positive.

> **"**I was looking for something to track my PEF-meter readings and other info like wheezing." [This person started the thread asking for recommendations about good asthma management apps].

> "I'd like something simple. A counter app I can set to start with how many doses my inhaler is supposed to have, and then a way I can count down doses until I need to get a new inhaler."

Specific comments about self-monitoring included concerns about data privacy when logging, storing and collecting health data with an app; logging several aspects of health data in one place (features that made life easier were regarded as 'useful').

2.4. Application features associated with fitness and health

15 people with asthma mentioned fitness and health features which were not usually included in asthma apps. These features were running coaching (n=6), weight watching (n=6), tracking activity (n=1), quitting smoking (n=1), logging health data such as exercise, hours slept and food (n=1). Two thirds (10/150) thought it would be useful to combine these features with other asthma monitoring features or were looking for an app with these features. One person doubted if an asthma app with running coaching would be helpful for all people because asthma was unique to the individual. People who mentioned running coaching were all frequent runners with asthma; they all thought exercise was good for their asthma, including two who described themselves as having exercise-induced asthma.

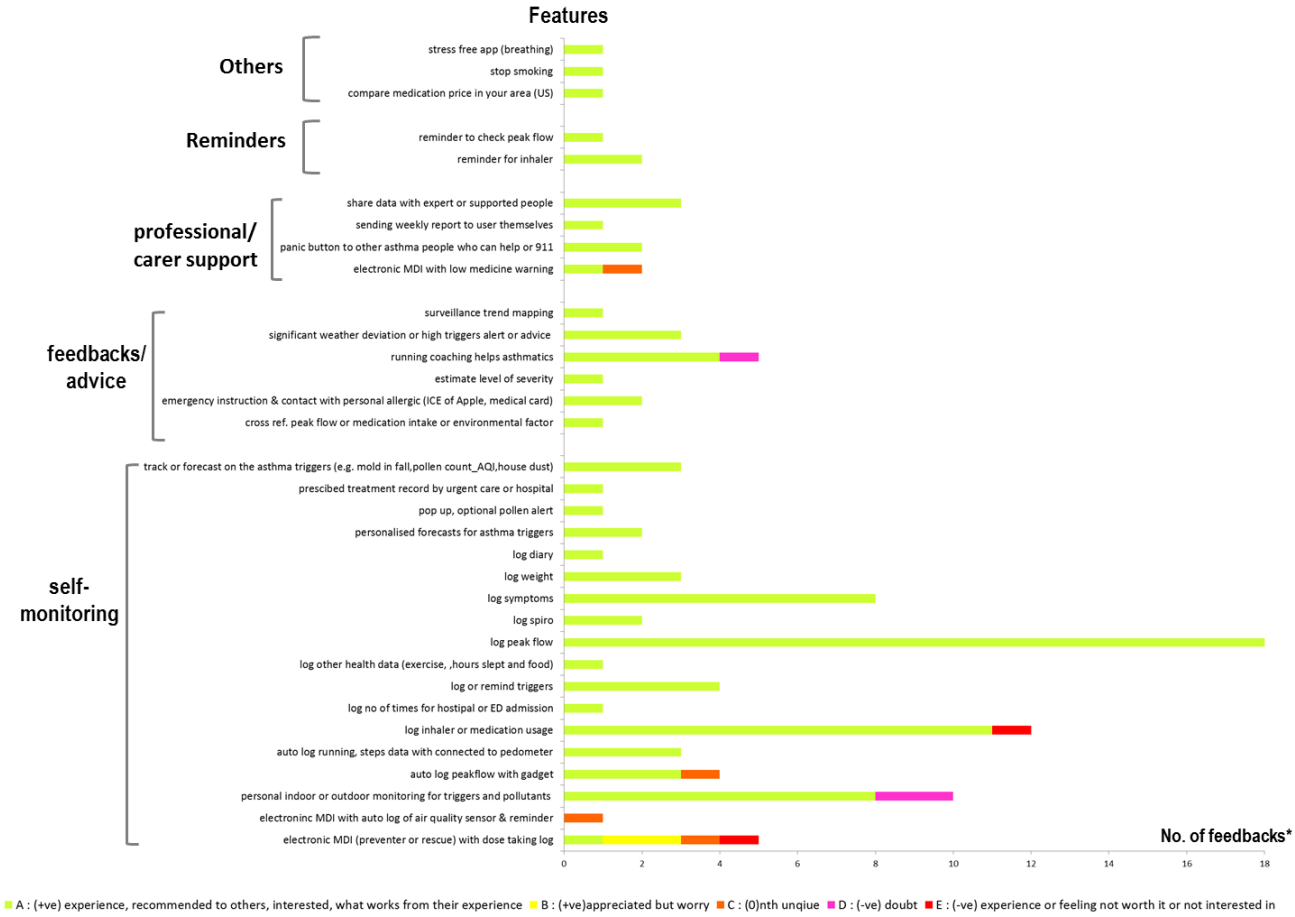


***Figure 2**: Response feedbacks on features*

> "haven't found any app that really helps an asthmatic track & improve their endurance training!...So I was wondering if others with asthma have used any specific resources (online sites, mobile apps, magazines etc etc) to help them train for their running goals?"

> "WHat[What] affects one person and works and doesn't work for one person often has nothing to do with another person's circumstances. For that reason, i wonder how an app could possibly be useful to all asthmatics."

Of the six people who mentioned weight watching, three people were positive about combining logging their weight and their asthma in a single app while three others mentioned specific weight watching apps that they had used. One person with asthma, was looking for the best app to help quit smoking.

2.5. Application features related to self-management

None of the respondents discussed features about education or explicitly mentioned action plans or using self-monitoring data to adjust medication by themselves, though people frequently discussed the features of 'self-monitoring' and receiving 'support from healthcare professionals'.

> "if you have an[a] smart phone there is an app called [the app's name] that I use. You can log symptoms, triggers, when you use your pro-air, Peak Flow Reading, etc. You can also send yourself a weekly report which I love.".

