

Digital tool for childhood first aid: app for professionals and caregivers

Ferramenta digital para primeiros socorros na infância: aplicativo para profissionais e cuidadores
Herramienta digital para primeros auxilios en la infancia: aplicación para profesionales y cuidadores


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Abstract

Objective: To describe the process of developing an app for children first aid support for professionals and caregivers.

Methods: Technological production study, developed in southern Brazil, between March/2022 and May/2023, based on the functionalities of the scrum method. Designed in cooperation with an interprofessional team, the software was developed based on a set of light and agile practices, the framework called Flutter and the Dart programming language.

Results: The app, developed in a systematic and participatory way with the participation of health and education professionals and caregivers, demonstrated plausible functionality, accessibility, feasibility and reliability in providing agile and safe information in events such as children's first aid. Called SOS Kids, the app has an attractive interface, quick access to visual information and various commands on a single screen. The graphic elements are interactive, in order to favor visualization and prospective decision-making.

Conclusion: The development process of the child first aid support software for professionals and caregivers, based on a method that relies on light and agile practices, proved to be functional and has the potential to support, in an effective and safe way, health professionals, education professionals and caregivers in general.

Resumo

Objetivo: Descrever o processo de desenvolvimento de um aplicativo de apoio em primeiros socorros infantis para profissionais e cuidadores.

Métodos: Estudo de produção tecnológica, desenvolvido no sul do Brasil, entre março/2022 e maio/2023, com base nas funcionalidades do método scrum. Concebido em cooperação com uma equipe interprofissional, o aplicativo foi desenvolvido com base em um conjunto de práticas leves e ágeis, o framework denominado Flutter e a linguagem de programação Dart.

Resultados: O aplicativo, desenvolvido de forma sistemática e participativa com a participação de profissionais da saúde, da educação e cuidadores, demonstrou funcionalidade plausível, acessibilidade, factibilidade e confiabilidade no fornecimento de informações ágeis e seguras em eventos como primeiros socorros infantis. Denominado de SOS Kids, o aplicativo possui interface atrativa, rápido acesso às informações visuais e aos diversos comandos em uma única tela. Os elementos gráficos são interativos, de modo a favorecer a visualização e a tomada de decisão prospectiva.

Conclusão: O processo de desenvolvimento do aplicativo de apoio em primeiros socorros infantis para profissionais e cuidadores, com base em método embasado em práticas leves e ágeis, demonstrou-se funcional e com potencial para apoiar, de forma eficaz e segura, profissionais da saúde, da educação e cuidadores em geral.

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Conflicts of Interest: nothing to declare.

Resumen

Objetivo: Describir el proceso de desarrollo de una aplicación de apoyo de primeros auxilios infantiles para profesionales y cuidadores.

Métodos: Estudio de producción tecnológica, llevado a cabo en el sur de Brasil, entre marzo de 2022 y mayo de 2023, basado en las funcionalidades del método Scrum. Concebida en cooperación con un equipo interprofesional, la aplicación se desarrolló con base en un conjunto de prácticas ligeras y ágiles, el *framework* denominado Flutter y el lenguaje de programación Dart.

Resultados: La aplicación, desarrollada de forma sistemática y participativa con profesionales de la salud y de la educación y cuidadores, demostró funcionalidad aceptable, accesibilidad, factibilidad y fiabilidad en la entrega de información ágil y segura en eventos como primeros auxilios infantiles. La aplicación, denominada SOS Kids, tiene una interfaz atractiva y un acceso rápido a la información visual y a los diferentes comandos en una única pantalla. Los elementos gráficos son interactivos, a fin de favorecer la visualización y la toma de decisiones prospectivas.

Conclusión: El proceso de desarrollo de la aplicación de apoyo de primeros auxilios infantiles para profesionales y cuidadores, basado en un método de prácticas ligeras y ágiles, demostró ser funcional y con potencial para ayudar, de forma eficaz y segura, a profesionales de la salud y de la educación y a cuidadores en general.

Introduction

First aid represents the support measures for an individual who suffers an accident or sudden illness, with the aim of minimizing damage until the arrival of a specialized care service.⁽¹⁾ First aid consists of an assessment of the need for intervention and can be provided by anyone who witnesses the injury and who is, at least, equipped for this purpose. The first aid approach is not restricted to health professionals or institutions, but is extended to people in the community, capable of providing quick and safe access to individuals when facing adverse situations.^(2,3)

In addition to violence on the streets, homes, schools and public places pose risks that cause the death of thousands of children each year in Brazil. Studies show that unintentional injuries (domestic accidents) represent the main cause of death in the age group between zero and ten years of age in the country.^(4,5) It becomes pertinent and relevant, from this perspective, education in health for the population, in general, through the development of educational technologies, broad and fast-reaching protocols, as well as digital devices that provide support for making quick and safe decisions about first aid.^(6,7)

