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Construction of a course on Mini-CEX in the distance learning modality for medical residence preceptors

Construção de curso sobre Mini-CEX na modalidade de ensino a distância para preceptores de residência médica

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ABSTRACT

Introduction: Assessment is paramount in the resident physician's teaching-learning process. The Mini-CEX is considered an appropriate instrument to carry out formative assessment, allowing structured educational feedback. In this context, residency preceptors need to undergo a continuous training process to better prepare their residents, and a viable form of training is using Distance Education (EaD).

Objective: To develop and validate a Distance Education (EaD) course on Mini-CEX for residency preceptors in Mastology.

Method: Development and validation of a technical-educational product, in the format of a training course and in the Distance Education modality (EaD). The consensus group technique was used in the product content validation process. Semantic validation was carried out through a validation questionnaire applied to the preceptors involved in the residency program in Mastology.

Results: A self-instructional and unmediated course was designed and validated, with a total workload of 02 (two) hours. The course was approved by the target audience, as it had an overall average score of 98% satisfaction and a Cronbach's alpha equal to 0.8.

Conclusions: The course developed and validated on Mini-CEX presents itself as a relevant option for the training of medical residency preceptors in Mastology and can be extended to any medical residency service. It should be noted that the Distance Education (EaD) course favors the adherence of the target audience, with an accessible format to strengthen knowledge on the subject, in addition to encouraging preceptors to also use the educational evaluation.

Keywords: Health Education; Formative Feedback; Internship and Residency; Education, Distance.

RESUMO

Introdução: *A avaliação é primordial no processo de ensino-aprendizagem do médico residente. O Mini-CEX é considerado um instrumento apropriado para realizar uma avaliação formativa, permitindo um feedback educacional estruturado. Nesse contexto, os preceptores de residência precisam estar em contínuo processo de capacitação para melhor direcionar os seus residentes, e uma forma viável de capacitação é por meio do ensino a distância (EaD).*

Objetivo: *Este estudo teve como objetivos desenvolver e validar um curso na modalidade de EaD sobre Mini-CEX para preceptores da residência em mastologia.*

Método: *Trata-se de desenvolvimento e validação de um produto técnico-educacional no formato de curso de capacitação e na modalidade de EaD. No processo de validação de conteúdo do produto, utilizou-se a técnica de grupo de consenso. A validação semântica foi realizada através de questionário de validação aplicado aos preceptores envolvidos na residência em mastologia.*

Resultado: *Foi elaborado e validado um curso autoinstrucional e sem mediação, com carga horária total de duas horas. O curso teve aprovação do público-alvo por apresentar um escore médio global de 98% de satisfação e um alfa de Cronbach igual a 0,8.*

Conclusão: *O curso desenvolvido e validado sobre Mini-CEX apresenta-se como opção relevante para a formação de preceptores de residência médica em mastologia, podendo se estender para qualquer serviço de residência médica. Ressalta-se que o curso na modalidade de EaD favorece a adesão do público-alvo apresentando um formato acessível para fortalecer o conhecimento sobre o tema, além de incentivar os preceptores a utilizar a ferramenta de avaliação educacional.*

Palavras-chave: *Educação em Saúde; Feedback Formativo; Internato e Residência; Ensino a Distância.*

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INTRODUCTION

Medical residency (MR) is a symbol in the life of the future specialist. When joining this postgraduate course, one seeks responsibility, the development of the capacity for initiative and judgment, critical sense, in addition to training in a new specialty.[1] MR was defined as a postgraduate teaching modality aimed at doctors through Law n. 6,932, under the responsibility of a health institution and under the guidance of professionals with high ethical and professional qualifications.[2]

MR in Mastology qualifies doctors in the specialty of Mastology with skills to study, prevent, diagnose and treat breast diseases, allowing and operating the necessary treatments, clinical or surgical ones, over a two-year period. Therefore, there are different skills that must be acquired during residency.[3]

One of the most important steps in the teaching-learning process during medical residency is assessment, as it allows the preceptor and resident physician to obtain information about the learning process and the teaching methodology used, stimulating learning and offering information about the effectiveness of the educational strategy to institutions and preceptors.[4,5]

There are two evaluation methods that stand out: the summative and the formative. The summative assessment allows an overview of skills, aiming at a classification. The formative assessment is one that reorients learning and promotes reflection.[6,7] In this context, the Mini-CEX (Mini-clinical Evaluation Exercise) is a formative assessment instrument that allows the preceptor to observe the resident as they conduct a specific history and physical examination, quickly and objectively, with an average duration of 10 to 20 minutes. It was designed based on the skills that residents should have in real encounters with patients.[8-10]

