

Mobile application for evaluation, prevention and treatment of dermatitis associated with incontinence

Aplicativo móvel para avaliação, prevenção e tratamento da dermatite associada à incontinência

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ABSTRACT | OBJECTIVE: To develop a mobile application to assist in the assessment, prevention and treatment of incontinence-associated dermatitis. **METHODS:** A study on the use of mobile technology in health care. The design of the mobile app involved the creation of didactic content, definition of topics related to the assessment, prevention, and treatment of IAD, selection of media, and interface design. In the implementation phase, tools and technological resources were configured, and an environment was built to download the app from the Internet and install it on a mobile device. **RESULTS:** Following an integrative review of the literature, the DIAPERSKIN mobile app was created containing 22 screens and 8 figures. It was registered with the Brazilian National Institute of Industrial Property (protocol number BR-51-2018-000-720-1) and is freely available in the Google Play Store. **CONCLUSION:** This study described the evidence-based planning and development of a mobile app for the assessment, prevention and treatment of IAD, which may be useful during clinical practice in the assessment of patients, selection of preventive measures and therapeutic approaches, and for continuing nursing education through an easy-to-use technology.

DESCRIPTORS: Dermatitis. Diaper Dermatitis. Computer software. Medical informatics applications. Health promotion.

RESUMO | OBJETIVOS: Desenvolver um aplicativo para auxiliar na avaliação, prevenção e tratamento da dermatite associada à incontinência. **MÉTODO:** Estudo aplicado à produção tecnológica na área da saúde. Para o *design* do aplicativo, foram elaborados: conteúdo didático, definição dos itens relacionados à avaliação, prevenção e tratamento da dermatite associada à incontinência e foi feita a seleção das mídias. Foram escolhidos os dispositivos do aplicativo. Na fase de implementação, os dispositivos e os recursos tecnológicos foram instalados, e foi construído um ambiente para baixar o aplicativo na Internet e implementar a funcionalidade do aplicativo móvel. **RESULTADOS:** Após revisão integrativa da literatura, foi desenvolvido o DIAPERSKIN com 22 telas e 8 figuras. Ele foi registrado no Instituto Nacional da Propriedade Industrial sob o número BR-51-2018-000-720-1 e está disponível gratuitamente no Google Play Store. **CONCLUSÃO:** Foram descritos o planejamento e desenvolvimento, com base em evidências, de um aplicativo móvel para a avaliação, prevenção e tratamento de DAI, o qual poderá ser útil durante a assistência, na avaliação de pacientes, seleção de ações preventivas e na indicação do tratamento, assim como para a educação continuada de profissionais da enfermagem por meio do uso da tecnologia de fácil utilização.

DESCRITORES: Dermatite. Dermatite das Fraldas. Software. Aplicações da informática médica. Promoção da saúde.

Introduction

Several environmental factors related to aging affect skin hydration and the efficiency of its function as a barrier, increasing the risk of incontinence-associated dermatitis (IAD). The incidence of IAD is higher among the elderly, being caused by urinary and fecal incontinence¹⁻⁴.

An IAD is defined as an area with the presence of erythema and edema, and may present bullous injuries with exudate, erosion, or secondary skin infection. These symptoms are due to constant exposure of this region to the presence of effluents such as urine, feces, perspiration and exudate from the injury. Also, young individuals may develop IAD, especially those who wear diapers and are dependent on Nursing staff to maintain body hygiene⁵⁻⁸.

The IAD as a distinct injury has motivated research in recent years to describe its etiology, diagnosis and treatment. It is estimated to affect about 30% of the elderly living in the community, from 40% to 70% of those hospitalized and 50% of elderly living in long-term institutions to⁹⁻¹⁰.

Nursing has currently used technological equipment such as smartphones, tablets and notebooks, as a means of increasing the systematization of assistance in general¹¹⁻¹². The study reports the benefits and speed for clinical practice using such equipment, which provides individualized, systematized, personalized assistance, as an important factor for the improvement of care¹²⁻¹⁶.

The nurses, through this innovative technology, have access to accurate information that helps them in their actions, ensuring care with quality and safety. The mobile applications are easily transported to hospitals and long-stay institutions, both urban and rural, which gives more dexterity to the professionals' work¹⁵⁻¹⁶.

The use of applications in the clinical practice of nursing contributes to the elaboration of computerized assistance, the activities of collection, annotation, storage, handling and recovery of individual records. Applications also enable administrative instrumentalization and help in decision making^{13,17}.

