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The transformation of health through technology: Saúde Já Curitiba app

La transformación de la salud a través de la tecnología: aplicación Saúde Já Curitiba

A transformação da saúde através da tecnologia: aplicativo Saúde Já Curitiba

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Abstract

The aim was to present the Saúde Já Curitiba application, which represents a crucial innovation in the transformation of health through technology. Developed by the Municipal Health Department in 2017, the application has evolved into its sixth version, emerging as an integrative platform for health services accessible via mobile devices. During the COVID-19 pandemic, it played a vital role in organizing information and offering services, becoming the main channel for information about vaccination. This is an original study of technological innovation, documenting the development of the application in collaboration with the Smart Cities Institute. Results indicate progressive improvements from the tracking of health units to the integration of services, highlighting the implementation of video calls for telemedicine. The importance of Saúde Já in optimizing health services is emphasized, highlighting the impressive numbers of users and services provided. Its contribution to the transformation of the healthcare model (Health 4.1) stands out and points to future innovations, including the potential development of Artificial Intelligence resources for personalized care and prediction of complications.

Descriptors: Digital Technology; Health Applications; Technology and Society; Health Technology; Software.

Resumén

El objetivo fue presentar la aplicación Saúde Já Curitiba, que representa una innovación crucial en la transformación de la salud a través de la tecnología. Desarrollada por la Secretaría Municipal de Salud en 2017, la aplicación evolucionó hacia su sexta versión, emergiendo como una plataforma integradora de servicios de salud accesible a través de dispositivos móviles. Durante la pandemia de COVID-19 jugó un papel vital en la organización de la información y la oferta de servicios, convirtiéndose en el principal canal de información sobre vacunación. Este es un estudio original de innovación tecnológica, que documenta el desarrollo de la aplicación en colaboración con el Smart Cities Institute. Los resultados indican mejoras progresivas desde el seguimiento de las unidades de salud hasta la integración de servicios, destacándose la implementación de videollamadas para telemedicina. Se destaca la importancia de Saúde Já en la optimización de los servicios de salud, destacando cifras impresionantes de usuarios y servicios prestados. Destaca su contribución a la transformación del modelo sanitario (Salud 4.1) y apunta a futuras innovaciones, entre ellas el potencial desarrollo de recursos de Inteligencia Artificial para la atención personalizada y la predicción de complicaciones.

Descriptores: Tecnología Digital; Aplicaciones de Salud; Tecnología y Sociedad; Tecnología de la Salud; Software.

Resumo

Objetivou-se apresentar o aplicativo Saúde Já Curitiba, o qual representa uma inovação crucial na transformação da saúde através da tecnologia. Desenvolvido pela Secretaria Municipal da Saúde em 2017, o aplicativo evoluiu para sua sexta versão, emergindo como uma plataforma integrativa de serviços de saúde acessíveis via dispositivos móveis. Durante a pandemia da COVID-19, desempenhou papel vital na organização de informações e na oferta de serviços, tornando-se o principal canal de informações sobre vacinação. Trata-se de um estudo original de inovação tecnológica, documentando o desenvolvimento do aplicativo com a colaboração do Instituto das Cidades Inteligentes. Resultados indicam melhorias progressivas desde o rastreamento de unidades de saúde até a integração de serviços, destacando a implementação de videochamadas para telemedicina. Enfatiza-se a importância do Saúde Já na otimização dos serviços de saúde, evidenciando números impressionantes de usuários e serviços fornecidos. Destaca-se sua contribuição para a transformação do modelo de saúde (Saúde 4.1) e aponta para futuras inovações, incluindo o potencial desenvolvimento de recursos de Inteligência Artificial para cuidados personalizados e predição de complicações.

Descritores: Tecnologia Digital; Aplicativos em Saúde; Tecnologia e Sociedade; Tecnologia em Saúde; Software.

Introduction

Applications are software installed on mobile devices, such as tablets and smartphones, which are increasingly a source of information, especially for hyperconnected individuals. In the educational context, including the health area, these mobile technologies innovate the teaching-learning process, promoting healthy habits, management of chronic conditions, and continuous health assessment[1-3].

Information and Communication Technologies (ICTs) applied to health offer tools that help organize and structure data and information, allowing storage, processing, remote access, and sharing of this data. These tools benefit both healthcare professionals and users. Intending to improve health care, the Municipal Health Department of Curitiba (SMS) developed the Saúde Já Curitiba application in 2017. Since then, it has undergone improvements and is currently in its sixth version, digitizing several services and allowing greater involvement of citizens in managing their health[4-7].