The examiner uses an established form to record the resident's performance, then offers organized feedback.[11] The Mini-CEX form completed by the observer seeks to assess six core clinical competencies: interview, physical examination, humanistic qualities, clinical reasoning, counseling and organization. Added to these six is a global category of general clinical competence.[12]

Aiming to guide residents more assertively, the preceptor must undergo a contin uous training process, with distance education (EaD, *Ensino à Distância*) being a strategy for professionals to remain in the job market. The use of technology in this scenario supports new ways of promoting learning, making it more creative, diverse and inclusive.[13]

The formative assessment contributes to the acquisition of resident skills and this research aimed at describing the process of development and validation of a distance education course on Mini-clinical Evaluation Exercise for medical residency preceptors.

METHOD

The study reports the development and validation of a technical-educational product of a didactic-instructional material type in the format of a training course in the Distance Education (EaD) modality, developed in the Master's Degree in Education for Teaching in the Health Area at Faculdade Pernambucana de Saúde (FPS), in Recife, state of Pernambuco, Brazil.

The research took place from January 2021 to November 2022. The study was approved by the Human Research Ethics Committee of Faculdade Pernambucana de Saúde and Instituto de Medicina Integral Prof. Fernando Figueira (IMIP), with CAEE number 52349221.2.3001.5201.

The course was developed according to the following steps, which will be described below: pre-production of the course; content validation; course production; and semantic validation.

Course pre-production

Initially, a bibliographic search was carried out on the course topic: Mini Clinical Evaluation Exercise (Mini-CEX), in the PubMed, Scielo and VHL, ERIC (Education Resources Information Center) and Scopus databases. The following descriptors and their combinations in Portuguese and English were used to search for articles: Health Education; Formative Feedback; Internship and Residency; Distance Education. The following were considered for the selection of articles: articles published in Portuguese and English; full articles that portrayed the topic related to Mini-CEX, without time restrictions.

Next, the construction of the course content plan started, which was structured to dialogue in a simple and practical way with the preceptor, using the instructional design methodology described by Morisson et al.[14].

The nine stages of this model were adapted to the characteristics and information relevant to the development of the Mini-CEX course, as follows:

After defining the nine stages proposed by the adopted method, the course content plan was created. After developing the course content plan, weekly meetings were held with the team, from January 2022 to March 2022, to structure the course recording script based on the prepared content plan.

The objective of the script was to provide the most significant information about the content to provide a practical instrument to the preceptor. It was built based on Field's[19] notes and prepared in video class format, containing all the topics to be covered, a record of the entire text to be spoken and indications on visual support to be synchronized with the presenter's speech.[20]

The course was structured into three learning units: 1) Getting to know the Mini-CEX - The instrument, its

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Chart 1. Stages of the Morrison et al.[14] Model and the main characteristics of each stage adapted to the performed research.

STAGE	CHARACTERISTICS AND INFORMATION OF THE COURSE CONTENT PLAN ABOUT THE MINI-CEX
Instructional Problems	1. Difficulty for teachers in the health area to participate in face-to-face training[15]; 2. Need to provide instruments to preceptors to improve resident assessment.
Target Audience	Medical residency preceptors in Mastology.
Tasks, goals and purposes	This course aims to present the Mini-CEX assessment instrument, showing how it works in preceptorship practice, and to encourage the use of the tool.[16,17]
Instructional objectives	1. To present the Mini-CEX, its characteristics and advantages, and how it works in preceptorship practice; 2. To demonstrate its applicability using the online form; prepare preceptors to use the educational assessment tool.[18]
Content sequence	1. Welcome 2. Getting to know Mini-CEX; 3. How to use the online tool 4. Applying feedback 5. Final considerations 6. Summative assessment 7. Tutorial for creating your own online Mini-CEX assessment.
Instructional Strategies	1. Video classes 2. Textual images 3. Videos/Images from the web 4. Supporting teaching-instructional material 5. Content fixation exercise.
Instructional message	1. The content information about Mini-CEX was provided through recorded video lessons and textual images.
Development of instruction	2. Fill out the online Mini-CEX form proposed in the course 3. Develop your own online Mini-CEX form 4. Use Mini-CEX as an educational assessment strategy and apply structured feedback.
Instruments of assessment	Multiple choice questionnaire with at least 70% correct answers

Source: Morrison et al.[14].

characteristics and advantages were presented; 2) How to use the online tool - The Mini-CEX items were indicated, as well as the online form to be used during the resident's in-person assessment; 3) Applying Feedback - The importance of feedback, characteristics, difficulties, steps and suggestions to facilitate the implementation were discussed. The course script also indicates complementary teaching-instructional material.

