Original Article

A new APP for prevention and treatment of complications of intestinal peristomal skin

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A R T I C L E   I N F O

A B S T R A C T

Objectives: To develop an application program for prevention and treatment of complications of intestinal peristomal skin.

Method: The framework of the application software development were: Phase 1 – "Design, identification of the needs for the application development": In this phase, the authors identified during their clinical practice that some professionals and caregivers find it difficult to provide care for at-risk ostomized patients or those with some kind of peristomal skin complication; Phase 2 – "Application prototype development": this phase included the integrative literature review in the main databases; Phase 3 – "Creating the application": this phase was intended to generate a decision tree algorithms, structure the database, and develop the software; Phase 4 – "Transition": performing the application functionality testing.

Results: The application "Dermatite Periestoma App" has 36 screens and 21 figures describing the procedures for prevention and treatment of complications of intestinal peristomal skin. It is freely available from the Play Store and has been registered with the Instituto Nacional da Propriedade Industrial Ministério do Desenvolvimento, indústria e Comércio Exterior (Brazilian Ministry of Development, Industry and Foreign Trade, National Institute of Industrial Property).

Conclusion: This study made it possible to describe the stages of planning and development of the mobile application "Dermatite Periestoma App". The steps taken indicate that the "Dermatite Periestoma App" has great potential for clinical practice in the evaluation of patients with stomal complications or at risk for developing peristomal skin complications, preventive measures, therapeutic approaches, and for nursing education through the use of technology.

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Aplicativo para prevenção e tratamento das complicações da pele periestoma intestinal

RESUMO

Objetivos: Desenvolver um aplicativo para prevenção e tratamento de complicações da pele periestoma intestinal.

Método: As fases de desenvolvimento da estrutura do aplicativo foram: Fase 1 – "Concepção, identificação das necessidades do desenvolvimento do aplicativo": nessa fase os autores identificaram, durante sua prática clínica, que alguns profissionais e cuidadores têm dificuldade em prestar assistência aos ostomizados com risco ou que adquirirem algum tipo de complicação da pele periestoma; Fase 2 – "Elaboração do protótipo do aplicativo": essa fase contemplou a revisão integrativa da literatura nas principais bases de dados; Fase 3 – "Construção do aplicativo": essa fase consistiu na elaboração da árvore de decisão dos algoritmos, estruturação do banco de dados e desenvolvimento do software; Fase 4 – "Transição": foram realizados os testes de funcionalidade do aplicativo.

Resultados: O aplicativo "Dermatite Periestoma App" tem 36 telas e 21 figuras descrevendo os procedimentos para prevenção e tratamento das complicações da pele periestoma intestinal. O mesmo está disponível gratuitamente na *Play Store* e foi registrado no Instituto Nacional da Propriedade Industrial Ministério do Desenvolvimento, indústria e Comércio Exterior.

Conclusão: Este estudo possibilitou descrever as etapas do planejamento e desenvolvimento do aplicativo móvel "Dermatite Periestoma App". As etapas percorridas indicam que o "Dermatite Periestoma App" tem grande utilidade potencial para a prática clínica na avaliação do ostomizado com complicação ou que apresenta risco para desenvolver complicações da pele periestoma, medidas preventivas, condutas terapêuticas, e para o ensino de Enfermagem por meio do uso de tecnologia.

Introduction

The SAS/MS Ordinance No. 400 of November 16, 2009, which deals with the Health Care of Ostomized People in Brazil, defines intestinal ostomies (colostomy and ileostomy) as surgical interventions performed on both large and small intestines and consists of the exteriorization of an intestinal segment through the abdominal wall, thus creating an artificial opening for the exit of fecal content.[1–3]

The purpose of this surgery is to divert the bowel contents (gases and feces) to an external pouch.[4] This procedure is performed to maintain the elimination function and causes several changes, including the elimination of gas, odor and feces by the stoma, which is located in the abdominal wall.

