

Virtual simulation on breastfeeding and nipple-areolar lesions: prototype development and validation

Simulação virtual sobre amamentação e lesões mamilo-areolares: desenvolvimento e validação de protótipo

Simulación virtual sobre lactancia y lesiones en el pezón y areola: elaboración y validación de prototipo

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Abstract

Objective: To develop and validate the content and appearance of the prototype of the Serious game “AleitaGame” on breastfeeding and nipple-areolar lesions.

Methods: This is a study carried out in three stages, namely: content selection through a Scoping Review, development of educational software based on the Benitti, Seara and Schlindwen approach, and a methodological study for content validation, technical and pedagogical aspects, carried out with six expert judges on the subject. Descriptive analysis was used in this study, as well as the Content Validity Index for the content assessment instrument.

Results: The content of the clinical cases and the simulated scenarios was built from a total of 115 studies and was validated by six judges in relation to the content and the technical-pedagogical aspects, the only ones who presented suggestions in the design and feedback of the game. The final version of the serious game contains different media and gamification resources for an interaction with the theme that deals with the breastfeeding technique as a cause of nipple-areolar lesion in lactating women.

Conclusion: The “AleitaGame” prototype was validated by expert judges and is suitable for the final stage of educational software development.

Resumo

Objetivo: Construir e validar conteúdo e aparência do protótipo do *Serious game* “AleitaGame” sobre amamentação e lesões mamilo-areolares.

Métodos: Trata-se de um estudo realizado em três etapas, sendo elas: seleção do conteúdo através de uma *Scoping Review*, desenvolvimento de software educativo embasado no método de Benitti, Seara e Schlindwen, e um estudo metodológico para a validação de conteúdo, aspectos técnicos e pedagógicos, realizada com seis juízes especialistas na temática. A análise descritiva foi utilizada nesse estudo, bem como o Índice de Validade de Conteúdo para o instrumento de avaliação do conteúdo.

Resultados: O conteúdo dos casos clínicos e dos cenários simulados foi construído a partir de 115 estudos e foi validado por seis juízes em relação ao conteúdo e os aspectos técnico-pedagógicos, sendo esses os únicos que apresentaram sugestões no *design e feedback do game*. A versão final do *serious game* contém diferentes recursos de mídia e gamificação para uma interação com o tema que trata da técnica de amamentação como causa de lesão mamilo-areolar em lactantes.

Conclusão: O protótipo do “AleitaGame” foi validado por juízes especialistas e está adequado para a etapa final de desenvolvimento do software educativo.

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Resumen

Objetivo: Elaborar y validar el contenido y la apariencia del prototipo del *serious game* “AleitaGame” sobre lactancia y lesiones en el pezón y areola.

Métodos: Se trata de un estudio realizado en tres etapas, a saber: selección de contenido a través de una *Scoping Review*, desarrollo del software educativo basado en el método de Benitti, Seara y Schindwien, y un estudio metodológico para la validación del contenido, aspectos técnicos y pedagógicos, realizada con seis jueces especialistas en el tema. En este estudio se utilizó el análisis descriptivo, así como también el Índice de Validez de Contenido para el instrumento de evaluación de contenido.

Resultados: El contenido de los casos clínicos y de los escenarios simulados fue elaborado a partir de 115 estudios y validado por seis jueces con relación al contenido y a los aspectos técnico-pedagógicos, que fueron los únicos que presentaron sugerencias sobre el diseño y *feedback* del juego. La versión final del *serious game* contiene diferentes recursos multimedia y de gamificación para interactuar con el tema que trata sobre la técnica de lactancia como causa de lesiones en el pezón y areola en lactantes.

Conclusión: El prototipo de “AleitaGame” fue validado por jueces especialistas y está preparado para la etapa final de desarrollo del software educativo.

The record of this review is stored in OSF REGISTRIES, and can be accessed through the link: <https://osf.io/s5bwk>.