It is important to develop a mobile application that offers the nurse a quick means of consultation for the prescription of preventive measures and treatment, such as cleaning the perineal and perianal region, with the aim of promoting injury healing.

This research is part of a project to develop a mobile application with an avatar for people who have risk factors to contract or who have already contracted IAD. The following questions were asked to guide the construction of the application: "What studies exist in the literature on mobile applications to prevent and aesthetically treat IAD? and "What guidelines and recommendations have been proposed for the development of this application?"

The objective of this study was to develop an application to assist in the evaluation, prevention and treatment of dermatitis associated with incontinence.

Methods

The study applied to technological production in the health area. The study was approved by the Research Ethics Committee of the Faculty of Health Sciences Dr. José Antônio Garcia Coutinho (opinion nº CAE 51545915.3.0000.5102) and conducted from January to May 2018.

The mobile application for the evaluation, prevention, and treatment of IAD was developed in four stages (Analysis, Design, Development and Implementation), using the Contextualized Instructional Design methodology¹⁸, which involves a constructivist proposal and consists of the intentional action of planning, developing and applying specific didactic situations, incorporating mechanisms that favor contextualization.

The Analysis stage consisted of understanding the didactic problem and solving the problems detected.

An integrative review of the literature in the databases: Cochrane Library, Scientific Electronic Library Online (SciELO), Latin American and Caribbean Literature in Health Science (LILACS), Online Medical Literature Search and Analysis System (MEDLINE), using

the descriptors present in Health Science/Medical Subject Headings DeSC/MeSH: skin; dermatitis and diaper dermatitis. The search strategy for each language was determined by the combination of the selected descriptors and the Boolean operator "AND", according to the examples: (1) skin AND dermatitis; (2) skin AND dermatitis of diapers. It was also searched in Google Play Store and Apple Store platforms to detect if there was an application related to the theme.

The inclusion criteria for the selection of publications were: primary studies that had a direct link with the theme, in Portuguese, English and Spanish, published from 2009 to 2019, and were available in full. Chapters of books, theses, dissertations, monographs, technical reports and articles that, after reading the respective abstract, did not converge with the proposed object of study were excluded, in addition to the publications that were repeated in the databases and virtual library. Also excluded were articles classified with level 6 (evidence based on expert opinions).

To classify the level of evidence of the selected studies, categories covering six levels were observed:

Level 1: evidence resulting from a meta-analysis of multiple controlled and randomized clinical trials;

Level 2: evidence obtained in individual studies with experimental design;

Level 3: evidence from near experimental studies;

Level 4: evidence from descriptive studies (non-experimental) or qualitative approach;

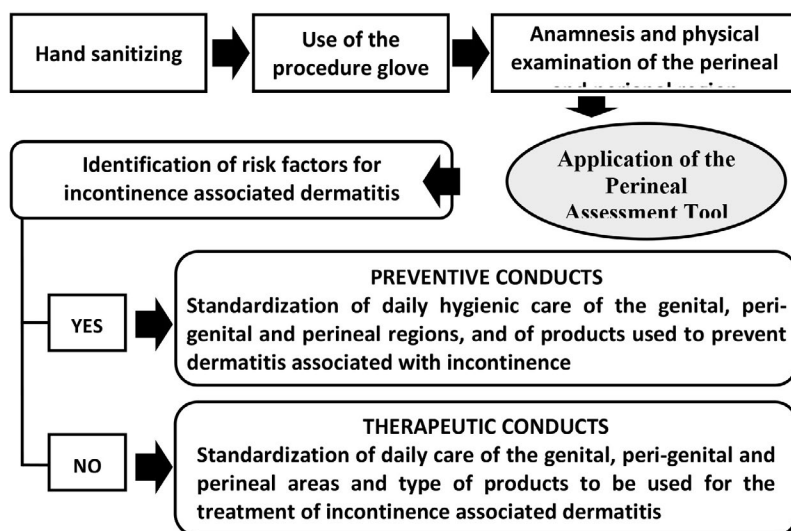
Level 5: evidence of case reports or experience;

Level 6: evidence based on expert opinion.

After classifying the level of evidence of the selected articles in the interactive literature review, a flowchart describing the application steps was built and sent to the computer programmer.

Flowchart elaborated based on the literature to help in the construction of the application, according to Figure 1 that follows.

