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# COVID-19: Distance learning to empower educators and health assistants in rural areas

Maria do Carmo Barros de Melo, Priscila Menezes Ferri<sup>1</sup>,  
Monica Maria Almeida de Vasconcelos<sup>2</sup>, Zilma Silveira Nogueira Reis<sup>3</sup>,  
Solange Cervinho Bicalho Godoy<sup>4</sup>, Vitória Andrade Palmeira<sup>5</sup>, Gabriel Rocha<sup>5</sup>,  
Rosalia Moraes Torres<sup>6</sup>, Unai Tupinambás<sup>7</sup>

Department of Pediatrics,  
Member of Health  
Technology Center  
and Telehealth Center.  
Coordinator of Simulation  
Center, Faculty of Medicine  
at Universidade Federal  
de Minas Gerais, Brazil,  
<sup>1</sup>Department of Pediatrics,  
Subcoordinator of  
Simulation Cente, Faculty  
of Medicine, Universidade  
Federal de Minas  
Gerais, Belo Horizonte,  
Brazil, <sup>2</sup>Department of  
Pediatrics, Faculty of  
Medicine, Universidade  
Federal de Minas Gerais,  
Belo Horizonte, Brazil,  
<sup>3</sup>Department of Obstetric  
Gynecology, Coordinator  
of Health Informatics  
Center, Faculty of Medicine,  
Belo Horizonte, Brazil,  
<sup>4</sup>Department of Basic  
Nursing, Coordinator  
of Telehealth Center,  
Nursing School Teacher,  
Universidade Federal  
de Minas Gerais, Belo  
Horizonte, Brazil, <sup>5</sup>Medicine  
Student, Faculty of  
Medicine – Universidade  
Federal de Minas Gerais,  
Belo Horizonte, Brazil,  
<sup>6</sup>Department of Clinical  
Medicine, Member of Health  
Technology Center and  
Telehealth Center, Faculty  
of Medicine at Universidade  
Federal de Minas Gerais,  
Brazil, <sup>7</sup>Department of  
Clinical Medicine, Faculty  
of Medicine at Universidade  
Federal de Minas Gerais,  
Brazil

**Address for  
correspondence:**

Dr. Maria do Carmo Barros  
de Melo,  
Avenida Alfredo Balena, 190.  
CETES. Santa Efigênia, Belo  
Horizonte, Brazil.  
E-mail: mcbmelo@gmail.com

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**Abstract:**

**BACKGROUND:** Educators and health assistants can act as key players in controlling the pandemic. In general, they are respected by the community, especially in rural areas, and can help guide and raise the population's awareness of preventive measures. The objective of this paper is to evaluate the results in knowledge progress of an e-learning course offered to educators and health assistants by a public university and to analyze the profile and satisfaction of the participants.

**MATERIALS AND METHODS:** A single group pre- and post-test design based on a questionnaire, interventional, study was conducted in the period from April 20<sup>th</sup> to June 20<sup>th</sup>. All participants of the course answered sociodemographic and satisfaction questionnaire and a pre- and post-test. Data were descriptively arranged and regarding the distribution and comparison of means and frequency, paired *t*-test for group comparisons. *P* < 0.05 was statistically significant. Data were collected from the Moodle® teaching platform, without identifying the participants.

**RESULTS:** A total of 674 participants were enrolled in the five groups, and 583 concluded the course (86.5%). The reasons for those who did not access the entire course (*n* = 47) were: Lack of time, difficulty in accessing the internet, and lack of experience with distance learning courses. On the evaluation of the course platform, from the tutors in general and the degree of satisfaction in several questions, participants marked maximum grades. The comparison between pre- and post-proficiency scores showed increased proficiency of the enrolled groups (*P* < 0.0001).

**CONCLUSIONS:** The course contributed to the training of health assistants and educators, preparing them to act in a participatory way in the prevention and control of the pandemic. The course was well evaluated and there was a progression of knowledge by the participants.

