Quality benchmarks identified for laboratory medicine mobile apps

Dr Snežana Jovičić and her colleagues from the EFLM "Patient Focused Laboratory Medicine" Working Group (PFLM-WG) have identified several benchmarks for quality evaluation of patient-oriented laboratory medicines apps. These include referencing information to ensure trustworthiness, appropriate graphics for knowledge supplementation, and simple explanations of laboratory test results. This ensures the empowerment of patients in understanding their own medical condition. These benchmarks should also be considered in future evaluations of patient-oriented laboratory medicine apps.

During recent years, many new smartphone applications (apps) for health interventions have been developed, due to the global use of smartphones and their accessibility to clinicians and patients. Digital healthcare is growing rapidly with the emergence of new technologies. The global mobile medical apps market is expected to grow from a valuation of $2.4 billion USD in 2017 to $11 billion USD in 2025. In short, we are living in a digital age; healthcare professionals and patients are increasingly adapting to this digital revolution.

For clinicians, health-related apps are used to directly interact with patients, as a clinical reference tool for patient history, and as a medical education tool. This facilitates and improves patient care. Patients can seek further information of a particular health condition and access health records on these apps, which empowers them to make better health decisions through improved knowledge of their own condition. Most apps are designed to target people who seek to manage or prevent chronic diseases. Although health-related apps show promising trajectory for the digital healthcare revolution, there are very few studies that evaluate their reliability.

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THE EVALUATION OF MOBILE HEALTH APPS

Several quality assessments exist for health-related websites to ensure users obtain accurate information, such as the guidelines of the National Institute of Health's National Library of Medicine. This includes the disclosure of site provider and funding, identification of information source, and disclosure of privacy policy for manipulation of users' personal information.

In comparison, the evaluation of the quality of health-related apps is challenging because there has been no standardised benchmark for the regulation of their content, especially for most apps that are freely available on smartphone software platforms like Apple's iOS or Google's Android. The Food and Drug Administration's Act on Mobile Medical Applications in the USA and the European Commission's Guidance Document for Medical Devices only regulate and recognise apps that function as an accessory to a regulated medical device. This disregards many other apps that are used by millions of people.

Moreover, the quality of these apps is typically determined by evaluating the user experience (UX) and user interface (UI) design, stability of the software programme, and its performance. Although important factors, there are gaps in assessing the quality or accuracy of health information in these apps.

Many health-intervention apps include laboratory medicine data, which is information about patients' laboratory test results. They are significant because they are needed to determine further clinical decisions. There is also a growing interest within patients to access and understand their laboratory test results on mobile apps, as it saves time and minimises the chances of patients missing key results. Allowing patients to access their laboratory results ensures a strong sense of ownership of their results, which increases patient engagement. Understanding of diseases allows patients to handle and monitor their health better over time. Therefore, the analysis of mobile health apps with laboratory medicine data has to be performed to ensure that both healthcare professionals and patients are receiving accurate health information from these mobile apps.

Dr Snežana Jovičić and her colleagues from the Working Group of the European Federation of Clinical Chemistry and Laboratory Medicine on Patient Focused Laboratory Medicine (PFLM-WG) decided to comprehensively evaluate the quality and reliability of content and functioning of health-related apps that utilise laboratory medicine data. A tool called the Mobile Application Rating Scale (MARS), which critiques the cover engagement, functionality, aesthetics, and information quality of the app content, was used to critically appraise health-related apps with laboratory medicine data. MARS was developed in 2015 by Stoyanov et al and has been consistently used to evaluate health-related apps.

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RESULTS

Apps that incorporate laboratory medicine data only represent a minority of health-related apps. Dr Jovičić grouped these apps into seven categories, which include apps that:

(1) provide medical advice about symptoms with the option of uploading laboratory test results for storage and sharing,
(2) include reference ranges of selected analysis with basic information about the changes in test results, designed for patients,
(3) provide quick reference of laboratory test results for medical professionals,
(4) monitor patients' health using health parameters, such as glucose and cholesterol as laboratory data,
(5) provide patients' laboratory results to physicians,
(6) enable patients to access their laboratory test results directly from diagnostic centres, and
(7) provide electronic health records, including laboratory test results.