Figure 1. Flowchart to guide the construction of the multimedia application on a mobile platform for the prevention and treatment of dermatitis associated with incontinence. Pouso Alegre, MG, Brazil, 2019



The procedures to be performed in the evaluation of the patient include anamnesis, physical examination with the evaluation of the skin in the genital, perigenital and intimate perineal areas, application of the Perineal Assessment Tool (PAT)¹⁹ Brazilian version and identification of risk factors for the individual to be affected by IAD. The following are indications of care and products to be used daily in hygiene in the genital, peri-genital and intimate perineal region, and preventive measures of the IAD based on the results of physical examination, anamnesis and scores on the PAT scale.

The standardization of therapeutic conducts for the treatment of IAD was made with the correct sequence of procedures and the use of appropriate products in hygiene in the genital, peri-genital, and perineal areas, based on the results of the evaluation of these regions and the scores of the PAT scale.

Several drawings were created to clearly illustrate the proposed procedures, not only for the professional who indicates them but also for the lay patient who may choose one or another method, when referred to the nurse.

In the Design stage, the researchers carried out programming and construction of the didactic content, choice of items related to the evaluation, prevention and treatment of the IAD and writing of the themes, selection of the media and the figure of the interface (layout). It was decided to use figures and texts structured in topics and connected by hypertext (links). This entire process was conducted by the authors of this research and the system programming team.

In Development, the selection of the application devices, the definition of the navigation structure and the planning of the configuration of each screen of the application were done.

In the Implementation step, the configuration of the devices and educational technology was performed, as well as the development of the environment to download the application on the Internet, the instructions to use it and the form of installation on the mobile device.

Results

The mobile application developed in this study is a hard technology, because it is the production of software, and provides the professional with a tool to assist in the evaluation, diagnosis, prevention and treatment of IAD. It has been registered at the National Institute of Industrial Property (protocol number BR-51-2018-000-720-1) and is available on the Google Play Store under the name DIAPERSKIN.

The interface of the application has a database composed of the patient's register, containing personal data and clinical aspects, and the IAD evaluation register, including the register of the perianal and perineal region evaluation, type and amount of exudate, type of tissue, presence of infection, anatomical location of the injury and data obtained with the PAT scale.

The developed application is composed of 22 screens containing 8 pictures. Captured images showing examples of the DIAPERSKIN application screens are shown in Figures 2 to 5 in sequence.

Figure 2. Examples of application screens. (a) Beginning of the evaluations or consultation of bibliographical references; (b) Evaluation of risk factors; (c) Scale of perineal evaluation. Pouso Alegre, MG, Brazil, 2019