**Keywords:**

Coronavirus, COVID-19, e-learning, pandemics, public health

## Introduction

The emergence of COVID-19 has created a global public health problem that requires social engagement to be contained. Understanding the disease and preventive measures are crucial to reduce transmission.<sup>[1]</sup> The education of the community in general and of the educators, for better knowledge and adoption of

preventive measures is essential in this context of pandemic. Behavioral changes may have a profound impact on the spread of diseases in epidemics, and an early educational approach can interfere with obtained results and better control.<sup>[2]</sup>

The period of confinement due to the measures adopted to control the spread of COVID-19 had negative effects on the psychological state of the world's

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population. Many teachers feel harassed by the accumulation of demands and by a drought of resources to cope.<sup>[3]</sup> Chen *et al.* analyzed the knowledge, attitudes, and practice on COVID-19's pandemic in residents in Anhui Province (China) by a network sampling survey. They concluded that it would be necessary to strengthen the community publicity, the mental health maintenance of residents and students' health education.<sup>[4]</sup>

The World Health Organization's (WHO) health emergencies platform OpenWHO.org hosts online learning resources for outbreaks and epidemics in various language.<sup>[5]</sup> In Brazil, many courses addressing COVID-19 have been offered, but most of them are aimed at training health professionals.<sup>[6]</sup> To the best of our knowledge, in the literature there were no studies with e-courses about COVID-19 aimed to educators and health assistants.<sup>[7]</sup>

Our institution developed many outreaches, research, and teaching activities in relation to the pandemic, some of them involving small districts and community associations of rural areas. It is important to train the professionals involved with local communities, promoting knowledge, self-care, and empowerment, to provide good interaction with students and the population. The objective of this study is to analyze the e-learning course' adherence and satisfaction, the pre- and post-course grades. The course is innovative for these professionals of rural areas and can improve their participation in this fight against Covid-19 with more efficiency and confidence.

## Materials and Methods

### Study design and setting

It was a single group pre- and post-test design based on a questionnaire [Figure 1]. A complete e-learning

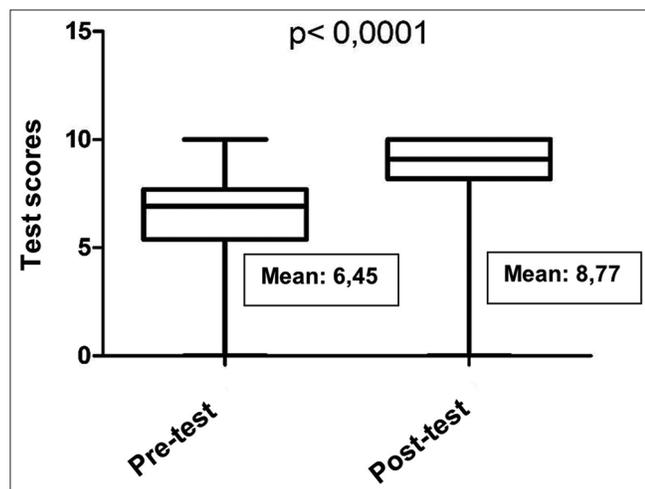


Figure 1: Comparison between means of the obtained grades on pre- and post-tests in the e-learning course about Covid-19 ( $n = 1008$ )

course with video classes, articles, technical notes, and official documents from Brazilian institutions and from other countries were made available to the enrolled students. Courses were made available for free through the Moodle® platform of the Health Informatics Center Centro de Informática em Saúde (CINS) of the School of Medicine.

### Study participants and sampling

The participants were invited by community associations, municipal health, and education secretariats, especially those that were part of university extension projects. Most participants come from rural and underprivileged regions of the Minas Gerais State, Brazil. In this study, we presented the analysis of data from five initial classes distance course, carried out from April 20<sup>th</sup> to June 20<sup>th</sup>, 2020. It was a convenience sample.

### Data collection tool and technique

The course also was disclosed in various media with registration made available through Google forms. A previous project created by the same research team during the pandemic is the "Adopt your neighborhood in times of coronavirus" in which university students, upon returning to their hometowns found leaders who placed and publicize the course. This project was the trigger for the current study.

