Design of an App for Documenting Daily Pain to Better Manage Triggers and Treatment

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Background

- Chronic pain is a prevalent problem in the US and world, experienced by at least ⅛ of adults [2].
- Difficult to achieve personalized treatment plans due to multitude of pain causes.
- Opioids used to treat pain are often over-prescribed, leading to dangerous side effects [3].
- Strategies for patients to monitor chronic pain currently includes apps with journal-style formats and bullet journaling.

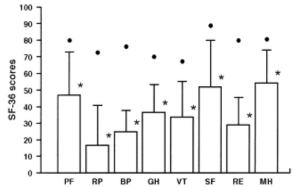


Fig. 1 Effect of chronic nonmalignant pain on quality of life [1]
as indicated by SF-36 subscores, PF = physical functioning; RP = role-physical; BP = bodily pain; GH = general health; VT = vitality; SF = social functioning; RE = role-emotional; MH = mental health

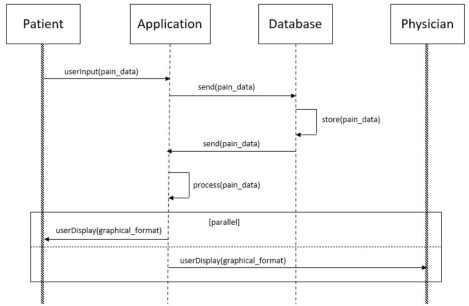
Design Criteria

Design Requirements	Justification
UI/UX Design	Simple and easy to use (SUS score of at least 80) with useful statistical information for the clinician
HIPAA	The app will need to handle sensitive medical information that meets HIPAA requirements
Cost	$20,000 budget to develop, test, and deploy the app
Expandability	Need the ability to add new libraries, languages, and features within future updates and implementations

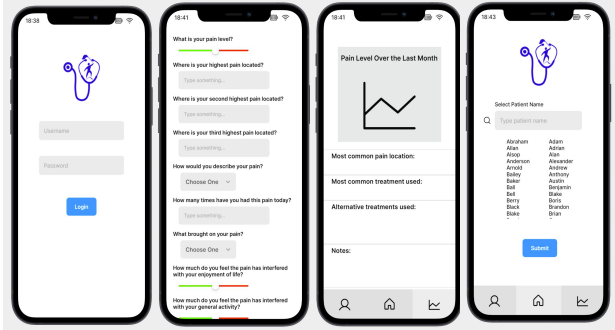
Engineering Standards

- IEEE 1752.1-202: details the collection and sharing of mobile health data [4]
- ISO/IEEE 11073-00103-2012: provides information on the testing of apps containing patient data [5]
- ISO/IEEE 11073-20601-2019: concerns optimizing the efficiency of patient data usage [6]

Prototype



This sequence diagram describes the backend features of the app, including the way the information flow and processing.



Selection of pages from application user interface design program (Framer). **A** is the check-in page for both patient and provider. **B** is the input page for the patient. **C** is the data output page for both patient and provider. **D** is the comprehensive patient lookup page for the provider.

Usability Testing Plan

Static Application Security Testing (SAST)

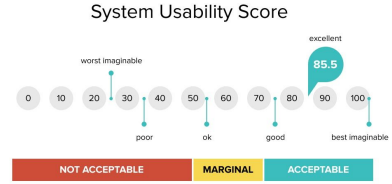
- This test uses tools to analyze code line by line without actually running it to ensure that there are no vulnerabilities that could lead to exposure of personal data [7].

Dynamic Application Security Testing (DAST)

- This test uses tools to attempt to "hack" into the application while it is running to assess any vulnerabilities [8].

System Usability Scale (SUS)

- Our goal is to have a System Usability Score of at least 80 [9].



Future Directions

- A suitable database should be selected, we recommend MongoDB as it is scalable, prioritizes data security, and allows for expansion.
- A 3D anatomical model of the human body should be made available for the patient to select the location of their pain.
- Push notifications should be implemented to remind patients to input data and for providers to look over patient data before an appointment.
- Data encryption and further decisions for increased data security are a must.

Acknowledgments

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