Introduction

It is a peaceful point that breastfeeding promotes physical and mental well-being for the mother-child dyad by providing more than the nutritional and immunological needs of newborns (NB), guaranteeing a healthy development throughout life, preventing them against diseases such as diabetes and overweight in the NB and breast and the mother's ovarian cancer, in addition to reducing the risks of neonatal mortality.^(1,2) Because it has these attributes, the World Health Organization (2018) recommends that breastfeeding mother should be offered exclusively until the first six months and in a complementary way until the age of two or more.⁽³⁾

It is known that there are several factors associated with breastfeeding, which can interfere positively or negatively in this process. Thus, it is extremely important to strengthen positive stimuli and minimize negative ones, in order to reduce the rate of early weaning, which is still higher than expected in many countries, especially in Brazil.⁽⁴⁾ Among these, the nipple-areolar lesions are highlighted, a condition present in 55.5% of postpartum women,⁽⁵⁾ and which can cause painful discomfort that is decisive in the decision to stop breastfeeding exclusively and that affects most postpartum women in the first few days after giving birth.^(6,7)

Nipple-areolar lesions, also called nipple trauma (NT) in the literature, are changes in the anatomy of the nipple, which consist of changes in the color and thickness of the nipple skin, and may present erythema, edema, ecchymosis, fissures and

blisters.⁽⁸⁾ Poor positioning of the newborn during breastfeeding significantly contribute to the emergence of these lesions, whose causes may be linked to failures in prenatal care and the lack of knowledge of health professionals about NT.⁽⁹⁾

It is worth remembering that nurses are also responsible for monitoring breastfeeding, starting with prenatal care and the postpartum period, including actions that encourage the technique and the breastfeeding process, supporting postpartum women.⁽¹⁰⁾ In addition, they should include the partner and the family, as the support of family members can prevent early weaning and reduce the appearance of possible complications with the puerperal woman and/or the NB.⁽¹⁰⁾

Thus, teaching nurses about breastfeeding and care for nipple-areolar lesions becomes opportune as a possibility of intervention aimed at reducing early weaning. Knowing that health education is currently undergoing a paradigm shift, characterized by encouraging the implementation of innovative teaching-learning strategies that can bring theory and practice together, virtual simulation is available in its best and most used version, serious games, as a possibility already experienced and with positive results in various contexts of health education.⁽¹¹⁾

The development and validation of the prototype of the serious game “AleitaGame”, which this study is about, was designed with the aim of providing information that improves knowledge and clinical reasoning about the latch assessment, breastfeeding technique, consequences of incorrect latch and decision-making on the care that should be performed

and oriented. So, the objective of this study was to build and validate the content and appearance of the prototype of the serious game “AleitaGame” on breastfeeding and nipple-areolar lesions.

Methods

This is an applied research and a methodological study that intertwine and complement each other, carried out in three main stages, according to the Polit and Beck approach,⁽¹²⁾ Polit, Beck and Hungler⁽¹³⁾ for the construction of clinical cases, development of simulated scenarios and the serious game and its validation. In the first stage, to support the content of the clinical cases, a Scoping Review was carried out in order to select studies that described the cause of nipple-areolar lesions.

In this step, the methodological framework of the Joanna Briggs Institute was used,⁽¹⁴⁾ composed of 5 steps, namely: (1) identification of research questions; (2) identification of relevant studies by searching the literature using electronic databases, documents that are found with a broad search based on keywords and a parallel list of references; (3) selection of studies, with establishment of eligibility criteria; (4) mapping of the 40 data; and (5) collecting, summarizing and reporting results.

The Population, Concept and Context (PCC) strategy was applied to guide the elaboration of the research question, so, the following research question was elaborated: “what are the essential attributes, antecedents and consequences that define the concept of nipple-areolar lesion in breastfeeding women in the puerperium context?” The search was based on the strategy described in the Joanna Briggs Institute’s scope review manual,⁽¹⁴⁾ with the aim of identifying published and unpublished primary studies (grey literature), as well as reviews.