During the SARS-CoV-2 pandemic, the application played a fundamental role in organizing information, and guidance and offering services that reduced the need for patients to leave their homes. Its support increased significantly when it became the main channel for information about vaccination during the pandemic. Currently, the application is an integrative health services platform, accessible in the palm of your hand, which has been gaining new features and bringing users closer to the public digital health service.

This way of doing health is part of the Health 4.1 model, implemented by SMS, which combines industry 4.0 technologies with a focus on the individual, represented by the number 1, providing technical knowledge and skills to meet people's needs.

This work aims to present the journey of development, implementation, and evolution of the Saúde Já Curitiba application. The solution is a technological tool that seeks to digitize health services and, at the same time, promote self-care, management of chronic conditions, and easy access to health information by the user.

Using the application demonstrates the importance of these technologies when applied to the health sector, and how they can optimize results, reduce health risks, generate savings, and understand the factors that influence health and the emergence of diseases. The work also addresses the relevance that this mobile technology had during the SARS-CoV-2 pandemic, highlighting how the application became a crucial channel for information and access to vaccination[7].

From this presentation, significant perspectives on the application of technology in healthcare emerge and highlight the importance of a user-centered approach in creating digital solutions for the healthcare sector.

Methodology

This is an original study of technological innovation and practical applicability, which began in May 2017 and continues to this day. It was launched by the public management of the Municipal Health Department of Curitiba, which addresses the planning, structuring, and functionalities of the Saúde Já Curitiba Application[7], this system is part of the Health 4.1 program. This work does not require an opinion from the Ethics Committee of the Curitiba Health Department and uses a Letter of Consent signed by the Health Secretary responsible for the project.

This work had the help of part of the team that participated in the development of the application, using data collected along the way. Based on the Information and Technology Center (NIT) and the Smart Cities Institute (ICI), both laboratories that programmed the platform, all technical parts can be accessed to describe the application's evolution. Thus, it was possible to present part of this immense process of creating a new and disruptive technological resource, focusing mainly on the main benefits it brings to the user.

Results and Discussion

Currently, Curitiba has a robust medical record system, e-Health, which, in addition to allowing the recording of actions carried out by the health team, is structured to monitor any epidemiological event. The municipality's system, developed and maintained based on a management contract with ICI, integrates and covers all records, from Primary Health Care (PHC) to specialized care of medium and high complexity, and is integrated with various platforms of the Ministry of Health (MH), which enables decision-making, based on concise and reliable data, generated in real-time.

Even with the federal government platform, ConecteSUS Cidadão[8], the absence of several other assistance services in this application, in line with the need for greater agility and organization, it was decided to develop a system that could serve the Municipal Secretariat of Curitiba and its citizens.

E-Health also has an interface with the citizen, the Saúde Já App, which was launched in 2017 and in its first version, available both on a web platform and in application stores in Android© and IOS©[9] versions, made it possible to locate the Basic Health Unit of reference for each user, registration in the network and scheduling of the first nursing and dental appointment, in a simple, quick way and without the need for in-person attendance.

In its second version, the application allowed viewing and printing of the national vaccination card and sending an alert message to patients with overdue vaccines, issuing and printing the declaration of conformity for school enrollment.

In the third version, the function of confirming consultations and specialized exams with service providers was included. In this functionality, the user receives a message informing the date, time, and location of the service, can confirm or cancel the attendance, and issue the referral guide, no longer needing to print any document for this service.

The fourth version made it possible to monitor prenatal care, allowing pregnant women to clarify doubts, carry out a virtual visit to their reference maternity hospital, save images of their ultrasounds, view appointment

calendars and a uterine contraction calculator. In this version, the messaging service was also added, which allows the forwarding of messages with team guidelines to all registered users or to specific groups, by health unit, age group or gender.

To improve interaction with the user, the service evaluation function was inserted, which allows the patient to attribute a concept to the service provided by the teams from their own services and by the teams from complementary services, using a Likert scale from 1 to 5.

In March 2020, the World Health Organization classified COVID-19 as a pandemic, and this new epidemiological condition advocated social distancing as one of the essential measures to contain the virus. In Curitiba, one of the strategies adopted to combat the pandemic was to strengthen the Saúde Já Curitiba application, adding features that allow the maintenance of care and guidance on citizen autonomy.