It should be noted that less than half of the laboratory medicine data apps available are intended for patient use (categories 2 and 4). These apps designed for patients are of the poorest quality due to lack of quality of content and useful information, which are generally not referenced. Moreover, there are significant privacy issues, as apps aimed for patient use generally have questionable affiliation of developers, which were mostly unknown or commercial. It is important to transparently disclose affiliated third parties, as personal laboratory medicine data can be collected, misused, and shared with parties that seek to exploit patients' data without the explicit consent of users.

There may be a lack of correlation between ratings on app stores and the MARS scores that were used as a professional benchmark for critical

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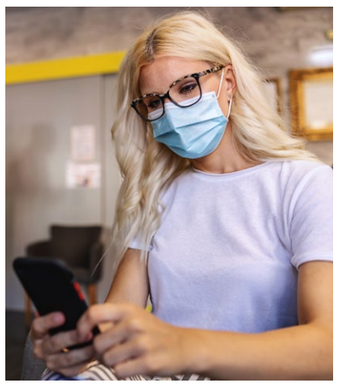
Information with visible references, appropriate graphics, and ease of usability must be considered by app developers to ensure patients can understand their own laboratory test results, and through them their medical condition.

evaluation. User ratings on app stores can be misleading as those writing them may not have enough medical knowledge to distinguish between useful and inaccurate information.

However, users' opinions are equally important to determine the gaps in analysis from the point of view of potential patients. A further study was performed to gather the opinions and impressions of 25 potential patients on these apps. An adapted questionnaire of MARS was used to stimulate critical appraisal from participants. Participants' age ranged from 20-60 years and were of both genders. This is then compared with the quality analysis of laboratory medicine specialists.

Participants corroborated the low utility of currently available laboratory medicine apps that were previously analysed by laboratory medicine specialists, signifying better app design is needed to answer patients' needs. They identified several important benchmarks that are required for mobile health app developers to keep in mind. Health-related apps should have understandable terminology, appropriate and creative graphic design, and trustworthy information. The importance of understanding patients' own laboratory test results should be stressed, so patients can confidently make better health choices.



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Patients are encouraged to fact-check information they find on laboratory medicine apps.

This requires the design of apps that better explain the meaning of specific health parameters with simplicity. Many apps that are designed for patients include explanations of laboratory test results that are over-detailed with scientific terminology that is not explained, which may be more suited for healthcare professionals or patients who are more motivated to enquire further information. Therefore, simple explanations are needed to cater to patients with varying motivation and prior medical knowledge.

LIMITATIONS OF THE STUDY

Even though the quality of health-related apps that include laboratory medicine data is influential, there lacks analysis on the effect of these apps on user habits and overall patient health – did the app increase health awareness or the understanding of laboratory test results? The small number of participants were all healthy with no chronic conditions. There is a difference in motivation between healthy and sick individuals. Patients suffering from chronic diseases are more motivated to understand and search for more information about their health. Therefore, participants in these studies may negatively critique the apps more so than patients who may be more motivated to search for further clarifications in other sources.

Regardless, this study has provided an important quality benchmark for laboratory medicine apps. Trustworthy and understandable information with visible references, appropriate graphics to supplement knowledge, and ease of usability must be considered by app developers to ensure patients can accurately understand their own laboratory test results, and through them their medical condition. In addition, these benchmarks should be considered when evaluating patient-oriented laboratory medicine apps in future studies.

Patients using laboratory medicine apps need to bear in mind the lack of regulation of the apps from government officials and academic institutions. Therefore, always fact-check and ensure only information with clearly stated and visible references is utilised.

Behind the Research

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Research Objectives

Dr Jovičić and her colleagues have developed benchmarks for quality evaluation of patient-oriented laboratory medicine apps.

Detail

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Bio

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Personal Response

How will you address the effects of laboratory medicine apps on patient behaviour in further studies?

"In further studies, the WG intends to collaborate with patients' organisations on evaluating the effects of laboratory medicine apps on behaviour of chronic patients, and on the outcome and management of their conditions. The planned finalisation of this project is to design a non-commercial laboratory medicine mobile application explaining laboratory results to patients that would be in accordance with the quality demands established through this study. If you want to learn more about the activities of the PFLM-WG, you may visit their webpage: https://www.eflm.eu/site/page/a/1153."