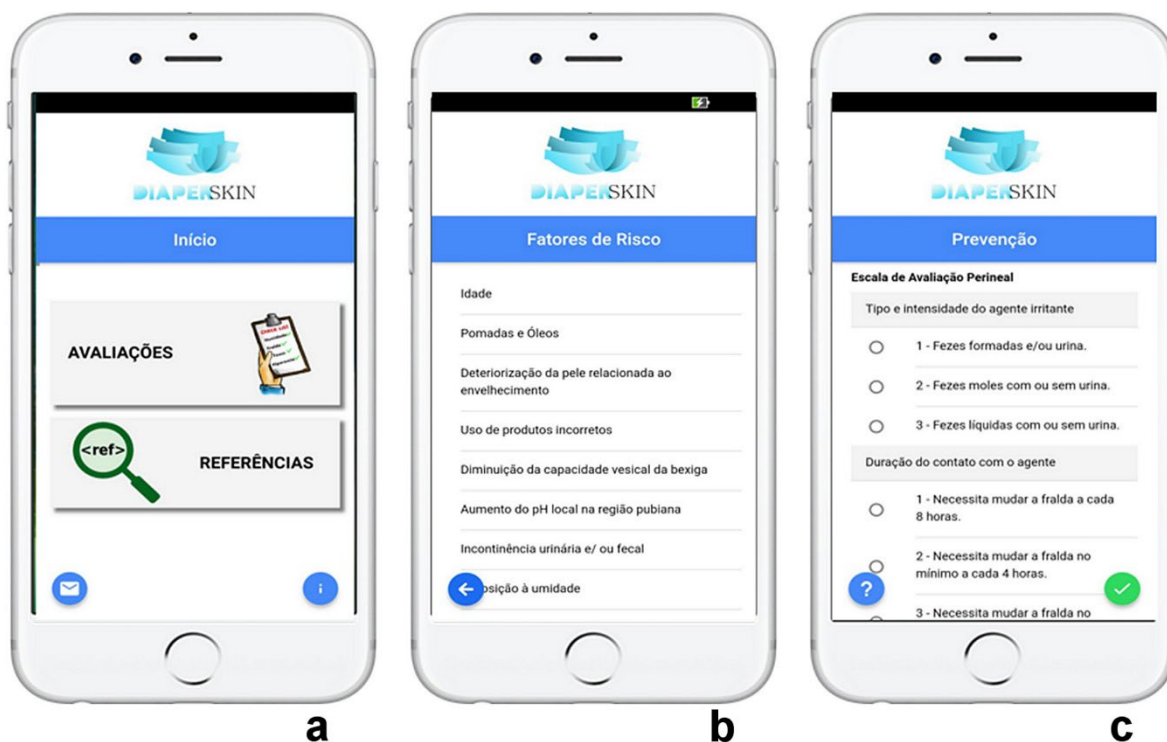


Figure 3. Examples of application screens. (a) Options of access to preventive or treatment conducts; (b) Hygiene of the hands before the procedures; (c) Partial text on preventive therapeutic conducts. Pouso Alegre, MG, Brazil, 2019

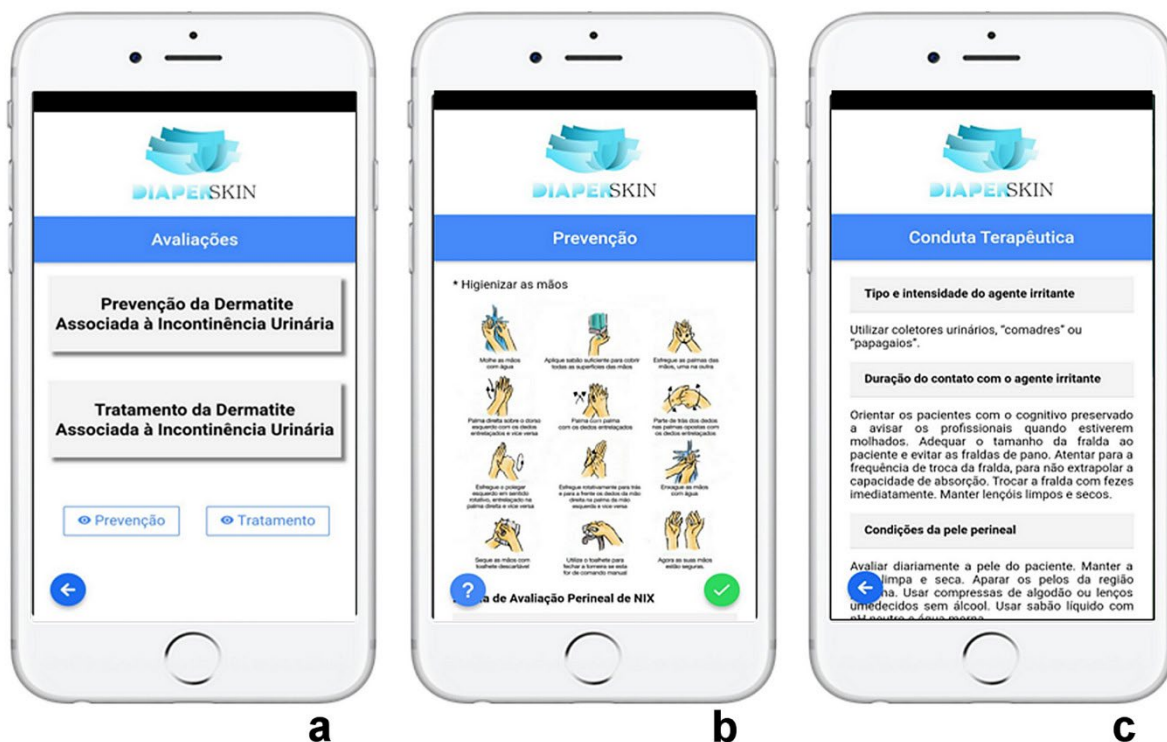


Figure 4. Examples of application screens. (a) Preventive treatment; (b) Prevention protocol algorithm; (c) Dermatitis assessment scale. Pouso Alegre, MG, Brazil, 2019