Subsequently, the course content validation was carried out with four experts in health education and teaching.

Content validation

To organize the content validation consensus group, some parameters adapted from the Fehring[21] model were determined, such as: degree, scientific production and time working with the proposed topic. The cutoff score to be considered an expert was a minimum of five points.

The experts selected to participate in the content validation process, after confirming their interest in participating in the study via email, signed the Free and Informed Consent Form (ICF) to participate in the study.

The meeting took place remotely and synchronously, in a virtual room using the Cisco Webex Meetings platform, with everyone having their cameras and microphones activated to allow verbal and non-verbal communication between the group members. The extent of agreement on the main aspects of the course was then analyzed and evaluated, and all suggestions were added to the course content plan and recording script.

Course production

The course was designed and structured in a video class format and was recorded in a studio, with the support of the institution's distance education team. SONY lapel microphones and a SONY A6500 camera were used, with the course being recorded in 4K format, using a Teleprompter to read the script (previously written, validated and re-evaluated by the project authors in partnership with the EaD team). A

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Cisco screen was used with the logo created and customized by the EaD team for the Mini-CEX background, which was created by the team's designer.

For editing, the team used, in addition to the recording made in the studio, images, graphics, soundtracks and videos collected from our Envato and Adobe databases, an OBS screen capture program, to show the Mini-CEX navigation and also for production of the tutorial video. For complete editing, Adobe programs were used – Premiere and After Effects.

After completing the course, the researchers made the last considerations, for the EaD team to generate the last adjustments, and then, the project was approved and released on the Institution's Continuing Education platform, MOODLE, which is free software used to manage, administer and make courses, teaching materials, etc., available to viewers.

Semantic validation

The semantic validation of a study must consider the relevance, coherence and comprehensibility of each item for the reference population (target audience) to whom the questionnaire or instrument is aimed. Regarding the understanding, it is observed whether the items are well understood by the segment of the population (target audience).[22]

For the semantic analysis of the course, an intentional non-probabilistic sample selection was carried out of the preceptors involved with the Residency in Mastology, including mastologists and radiologists, who agreed to participate in the study by reading and signing the ICF. Of the sixteen selected preceptors, only fourteen agreed to participate.

The analysis criteria for evaluating this form were based on the level of understanding of the item, using a Likert scale ranging from 1 to 5, as follows: 1 - strongly disagree, 2 - disagree, 3 - indifferent, 4 - agree and 5 - strongly agree.

The objective of the questionnaire was to verify the preceptors' opinion and was based on three main points: content, teaching material and virtual environment, aiming to improve the course.

An analysis of the responses to the forms was carried out to evaluate the teachers' considerations regarding semantics.

Next, the responses to the forms were analyzed to evaluate the preceptors' considerations regarding semantics. Cronbach's alpha was calculated in relation to the investigated level of understanding and the percentage of agreement between participants. These analyses were carried out using Excel software (Microsoft Office 365, 2021).

RESULTS

As a result of this study, a distance education course on Mini-CEX was designed and validated for preceptors of a Mastology residency. This is a self-instructional and unmediated course, with a workload of 02 (two) hours, voluntary, with the issuance of a certificate, having preceptors as the target audience.

This course has the general objective of training Mastology residency preceptors on the use of the Mini-CEX educational assessment tool in their preceptorship practice.

The course was divided into learning units: Unit I - Getting to know the Mini-CEX; Unit II - How to use the online tool; Unit III - Applying Feedback, as shown in Figure 1.

The semantic validation process was carried out with the preceptors of the Mastology residency, with a total of fourteen female participants, aged between 35 and 58 years old, postgraduates (medical residency), two of which had a Master's degree. When asked whether the content of the videos contributed to learning the covered topics, all course participants answered that they strongly agreed. Also when asked if the videos had satisfactory audio, image and duration, everyone strongly agreed. Regarding the clarity and synthesis of the way the course was presented in the virtual environment, 92.9% strongly agreed and 92.9% of the course participants strongly agreed that the texts shown on the screens were clear and succinct, making it possible to understand the activities. About the virtual environment, 85.7% strongly agreed that the information was adequate for participation in the course activities. When asked about the course workload, 78.6%

Figure 1. Course screens at the beginning of each unit.