Before starting the course, all the enrolled participants answered a sociodemographic and pretest questionnaire, and at the end, a satisfaction and posttest questionnaire. The satisfaction questionnaire used simple multiple-choice questions and a Likert scale (five points) to assess the items related to forums they participated in and about the overall course's objectives. The validity of the questionnaires was established through experts' opinions in the field of infectious diseases, medicine and nursing. They are 4 professors (1 nurse, 1 infectious disease specialist, and 2 medical doctors) with experience in distance learning courses and Covid-19, following models previously used by the researchers. The material was tested previously, before the final use. The e-learning material was elaborated with the participation of a multidisciplinary team, including physicians, physiotherapists, nurses, mental health professionals, educational therapists, physical educators, among others. The groups were divided and organized with approximately 25 participants, a teaching tutor, and a student tutor. Medical and nursing students were previously trained as a tutor. Tutor students were trained in a project by the Faculty of Medicine of the Federal University of Minas Gerais (UFMG) to answer questions from the population about the Covid-19 disease.<sup>[6]</sup> Four to five groups were organized for each date of the course, according to the number of participants. The course contained eight modules and each one addressed

a different topic: Module 1: Basic concepts about COVID-19; modules 2–4: Three video lessons covering the themes “What to do in the daily life of social isolation,” “Children’s neurodevelopment during the pandemic,” “Caring for posture during telework;” module 5: “The importance of sleep quality in social isolation” and “How nurses can act in primary health care;” module 6: “Use and manufacture of masks and face shields” (using soda plastic bottles), and “Cleaning products and clothing;” module 7: Video classes on “How municipalities can organize themselves to face COVID-19;” and “How to go back to school;” module 8: “How can you promote mental health in your county, school or community?”

In each module, participants formulated questions and answers regarding the covered topics. Next, the tutors evaluated the submitted assignments and feedback was provided to the students enrolled in the courses. Forums of each group were used for interaction and to encourage discussions on relevant issues. For pre- and post-tests, multiple choice questions, with five alternatives, were reviewed and validated by the organizing committee and tutors. They were the same in both tests, but the alternatives and the question sequence were randomized. At the end of each class, a virtual meeting was held through an online video platform with a compilation of the latest relevant information about the pandemic and answers to questions sent through chat. The course load was 100 h, as in addition to taking the course, the student still had access to it for updates. All participants were invited to participate in the virtual meeting. The sessions were available for offline access.

### Statistical and descriptive analysis

The evaluated parameters were course adherence, participant sociodemographic characteristics, degree of satisfaction of participants, correct answers in pre and posttest, and number of approvals. Data were analyzed in terms of frequency, distribution of means, and paired *t*-test for group comparison. A *P* < 0.05 was considered as statistically significant.

### Ethical considerations

Student data were collected from the institutional Moodle® teaching platform, without identifying the participants and in accordance with “General Data Protection Legislation” (Law 13.709/2018, Brazil) and CONEP (Brazilian Council of Research Ethics, Brazil) Resolution 510 (April/2016), which guarantees data confidentiality.

## Results

Each group’s course lasted 10–12 consecutive days. A total of 674 participants were enrolled in the five

groups, and 583 concluded the course completely (86.5%). The general data of the participants’ demography are shown in Table 1.

Figure 1 shows the pre- and post-test scores, demonstrating an increase in the knowledge’s proficiency on the course subjects. The average time for the student to answer the questions in the pre- and post-test, respectively, was 25 min, a minimum time of 8 min and a maximum of 40 min in both, with an average grade of  $6.45 \pm 1.2$  in the first and  $8.77 \pm 0.8$  in the second (*P* < 0.0001). The maximum score was obtained by 13 students in the pretest (1.9%) and by 184 students (31.6%) in the posttest (*P* < 0.0001).

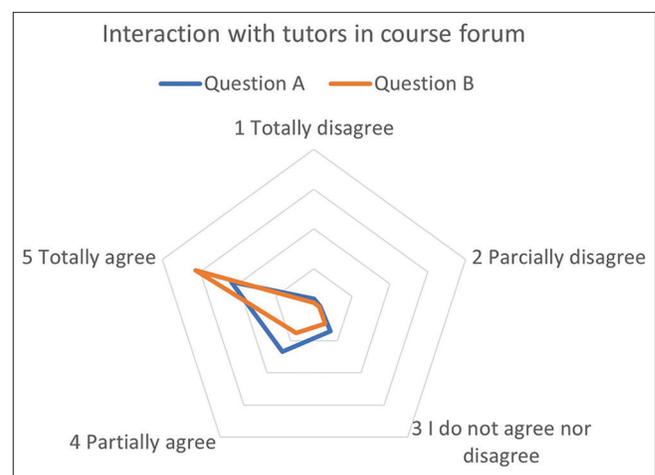
Regarding participation in the course, Table 2 presents data on the percentages of students who completed the course, the reasons for not having accessed all the material available (when applicable) and the evaluation of the interaction by the forums with the tutors.