Digital technologies have a growing impact on different areas of knowledge, but especially in the area of health. There is an increasing influence of telehealth and other virtual care models, more specifically in response to the Covid-19 pandemic.^(8,9) Despite substantial advances in this area, challenges associated with the use of digital tools persist by nursing professionals, especially with regard to

rapid changes and their impact on health care.⁽¹⁰⁾ To respond to growing challenges, nursing needs to be qualified in the development and use of digital tools, in order to respond to the complex global challenges faced by health systems.^(11,12)

When searching for apps for mobile devices in virtual stores (Play Store and Apple Store) to support children's first aid, no similar digital technology apps were found. Thus, in order to expand discussions on the topic and contribute to the advancement of technological production in the area of nursing/health, the present study has the following research question: what is the relevance of an app to support children's first aid for professionals and caregivers? The objective, based on the above, was to describe the process of developing the software to support children's first aid for professionals and caregivers.

Methods

Technological production study, second edition, developed in the southern region of Brazil, between March/2022 and May/2023, based on the functionalities of the scrum method.⁽¹³⁾ It was designed in cooperation with an interprofessional team in which the nursing, education, information systems, biomedical engineering professionals and caregivers. The technological development path demonstrated in the block diagram in figure 1 describes the systematization, methods and instruments applied in the app development path. The scrum method is recognized as a framework that prescribes a set of

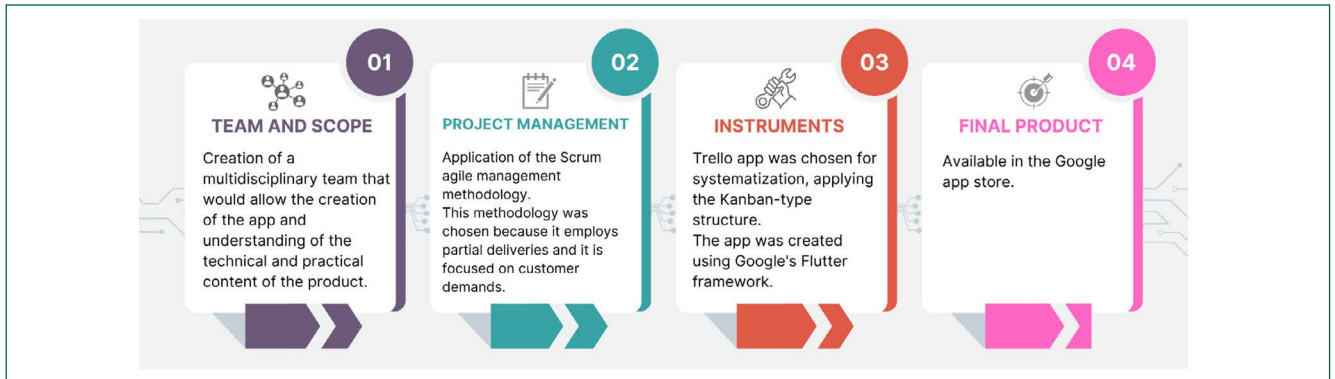


Figure 1. Own technological development path, based on the scrum method.

light and agile practices for induction and support for complex projects, which considers that individuals are more important than processes and tools; that the technology in operation transcends specific techniques; that human and professional interactivity is above the negotiation of contracts and that responding to rapid changes is not reduced to the prescriptive linearity of an action plan.⁽¹⁴⁾

The Product Backlog was defined among the team members and based on the principles and techniques of the scrum method, which consists of outlining the application's functionalities, that is, the procedural deliveries necessary for the creation of the digital tool. This activity was organized and carried out in two meetings. In addition to the developers and researchers, three child caregivers and three educators who take care of children in elementary schools participated in the first meeting. This meeting provided space for participants to express their perceptions and expectations in relation to the weaknesses they saw when providing first aid to children. In the second meeting and through an extensive discussion, participants highlighted the need for a digital tool that would support caregivers in directing agile and safe conduct in adverse events, such as unintentional injuries to children. After defining the Product Backlog, the first sprint backlog was structured, in which weaknesses were reviewed and technological possibilities with potential for qualifying children's first aid were discussed collectively. Based on this qualified listening and extensive discussion among participants, an initial diagram of use cases for the app was developed, with

the aim of demonstrating interactivity between the user and the system which was being developed. This journey enabled an expanded and prospective understanding of the app's various functionalities.

