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# Management of post-COVID-19 conditions: development and validation of educational tools for healthcare professionals

## Manejo das condições pós-covid-19: construção e validação de dispositivos educacionais para profissionais da saúde

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**Abstract**

The objective of this study is to describe the process of constructing and validating a guide and infographics designed to guide healthcare professionals in the management of individuals with post-COVID-19 conditions. This is a methodological study developed in two phases: production-construction and semantic validation of the technologies. Phase one comprised situational diagnosis, narrative review, and construction of the educational technologies. In phase two, the technologies were validated by the target audience (nurses and physicians, n=10) using a questionnaire. A minimum semantic validity index (SVI) of 0.80 was considered. The construction of the technologies was based on situational diagnosis and a narrative literature review. The guide and infographics produced present the management of the main post-COVID-19 conditions (dermatological, neurological, cardiovascular, respiratory, musculoskeletal, and gastrointestinal), obtaining an SVI of 0.99. The construction of technologies based on scientific evidence and adapted to the needs of the target audience, followed by validation, ensures clarity and suitability of the materials for the target audience regarding the management of post-COVID-19 conditions.

**Keywords:** COVID – long; health education; health professionals; educational technology; health technology assessment.

**Resumo**

O objetivo deste estudo é descrever o processo de construção e validação de um guia e infográficos destinados a orientar profissionais da saúde no manejo de indivíduos com condições pós-covid-19. Trata-se de estudo metodológico desenvolvido em duas fases: produção-construção e validação semântica das tecnologias. A fase um compreendeu diagnóstico situacional, revisão narrativa e construção das tecnologias educacionais. Na fase dois, as tecnologias foram validadas pelo público-alvo (enfermeiros e médicos, n=10) utilizando um questionário. Considerou-se o índice de validade semântica (IVS) mínimo de 0,80. A construção das tecnologias foi embasada pelo diagnostico situacional e revisão narrativa de literatura. O guia e infográficos produzidos apresentam o manejo das principais condições pós-covid-19 (dermatológicas, neurológicas, cardiovasculares, respiratórias, musculoesqueléticas e gastrintestinais) obtendo IVS de 0,99. A construção das tecnologias fundamentada em evidências científicas e adaptadas às necessidades do público-alvo, seguida de validação, garante clareza e adequação dos materiais ao público-alvo sobre manejo de condições pós-covid-19.

**Palavras-chave:** COVID – longa; educação em saúde; profissionais da saúde; tecnologia educacional; avaliação de tecnologias em saúde.

## INTRODUCTION

Coronavirus disease 2019 is an acute respiratory disease caused by Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), characterized by its high transmissibility and global impact (Brasil, 2022). With the advancement of immunization and the expansion of vaccination coverage, a significant decline in reported cases has been observed. However, since the

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second half of 2020, the scientific community has identified and studied persistent symptoms in some patients following the acute phase of the disease. It is estimated that between 10% and 20% of individuals who contracted COVID-19 may develop prolonged symptoms lasting three months or more, without any other identifiable cause. In Brazil, this percentage is 18.9%. Initially referred to as "long COVID" or "post-COVID syndrome," this condition was formally named by the World Health Organization (WHO) as "post-COVID-19 condition" (World Health Organization, 2021a; Brasil, 2024; Raman et al., 2022).

These symptoms vary widely, affecting the quality of life and functionality of affected individuals, while also representing a new challenge for healthcare systems worldwide (World Health Organization, 2021a). Given this emerging demand, it is essential that healthcare professionals be trained to identify, manage, and rehabilitate these patients using evidence-based approaches and practical, accessible educational tools.

The post-COVID-19 condition presents important challenges for contemporary medicine, as it still lacks clear biochemical and radiological criteria to support diagnosis, in addition to involving multiple phenotypes and varied prognoses. The persistent effects of this condition are multisystemic and include symptoms such as fatigue, dyspnea, hair loss, anosmia, and cardiovascular complications. Furthermore, neuropsychiatric symptoms such as memory loss, mental confusion, and depression significantly affect quality of life and may generate substantial impacts on health and well-being (Gomes et al., 2024).

Given the complexity of these conditions, beyond the absence of clinical protocols, there is also a gap related to the availability of systematized, accessible, and validated educational materials that support the training and practice of healthcare professionals in addressing the demands of post-COVID-19 condition. Therefore, it is essential to invest in strategies that promote the qualification of care through the strengthening of educational processes aligned with the needs of everyday healthcare practice.