Between 21 % and 70 % of ostomized patients develop some type of complication, although of the total of ostomized patients there is a significant percentage that could live with the stoma without the complications. These complications are related to ostomy malfunction, stoma inadequate localization, and poor self-care.[5,6] Such complications can lead to dermatitis, bleeding, prolapse, necrosis, hernias, edema, waste leakage, peristomal hernia, stenosis, and retraction, among other adversities.[7–13]

The development of an application program (app) for nursing professionals who provide care to patients with skin lesions has proved to be valid as a strategy for training, diagnosis, and prescription of therapeutic conduct, especially in the theory and practice relationship and in the interrelation of knowledge and contextualization of learning.[14–21]

The use of apps as a teaching tool, care, and diagnosis in the area of skin lesions is very innovative and is a method that can generate interest and motivation to learn more, given that the mobile devices that host these apps are used by healthcare professionals at a rate of 45%–85% and are more consulted than books.[22–25]

In the search for mobile apps related to prevention and treatment of peristomal skin complications in online stores (Play Store and Apple Store), no national and international mobile app was found. In this context, we decided to develop the "Dermatite Peristoma App", whose information was built with scientific basis so that nurses can perform the assessment of peristomal skin in an individualized and systematized way and, after evaluation, the app can provide preventive measures and therapeutic approach.

"Dermatite Peristoma App" is intended to minimize the difficulties and shortcomings of nurses regarding clinical practice. Thus, it is expected to contribute to the dissemination of knowledge about the evaluation of intestinal peristomal skin, promote the health of this population, as well as assist professionals in the preparation of preventive actions, therapeutic approaches and health education actions.
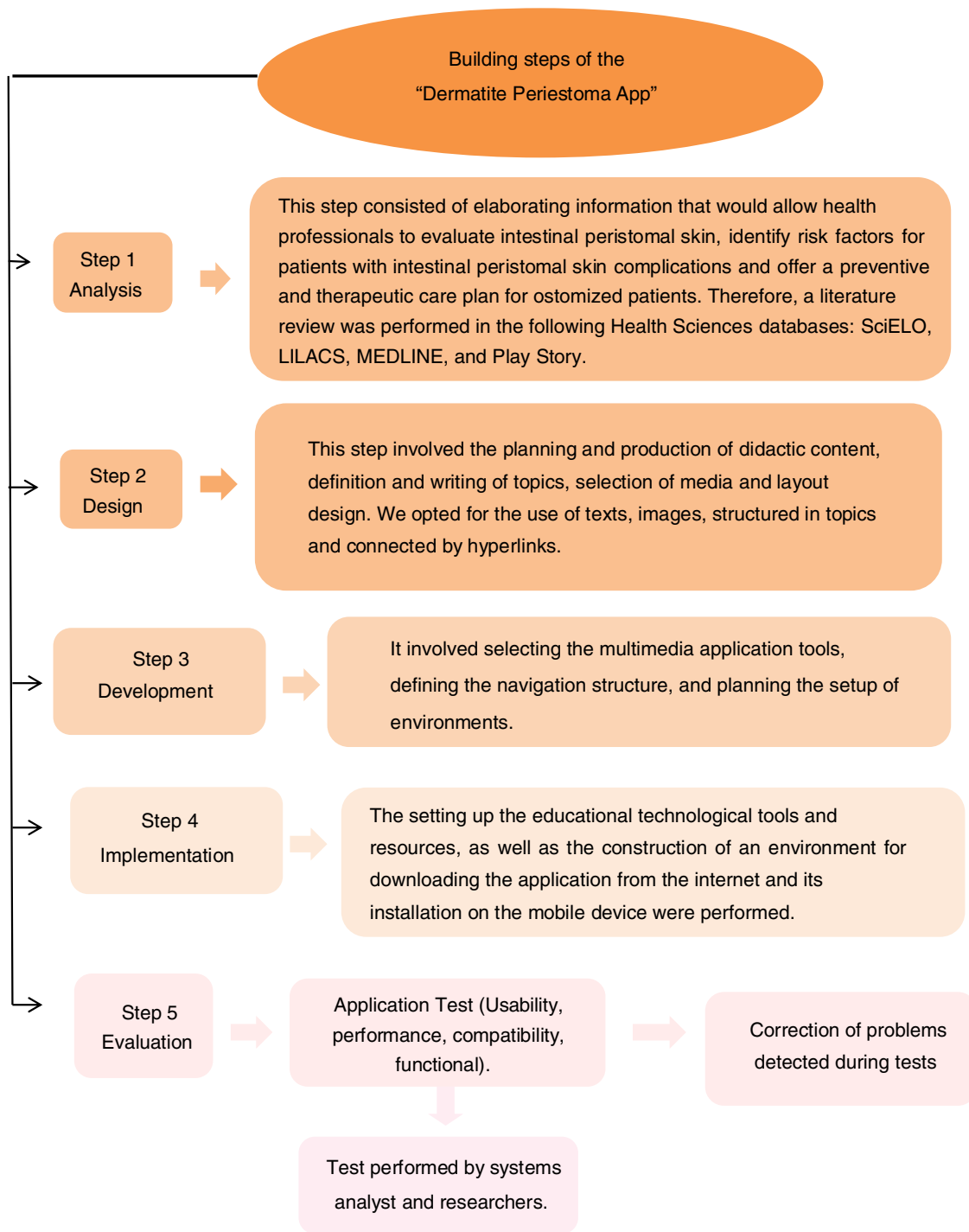
Building steps of the "Dermatite Periestoma App"