Following the recommendations of this methodological framework, the search and selection strategy of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to conduct this review. The objective was to select studies that addressed the essential attributes, antecedents and consequences of nipple-are-

olar lesion. The searches were carried out between September and December 2019 in two databases: CINAHL and WEB OF SCIENCE, using the keywords “nipple trauma” OR “nipple pain” OR “nipple crack” OR “nipple damage” OR “nipple lesions”, and selected 138 studies, which originated the following concept synonyms: “nipple trauma”, “nipple pain”, “nipple crack”, “nipple damage” and “nipple lesions”, which were used for the gray literature search combined with the Boolean OR operator. This second moment was carried out on Google Scholar and resulted in the addition of 53 studies to the sample. In total, 191 studies were used to support the “AleitaGame”.

After this step, a selection was made from this sample of studies that addressed incorrect latch and/or inadequate breastfeeding technique as the cause of nipple-areolar lesion, and/or presented a clinical description, photo, video and/or specific care procedures for those cases. Of the total, 76 studies were excluded and this selection totaled 115 articles that supported the research, presented in the flowchart (Figure 1).

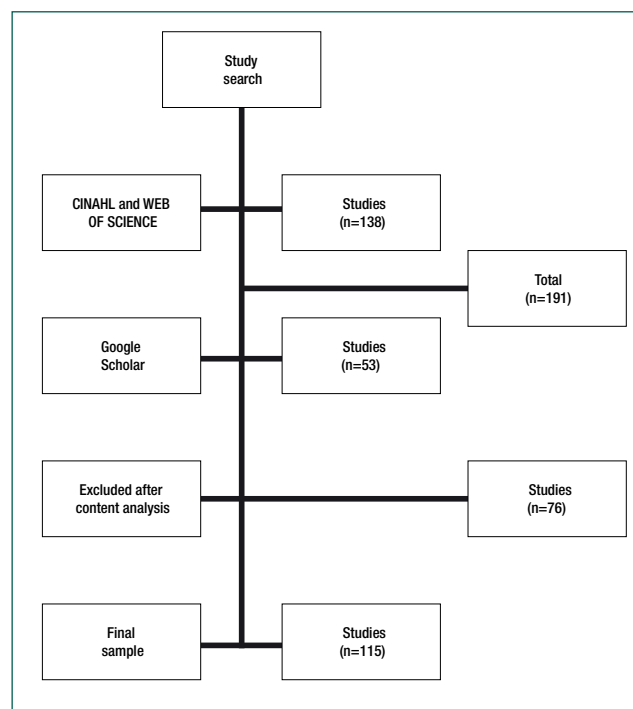


Figure 1. Flowchart of the study selection process

The results of this review demonstrate, in summary, that nipple-areolar lesion is a complex injury

preceded by ineffective breastfeeding, inappropriate use of human milk pumps and/or use of cosmetics, and can lead to early weaning of the child, involvement breast due to mastitis and/or decreased milk production. All these antecedent and consequent factors can appear in isolation or in combination, emphasizing the importance of describing the analysis of this concept for professionals who deal with breastfeeding.

In addition, the other resources of this scenario were identified in other sources, such as <YouTube.com> and the research's own collection. The author responsible for this stage worked in the area of breastfeeding for three years and has, in addition to clinical experience, more than 200 hours of training courses in the maternal-infant and breastfeeding area.

Data collection from the studies and organization of the information that was presented in the scenario were carried out using an instrument built by the researcher. This instrument contained the stages of construction of the clinical case, their respective descriptions, gamification techniques used and learning objectives, according to Bloom's taxonomy.

The development of the "AleitaGame" scenario, as well as the game itself, followed the methodological framework of Benitti, Seara and Schlindwen,⁽¹⁵⁾ who describe it from the following stages: conception, elaboration, completion and feasibility. For this phase, an instrument in electronic format was built by the developers of the educational software, by google docs, to meet the demands of "AleitaGame" containing all the content, resources and gamification and phases of the game. The game is available for online access, through the following website: <https://aleitagame.github.io/#aleitagame>.