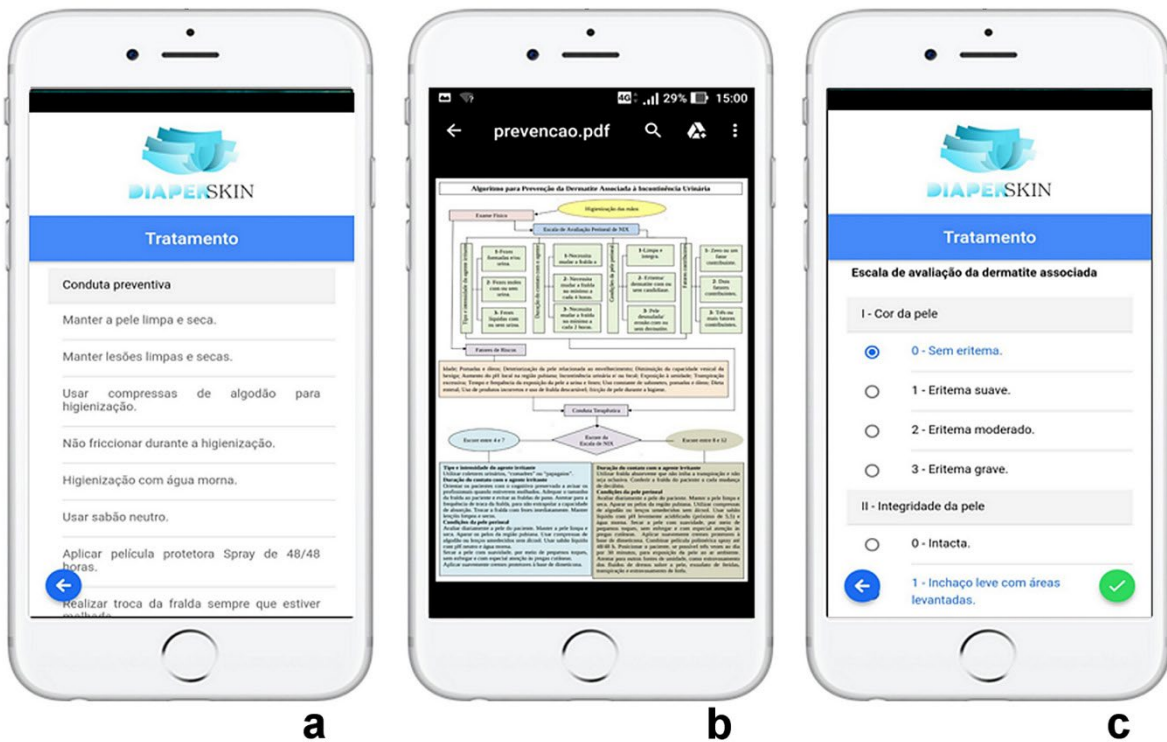


Figure 5. Examples of application screens. (a) Evaluation and treatment procedures; (b) Partial text on dermatitis treatment conducts; (c) Treatment protocol algorithm. Pouso Alegre, MG, Brazil, 2019



The initial screen shows the authors' names, the name of the institution where the study was developed and three icons: envelope, which provides an electronic address (e-mail) for contact if the user has questions or suggestions; information, which opens a screen with the definition of IAD; and options. The options icon leads to a screen where the user can consult the bibliographic references inherent to the application or start the skin evaluation in the genital, perigenital and perineal regions (Figure 2a), risk factors (Figure 2b), and apply the PAT scale (Figure 2c). The following is the screen with the options of procedures for the prevention or treatment of IAD (Figure 3a). The prevention icon gives access to the preventive therapeutic conducts (Figures 3b, 3c, 4a) and the clinical protocol in the form of an algorithm (Figure 4b), which is available for download. After the clinical evaluation (Figure 4c), the user can open the screens with the therapeutic conducts for the treatment of the IAD (Figures 5a and 5b) and the screen with the algorithm for the treatment, available for download (Figure 5c).

Discussion

The use of computer technologies in education and health has been innovating the teaching-learning and theory-practical relationships in assistance. The use of virtual environments for continuing education has demonstrated that interactivity favors the learning process and the improvement in safe care without harm to the patient¹⁵⁻²⁰. The use of applications in the clinical environment contributes to the annotation and evolution of care, which has as consequence the continuation of treatment and care with safety¹³. The individualized, personalized assistance provided to the patients with injury reduces the healing time and contributes to the analysis of the costs and effectiveness of the treatment used²¹⁻²². Mobile applications enable users to be mobile, who can use their personal smartphone 24 hours a day, wherever they are.

When evaluating the patient with IAD, the nurse needs to make decisions, and these should be based on scientific evidence, knowledge of physiology and skin anatomy. Without this knowledge, the professional will not be able to prescribe the ideal coverage, assess and follow the evolution of the injury^{20,23}.