In the context of healthcare professional training, Care-Educational Technologies (CETs) are considered strategies that enhance knowledge construction by facilitating the organization, mediation, and translation of complex content into more accessible formats (Martins; Almeida, 2020). These technologies are not characterized as direct clinical intervention tools, but rather as resources that support the educational process and decision-making, contributing to the improvement of healthcare practices (Vendruscolo et al., 2022).

Among the technological resources applicable to teaching, the use of animated infographics and online guides stands out for making a wide range of content accessible to different audiences. By using visual and interactive elements such as images and text, they capture attention and make learning more engaging. In addition to facilitating the rapid and clear assimilation of complex information, these educational technology models have gained prominence in the media, including newspapers, magazines, and digital platforms such as YouTube and social networks, consolidating themselves as effective teaching-learning tools (Dorneles et al., 2020).

The guide and infographics represent important educational tools for disseminating guidance among healthcare professionals; in this sense, CETs become practical, simple, and objective resources that integrate images, symbols, and words, providing a better understanding of the presented content (Teixeira, 2020). These tools were designed to offer visual and accessible guidance, facilitating the understanding of effective practices in the management of post-COVID-19 conditions.

Given this context, the present study aims to describe the process of development and validation of a guide and infographics intended to guide healthcare professionals in the management of individuals with post-COVID-19 condition, considering their pedagogical adequacy, clarity, and applicability as support resources for professional training and practice.

## METHOD

This is a development research project with an interface with the methodological approach, developed in two phases: production-construction and validation, based on the model of

Teixeira and Mota (2011). Methodological research was chosen for its ability to produce practical and immediate interventions, such as educational resources, based on consolidated knowledge (Polit; Beck, 2019).

The first phase consisted of 3 stages: situational diagnosis, narrative review, and technology production. The situational diagnosis aimed to identify the needs and expectations of healthcare professionals (the target audience of the technologies) regarding educational technologies, in order to subsequently develop a strategy that would qualify and standardize the care offered in an emergency and urgent care clinic. To this end, a semi-structured questionnaire was applied to the professionals. This questionnaire contained questions about their professional profile, knowledge about post-COVID-19 conditions, learning preferences, and previous experiences in the use of technologies in the workplace, for the subsequent development of a CETs.

For data collection, 23 individuals who met the following criteria were invited: being a healthcare professional (nursing technician, nurse, or physician) working in an emergency medical service, and having provided care to individuals with post-COVID-19 conditions. Those who were on leave (vacation or sick leave) at the time of data collection were excluded. The questionnaire was administered in person at the study site in January 2024. Initially, the research objectives and relevant aspects of the study were explained, and then participants completed the Informed Consent Form. Data were collected using a Google Forms questionnaire and then tabulated using Microsoft Excel software, and analyzed quantitatively, being presented in the form of absolute and relative numbers.

The second stage consisted of a literature review focusing on the management of post-COVID-19 conditions, based on national and international guidelines and scientific publications, ensuring the accuracy and relevance of the collected information, which scientifically and technically supported the development of the educational and care technologies (CETs). The selection of studies took place in June 2024, following searches conducted in the electronic databases PubMed, SciVerse Scopus (SCOPUS), Scientific Electronic Library Online (SciELO), the Nursing Database (BDENF), and the Google Scholar search engine. Gray literature was represented by manuals and review documents issued by the Ministry of Health. The following combination of descriptors was used for the search: "Long COVID" OR "post-COVID-19 syndrome" OR "persistent COVID-19 symptoms" OR "Long COVID-19 syndrome" AND "Nursing" AND "Clinical Management" AND "management." Bibliographic materials published between 2020 and 2024 in Portuguese, English, and Spanish were included, consisting of full-text studies available electronically and free of charge, preferably review articles. The analyzed studies were organized into tables presenting the authors, year of publication, journal, database source, study type, and main findings. These data were analyzed quantitatively and expressed in absolute and relative numbers. The qualitative analysis of the data allowed the categorization of information into specific topics, whose content served as the basis for the development of the technologies.

