

Development of a Prototype Patient Respiratory Management Mobile Health Application Using Validated Tools to Assess User Experience

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INTRODUCTION

In recent years, the field of mobile health (mHealth) has experienced a rapid expansion, with a wide array of mobile applications catering to various health and wellness needs. These applications hold immense potential to transform healthcare, empowering individuals to actively participate in their treatment and well-being.

However, poor design features, such as complicated navigation and screen presentations are not accepted by users in real-world settings¹ and as a result can hinder engagement and adherence to recommended treatments.² Similarly, features that promote usability and personalization are associated with increased use of mHealth apps.^{3,4,5}

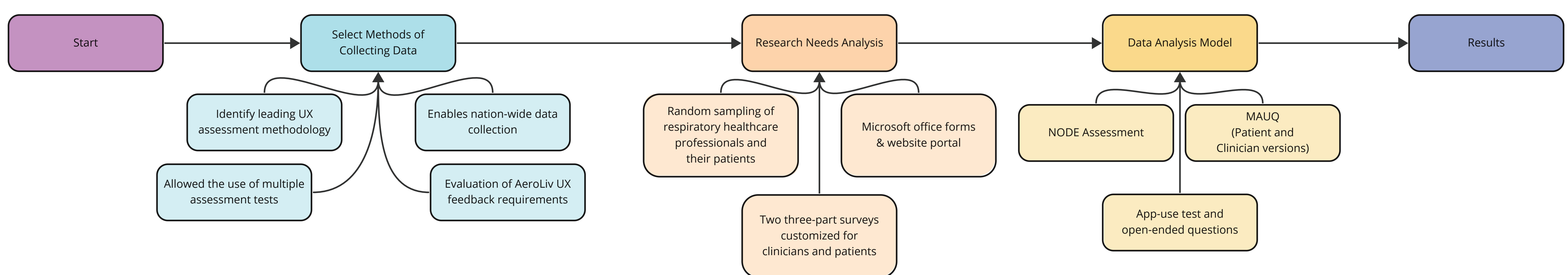
Therefore, evaluating the usability of mHealth applications becomes paramount to ensure their efficacy in promoting positive health outcomes. To address this crucial aspect, researchers and experts have developed evaluation tools, such as the NODE.Health (Network for Digital Evidence)⁶ and mHealth App Usability Questionnaire (MAUQ).⁷ These tools allow developers to obtain valuable insights into the strengths and weaknesses of an mHealth application, enabling them to make informed decisions for improvement and optimization.

OBJECTIVES

- Develop a validated survey framework to systematically evaluate a user-centric mobile health application
- Apply scientifically-validated tools to assess the usability of a mobile respiratory health app
- Identify and prioritize areas of improvement communicated by app users and clinicians
- Lay the foundation for a user-friendly scientifically-validated software-as-a-medical-device mobile app