In parallel, the first sprint was shared and discussed in order to broaden perspectives and improve the tool's functionalities. In these meetings held over a period of ten weeks, a total of three routes and the main items/injuries that should be included in the app were assessed. Practical aspects related to the functioning and appearance of the tool being developed were also discussed.

Then, we proceeded to the second sprint backlog, in which the features and unintentional pediatric injuries that should make up the conduct protocol were selected. Along the way, the possibility of generating specific infographics was considered, capable of outlining the profile and main pediatric occurrences in a given period of time. For this second sprint, database research was carried out, with emphasis on advanced support guidelines, studies on the epidemiology of accidents in childhood, manuals from the Ministry of Health on first aid, manual for diagnosis and treatment of accidents caused by venomous animals and international guidelines of the American Heart Association on life support in cardiology and others.⁽¹⁵⁻¹⁹⁾ The conduct protocol on children's first aid contained the main injuries that occur in home environments, schools and public spaces, namely: Burns, Falls, Poisoning, Injuries, Drowning, Choking/Suffocation, Cardiorespiratory Arrest, Venomous Animals, Electric Shock and Convulsion/Epilepsy.

The third and final sprint backlog focused on the app’s appearance, accessibility, and functionality. Along this route, the developers presented procedural deliveries of the prototype and, in a clear and objective way, the participants presented their suggestions and criticisms, with a view to qualifying the functional version of the digital tool.

The sprint review was carried out with all team members and four other new participants, including healthcare professionals with experience in first aid, in order to validate the content and functionalities of the tool.

Regarding the construction and development of the app, in terms of programming and creation environments, we chose to use the framework called Flutter, created by Google, based on the Dart programming language. This cross-platform framework allows the creation of apps for Android and IOS systems (REF). The SOS Kids app, however, was only available for Android. This option was adopted due to its technical and commercial characteristics for registration on the IOS platform.

As it is a technological production study, developed based on the functionalities of the scrum method, it was not approved by CEP – CONEP.

Results

The digital tool was developed in cooperation with professionals from different areas of knowledge. Three child caregivers and three educators who take care of children in elementary schools also participated, whose experience varied between 4 to 12 years of experience. After presented and discussed, in five consecutive weekly meetings, the participants considered the app adequate in its functional, apparent and subsidy form to support actions related to children’s first aid. Based on a gradual and systematic construction process, the tool proved to be accessible, practical and viable in providing agile, safe and effective guidance for both professionals and caregivers. Based on this evolutionary and prospective path, the tool reached maximum maturity level - TRL7 maturity (Technology Readiness Level). Based on the construction and prior vali-

dation of the conduct protocol on child first aid, which contained the main unintentional injuries to children, the initial prototype of the app was delimited, which was deposited on the “Super easy App” Platform. Based on the evolutionary and participatory path, a conceptual map was created with the ten main unintentional injuries, which illustrate the step-by-step process to be followed by the professional rescuer or caregiver. Figure 2 shows the conceptual map of one of the injuries, more specifically, cardiorespiratory arrest.



Figure 2. Conceptual map of Cardiorespiratory Arrest

Throughout the entire application development process, priority was given to a practical tool that is easy and quick to access, with or without internet access, as long as the app had previously been downloaded. The app screens in figure 3 have the ten icons of the selected unintentional child injuries, as well as the button (*EMERGÊNCIA*) that directs the call to the Urgency and Emergency Mobile Care Service (SAMU), in addition to the information icon and the explanations icon usage.

On the injury selection screen in figure 3, it is possible to navigate between the different demands



* This is the original screen of the application that was developed in Portuguese and therefore is not in the English language

Figure 3. SOS Kids app screens*

and quickly select the desired injury. After choosing the injury and its subcategory, if necessary, such as: Burns (*Queimadura*) - chemical burn, the navigator will automatically direct the rescuer to the course of action to be taken. Called SOS Kids, this app has an attractive interface, with quick access to visual information and various commands (touches), on a single screen. The graphic elements are interactive, in order to facilitate visualization and quick decision-making. Under this approach, the app was considered relevant and pertinent for achieving agile results and with the potential to determine local strategic interventions, based on the infographics that induce and guide conduct. It should be noted that the data will not be shared with third parties and will not be stored by the app, in order to ensure users' confidential information. The development of the application followed the specific regulations of the National Health Surveillance Agency (ANVISA). The app's functionalities and contents were evaluated in relation to RDC No. 657/22(20) and RDC No. 751/22.⁽²¹⁾

SOS Kids' app was registered with the National Institute of Industrial Property, under Code: BR512020002188-3 and, subsequently, made

available to the general community through Google's Play Store. Incipient results from its operation demonstrate satisfaction and practicality both on the part of professionals and caregiver users who had access to the tool. Access to the application can be done via <https://play.google.com/store/apps/details?id=com.ufn.soskids&pli=1>.