In the third stage, the development of the technologies took place between June and November 2024, based on the literature review and the situational diagnosis. Since most participants selected infographics and a guide, made available online, as preferred technological formats, their development began with content selection using graphic design tools, prioritizing clarity and accessibility of the information. Initially, the guide was developed with a description of the main stages for managing post-COVID-19 conditions, including initial assessment, therapeutics, laboratory and imaging tests, and referrals. Subsequently, the infographic content was created based on the guide, using images available in the Canva® image bank for the construction of the material. Afterwards, the material underwent an editing and layout process carried out by a professional graphic designer responsible for the social media content of the institution where the situational diagnosis was conducted.

In the second phase, which comprised the semantic validation of the CETs, individuals representing the target audience of the technologies and who met one or more of the following criteria were invited to participate: Having clinical care experience with individuals who developed post-COVID-19 conditions at least six months prior; being professionals with higher education (nurse or physician); having published works in journals and/or events on post-COVID-19 conditions; having published works in journals and/or events on the construction and validation of CETs in the thematic area.

For recruitment, the initial search was conducted through consultation of the Lattes Curriculum, on the Platform of the National Council for Scientific and Technological Development (CNPq), using the criteria previously mentioned, followed by snowball sampling (Benevides et al., 2016). The invitation letter and Informed Consent Form (ICF) were sent by email or, when provided by the participant, to their telephone contact via WhatsApp.

For semantic validation, 35 invitations were sent, but only 10 accepted to participate in the study, a number considered adequate by other authors (Melo et al., 2021a; Silva et al., 2022). Data collection was carried out using a Google Forms instrument structured in four sections: Informed Consent Form (Section 1); Participant Characterization Questionnaire (Section 2); Infographics and their respective validation instrument (Section 3); Guide and respective validation instrument (Section 4). In the validation instruments in sections 3 and 4, the total number of questions in each section was 21 (Polit; Beck, 2019).

For data analysis, the agreement strategy was used, performed through the calculation of the Semantic Validity Index (SVI), using a Likert scale composed of 4 valuation items: 1- for totally adequate, 2- for adequate, 3- for partially adequate and 4- for inadequate (Teixeira; Nascimento, 2020). Participants were also asked to consider, if the chosen alternative was 3 or 4, leaving suggestions and/or reasons for their choice, in order to improve the technologies.

The SVI calculation was performed by summing the responses "1" and "2" from each participant in relation to each item of the questionnaire, divided by the total number of responses. An agreement index equal to or greater than 0.80 was considered a validity parameter (Teixeira; Mota, 2011).

The research has been approved by the Research Ethics Committee Involving Human Beings of the State University of Santa Catarina (CAAE 75424423.4.0000.0118) and is the result of a Course Completion Project of the Graduate Program in Nursing in Primary Health Care at Udesc, Master's level.

## RESULTS

The situational diagnosis, the first stage of the technology development phase, was essential to guide the choice of typology and information that made up the educational technologies, aiming to qualify the management of post-COVID-19 conditions. Nineteen healthcare professionals responded to the questionnaire, 52.6% of whom were female and 47.4% male. Regarding their level of education, 42.1% had a technical course in nursing, 36.8% had a degree (Nursing and Medicine), and 21.1% had a graduate specialization/residency.

One of the relevant data points from the collection refers to preferences regarding the content for the technologies. The majority (73.7%) expressed interest in receiving comprehensive information: signs, symptoms, diagnoses, referrals, treatments, and tests related to post-COVID-19 conditions, while 26.3% of participants prioritized specific information on treatments and therapeutic interventions. Regarding the use of technologies, all participants reported using them daily in the workplace, demonstrating familiarity with digital tools. The most used technologies include Electronic Health Records (52.6%), medical devices (42.1%), and telemedicine (10.5%). Based on these results, as well as the choice of Guides and Infographics as educational technologies, and the suggestion to use social media to make information accessible to professionals, it was decided to develop a specific tab on the website of the emergency medical service – AMU (where the research was conducted) with materials providing information on the management of post-COVID-19 conditions. In this way, the aim was to integrate the technologies produced with what is already used in the daily work of professionals, maximizing the educational impact.

In the second stage of phase 1, the literature review identified scientific articles, dissertations, and theses, totaling 323, with 26 in the Scopus database; 25 in Pubmed; five in Bdenf; 57 in the Capes Portal; 19 in SciELO and, as grey literature, Google Scholar with 191. Of these, five publications were duplicates and were excluded. 318 abstracts were read, resulting in the exclusion of 240 bibliographies for not meeting the criteria. Of the remaining 78 that were read in full, 57 were excluded for not addressing the management of post-COVID-19 conditions. In total, there were 302 exclusions and 21 literatures read and analyzed to support the construction of the technologies.