Step 1 Analysis

This step consisted of elaborating information that would allow health professionals to evaluate intestinal peristomal skin, identify risk factors for patients with intestinal peristomal skin complications and offer a preventive and therapeutic care plan for ostomized patients. Therefore, a literature review was performed in the following Health Sciences databases: SciELO, LILACS, MEDLINE, and Play Story.

Step 2 Design

This step involved the planning and production of didactic content, definition and writing of topics, selection of media and layout design. We opted for the use of texts, images, structured in topics and connected by hyperlinks.

Step 3 Development

It involved selecting the multimedia application tools, defining the navigation structure, and planning the setup of environments.

Step 4 Implementation

The setting up the educational technological tools and resources, as well as the construction of an environment for downloading the application from the internet and its installation on the mobile device were performed.

Step 5 Evaluation

Application Test (Usability, performance, compatibility, functional).

Correction of problems detected during tests

Test performed by systems analyst and researchers.

Fig. 1 – Building steps diagram of the multimedia Ďermatite Periestoma Appön mobile platform. Pouso Alegre, MG, Brazil, 2019.

The purpose of this research was to develop an app for prevention and treatment of complications of intestinal peristomal skin.

Methods

Research study of methodological development applied in the technological production modality.

The study was approved by the Research Ethics Committee of the Faculdade de Ciências Médicas Dr. José Antônio Garcia Coutinho da Universidade do Vale do Sapucaí, under Consent Report No. 2,557,232.