> "Can you also make it iOS compatible? I'd pay good money to have a more convenient way to track meds than my little snoopy notebook" [A developer mentioned plans for an asthma medication diary and the person with asthma posted this response].

> "I've never used an asthma app…But if I had to imagine I were using one, it would do the following... Sends information in an eMail to my pulmonologist…

There was one person who recommended an app endorsed by Asthma New Zealand, which incorporated an action plan and other monitoring features; other respondents indicated that they were 'very interested' in using this app.

> "What is the app called please would be very interested in this please reply asap [as soon as possible]" [An enquiry to the previous respondent who mentioned an app by Asthma New Zealand which combined several records in one place].

> "I use it and find it very helpful, can also show to your Dr or even email a report to their office, very clever little app." [Response to the enquiry].

There were another seven people who discussed an app prototype with an action plan. They discussed the monitoring features such as logging PEF and two mentioned another app which also incorporated an action plan with monitoring features. However, none of them explicitly discussed the action plan feature in the app.

> "Has anyone signed up the [name] app. Loving it simple features. To find the link go to Asthma UK Facebook page and click on it. They want people with asthma to try out the app. Especially love the place for recording peak flow and diary entry." [This person starting the discussion in the forum].

> "I also use [name] app. That graphs it [the PEF]."

2.6. Application features related to emerging technology

Comments about using environmental surveillance to detect and display the concentration of triggers, enabling people to cross reference to their asthma control were all positive.

> "I would want the ability to graph my peak flows with a decent level of detail. Track medication taken and the ability to print out and cross reference data points. Ideally to weather conditions like temperature, humidity and air quality."

Responses related to smart devices such as electronic metered dose inhalers, pedometers and indoor air monitors connected with smartphone apps varied. Of 14 responses in which a smart device was mentioned, eight were positive about using the device to auto log PEF, running, steps, indoor triggers, and medication use.

> "The only feature that would really benefit me would be a way to track when I took it, maybe interfaced with smart phones." [suggesting a smart inhaler – this was a response to a list of inhaler features, including app, ergonomic and aesthetic, suggested by a designer at the beginning of the threat].

> "I'm after an app where I can track my peak flow readings, my medication intake and hopefully have a pedometer incorporated. Does such a thing exist?"