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Table 1. Answers to the Semantic Validation questionnaire of the Mini-CEX Course in practice.

SEMANTIC VALIDATION QUESTIONNAIRE					
Questions	**Answers – n (%)**				
	Strongly agree	**Agree**	**Indifferent**	**Disagree**	**Strongly disagree**
The information in the virtual environment was adequate for my participation in the course activities.	12 (85.7%)	2 (14.3%)	0	0	0
The articles and study materials (supplementary reading) offered were up to date and relevant to the proposed activities.	12 (85.7%)	2 (14.3%)	0	0	0
The texts on the screens were presented clearly and succinctly, making it possible to understand the activities.	13 (92.9%)	1 (7.1%)	0	0	0
The videos showed satisfactory audio, image and duration.	14 (100%)	0	0	0	0
Information about the course was presented clearly and synthetically in the virtual environment.	13 (92.9%)	0	1 (7.1%)	0	0
The learning verification exercises contributed to the consolidation of the learned content.	12 (85.7%)	2 (14.3%)	0	0	0
The text showed adequate behavior and no information was lost.	12 (85.7%)	2 (14.3%)	0	0	0
The content of the videos contributed to the learning of the covered topics.	14 (100%)	0	0	0	0
The course workload was compatible with the presented content.	11 (78.6%)	3 (21.4%)	0	0	0
The course access time was adequate.	14 (100%)	0	0	0	0

Source: the authors.

strongly agreed that it was compatible with the presented content, and 92.9% strongly agreed that the access time was adequate. After individual assessment of the items, an overall average satisfaction score of 98% and a Cronbach's alpha of 0.8 were obtained.

The last two questions of the evaluation asked the participant to feel free to make comments or suggestions. Some of the comments/suggestions left by participants were: "Very good"; "Everything is good"; "The course was very didactic, objective and with practical examples"; "Institute the Mini-CEX every two months, aiming to improve engagement and desire to improve, both in residents and preceptors".

DISCUSSION

Preceptorship is a role that demands a lot from the specialist physician. There is a feeling of great responsibility on the part of preceptors considering the required qualitative demands, technical skills, in addition to pedagogical competence to assist in the resident's teaching-learning process. Understanding this practice and reflecting on the real role of the residency preceptor is a difficult and pressing task for the professional involved in the residency service. There is no guaranteed training for these professionals to perform this role. The educational institutions to which the residency programs are linked should be responsible for this training, mainly aimed at improving the role of educator and encouraging continuing education in health services.[23]

Distance education (EaD) in the health sector is increasingly present in the form of improvement courses, extension courses, continuing education, as well as specialization courses provided by distance education institutions. The idea of developing an EaD course on the Mini-CEX educational assessment tool, with clear and accessible language to provide an instrument to preceptors to boost their actions, came from the reflection that a foundation is needed to exercise preceptorship and contribute in a systematic way with the training of residents.[24]

The Mini-CEX with structured feedback works as an excellent regulator of the teaching-learning process and using it in preceptorship practice helps to guide the resident.[7,25] By offering an EaD course to train preceptors and encourage them to use the tool, the displacement of these professionals is avoided, as they can organize their class schedules, thus developing self-management of learning.[24]

The development of distance education content requires prior knowledge of the target audience and a multidisciplinary team (education, technology, communication and administration professionals) prepared for the role.[20] During the creation of this course, the authors were able to understand the importance of the multidisciplinary team and how much it was essential to the carrying out of the project.

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The choice of the instructional design model by Morrison et al.[14] allowed greater flexibility in the process of preparing the course content, as the fact that this model simultaneously uses 9 steps, and can even have some steps suppressed, allows a more dynamic and practical construction. After adapting this model and defining all the characteristics and information of the steps proposed by the method, the course content plan was developed.[14]

The next stage – creating the course recording script – was characterized by several weekly meetings with the team, who guided and adjusted the script, reinforcing the importance of having a multidisciplinary team to build a distance education course.[20]

The proposal for a course in video class format led to the creation of a script based on Field's[19] notes on the linear structure of scripts and Filatro's[20] proposals, which helped to organize the steps, from detailed speech to images synchronized with each speech.