As a methodology for developing the multimedia app, we opted for the Systematic Instructional Design, which involves a constructivist proposal and consists of the intentional action of planning, developing and applying specific
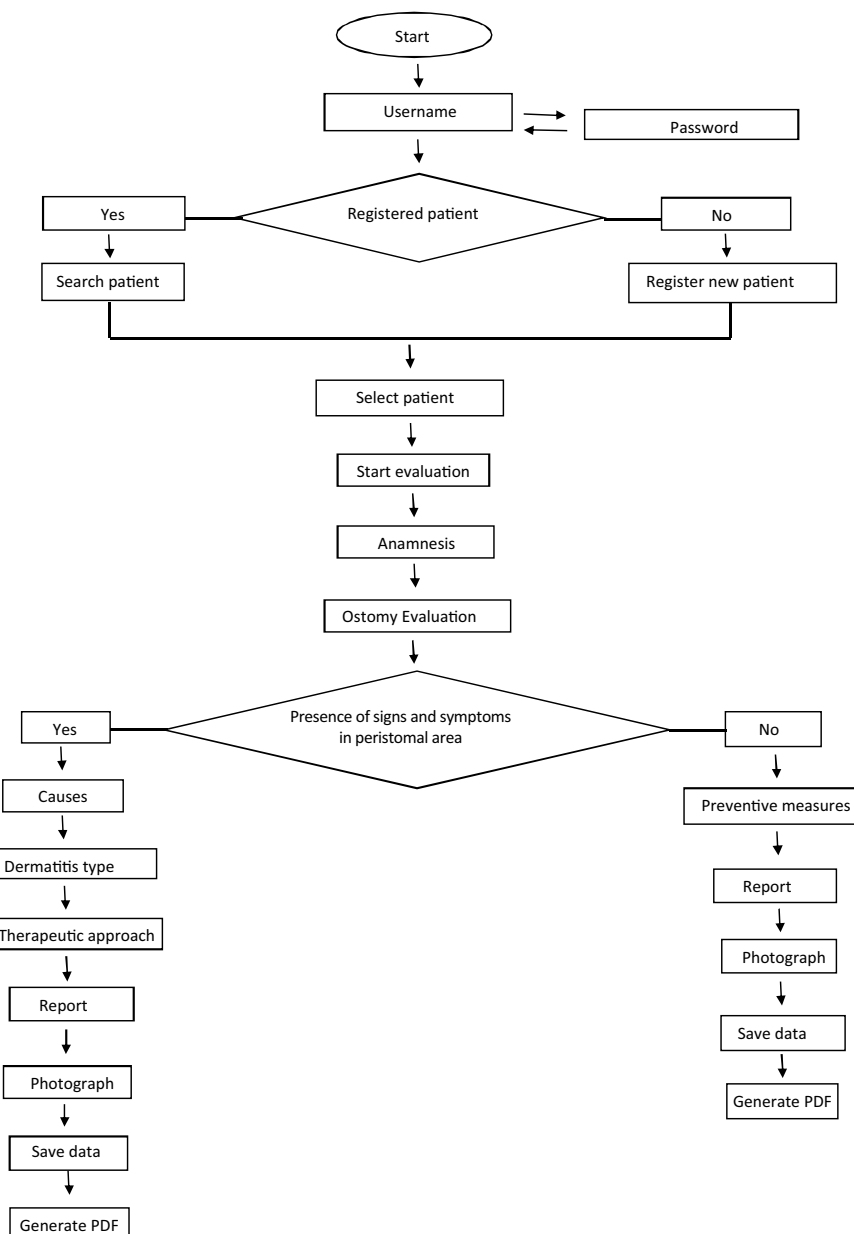
Fig. 2 – Decision Tree for building the mobile platform multimedia application "Dermatite periestoma App". Pouso Alegre, MG, Brazil, 2019.

didactic situations, incorporating mechanisms that favor contextualization.[19,26] To develop the multimedia "Dermatite Periestoma App" on mobile platforms, the following steps were fulfilled (Fig. 1):

Step 1: Analysis – this stage consisted of elaborating information that would allow health professionals to evaluate the intestinal peristomal skin, identify the risk factors for patients with complications of intestinal peristomal skin and offer a preventive and therapeutic care plan to ostomized patients. For such, an integrative literature review was performed in the Health Sciences databases SciELO, LILACS, and MEDLINE.

Step 2: Design – this step involved the planning and production of didactic content, definition and writing of topics,

media selection, and layout design. We opted for the use of texts, structured in topics and connected by hyperlinks.

Step 3: Development – it involved selecting the multimedia app tools (decision tree), defining the navigation structure, and planning the environment setup (Fig. 2).

Step 4: Implementation – Setting up the educational technological tools and resources, as well as the construction of an environment for downloading the application from the internet and its installation on the mobile device were performed. It is available on the play store link under the name "Dermatite Periestoma App".