Based on the data obtained in stages 1 and 2, the construction of the CETs began: guide and infographics. The content of these documents was based on national and international technical and scientific literature, resulting in a 63-page guide divided into 7 chapters, covering 15 post-COVID-19 conditions, namely: Dermatological Changes (Alopecia); Neurological Symptoms and Complications (Cognitive Impairment, headache, loss of taste and/or smell, sleep disorders and persistent fatigue); Mental Health Symptoms and Complications (anxiety, depression); Cardiovascular Symptoms and Complications (chest pain, deep vein thrombosis/thrombus, acute myocardial infarction and arrhythmias, hypertension); Respiratory Symptoms and Complications (cough and dyspnea); Musculoskeletal Symptoms and Complications (muscle and joint pain); Gastrointestinal Symptoms and Complications (vomiting/nausea, diarrhea and abdominal pain, constipation).

For each condition, the symptomatology, aspects of the initial assessment, imaging and laboratory tests, therapy, and referrals were reported. During the guide's production process, modifications were made to the content organization and appearance (changes in colors, fonts, and images used), resulting in the version submitted for semantic validation.

Similarly, the six infographics produced provide an objective and visual overview of all the content in the guide, with hyperlinks available for further research whenever the reader deems it necessary. During the development process, the infographics underwent revisions aimed at making the information they contain as clear as possible.

In phase 2 of the study, semantic validation of both technologies was carried out with the target audience. In this stage, 10 healthcare professionals participated, meeting one of the previously described selection criteria, encompassing different areas of professional activity, levels of education, and years of experience. These factors allow for an understanding of the technology from various perspectives, reinforcing the relevance of the opinions obtained.

All participants in this stage had higher education (100%), in the areas of nursing (90%) and medicine (10%). Of these, 60% worked in primary health care, 10% in emergency care, and 20% in the hospital area, with 70% holding a master's degree and 30% having a specialization/residency. Professional experience varied widely, between 5 and more than 20 years, with the largest number of respondents having between 10 and 15 years of experience (50%), which indicates professional activity during the period encompassing the problems of the pandemic.

Participants emphasized that the guide is highly effective in supporting the target audience, being highlighted as a robust tool for managing post-COVID-19 conditions. The logical sequence of information and the appropriateness of the vocabulary were frequently praised, reinforcing that the material meets the knowledge level of the health professionals to whom it is intended. Additionally, the illustrations were considered complementary and well integrated into the textual content. The guide was considered valid, obtaining an SVI of 0.99. Table 1 presents the degree of agreement in the answers to each question among the participants in the semantic validation process of the guide and its respective SVI (Semantic Validation Index).

After semantic validation, participants suggested the following changes, which were accepted: review the order of signs and symptoms (cephalocaudal) in the chapter on gastrointestinal conditions and reorganize the order of presentation of the chapter on Alopecia, as, according to the evaluators, it was inconsistent or "lost" in the guide (Figure 1).

Regarding the responses obtained in the validation of the infographics, these indicated a predominance of positive evaluations, with most items receiving ratings such as "Adequate" or "Totally Adequate," resulting in an SVI of 0.99. The first question, which assesses whether the technology meets the objectives of the target audience, obtained a high level of positive responses. However, questions related to the attractiveness of the technology and the organization of its parts presented isolated cases of evaluation as "Partially Adequate," indicating aspects that deserve attention (Table 2).

Despite the overall positive performance, some specific observations suggest improvements. Comments pointed out typos and grammatical errors, and suggestions for online and digital availability. Regarding the infographic on the management of post-COVID-19 gastrointestinal conditions, an adaptation to the cephalocaudal order was suggested. As these were coherent suggestions, all were accepted. Adjustments suggested by participants, such as the inclusion of more dynamic digital versions and the reorganization of specific topics, were considered as they represent valuable opportunities to improve the technology. Below is the final validated version of all infographics (Figure 2).