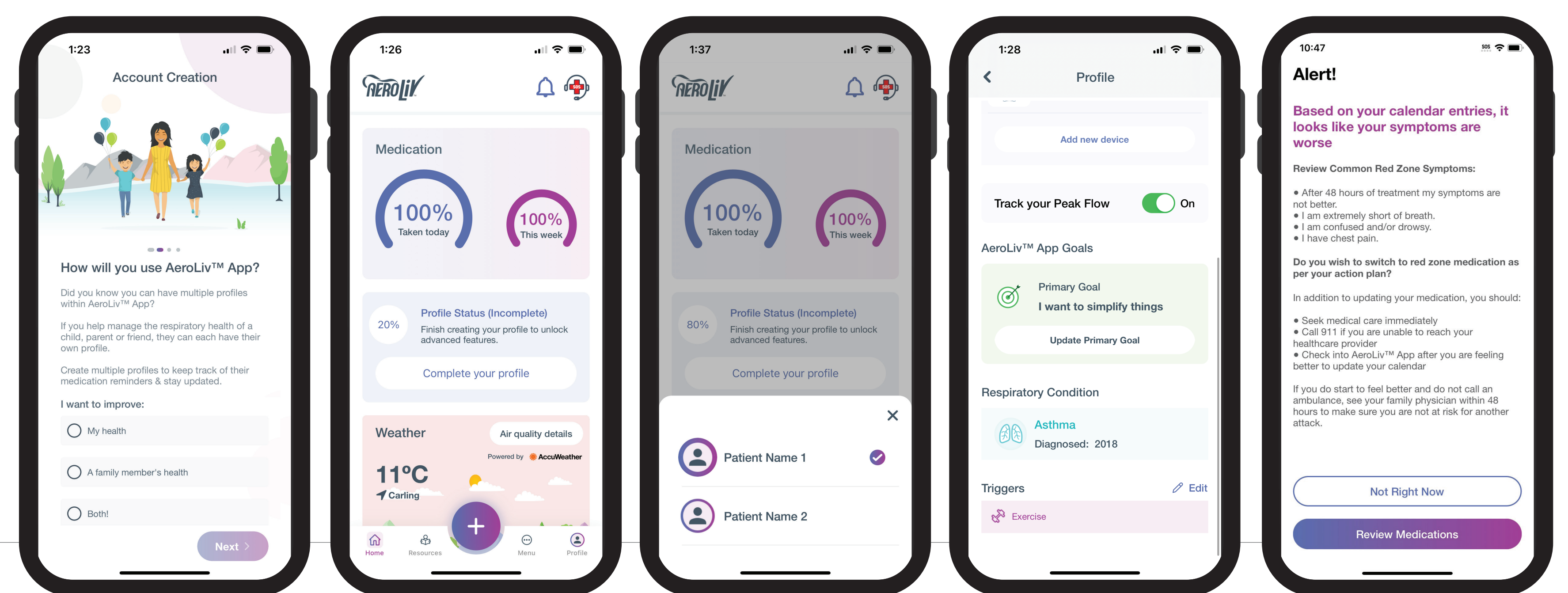
MATERIALS & METHODS

Given that this was the first iteration of evaluating the application, the survey was focused on those elements of NODE. Health and MAUQ that were related to **Design** - follows familiar user-centered design patterns and is easy to use and **Value** - provides efficiency and value for users.



Acceptances were received from 11 HCPs (nurse, respiratory therapist and physician) and 12 patients (10 asthma, 2 COPD). The HCPs were asked to evaluate the app through the lens of how their patients might respond.

Given sufficient responses a statistical approach such as SPSS Exploratory Factor Analysis (EFA) can be used to assess each of the questions.⁸ However, given the early nature of this investigation we set arbitrary limits where, if 30% or more responses indicated they 'Strongly Disagreed' or 'Disagreed' with a particular question, we deemed those aspects to require further investigation and look to improve those elements of the application.



RESULTS & FOLLOW UP

Of the 15 questions asked approximately 2/3 received overall positive responses (Neither Agree nor Disagree/Agree/Strongly Agree).

The following questions were identified as requirement more investigation for our next iteration:

Patients	Clinicians
<i>I would use this app again.</i>	<i>Adding symptoms was easy</i>
<i>Overall I am satisfied with this app.</i>	<i>I like the interface of the app.</i>
<i>The amount of time involved in using this app has been fitting for me.</i>	<i>The app adequately acknowledged and provided information to let me know the progress of my action.</i>
	<i>This app has all the functions and capabilities I expected it to have.</i>
	<i>Whenever I made a mistake using the app, I could recover easily and quickly.</i>

To determine how best to eliminate the identified gaps, HCPs were assembled as an advisory board where follow-up questions based on survey results could be asked to gain a consensus. For patients, where possible, phone calls were arranged to discuss their feedback. From both groups, written comments from the survey were used for direction on how to improve and add more value to the user experience.

Implementing Feedback

It was identified that priority development should be given to changes that reduce the time a user needs to spend on the app to complete a task.

Future Versions of the Application

One of the limitations in conducting this survey was that the app is also intended (in the future) to form the basis of a companion to a piece of connected technology (i.e. smart dose counter, smart valved holding chamber etc.). Without the accompanying tactile experience, some aspects of the questionnaire resulted in comments that the app is not "useful enough yet". From further discussions participants described that the app needed to tell the patient something "they don't already know", therefore, additional features that prioritize a "so-what" outcome are necessary.

Strengths and Limitations

The strength of the study is that we have outlined a systematic approach to ensure that the application is created with the user at the center of the experience. The greatest limitation of this work is that it is still in the early stages with few respondents and an identified need to incorporate a tangible connection to their actual therapy / treatment. Future work will also need to expand the questionnaire to encompass other aspects of the NODE.Health and MAUQ that evaluate data control (privacy, control and security of data) as well as functional performance, such that tasks are executed quickly and accurately without impeding the user.

CONCLUSION

Developing a mobile health application using validated survey frameworks provides a systematic and user-centric approach that can help address the needs, desires, and expectations of patients. Developers can create an application that enhances disease management, improve patient outcomes, and promote self-care. In this case, the survey enabled the identification of a number of priority areas which were able to be followed up with patients and HCPs with the intent of making further improvements.