> "I had a respiration problem because of the dust particles. I started using a product named [the smart indoor monitor] and it works great… It just update the information in my smartphone as well as my tablet and I feel that am protected. It is just amazing"

One person felt the smart metered dose inhaler with features of dose-taking log, peak flow log, air quality sensor and reminder was nothing unique from a common metered dose inhaler. Four responses emphasised that they just "want it (the inhaler) to work". Two responders who appreciated using a smart device were also worried about the high cost and data privacy issues.

> "None of those things [a list of features suggested by designer] seem important to me. I just want it to work. Remaining puffs has already been implemented

through a counter; I'd like to keep that. Otherwise, my only criteria is that it work." [Response A].

"Not really interested in any of those things. Like [response A] said I just want it to work and not cost a fortune." [Response B - commenting on response A].

"I've been reading this thread and also the original, and I've really felt the same as most people in that we just need something that works and isn't a million bucks…My concern comes down to data/privacy and access to health information though." [Response C- commenting on the thread of response A and B].

3. Discussion

Our online social forum review captured perspectives on mobile app features that people valued. Four categories (self-monitoring, feedback/advice, professional/carer support, reminders), were discussed by people with asthma in eight social forums during the period (November 2013-January 2017). Self-monitoring features (logging PEF, medication and symptoms, monitoring for triggers and pollutants) were widely discussed and valued by people with asthma. General health and interest forums reach a wide population and attracted the majority of people in our included threads. Including fitness and health features (running coaching, weight loss and quitting smoking) in an asthma app would avoid multiple apps and be convenient. Smart devices provoked a wide range of responses.

No-one explicitly commented on features related to education, action plans or using logged data to self-manage their medication. However, seven people discussed apps known to incorporate an action plan, though the feature people highlighted and recommended to others was being able to send information to their doctor.

4. Strengths and limitations

The strength of this review is that it provides an evidence-based review of application features that people with asthma discuss in forums and captures their views on emerging technologies. However, the review has some limitations.

Compared to qualitative interviews, body language, facial expression and tone, could not be captured from questions and responses in online social discussion forums. We did not post follow up questions to clarify peoples' opinions as that would have affected the discussions. On the other hand, the data we collected were freely expressed in an 'open' environment uninfluenced by a specific research agenda.

The opinions we collected were from 'posters' (people who communicate their experience to others) and omitted the 'lurker' (those who read the content but do not post their opinions). The results may not include all the features that would be valuable to all people with asthma. The features discussed were generally components of existing apps; further research will be needed to identify novel features that may motivate people to adopt asthma self-management in an app. Our list of valued features, however, is a useful starting point for discussing and developing a prototype app.

Due to resource/time constraints, the initial selection was undertaken by a single reviewer, though a proportion was checked by a second reviewer as a quality check.

5. Interpretation of findings in relation to previously published work

The PRISMS taxonomy (Pearce 2016) summarises 14 strategies for supporting self-management. The 33 different features discussed (typically positively) by people with asthma in our study reflected 12 of the taxonomy items. The two taxonomy items not discussed were 'information about available resources' and the 'action plan'. Some people, however, were using a national patient charity's support group forum to share experience and information so were implicitly using resources.

No respondents explicitly discussed action plans, though one person mentioned other features of an app known to contain an action plan. Action plans are uncommon features of asthma apps in the market (Huckvale 2015), so people may not have tried one, or may not know what an 'action plan' was; or not be aware that it could be implemented in an app. In contrast, a number of features of mobile apps associated with supported self-management (such as monitoring peak flows, symptoms, medication use, monitoring indoor or outdoor triggers and pollutants, receiving feedback or advice for further actions on their asthma) were accepted by people with asthma.

6. Conclusion

Currently available apps and the majority of comments posted on social forums by people with asthma focus on self-monitoring rather than self-management. Specific features such as running coaching, weight loss and quitting smoke were welcomed by a few people, and could be integrated in asthma apps. Further research is needed to understand the barriers to moving apps from self-monitoring to self-management, and to evaluate app's features associated with effective adoption and adherence to self-management.

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