**Table 1.** Agreement of participants for the items of the validation instrument of the Guide for the management of post-COVID-19 conditions. Chapecó, Santa Catarina, Brazil, 2024.

| Items | Number of responses | | | | |
|---|---|---|---|---|---|
| | I | PI | A | TA | SVI |
| 1. The technology meets the objectives of the target audience (healthcare professionals) for whom it is intended. | 0 | 0 | 3 | 7 | 1 |
| 2. The technology helps the target audience for whom it is intended. | 0 | 0 | 2 | 8 | 1 |
| 3. The technology is suitable for use by any professional working with people with post-COVID-19 conditions. | 0 | 0 | 3 | 7 | 1 |
| 4. The technology is attractive and indicates the content of the material. | 0 | 0 | 3 | 7 | 0.9 |
| 5. The size of the title and content in the parts of the educational material are appropriate. | 0 | 0 | 5 | 5 | 1 |
| 6. The parts have a logical sequence. | 0 | 0 | 4 | 6 | 1 |
| 7. There is coherence between the information and presentation. | 0 | 0 | 4 | 6 | 1 |
| 8. The themes portray important aspects. | 0 | 0 | 2 | 8 | 1 |
| 9. The writing style is appropriate. | 0 | 0 | 4 | 6 | 1 |
| 10. The content is interesting. | 0 | 0 | 3 | 7 | 1 |
| 11. The vocabulary is accessible. | 0 | 0 | 4 | 6 | 1 |
| 12. There is an association between the theme of each part and the corresponding text. | 0 | 0 | 3 | 7 | 1 |
| 13. The text is clear. | 0 | 0 | 4 | 6 | 1 |
| 14. The writing style corresponds to the level of knowledge of the target audience. | 0 | 0 | 5 | 5 | 1 |
| 15. The content or parts appear organized. | 0 | 1 | 3 | 6 | 0.9 |
| 16. The illustrations serve to complement the texts. | 0 | 0 | 4 | 6 | 1 |
| 17. The illustrations are expressive and sufficient. | 0 | 0 | 4 | 6 | 1 |
| 18. The material presents logic. | 0 | 0 | 4 | 6 | 1 |
| 19. The technology addresses the necessary topics for the target audience. | 0 | 0 | 2 | 8 | 1 |
| 20. The technology proposes knowledge for the target audience. | 0 | 0 | 2 | 8 | 1 |
| GLOBAL SVI | | | 0.99 | | |

I: Inadequate; PI: Partially Inadequate; A: Adequate; TA: Totally Adequate; SVI: Semantic Validity Index.
**Source:** Research data, 2024.

The guide and infographics are available via a link on the UDESC Graduate Nursing Program page (Universidade do Estado de Santa Catarina (2025).

## DISCUSSION

Care-Educational Technologies (CETs) have proven to be necessary and highly relevant in the healthcare field because they promote knowledge construction through information presented in an attractive and accessible manner (Benevides et al., 2016). This study presents the development stages of two technologies aimed at guiding healthcare professionals on the management of post-COVID-19 conditions, seeking to address the workplace demands identified by one of the researchers and which may be replicated across different care settings for this population.

The situational diagnosis conducted in this research was a crucial stage in defining both the typology and the content of the educational technologies developed, with the objective of improving the quality of care provided to patients. The results obtained reflect the diversity of professionals' expectations and indicated the need to address both general and specific aspects of the topic in the development of educational resources.


**Figure 1.** Images from the management guide for healthcare professionals. (A) First Version. (B) Final version after validation. Chapecó, Santa Catarina, Brazil, 2024.
**Source:** Authors, 2024.

Furthermore, they highlight the need for CETs that are not only understandable and accessible, but also integrated into the digital platforms already used by healthcare professionals. The familiarity of these professionals with digital technologies, as identified by the research participants, reinforces the feasibility of implementing interactive educational solutions, such as websites and applications, capable of expanding the reach and effectiveness of the technology.

In addition, these findings are aligned with studies that demonstrate the benefits of incorporating Information and Communication Technologies (ICTs) into healthcare. The study by Pavinati et al. (2022) points out that ICTs contribute to improving service quality by optimizing time, facilitating communication among team members, and enhancing the management capacity of health policies. In this context, the use of educational technologies combined with the knowledge healthcare professionals already possess appears to be an effective strategy for professional training and the consequent improvement in the quality of services provided.