And finally, in the validation stage, the search for the judges was carried out through information on the website <aleitamento.com>, snowball technique and invitation in a group of the Whatsapp application formed by technicians responsible for the Brazilian Network of Human Milk Banks in the State of Rio Grande do Norte. This study partially contemplated the stages of development of the Educational Software, being limited to the elaboration in the validation of the content.

The inclusion criteria at this stage were: being a nurse and having the International Board Certified Lactation Consultant® (IBCLC) credential, and/or working directly in the care of puerperal women in a child-friendly hospital for at least five years, and/or be technically responsible and act directly in providing care to postpartum women for at least five years.

IBCLC certification is awarded to professionals who pass a type of selection that is valued worldwide as the most trusted source for certifying professionals in lactation and breastfeeding care. Currently, Brazil has a total of 154 certified professionals who underwent an exam containing 175 multiple-choice questions, had at least 90 hours of specific training in lactation and a minimum time of 300, 500 or 1000 hours, according to the option selection chosen by the candidate.⁽¹⁶⁾

Four e-mails were sent to all contacts available on the website, totaling 53 professionals who received them twice a week over a two-week period. This contact pattern was repeated in the WhatsApp group. Four professionals responded to the invitation and two others were included by indication, according to the snowball technique. It is worth noting that this number meets the recommendation of the Nielsen framework, which indicates a minimum of 3 specialists to evaluate digital technologies.⁽¹⁷⁾

Three virtual meetings were held through the Meets platform, in total 6 judges who met the criteria participated. The game was presented demonstrating the content, didactic media resources, gamification and all possible feedbacks. Each judge received a link containing an electronic form, built on google forms, to fill in the serious game evaluation. This instrument was divided into three parts: one containing information on the professional profile of the judge (session I), another on the assessment of the scenario regarding the narrative, clinical and contextual aspects (session II), and, finally, the Egame Flow items, which was used to assess the judges' satisfaction with the educational game. It is composed of eight categories (concentration, challenges, autonomy, clarity of objectives, feedback, immersion, social interaction and knowledge improvement) that are evaluated through a scale that

varies from 1 to 7, with scores closer to 7 being those of better levels of satisfaction.⁽¹⁸⁾

Still in the serious game evaluation stage, a second category of judges was included, who are responsible for the technical and pedagogical aspects of the game. Two online meetings were held through the Google Meet platform. The data collection instrument for this category was made available through a Google forms link and was subdivided into three sections: data on the professional profile of the research judges and evaluation of the technical and pedagogical aspects in two subsections containing each of the items from the following instruments: Learning Object Review Instrument (LORI) and Gameflow.^(19,20)

Data were collected directly in the electronic form and later organized and categorized in Excel. Descriptive analysis was used in this study, as well as the Content Validity Index (CVI) to validate the technology's content. The aforementioned stages of this research lasted approximately 15 months between 2019 and 2020.

Considering the ethical and scientific rigor, this study was sent to the Research Ethics Committee of UFRN identified by CAAE 15860819.0.0000.5537 and approved under number 3 552 016. In data collection, all participants received the informed consent in virtual format with assured and clarified information about rights and after accepting to participate in the research, they were required to sign the aforementioned document with the guarantee of their anonymity.

Results

The evaluation of the content of "AleitaGame" was performed by six professionals who met the inclusion criteria of the study. All evaluators were female, the average age among them was 54.6 years old and had a nursing training with an average time of 31 years. Four of the evaluators met the inclusion criteria of having the IBCLC certification, one of them worked at a Baby-Friendly Hospital while the other one was Technical Responsible (TR) at the Brazilian Network of Human Milk Banks (rBLH-BR), to-

taling the 'N' of selected judges. The distribution among the highest level of training was egalitarian, so that three of them had a master's degree and the other three were specialists in the area in question. Regarding the complementary training related to the theme of breastfeeding, three presented this theme as an object of study of the master's degree, and two of these also had a specialization in breastfeeding, of the other evaluators, one was a specialist in Obstetrics, one was a specialist in Pediatrics and Neonatology and the other did not describe additional training in the questioned area. Table 1 presents the profile of the judges who evaluated the content covered in "AleitaGame".