Following the multimedia mobile "Dermatite Periestoma App" development, it was registered with the Instituto
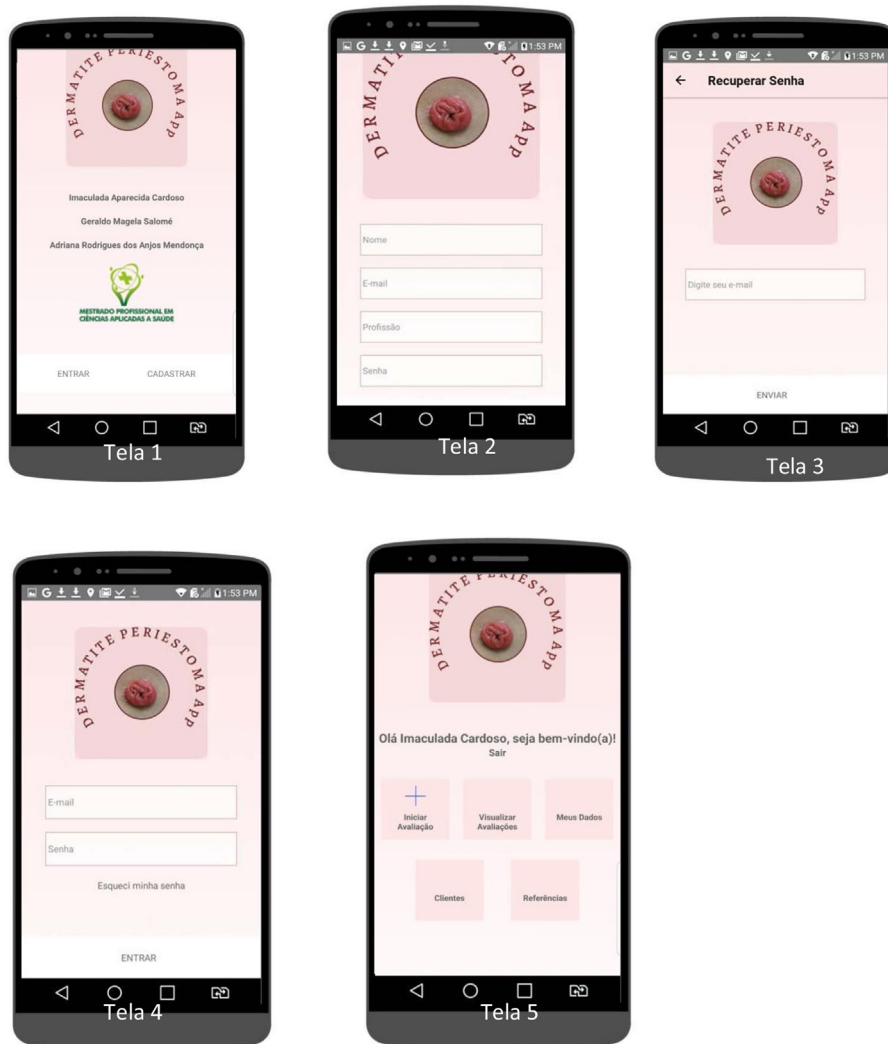
Fig. 3 – User or patient registration screens and "Dermatite Periestoma App" home screen.

Nacional da Propriedade Industrial (Ministério do Desenvolvimento, indústria e Comércio Exterior).

Step 5: Evaluation – in this step the functionality tests (usability, performance, compatibility and functional) were made. The testing process was performed according to the steps described below:

Usability test: It was tested to see if the user could intuitively use the software from the home screen to the end result. The authors of the project used the software five times, accessing the software, patient registration, patient selection, anamnesis, stoma evaluation, presence or absence of signs and symptoms in the intestinal peristomal skin, causes and types of peristomal dermatitis, indicated therapeutic approaches, and photographs of the evaluated ostomies. These actions generated the reports.

Performance test: Responsiveness was assessed after each command performed. While using the software, the systems analyst and the author of the project checked the startup time, screen changeover time, and software completion time, tak-

ing into account each screen: software access, registration of the patient, patient selection, anamnesis, ostomy evaluation, presence or absence of signs and symptoms in the intestinal peristomal skin, causes and types of peristomal dermatitis, indicated therapeutic approaches, photographs of the evaluated ostomies, and the respective reports were generated.

Compatibility test with the theoretical framework: This test was divided into two steps: Firstly the software content information was verified semantically and syntactically and secondly the functional test or black box to test the system was performed by the systems analyst.