In its fifth version, the application's initial interface has been improved - the user registration option. In it, citizens, who did not yet have registration with the municipal health network, were able to do so, which greatly facilitated access to care related to COVID-19 and vaccination, speeding up care and preventing the user from traveling to the health unit to register. Still on the issue of registrations, the option "register dependents" was inserted, allowing family members to register children and elderly people who have difficulty accessing the application, or even who do not have mobile devices.

Thus, the person responsible proceeded with the registration and, from that moment on, began to receive information regarding vaccine scheduling and user eligibility concerning vaccination groups. These messages were sent via notification, informing that the group to which the patient belonged was already eligible for vaccination.

In the main interface, a specific icon called "Coronavirus" was created (Figure 1), with the following functionalities available: My vaccine, Ask your questions, Test results, and Newsletter.

Figure 1. Specific options for COVID-19 with several other subcategories. Curitiba, PR, Brazil, 2020-2022

Figure 2. Functionality of vaccination scheduling and dependent registration. Curitiba, PR, Brazil, 2020-2022

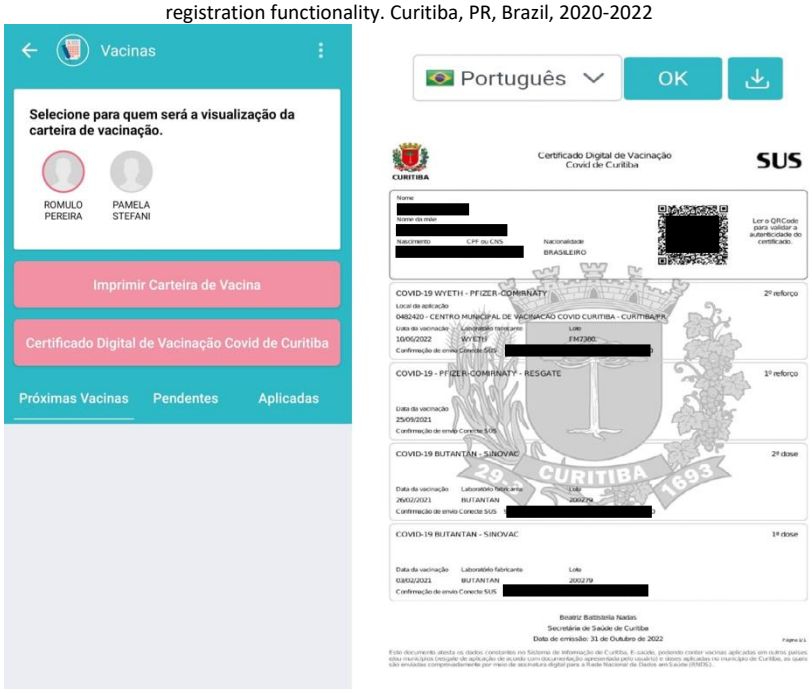
My vaccine: allowed scheduling of vaccinations. These were programmed with place and time and informed by the application through notification. Users who were already eligible to receive the vaccine were also informed, as the groups were covered. In this tab, the user can also consult the vaccine that was administered, the time, date, and location. It is also possible to automatically generate proof of vaccination and attendance. Another function included in the application, to contribute to the vaccination process, was the registration of bedridden users so that they could be vaccinated at home. For this purpose, a function was created that allowed the insertion of this information for later scheduling (Figure 1).

Ask your questions: in this tab, the user has access to the main questions and answers regarding the coronavirus, which include information about the vaccine, symptoms, guidance on isolation, and service flows. In this item, there is also an integration for care with Laura Robot, a Health tech founded in Curitiba that uses Artificial Intelligence in patient risk management.

Test results: in this tab, the user has access to the results of PCR tests collected in health units. For this purpose, the system was integrated with e-saúde and the GAL system (Laboratory Environment Manager), of the state laboratory responsible for processing the exams, in addition to allowing access to the isolation term, with guidance and home care in suspected and confirmed cases.

Fact sheet: the daily updated bulletin presents the user with the current risk flag, the number of new cases, deaths, and total confirmed, active, and recovered cases.