The evaluation of the tutors’ performance, as support for the participants, is shown in Figure 2.

Figure 3 shows the participants’ assessment of the acquisition of skills and satisfaction with the course.

## Discussion

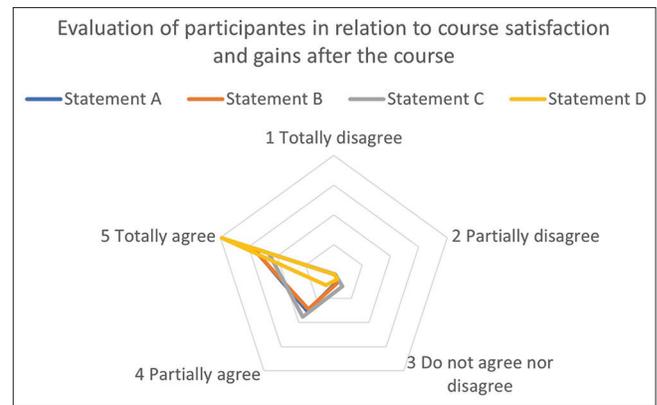
According to the WHO, “health literacy represents the cognitive and social skills that determine the motivation and ability of individuals to gain access to understand and use information in ways which promote and maintain good health.” On the OpenWHO electronic page (<https://openwho.org/channels/COVID-19-national-languages>) an “Online COVID-19 Course in Multiple Languages” was offered. The focus is on designing knowledge transfer resources for frontline



**Figure 2:** Interaction with tutors through forums in the course. (A) question A: “Do the questions raised by the tutors help me to think critically?” (B) question B: “Did the tutors answer your questions properly?”

**Table 1: Sociodemographic characteristics of participants in the coronavirus disease-2019 training course**

	<i>n=674, n (%)</i>
State of origin	
Minas Gerais State, Brazil	640 (95.0)
Others	34 (5.0)
Age (years)	
18-25	63 (9.4)
26-35	121 (18.0)
36-45	255 (37.8)
46-55	187 (27.7)
>55	48 (7.1)
Gender	
Female	610 (90.5)
Male	64 (9.5)
Civil status	
Married or stable union	207 (30.7)
Not married	396 (58.8)
Others	71 (10.5)
Have children	
Yes	440 (65.3)
No	234 (34.0)
Number of children	
No	237 (35.2)
1 or more	371 (55.0)
3 or more	69 (9.8)
Elementary school	
Studied all or most of it in public school	577 (85.6)
Studied all or most of it in private school	97 (14.4)
High school	
Studied all or most of it in public school	543 (80.6)
Studied all or most of it in private school	131 (19.4)
Did technical course	
Yes	270 (40.0)
No	404 (60.0)
Is public employer	
Yes	535 (79.4)
No	139 (20.6)
Is health professional from primary care	
Yes	78 (10.6)
No	596 (88.4)
Educator	
Yes	520 (77.2)
No	154 (22.8)
If educator ( <i>n=520</i> )	
Child education	226 (43.5)
Elementary school	215 (41.3)
High school	37 (7.1)
Others	29 (5.6)
University	13 (2.5)
Had you already studied the topic	
Yes	244 (36.2)
No	430 (63.8)
Motivation for taking the course	
To learn more about the topic	258 (38.3)
To contribute to facing the pandemic	388 (57.6)
Boss' request	10 (1.5)
For other reason	18 (2.7)