**Table 2.** Participant agreement for the items of the infographic validation instrument for managing post-COVID-19 conditions. Chapecó, Santa Catarina, Brazil, 2024.

| Items | Number of responses | | | | |
|---|---|---|---|---|---|
| | I | PI | A | TA | SVI |
| 1. The technology meets the objectives of the target audience (healthcare professionals) for whom it is intended. | 0 | 0 | 2 | 8 | 1 |
| 2. The technology helps the target audience for whom it is intended. | 0 | 0 | 3 | 7 | 1 |
| 3. The technology is suitable for use by any professional working with people with post-COVID-19 conditions. | 0 | 0 | 4 | 6 | 1 |
| 4. The technology is attractive and indicates the content of the material. | 0 | 1 | 3 | 6 | 0.9 |
| 5. The size of the title and content in the parts of the educational material are appropriate. | 0 | 0 | 5 | 5 | 1 |
| 6. The parts have a logical sequence. | 0 | 0 | 7 | 3 | 1 |
| 7. There is coherence between the information and presentation. | 0 | 0 | 4 | 6 | 1 |
| 8. The material is appropriate. | 0 | 0 | 6 | 4 | 1 |
| 9. The themes portray important aspects. | 0 | 0 | 3 | 7 | 1 |
| 10. The writing is in an appropriate style. | 0 | 0 | 5 | 5 | 1 |
| 11. The content is interesting. | 0 | 0 | 3 | 7 | 1 |
| 12. The vocabulary is accessible. | 0 | 0 | 5 | 5 | 1 |
| 13. There is an association between the theme of each part and the corresponding text. | 0 | 0 | 3 | 7 | 1 |
| 14. The text is clear. | 0 | 0 | 4 | 6 | 1 |
| 15. The writing style corresponds to the level of knowledge of the target audience. | 0 | 0 | 5 | 5 | 1 |
| 16. The content or parts seem organized. | 0 | 0 | 5 | 5 | 1 |
| 17. The illustrations serve to complement the texts. | 0 | 0 | 4 | 6 | 1 |
| 18. The illustrations are expressive and sufficient. | 0 | 0 | 3 | 7 | 1 |
| 19. The material presents logic. | 0 | 0 | 4 | 6 | 1 |
| 20. The technology addresses the necessary topics for the target audience. | 0 | 0 | 3 | 7 | 1 |
| 21. The technology proposes knowledge for the target audience. | 0 | 0 | 4 | 6 | 1 |
| GLOBAL SVI | | | 0.99 | | |

I: Inadequate; PI: Partially Inadequate; A: Adequate; TA: Totally Adequate; SVI: Semantic Validity Index.
**Source:** Research data, 2024.

Technologies are tools that promote significant changes across various dimensions of people's lives by integrating practices, services, and knowledge in a more accessible and efficient manner. Their usefulness is highlighted in the processing, storage, and transmission of information, enabling advances in the organization and execution of activities. From this perspective, Soares et al. (2022) also consider ICTs to be indispensable instruments capable of driving transformations by impacting individuals and promoting physical, cognitive, and social changes. Furthermore, they function as tools that expand healthcare professionals' possibilities in carrying out practices that promote care, thereby contributing to improvements in the quality of healthcare assistance. These tools are essential for ensuring that the knowledge-construction process occurs in a more collaborative and horizontal manner (Melo et al., 2021b).

The literature review was essential to support coping strategies and therapeutic decisions that contribute to effective care offered in health services. However, the findings needed to be carefully selected because the speed of the virus's spread exceeded the pace of generating scientific evidence, leading to challenges such as the "infodemic," characterized by the dissemination of unverified and false information (Cruz et al., 2021).