The application developed provides measures for the prevention and treatment of IAD, seeking to promote the healing of the injury through systematic assistance, individualized, with quality, without risk or damage to the patient. It can be used as a pedagogical, theoretical and practical support tool and provides an environment in which professionals or students go through cycles of reflection and action^{6,7,20}.

The screens were built with simple images, accessible and clear vocabulary, and short texts with enough information to understand the subject. The type and size of the font were chosen aiming at a harmonious aesthetic and that the content was visible to the user. The text of an application should present a vocabulary that is easy to understand, a reading that promotes the user's interest in the use. The choice and presentation of content should take into account its ability to trigger students' prior knowledge^{7,20}.

As the main tool, the figures and photos of an application must be constructed in a clear, objective and, mainly, pedagogical way, in order to favor the alteration of the routine in the conduction of the content and to make possible several ways of apprehending the subject. The figure or photos should motivate the user to promote intuitive knowledge and provide the understanding of concepts that, if they were arranged only by text, would be more difficult to assimilate²⁰.

The union of text, pictures and photos should bring agility to the learning process, offering environments for Nursing actions, contributing to evidence-based practice. This application should provide the nurse with the information contained in his screens and also promote the development of knowledge, allowing the user to define his or her own path, which translates into a huge potential for education¹⁵⁻²⁰.

This application was built thinking about the importance of colors, size, proper font so that the user can have good reading and understanding of the theme and the screens related to the content.

The screens of an application should be built with light colors and simple backgrounds, using neutral colors, because they increase the other colors visibility present in the text. Color is a relevant feature and can make a difference in a text, depending on the position and contrast¹³⁻²¹.

In case the professional notices that the patient does not present IAD, after evaluating the skin in the genital, peri-genital, and perineal regions, he/she can take advantage of the guidelines related to the hygiene technique of these regions, preventive measures and therapeutic conducts pertinent to dermatitis.

Several studies report that, in order to avoid IAD, it is necessary that the professional, the patient and the caregiver use diapers that absorb the humidity of the skin, urine, feces and whenever the patient urinates or evacuates, the diaper change must be immediate^{3-4,20,23}.

One of the concerns that the professional should have is to investigate if there is the presence of bacteria, bearing in mind that an area of humid skin, with the existence of feces and urine, has as consequence the formation of bacteria that can originate secondary infection by the skin injury installed^{3-4,23}.

A study evaluated the cost of using One Step Incontinence System coverage in the treatment of fecal and urinary incontinence. Two wet wipes were used for cleaning, hydration, and protection; and the other product was an absorbent (diaper). It was demonstrated that OSIS contributes to the reduction of IAD because this product promotes the cleaning of the skin with the presence of sweat, urine and feces, it also reduces the permanence of feces and urine in contact with the skin in the diaper area^{9,23}.

Regarding the products to treat IAD, the spraying of barrier products based on polymer film in the genital, peri-genital and perineal regions, prevents IAD and has excellent cost-benefit in the treatment of this bill of review. The use of superabsorbent diapers, wet wipes impregnated with dimethicone 3% and spray for the formation of polymer film, prevents the IAD and is also a great option to treat it. The treatment with antifungal and corticoid is indicated in cases of infection^{3,20,23}.

The use of barrier creams contributes to preventing humidity in the diaper area, diminishes the disappearance of water trans-epidermal, reduces the permeability of the skin, and minimizes the contact between the feces and the skin because the creams adhere to the epidermis.

Conclusion

After an integrative literature review, the "DIAPERSKIN" application was developed, which has great potential for use in the clinical practice of the health professional, during the evaluation of the IAD, in the choice of preventive measures and the ideal product to treat the IAD, and for the continued education of these professionals, because the "DIAPERSKIN" application is an innovative technology.

The limitation of the study was the non-validation of the DIAPERSKIN application, being this our future perspective of the study.

Authors' contributions

Da Rocha CA and Amanda GT contributed to the design of the work, the writing of the article and the final approval of the version to be published. Salomé GM contributed to the conception of the work, in the interpretation of the findings and in the final approval of the version to be published.

Conflicts of interest

No financial, legal, or political conflicts involving third parties (government, companies and private foundations, etc.) have been declared for any aspect of the submitted work (including, but not limited to grants and financing, participation in the advisory board, study design, preparation of the manuscript, statistical analysis, etc.).

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