Table 1. Profile of the judges who evaluated the content of "AleitaGame" (n=6)

Variables	Expert judges n (%)	Mean (years)
Female gender	6(100)	
Training in nursing	6(100)	
Age group		54.6
Professional experience in the field		
IBCLC certification*	4(66.6)	
Baby Friendly Hospital	1(16.7)	
Human milk bank	1(16.7)	
Nursing training time		31
Certification		
Specialization	3(50)	
Master's degree	3(50)	
<i>Theme in complementary training</i>		
Breastfeeding	3(50)	
Obstetrics	1(16.7)	
Pediatrics and neonatology	1(16.7)	
Others	1(16.7)	

*IBCLC - International Board of Lactation Consultant

About the State of the Brazilian Federation in which these professionals developed their work, three of them worked in Rio Grande do Sul, two in Rio Grande do Norte and one in Paraná. Finally, all of them worked in direct care to postpartum women with nipple-areolar lesions and the average time of work in this area was 22.3 years. The construction of this scenario was based on 115 scientific articles, selected through a scope review, and the researcher's empirical experience. From them, it was possible to select the content of the scenarios and media resources of the game, such as real images. In addition to these, the content of this scenario was presented through texts, videos with real images and

Chart 1. Description of the contents presented in the Hospital scenario and their respective teaching resources

Content	Didactic resource	Theoretical basis	Identification in figure 2
Inadequate breastfeeding technique	Photo-like real image Video-like real image	Amir, L.H. Managing common breastfeeding problems in the community. <i>BMJ</i> , v. 348, p. 31-34, 2014.	1,2
Historic	Fictitious medical record	Barbosa DM, Caliman MZ, Alvarenga SC, Lima EFA, Leite FMC, Caniçali Primo C. Assessment of factors associated with nipple trauma. <i>Rev Fun Care Online</i> . 2018.	3
Anamnesis	Narrative in dialog format	Barbosa DM, Caliman MZ, Alvarenga SC, Lima EFA, Leite FMC, Caniçali Primo C. Assessment of factors associated with nipple trauma. <i>Rev Fun Care Online</i> . 2018.	4
Relevant clinical parameters	Multiple choice question	Tiruye, G., Mesfin, F., Geda, B. <i>et al</i> . Breastfeeding technique and associated factors among breastfeeding mothers in Harar city, Eastern Ethiopia. <i>Int Breastfeed J</i> 13, 5 (2018).	5
Key points of latch evaluation and positioning	Text Video-like real image	Brazil. Ministry of Health. Food guide for Brazilian children under 2 years old, Secretariat of Primary Health Care, Department of Health Promotion. Brasília, 2019.	6
Influence of the latch on the occurrence of nipple-areolar lesion	Animation type video	Coca KP, Gamba MA, Silva RS, Abrão ACFV. Does the breastfeeding position determine the onset of nipple trauma? <i>Revista da Escola de Enfermagem - USP</i> . 2009;43(2):446-452.	7
Influence of the latch on the ejection of breast milk	Video-like real image	Brazil. Ministry of Health. Food guide for Brazilian children under 2 years old, Secretariat of Primary Health Care, Department of Health Promotion. Brasília, 2019.	8
“c” technique to assist in breastfeeding	Video-like real image	Ministry of Health. Food guide for Brazilian children under 2 years old, Secretariat of Primary Health Care, Department of Health Promotion. Brasília, 2019.	9
Breastfeeding advice	Text	Bueno LGS, Teruya KM. Breastfeeding counseling and its practice. <i>Jornal de Pediatria</i> . v. 80, n. 5(supl), 2004	10
Variety in the clinical presentations of nipple-areolar lesions	Text and real photo type image	Nakamura M, et al. Nipple Skin Trauma in Breastfeeding Women During Postpartum Week One. <i>Breastfeed Med</i> , v. 13, n. 7, p. 479-484, 2011.	11
Most appropriate conduct for the case	Multiple choice question	Berens P, Eglash A, Malloy M, Steube A M, and the Academy of Breastfeeding Medicine. <i>ABM Clinical Protocol #26: Persistent Pain with Breastfeeding</i> . <i>Breastfeeding Medicine</i> . Volume 11, Number 2, 2016. Brazil. Ministry of Health. Food guide for Brazilian children under 2 years old, Secretariat of Primary Health Care, Department of Health Promotion. Brasília, 2019. Dennis CL, Jackson K, Watson J. Interventions for treating painful nipples among breastfeeding women. <i>Cochrane Database of Systematic Reviews</i> 2014, Issue 12.	12