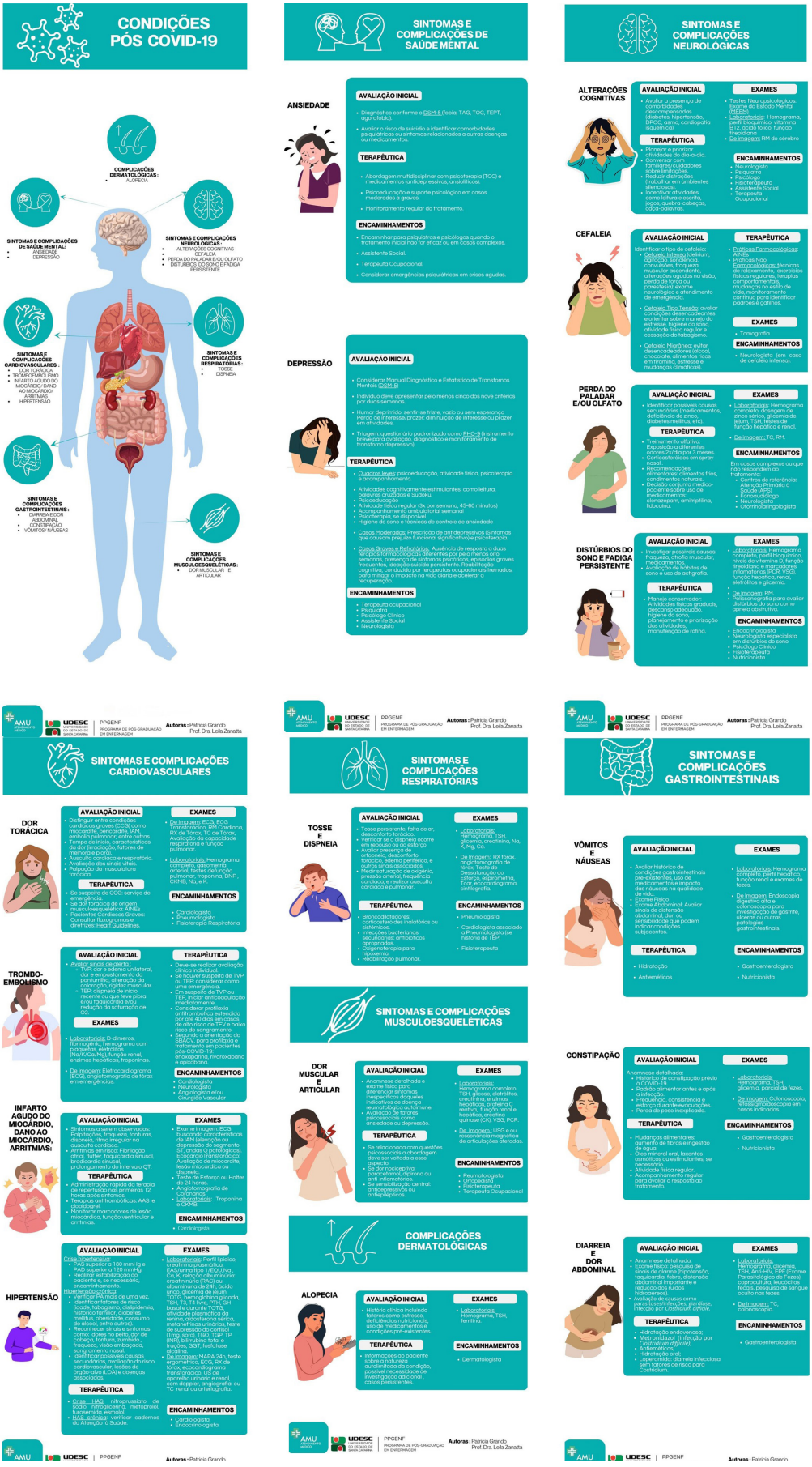


**Figure 2.** Final validated version of the infographics on the management of post-COVID-19 conditions for healthcare professionals, Chapecó, Santa Catarina, Brazil, 2024.
**Source:** Authors, 2024.

In this way, the narrative review gathered data and publications that address the management of post-COVID-19 conditions, integrating official documents and academic studies to compose the theoretical basis of the research. Among the materials used are guidelines such as those from the World Health Organization (2021b) and the Brazilian Ministry of Health (Brasil, 2022), which offer specific recommendations for the management of persistent conditions, such as chronic pain, respiratory symptoms, and neurological complications. Studies such as those by Tong et al. (2020), Olds et al. (2021) and World Health Organization (2021a) explore dysfunctions, recommending specialized interventions. In turn, the document from the Albert Einstein Beneficent Society (Sociedade Beneficente Israelita Brasileira Albert Einstein, 2021) reinforces the need for integrated rehabilitation, addressing technological interventions as a promising resource for training professionals and disseminating reliable information.

In this sense, the technology entitled Management Guide for Healthcare Professionals: Post-COVID Conditions is an educational resource that aims to empower professionals for the decision-making process. Several types of technologies can contribute to healthcare and patient safety, such as methodologies, medications, protocols, documentary letters, videos, printed materials, technical procedures and guides, among others. Practice Guides are a set of recommendations systematically developed to help professionals and patients make decisions about the most appropriate healthcare (Vale, 2022).