Funcional test: For the functional test, we chose some devices that had as determinants the Android technology, characterized by mobile devices and Wi-Fi available for wireless network access, in which usability and compatibility tests were performed. The entire testing process was conducted by both the author and the systems analyst. The app was only made available to the user after performing the tests and making corrections.
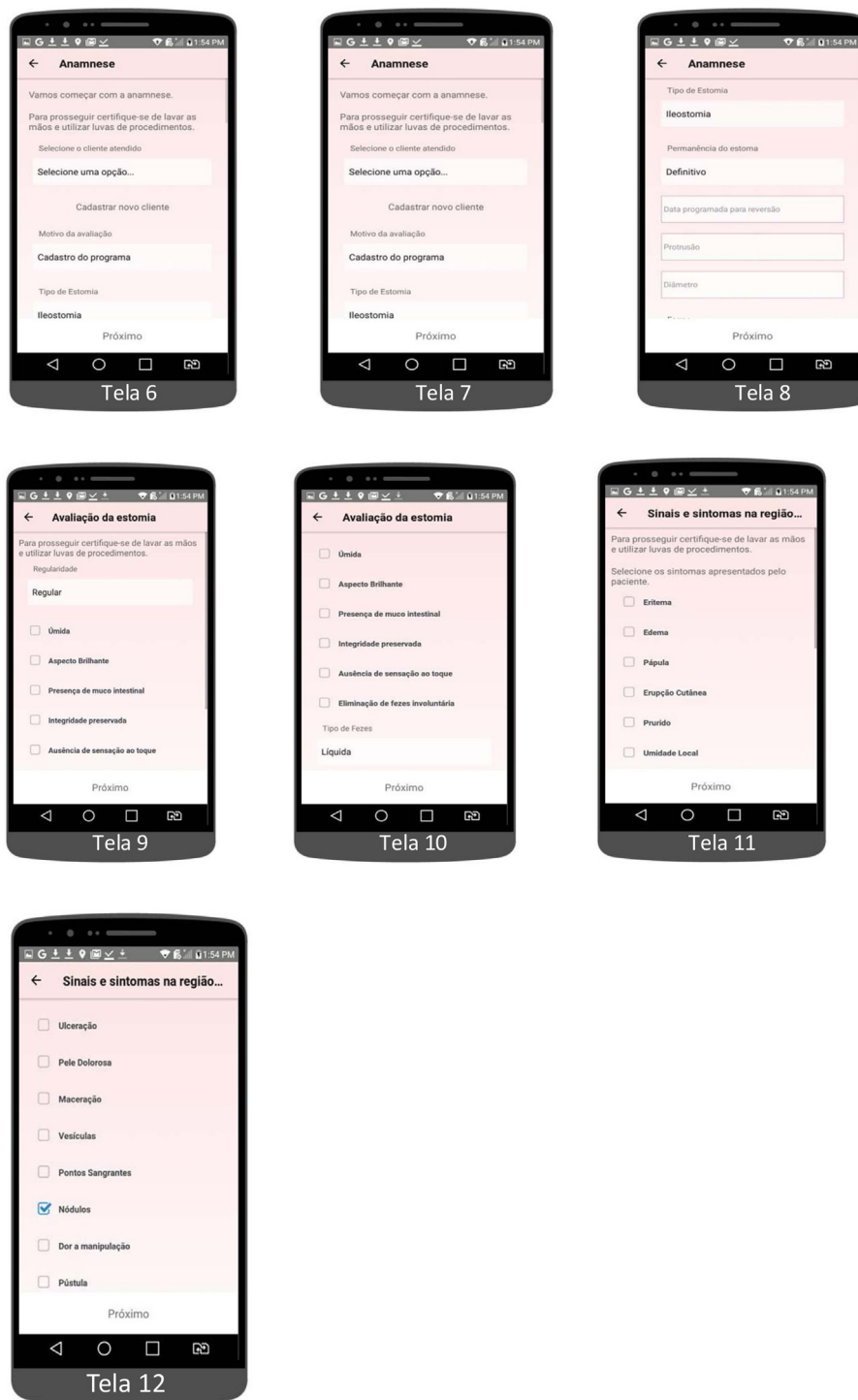
Fig. 4 – Dermatite App screen for evaluation, clinical examination of peristomal skin, and anamnesis of ostomized patient.

Results

The multimedia mobile "Dermatite Periestoma App" has 36 screens and 21 figures describing the procedures for prevention and treatment of complications of intestinal periestomal skin (Figs. 3–5). It is available for free on Play Store; it was also registered in the computer program at the Instituto Nacional da Propriedade Industrial Ministério do Desenvolvimento, indústria e Comércio Exterior under the number:

The opening is defined by the logo with the app name "Dermatite Periestoma App", access icons to enter the app or register as a user (Screen 1), when clicking the "Enter" button, Screen 2 will appear.
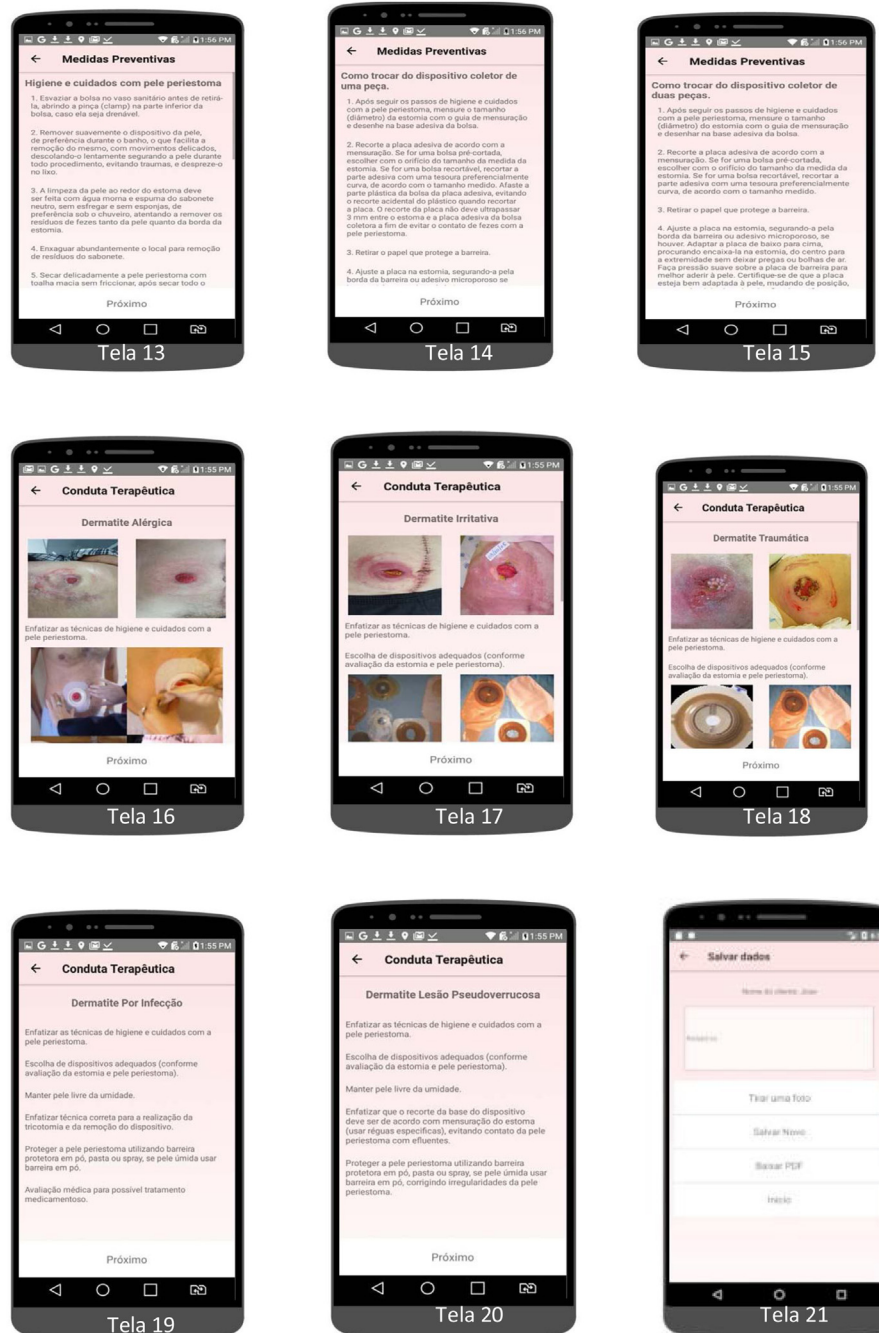
Fig. 5 – Preventive Measures and Therapeutic Approach screens of the "Dermatite Periestoma App".

In Screen 2, the user must perform the registration by filling in the fields: name, email, profession, and password. Upon completion of this data, Screen 3 will appear.

To access the "Dermatite Periestoma App", the professional must login using email and passwords already registered (Screen 3). If the user has forgotten the password, simply clicking on the "Forgot Password" icon will direct the user to the password recovery screen; clicking the Ñextbutton will start Screen 5.