**Figure 3:** Evaluation of participants in relation to the course. (A) Statement 1: "After training, I feel safer to provide information to the population" (B) statement 2: "After training, I feel safer to recognize the signs of disease severity" (C) statement 3: "After the training, I feel safer to work professionally". (D) Statement 4: "Would you recommend this training to a colleague"

responders and affected communities.<sup>[5]</sup> The source of accurate health information during epidemics has a potential to shape health behavior. The course presented in this paper prioritized contextualization for the reality of small Brazilian districts, recognizing that educators and local assistants of health professionals can be a key to the promotion of health literacy. Meena *et al.*<sup>[8]</sup> conducted a cross-sectional, questionnaire-based study with healthcare workers in India to evaluate the knowledge about COVID-19, their experiences while dealing with the disease, and the protective measures taken to prevent the infection. They concluded that more educational training programs for awareness of the professionals are necessary to improve their knowledge and participate in this fight against COVID-19 with more efficiency and confidence. Furthermore, Kumar *et al.*<sup>[9]</sup> conducted an online cross-sectional survey study in India to assess knowledge, attitude, and practice towards the COVID-19 disease among health professionals, physicians, nurses, and allied health care staff (dentists, hospital attendants, and nursing students) working in public and private health facilities, in a rapid outbreak in India. They concluded that they have good knowledge, a favorable attitude, and practice. It highlighted the need for focused education and an up-to-date program and training for health professionals across the country.

Tsao *et al.*<sup>[10]</sup> emphasize that social media has great potential to increase community knowledge in the current pandemic condition. The real-time surveillance from social media about COVID-19 may be an important tool in the armamentarium of interventions by public health agencies and organizations. In Brazil, teachers and health assistants of rural areas contribute to disseminate news through social media and to clarify community doubts.

Adherence to the course was high (86.5%) and according

**Table 2: Data obtained from the satisfaction questionnaire at the end of the course**

Data	Number of participants, n (%)
Participants who completed the course	n=583
Participants accessed all the course content?	
Yes	417 (71.5)
No	47 (8.0)
No answers	119 (20.4)
Reasons for those who did not access the entire course: (n=47)	
Lack of time	15 (32.0)
Difficulty in accessing the internet	13 (27.7)
Personal reason	6 (12.8)
Lack of practice in using distance learning course	13 (27.7)
Disinterest	0
Were the group forums well developed?	
Yes	349 (59.9)
No	115 (19.7)
No answers	119 (20.4)
Were the general forums well developed?	
Yes	360 (61.8)
No	104 (17.8)
No answers	119 (20.4)
Did the tutors provide the necessary assistance?	
Yes	437 (75.0)
No	27 (4.6)
No answers	119 (20.4)

to the target audience, it is within expectations. It is important to emphasize that several participants live in small towns, with weak internet connections and reporting little experience in distance learning courses. According to Appenzeller *et al.*, the main problems identified in distance education are unstable internet and/or only the possibility of access via mobile networks; great difficulty in following synchronous activities; students who needed to share computers or notebooks with other family members.<sup>[11]</sup>

Hybrid teaching can be one of the pedagogical proposals that meet the reality of the 21<sup>st</sup> century. Digital technologies integrated into teaching can help to develop the participant's autonomy as it is a creative, reflective, and critical process.<sup>[12]</sup> In this way, the course was offered with the support of tutors, students, and teachers, and contributed to digital inclusion, providing knowledge, and consequently empowerment.

Amri *et al.*<sup>[3]</sup> evaluated the magnitude of exhaustion and associated factors among elementary school teachers in Kenitra, Morocco, during this period of confinement. They concluded that interventions designed to promote the mental well-being of teachers during and after confinement should be implemented. The teachers may no longer adapt, making themselves potential

candidates for burnout—a negative psychic experience, linked to chronic emotional stress.<sup>[13]</sup> Lai *et al.* (2020)<sup>[14]</sup> in a cross-sectional study of 1257 health professionals in 34 hospitals and clinics during pandemic, demonstrated a considerable proportion of health professionals with symptoms of depression, anxiety, insomnia, and distress. It seemed to occur especially in women nurses, who worked in Wuhan and the front line. In our study, we had a higher number of women than men ( $P < 0.001$ ). Relaxation practices, guidelines on quality of life and issues related to telework, including ergonomic exercises are important to prevent burnout in these professionals. When a disease starts spreading and causing negative feelings, timely, proper, and effective risk communication is needed to help ease people's anxiety or negative attitudes.<sup>[14]</sup> One of the objectives of the course we developed was to offer participants ways of relaxation and distraction, to help them overcome the emotional problems related to the pandemic. Moreover, later, they could apply the technique to the population to which they provide assistance or education.