Educational technologies, such as the creation of infographics, have proven to be innovative tools for disseminating health information. They allow guidelines to be conveyed in a simpler and clearer way, in addition to facilitating dialogue and interaction between the patients and the health team through open and informative communication (Oliveira et al., 2021).

In health care practices, the use of these technologies plays a fundamental role in transforming processes, promoting higher quality care. In this context, CETs are seen as effective tools in disseminating information about diseases, stimulating reflection and learning (Nogueira et al., 2022).

Currently, some educational technologies have been developed to support healthcare professionals in managing post-COVID-19 conditions. One example is the manual designed to support Primary Health Care (PHC) professionals in caring for patients with persistent or late symptoms of COVID-19 (Brasil, 2022). This manual aims to provide practical guidance for the appropriate management of these conditions. In addition, Dors (2023) produced a manual intended to assist PHC healthcare professionals in the management of post-COVID-19 conditions. Another highly valuable technology is the initial assessment and standardized documentation instrument for nursing consultations with individuals experiencing post-COVID-19 conditions, developed by Santos (2023), which aims to support nurses' consultations with people affected by post-COVID-19 conditions. The distinguishing feature of the materials produced in this study is their focus on training professionals for care delivery rather than supporting clinical management.

There has been continuous growth in the development of technologies aimed at supporting the care process for this population. However, the literature still lacks robust evidence and comprehensive mapping of specific educational technologies designed to train professionals in the management of post-COVID-19 conditions. This highlights the importance of initiatives aimed at filling this gap by providing valuable resources for the education and training of healthcare professionals.

The guide and infographics developed were considered appropriate by the target audience (nurses and physicians) as educational technologies, as demonstrated by the Semantic Validity Index (SVI) of 0.99, confirming a current trend toward the use of infographics as a means of simplifying complex information (Camacho; Cogo; Flores, 2022).

One aspect to be considered concerns the size and profile of the evaluator sample in this stage of semantic validation. Although the high SVI found indicates agreement regarding the clarity and comprehensibility of the materials, it is important to consider that small samples with homogeneous professional characteristics tend to favor greater uniformity in responses, which may overestimate this index. Therefore, the results obtained should be interpreted in light of this context, understanding that the validation carried out primarily demonstrates the semantic adequacy of the materials for a specific group of evaluators within a particular setting. Thus, the scope of the findings is limited, and it is not yet possible to infer the educational effectiveness of the developed technologies or their impact on professional practice. These dimensions require further investigation with larger and more heterogeneous samples capable of encompassing different practice settings and user profiles, thereby strengthening the robustness of the evidence produced.

The Guide and infographics will be available after registration on platforms such as Cofenplay and on the pages of the Graduate Program and the Medical Care Service where the data collection was carried out. In this way, the aim is to equip health professionals, aiming to enhance practices directed at the care of individuals with post-COVID-19 conditions in various care settings, and thus strengthen the professional's work process, potentially contributing positively to the quality of life of this population.

## CONCLUSION

This study enabled the construction and validation of two educational technologies, of the infographic and guide type, based on the needs of health professionals in the management of post-COVID-19 conditions and on updated scientific evidence. The developed technologies proved to be adequate in terms of clarity, organization and comprehension of the content, as indicated by the high Semantic Validity Index, highlighting their relevance as resources to support the training process.

It is worth highlighting that the use of methodological research as a research method allowed for the development of scientifically grounded CETs, considering the reality of the study participants and the opinion of health professionals working in other services. The methodological study followed a rigorous and structured approach, designed to fill gaps identified in the situational diagnosis, favoring its potential applicability in the daily routine of health services. However, the validation carried out is limited to the semantic aspect, and it is not possible to infer, from these results, its educational effectiveness or direct impact on professional practice. The next phase of this study will be marked by the implementation of the technologies in real practice contexts where it is expected to measure these impacts.

Additionally, the small number and relatively homogeneous profile of the evaluators constitute limitations that should be considered in the interpretation of the findings, indicating the need for future studies with larger and more diverse samples. Furthermore, despite the advances, some critical areas present important gaps that reinforce the need for additional research, especially with regard to the training of professionals and the continuous support for patients with persistent sequelae. Finally, this study advances by offering technologies aligned with the daily needs of services. It is, therefore, a relevant contribution to the field of educational technologies in health, combining methodological rigor, practical relevance, and a commitment to qualified training in the face of the emerging challenges of post-COVID-19 conditions.

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