In Screen 5, the user will see the following icons: "Start the evaluation", in this icon the user will be able to perform the clinical evaluation of the patient and the peri-stomal skin examination; "View evaluations", in this icon the user can check all previous evaluations; "My data", in this icon the users can change their data; "Clients", in this icon the user will be able to view all clinical evaluations, preventive measures and therapeutic approaches previously performed with clients registered by the professional.

By accessing the "Start evaluation" icon, the user will be directed to the "Dermatite Periestoma App" anamnesis screen (Screens 6–8). The professional should select the customer to be served, or register a new customer by filling in the new customer's data (name, CPF number, and date of birth). These

screens also bring all the necessary items for the user to make the anamnesis.

To perform the anamnesis, the professional must fill in the fields according to the evaluated client; when clicking on the "Next" icon, the "Ostomy assessment" icon will appear. The stoma evaluation screens (Screens 9 and 10) present all the items necessary to evaluate a stoma; by clicking on the "Next" icon, Screens 11 and 12 will appear, where the user can select the signs and symptoms related to peristomal skin complications.

In Screens 13–15, the user can check the preventive measures related to peristomal skin complications, according to the evaluation performed.

In Screens 16–20, the user will be able to see the therapeutic approaches for each peristomal skin complication, according to the type of complication detected during anamnesis and physical examination.

Discussion

The theme "App for the prevention and treatment of complications of intestinal peristomal skin" was chosen due to the difficulties of researchers in their clinical practices and some professionals in evaluating intestinal peristomal skin, preventing and indicating the therapeutic approaches related to complications.

After a systematic review of the literature, we decided to develop a scientifically based app, so that professionals could perform the evaluation and systematization of the peristomal skin care of ostomized patients. After this evaluation, the software will provide the professional with a therapeutic plan and preventive measures.

In Brazil, the use of management software has grown exponentially in different areas. In the work process of health professionals, informatics is increasingly improved through the development and evaluation of tools, processes and structures that help these professionals in care management, whether preventive or as treatments.[21,26–31]

By using the app developed in this study, professionals who provide care to patients with intestinal stoma will be acquiring and developing clinical skills, as they will be providing care with the least possible risk, without harm and adverse events; ultimately, a safe care for ostomized individuals, as the app was developed with scientific basis, through a systematic literature review in the main databases.

The "Dermatite Periestoma App" developed in this study collaborates with health professionals and provides them with theoretical and practical basis, contributing to the standardization of the evaluation, presenting preventive measures and therapeutic approaches according to the complications identified during the clinical and anamnesis evaluation, which results in improved care for ostomized patients, individualized and systematized care, and greater safety for both health professional and patient.

The more clinical information provided in the app, the better the decision making. Thus, it is essential to develop technological tools that make the clinical management related to ostomized patients more efficient, as well as minimize the difficulties and deficiencies of professionals regarding clinical practice.[32]

Through the use of smartphones, notebooks and tablets, the "Dermatite Periestoma App" allows health professionals, caregivers, and patients quick access during consultation and clinical evaluation. It also assists the professional in data collection, as the app provides a report of the entire assessment and procedures performed.

The use of the app for the evaluation, prevention and treatment of peristomal skin complications has the social impact of providing health professionals with theoretical and practical grounding, as well as the standardization of evaluation, preventive measures, therapeutic approaches, and instructions for self-care, which results in improved care for ostomized patients, individualized and systematized care, and greater safety for health professionals and ostomized patients.[21,26,27]

With technological advancement, especially of mobile phone, app usage is becoming increasingly common; thus, professionals will make their most informed decisions, following clinical protocols that will be evolutionarily more effective, providing a lower chance of error during clinical procedures.[21,26,27]

In conclusion, we can state that, after a dedicated integrative literature review in the main databases, the "Dermatite Periestoma App" was developed, which is a practical tool to qualify, direct, and guide the practitioner in the assessment procedure, preventive measures, and therapeutic approaches for ostomized patients with peristomal skin complications. Such procedure results in the reduction of adverse events, as well as the provision of care with the minimum acceptable risk and damage, providing safety and quality care.

Conflicts of interest

The authors declare no conflicts of interest.

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