Figure 3. The function of generating the digital COVID-19 vaccination certificate, with the option to change the language. Vaccination scheduling and dependent registration functionality. Curitiba, PR, Brazil, 2020-2022



Initially, the main difficulty encountered was the integration of the system with the official platforms for recording vaccines, since each registered application automatically feeds the national reports of the National Immunization Plan (Figure 3), the Information System of the National Immunization Program Immunizations (SIPNI). For this, an authorization process with SIPNI was necessary for systems integration. After consolidation, another difficulty was the sedimentation of the application's functionalities with the user.

The implementation of the application had an immense impact on healthcare workflows. The reorganization was necessary to ensure efficient and timely service. Employees from all health teams were trained and qualified to use the new tool. The teams began to instruct users on how to use the application, guiding and teaching all available functionalities and each new feature that appeared. The Municipality's Department of Social Communication created a campaign to publicize the application, with a view to local media and the distribution of graphic and digital material to encourage the use of Saúde Já Curitiba.

The application is available to all citizens of Curitiba and, according to IBGE, the population of the capital of Paraná is 1,948,626 inhabitants (data from 2020)[10]. The application has 1,908,703 registrations with complete and validated information, 2,500,000 vaccines carried out and registered and with data sent to the Ministry of Health via digital integration, 78,905,892 individual messages sent to guide the population, 2,500,000 certificates of vaccination issued, 817,359 home isolation notices issued, and 505,596 PCR results made available[7].

New tools are being developed for continuous improvement of the Saúde Já Curitiba Application, aiming to offer a wide range of health services to the user in an easy and accessible way, without the need to face queues and subject them to unnecessary trips to the units. With the compilation of this integrated and user-active database, new Artificial Intelligence (AI) mechanisms can be designed for future applications. One example is the development of lines of care for patients with chronic illnesses. Since we have integration with laboratory databases and medical records integrated into the application, associated with the patient's participation in this data collection process, it is possible to outline which best care can be applied individually.

In Brazil, restricted to the universe of the Unified Health Service (SUS) and government spheres, we have as an example the project of the city of São Paulo, where the E-SaúdeSP platform was developed, being a creation of the Municipal Health Department of São Paulo. Paulo to facilitate access and recording of health information for São Paulo citizens. It is an application with similar purposes to

Saúde Já, but with a still limited number of features and functionalities. Except for the example of São Paulo, we did not find other models that serve as a reference for the public service, except for private Healthtechs[11].

The application is accessible to all residents of Curitiba. Currently, in July 2023, we have registered a total of 2,373,225 registered users, whose information has been duly completed and validated. Our statistics include the registration of 6,557,327 vaccination card issues, with the effective transmission of this data to the Ministry of Health through digital integration. In addition, 110,334,967 individual guidance messages were sent to patients. The app issued 6,557,327 vaccination certificates, and 2,876,389 international vaccination certificates in English and Spanish, and sent 817,359 home isolation announcements.

The platform also made 13,789,556 test results for COVID-19 available, enabling 80,678 medical video consultations. All these records are managed and accessible directly through the application interface. Concerning the adoption of the application, 1,744,884 downloads were made through the Google Store©, 399,057 on the Apple Store©, and 229,411 accesses via the web platform, totaling 2,373,225 active users to date[9].

Conclusion

The efficient use of information and communication tools is essential to reduce the burden on public health systems[12]. The Saúde Já app stands out as an essential technological tool to face this challenge. By using a solid and structured base of records and data production, the application promotes greater proximity between citizens and the municipal administration, improving the population's quality of life and access. With its integrated digital service, the application offers a disruptive public service, driving transformation in healthcare. By analyzing data and using technological resources appropriately, it is possible to make decisions based on indicators aimed at addressing health challenges more effectively. In short, the Saúde Já application is a powerful tool that has been progressively improving the quality and effectiveness of health services in Curitiba, providing integration and access to health information, fostering innovation, and providing a quality public service.

We are continually developing new features and improvements, to offer a variety of health services to users in an agile, easy, and accessible way, avoiding queues and unnecessary trips to health units. Building a SuperApp involves offering a functional range, ensuring that citizens have the most diverse health services at their fingertips. With the consolidation of this integrated and active database with users, it will be possible to develop new Artificial Intelligence resources for future applications. One example is the development of care lines for patients with chronic diseases, predicting complications and risks of hospitalization. With the integration of exams and medical records into the application, together with the patient's participation in the data collection process, it will also be possible to determine the best care to be applied individually.

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