Strong primary care may reduce unnecessary admissions, relieving the hospital system, and expanding the availability of hospital beds for patients with COVID-19. Facing the COVID-19, the Unified Health System (SUS) in Brazil, assumes a fundamental role in the containment of the disease.<sup>[15]</sup> The Family Health Strategy may help to organize the families to prevent the disease and recognize the severity. For this reason, we also included health assistants as one of the target audiences of this course. The posttest grades demonstrated that there was an improvement in the knowledge of them, so the course fulfilled its objective.

Santos reports that e-learning education is not an easy-to-implement methodology, requiring a prepared team with a well-established organizational infrastructure (technological, pedagogical, and administrative). The development of multiple workspaces, interaction, and socialization is essential for the success of the course.<sup>[16]</sup> The satisfaction questionnaire carried out in this study showed the good result of the course and the contribution to the involved professionals. Participants believe that after the course they will be safer to provide information to the population to recognize the COVID-19 severity signs and to act professionally and would recommend this training to a colleague. Interaction with tutors through the course forums was well evaluated too.

Using a social network is an important asset for communities and ensures empowerment for better responses, especially in pandemics. Alonzo and Popescu studied the potential of harnessing social media platforms to address the mental health needs of underserved

populations or individuals experiencing psychological distress related to the COVID-19 pandemic. The authors used a participatory approach to improve recognition of mental health symptoms, promote help-seeking, and provide immediate strategies for self-care. They concluded that the use of social media campaigns to promote mental health must be incorporated to build capacity for better responses.<sup>[17]</sup>

The pandemic has highlighted the need for strong partnerships between educators and healthcare professionals to facilitate collaborative efforts and improve knowledge of the community. Educators and health professionals, through their involvement, have an opportunity to showcase their value and position as essential long-term partners on teams committed to the pursuit of students' health and educational well-being. The public university has the important role to give back the community the knowledge to overcome the difficulties faced by the pandemic.

Bagheri Lankarani *et al.* studied the Iran people's expectations of government measures to control and manage the coronavirus disease 2019. Some people underestimated the risk of COVID-19, which would ultimately lead to rapid spread of the disease. It is necessary to provide authentic and practical information to guide the people to protect themselves. They concluded that one of the best ways to respond to these demands is appropriate risk communication.<sup>[18]</sup>

The e-learning course offered to health assistants and educators aimed to teach: (1) preventive measures toward the virus, (2) guidance on how to recognize the signs and symptoms of COVID-19, and (3) maintenance of a good quality of life during the pandemic. The subjects were addressed in a simple way, in order to facilitate the comprehension and incorporation of good practices. The highly respected educators and health assistants had the power to provide reliable and updated information to their rural communities, avoiding fake news and properly promoting the knowledge and the empowerment of everyone in the fight against the pandemic.

### Limitations and recommendations

As one of the limitations of this study is the fact that it is a cross-sectional study with a relatively small sample size. Another factor is the generalizability of the findings. However, it is noteworthy that the heritage of the course given was valued for access to information with the support of local leaders. The interaction between a public university such as UFMG and the poor rural community is essential for the dissemination of quality information, especially in times of pandemic. A multicenter study would have been better to assess the knowledge

progress and satisfaction about the course. Despite these limitations, this study is innovative in our country as it provided important information that empowered the educators and health assistants of rural area. It happened in an early stage of the pandemic when no information was available for them. These professionals are considered leaders in our country, especially in small communities.

## Conclusions

The e-learning course contributed to the training of educators and health assistants, preparing them to act as protagonists in the prevention and control of the pandemic. The course was well evaluated and there was a progression of knowledge on the part of the participants. The public university must fulfill its role of supporting communities to improve health. Professors and undergraduates in medicine and nursing courses were able to act effectively after the pandemic was declared.

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### Conflicts of interest

There are no conflicts of interest.

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