Before operationalizing the recording, the course underwent content validation with experts in health education, which gave consistency to the product and support for the performance of the recording. The validation allows inferring validity and reliability for a practice that produces qualified care, as well-produced and validated educational material can contribute to transforming the individuals' reality. The possibility for experts to give their opinion freely in a consensus group, both on the recording script and on the course content plan, showed to be useful and positive for obtaining criticism and suggestions.[26,27]

The teleprompter, a device adaptable to the video camera that displays the text to be read by the presenter, was a positive aspect. The device allows the presenter to speak directly to the camera without having to memorize the content in advance or having to improvise their speech at the time of the recording. This task results in an effective gain in terms of reducing studio time and quality in the final product.[20] The use of the teleprompter actually reduced the recording time of this course and resulted in gains in the quality of the final product, as observed during the performance.

Semantic validation used an evaluation questionnaire for the target audience, the preceptors involved in the mastology residency. The objective of the questionnaire was to verify the preceptors' opinion and was based on three main points: content, teaching material and virtual environment. Of the sixteen selected preceptors, fourteen agreed to participate in the study. This was one of the challenges faced during the research, because even though it was a short and objective distance education course, there were two preceptors who decided not to take it. There are some difficulties related to adherence to the distance education modality, such as the need for a favourable home environment, dealing with family members during the teaching period, consequences due to excessive use of screens, among others.[28]

When developing digital educational technology, it is necessary to pay attention to aspects such as organization and visualization, in addition to observing the amount of information contained on each screen. One must seek to maintain the clarity and fluidity of the video, as these are qualities that make it an instrument capable of modifying attitudes and behaviors.[26] According to our research questionnaire, regarding the items image, audio and duration, all participants felt completely satisfied. And regarding the clarity and synthesis of the information contained in the video, 92.9% of the target audience felt completely satisfied.

The spoken language is a key instrument in the development of distance education content. Emphasis, intonation, rhythm, articulation and good diction are precautions to be taken during the use of spoken language. These precautions are justified by the fact that the sound is interrupted as soon as it is transmitted. Poorly structured sentences, said at a fast pace or with poor diction harm the student's processing capacity. Consequently, when planning oral resources such as videos, it is important to recognize the need to balance the imposed cognitive load so as not to hinder learning.[20] In our satisfaction survey, all participants strongly agreed that the course content contributed to the learning of the covered topics.

The written language, a symbolic representation of communication and distance education content, is intended to be easily understood by those who share the reading. For this reason, important elements such as spelling, clarity, conciseness, coherence, connection, intratextuality (internal organization of messages) and intertextuality (relations established with external materials) need to be respected. These precautions are also related to the balance of the cognitive load we place on students when presenting information in text form.[20] In our survey, 85.71% of the participants strongly agreed that the video text was adequately presented and no information was lost.

The workload of distance education training courses is not something that is pre-established in the literature. They usually have a short duration and do not depend on the Ministry of Education regulation. In our survey, 78.6% strongly agreed that the workload was compatible with the presented content. This made us think that this is a point to be improved in our course, since this was the item in our validation questionnaire that showed the least agreement among the participants.[29]

The course developed during this research contributes to the expansion of knowledge about the Mini-CEX educational assessment tool and encourages its use in resident training.

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It is interesting that more studies be developed on distance education courses for the training of preceptors, within permanent education projects, considering that these professionals have an extensive workload, often in different locations, making it difficult to carry out in-person courses.

CONCLUSION

The course developed and validated on Mini-CEX, the final product achieved with this research, showed to be a relevant option for the training of medical residency preceptors in Mastology, and could be extended to any medical residency program. It is noteworthy that the Distance Education (EaD) modality favors the target audience's adherence in an accessible way to improve knowledge on the topic, in addition to encouraging preceptors to use the educational assessment tool.

The Mini-CEX is one of the most studied clinical skill assessment methods and has shown consistent and satisfactory results for the offer of formative feedback. The course offered on this instrument met the methodological rigor it proposed, being validated by experts in health education and by the target audience – preceptors of the medical residency in Mastology – combining a short and feasible workload with a dynamic and attractive format.

Therefore, it is estimated that the described course contributed to training and qualifying the study participants to use the Mini-CEX, and it can also be used by other medical residency programs, collaborating with the performance of preceptors in formative assessment, one of the fundamental pillars of the teaching-learning process during resident training.

AUTHORS' CONTRIBUTION

Isabella de Andrade Figueirêdo: study conception, data collection, design and writing of the manuscript. Carla Pinheiro Maciel and Isabel Cristina Areia Lopes Pereira: manuscript review. José Roberto da Silva Júnior: research orientation and critical review of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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