animations and other real images from the research collection. Of these, a total of 12 were selected as a theoretical basis for the content of the scenario, confirming it as an educational resource based on scientific literature, as shown in chart 1. The others had images, findings and clinical descriptions of research that complement these studies. Thus, reading and the knowledge acquired through them contributed to the construction of scenarios indirectly. The contents and media resources of the game, such as real images, animations, texts and videos used to build the scenario “Inadequate breastfeeding technique” are described in chart 1.

Figure 2 below demonstrates the presentation of the content items described in chart 1.

The judges’ assessment of the content of the hospital scenario, with regard to the narrative, clinical and contextual aspects, presented maximum scores in the Content Validity Index in the three evaluation items (CVI=1), with no need to adjust accordingly. Thus, the content of the scenario was considered by the evaluators as appropriate for teaching care for nipple-areolar lesions. In the GameFlow stage, used to assess the judges’ satisfaction with the



Figure 2. AleitaGame hospital scenario screens

educational game, the items in the categories “challenge”, “player skills”, “objectives”, “feedback” and “knowledge improvement” presented scores close to the maximum score (7 points) and approximate values between the responses of the two categories of evaluators. In the other categories “control”, “concentration” and “immersion”, the scores of the two categories differed by more than 1.5 points in the same items evaluated. Table 2 below presents the details of this evaluation stage.

Table 2. GameFlow instrument evaluation items (n=9)

GameFlow instrument items	n(%)
What is your contact with technological resources (computers, tablets, smartphones, etc.)?	
I use it daily	9(100)
What is your contact with digital games (video games, tablets, smartphones, etc.)?	
I rarely play	3(33.4)
I never play	2(22.2)
I play occasionally	2(22.2)
I play daily	2(22.2)
Educational Software Evaluation Items	Average score (Content*) average score (Tec/Ped**)
Does the game hold my attention?	6.85(4)
Am I distracted from tasks I should be focusing on?	6.57(5.3)
Do I enjoy the game without getting bored or anxious?	6.57(4)
Is difficulty adequate?	6.57(6)
Will my skills increase as the game progresses?	6.42(6.3)
Am I motivated by improving my skills?	6.57(5)
Do I have a sense of menu control?	6.71(5.3)
Does the game allow me to recover from mistakes made?	7(5)
Do I feel like I can use any strategies?	6.57(4.3)
Do I know the next step in the game?	6.14(5.3)
Are general objectives presented at the beginning of the game?	6.57(6.6)
Do I understand the goals of learning through the game?	7(7)
Do I get feedback on my game progress?	7(7)
Do I receive information about my status, such as level or score?	7(6)
Do I lose track of time while playing?	6.14(3.3)
Do I forget things around me while playing?	6.28(3.3)
Do I forget about everyday problems while playing?	6(3)
Am I involved with the game?	6.85(4.6)
Does the game improve my knowledge?	7(5.6)
Do I try to apply the knowledge in the game?	7(6.6)
Do I want to know more about the featured content?	6.85(5.6)