Discussion

In different fields of knowledge, digital tools have gained an increasing demand and support as a way of supporting agile and strategic decision-making, especially following the Covid-19 pandemic event. The impact of digital technologies on teaching and learning, but also on social and health services and organizations in general, is unquestionable. This evolutionary process of adherence to digital technologies has modified professional attitudes and behaviors, in addition to expanding interactive and associative possibilities between organizations and services.^(22,23)

In Brazil, just like around the world, digital technologies have gained strength and speed through the induction of specific policies, such as the Digital Health Strategy for Brazil 2020-2028, which aims to increase agile and affirmative solutions for the Unified Health System (SUS).⁽²⁴⁾ Driven as a tool to support the fight against Covid-19, today, the focus of the Digital Health Strategy is to best serve SUS users, who demand greater resolution, agility and quality in processes and therapeutic flows. Considering this, nursing/health professionals need get together for the development and appropriation of new technologies, with a view to achieving the proposed goals.

Studies show that accidents are the biggest cause of death among children aged 1 to 14. These events represent a loss of R\$63 million for SUS. Fractures, burns, traumas and poisonings occurring at home or at school are second only to upper and lower airway disorders in number of hospitalizations, which together account for 24% of cases, intestinal changes (16%) and infections (9%). Domestic accidents alone correspond to 6% of child hospitalizations, which represents the fifth highest occurrence.⁽²⁵⁻²⁷⁾

Therefore, domestic accidents and other urgent and emergency situations for children are common in homes and school environments. Hence, developing digital technologies to support professionals and caregivers is fundamental and economically rewarding, in addition to exploring preventive strategies at a collective level. To save a life, the time factor is crucial, as the use of agile and appropriate rescue procedures can significantly reduce damage to the victim and even prevent fatalities. It is considered that the contact time between mobile emergency care and the arrival of help is the primary variable for minimizing adverse damage.⁽²⁸⁾

Scientific evidence shows that information and communication technologies must be combined with continuous and systematic learning, that is, it is not enough to develop and implement a wide-ranging digital tool. They must stimulate both performance and permanent appropriation among professionals, and support the population, in general, in the process of agile and safe interventions, in order to qualify decision-making in child first aid situations.^(29,30)

Unintentional injuries in childhood constitute an important public health problem. Under this approach, the Lucas Law - law 3,722, of October 4th, 2018, “makes training in basic first aid notions mandatory for teachers and employees of public and private basic education establishments and children’s recreation establishments.”⁽³¹⁾ The SOS Kids app constitutes, in this sense, a substantial support tool, both in the process of training professionals and in use in urgent and emergency situations for children.

During the development of this app, the Android storage platform was considered, given that in the mobile device market and particularly among smartphones, Android platform has proven to be promising and the most popular among the platforms. This option was based on a study⁽³²⁾ that demonstrated that the Android platform dominated 70% of smartphone sales in 2012. Other attractive features of this platform are related to the open source, the broad support provided to developers, in addition to be free and with greater scope, have extensive documentation and practicality in distrib-

uting the developed apps. These and other characteristics suggested the option for the Android platform to store this application.

The main contribution of this study to nursing/health/education science is associated with the proposition of a new digital tool to support children’s first aid for professionals and caregivers. Furthermore, this production aims to contribute/respond to the guidelines of law 3,722, of October 4th, 2018 and with an important contribution to achieving the goals established by the Digital Health Strategy for Brazil 2020-2028.

The limitations of this study are associated with the little expertise of researchers in the nursing/health field in developing digital tools based on agile methodologies. Based on this technological production, we recommend greater investments in interprofessional pathways, in order to enhance initiatives and meet specific demands that require agile and prospective responses.

Conclusion

The children’s first aid support app developed has proved to be functional and has the potential to rapidly support that is effective and safe, for both health and education professionals and caregivers in general. It will contribute to achieving the goals established by the Digital Health Strategy for Brazil 2020-2028, as well as the guidelines proposed by law 3,722, of October 4th, 2018. The app, developed and validated with broad participation of professionals and users, was considered relevant and pertinent to achieving agile results and with the potential to determine local strategic interventions, based on inductive and guiding infographics. It also demonstrated plausible functionality, accessibility, feasibility and reliability in providing information and guidance in the event of adverse events.

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Collaborations

Pereira ADA, Weissheimer AS, Pires MO and Backes DS collaborated with the design of the project, collection, analysis and interpretation of data, writing of the article, relevant critical review of the intellectual content and final approval of the version to be published. Rodrigues Junior LF, Marchiori MRCT collaborated with the writing of the article and relevant critical review of the intellectual content and final approval of the version to be published.

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