*Content - category of judges who rated the content; **Tec/Ped - category of judges who evaluated the technical and pedagogical aspects

In addition to the quantitative assessment, the judges had the option of presenting suggestions for improvements, such as: adding verbs in the infinitive in the text box referring to the game’s commands and better describing what the student should do in that phase; differentiate the colors of

text boxes referring to game commands, dialogues and narratives; remove the option to advance on the home page of the exploration phases of the scenarios and add them only when the student is familiar with the scenario in the highlighted items, highlight more the captions of the highlighted items in the exploration phases of the scenario of choice; explain in the feedback the item that the student selected wrongly in the multiple-choice questions; add the option to “try again” in the final scenario feedback. The exploration time of the scenario will depend on the interest of each participant, but the minimum time is 20 minutes to access all resources. All recommendations were accepted and changed in the final version of the game, which can be viewed at: <https://www.youtube.com/watch?v=tcOFUZ4MRg0>.

Discussion

The core of the game “AleitaGame” was based on real-life professionals, and only aspects related to these professions are developed, being digitally supported learning environments games, designed so that students can develop skills in a specific domain, under realistic constraints.

In the scenario on breastfeeding technique, the steps of history, anamnesis and relevant clinical parameters are used where the latch is approached through a photograph and video type real image, and textual information. Positioning is portrayed in video-type real image and textual information.

Regarding the first stage of the validation questionnaire, which addresses aspects of the game in terms of narrative, clinical aspects and context, the CVI was 100%, that is, maximum agreement of the judges and there was no suggestion of alteration, only positive comments about the scenario.

“C” technique is portrayed in a video and, finally, the various clinical presentations of nipple-areolar lesions and the key points of assessment of the latch and positioning were described through several photograph-type real images, as well as textual information containing their respective settings.

The Influence of the latch on the occurrence of nipple-areolar lesion and the latch on the ejection

of breast milk were also evidenced in the scenarios and it is known that these are maternal complaints and are related to the motivations for early weaning.

A study showed that 41% of the complaints reported by puerperal women who sought a milk bank were related to the breastfeeding technique, with the procedure “orientation of position, latch and suction” being performed more frequently.⁽²¹⁾

Another study carried out an educational intervention focused on breastfeeding technique and demonstrated a significant improvement in the prevalence of breastfeeding in the first 30 days. The strategies used were: presentation of the 22-minute video “Breastfeeding is much more than feeding the child”, produced by the Ministry of Health, with verbal guidance on the benefits of breast milk, appropriate clothing that facilitates breast exposure, position of the mother and child, key points for correct latching and the individualized demonstration of the technique of breastfeeding with the use of mannequins. The mother repeated the procedures taught to her child and if any unfavorable parameter of the breastfeeding technique was identified, proper guidance was given.⁽²²⁾

Considering the complexity of breastfeeding, it is known that assessing latch is not a simple process, as the combination of latch, suction and breastfeeding position favors the effectiveness of breastfeeding and contributes to a more or less comfortable process for the binomial.

Thus, the points explored for the construction of the scenarios were: alignment of the baby’s head and body, the baby’s safe proximity to the mother’s body, the baby properly supported, with the mother able to position and hold him, and the positioning of the baby facing the breast, with the nose facing the nipple.⁽²³⁻²⁵⁾

There are several positions for a woman to breastfeed: sitting, lying down or in any other position that is pleasant, familiar and more appropriate for the moment. Mother and baby should feel comfortable and some examples are: traditional position, “football player” position, lying down, traditional inverted position, among others.⁽²⁶⁾

Regarding the conduct for treatment and prevention, it is observed in this scenario the focus on inter-

vention, health education and topical treatment. This data corroborates the results of a systematic review, which concluded that health education on breastfeeding, with clinical demonstration, it presents itself as an effective strategy in the care of nipple-areolar lesions, and more than one educational approach should be carried out. An important observation is that all interventions were conducted postpartum, which points to the need for clinical research on the prevention of nipple-areolar lesions in prenatal care.⁽²⁷⁾

Regarding topical treatment, there is a wide variety of procedures and products presented in the literature, but the consensus among all is the maintenance of moisture in the nipple-areolar area.⁽²⁸⁾

The combination of topical treatment with health education strategies enhances the positive effect of the intervention, as well as the use of materials that help to reduce the contact between the lesion and the clothing, also favoring healing.^(29,30)

In this study, both strategies are demonstrated through the following interventions presented as appropriate for the case, in the last activity of the game: “teach two more positions to breastfeed your baby”,^(21,26) “teach newborn latch correction”,^(21,26) “teach the mother to manually extract milk from the breasts”,^(10,21,22) “wet treatment: “stimulate the topical use of human milk on the nipple after feedings”,^(10,21,22) and “communicate using counseling skills”.^(3,21)

It is worth noting that there is evidence that the content on the use of human milk is effective in the treatment of nipple-areolar lesions, even better than lanolin. This information is relevant, taking into account the cost-benefit issue, a very important aspect that must be taken into account in the professional’s decision making, especially in the Brazilian context.⁽²⁹⁾

In this context, it is important to highlight the importance of using educational tools to improve knowledge, skills and attitudes, as well as the participation of nurses with experience for this study, since the advanced mastery of the subject in question and the skills for the practice strengthen their role as health educators and guide the dissemination of specific guidelines that help in the process of adaptation and health promotion, strengthening care to encourage and qualify breastfeeding.

Furthermore, it is necessary that nurses contribute to the construction of technologies and educational actions that help in the teaching-learning process about breastfeeding care through the elaboration and validation of all content used, as in the construction of this technology.

From this perspective, the increasing use of substantiated and validated technologies helps the teaching-learning process through interactions experienced by nurses. The participatory approach, used in the construction of this teaching material, made it possible to identify the needs of patients, who indicate the content of this technology to meet the pedagogical demands of this audience.

Thus, the construction and validation of “AleitaGame” presents a new teaching strategy on the subject. So, in line with the paradigm shift in health education, it brings theory and practice together in an educational resource that favors active and meaningful learning by offering multiple didactic resources and bringing the student closer to a problem close to reality.⁽³⁰⁾ It is also believed that the construction and validation of this educational technology can positively contribute to the adherence to good practices for successful breastfeeding.

So, after the development and evaluation stages, it was possible to categorize “AleitaGame” as an “epistemic game”, which is defined by a type of software where players think and act like real-world professionals.

The study presented as a limitation the restricted selection of judges with IBCLC certification to compose the validation sample. The stages of this research were limited to the validation of the scenario content, characterizing it as a prototype. Thus, it is recommended to continue the steps, which are validation with the target audience, completion and feasibility. We emphasize the importance of completing all stages of development of this environment so that it can serve its teaching purpose reliably and appropriately for the target audience.

Conclusion

The Serious game “AleitaGame” proved to be valid in its content and appearance for the practice of

health education as a learning tool that makes the teaching of breastfeeding and nipple-areolar lesions easier. The article studied the scenario that promotes the knowledge of inadequate breastfeeding technique as the cause of nipple-areolar lesion in the prototype of “AleitaGame” through various media and gamification content and resources, which had no suggestions for improvements in terms of content, only technical aspects, which were fully met. Thus, the construction and validation process of the Serious game contributes to the advancement of knowledge in the area of breastfeeding through the provision of an innovative, useful and easily accessible teaching resource on the subject, presenting itself as a technology possibility that accompanies the paradigm shift in health education.

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Collaborations

Medeiros LP, Sena JF, Rodrigues MIR, Nascimento RM, Fonseca LM and Costa IKF contributed to the study design, data analysis and interpretation, relevant intellectual critical review and approval of the final version to be published.

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