

# Rolling e-learning courses on COVID-19: an Italian experience

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## Research Article

**Keywords:** e-learning, Continuing medical education (CME), Continuing Professional Development (CPD), Healthcare professional training, Education in epidemics and pandemics, Pandemic preparedness, COVID-19 pandemic, SARS-CoV-2, Epidemics, Pandemics

**Posted Date:** March 22nd, 2022

**DOI:** <https://doi.org/10.21203/rs.3.rs-1321853/v2>

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## Abstract

**Background** We report the results of an e-learning project focused on the progressively acquired knowledge on Coronavirus Disease 19 (COVID-19), targeted to Italian healthcare professionals. and funded by the Italian National Federation of the Associations of Doctors, Surgeons and Dentists (FNOMCeO) and the Federation of Orders of Italian Pharmacists (FOFI).

**Methods** The core course was launched as soon as the first cases of COVID-19 occurred in Italy. Several courses have been published throughout 2020 to meet the pandemic-related educational needs and offer continuously updated and evidence-based contents, supported by evidence-based scientific information and institutional sources.

**Results** From February 22nd to December 31st, 2020, 70,825 health professionals enrolled in the main course and 67,103 (94.7%) passed, obtaining the Continuing Medical Education (CME) credits. The participants accounted for approximately 19% and 12% of all Italian practising physicians/dentists and pharmacists, respectively. Over 99.5% of participants considered the contents of high quality, relevant and appropriate for their immediate educational needs.

**Conclusion** The Italian e-learning offer developed in the first nine months of the pandemic achieved wide dissemination and excellent acceptance by healthcare professionals working in the field. This educational model provides healthcare professionals with evidence-based and tailored information. During pandemics it offers several advantages: time flexibility, remote participation, continuous updating following the emerging evidence.

## Background

The efficacy of e-learning for healthcare professionals is well known. Several studies found that e-learning, when appropriately designed and evidence-based, can enhance knowledge and modify behaviours equal to or greater than residential learning [1,2,3].

The COVID-19 pandemic is an unprecedented and disrupting time for medical education as it requires intense and prompt attention in response to the global emergency, in terms of finding solutions to deal with social distancing and shortage of time or adequately updated and homogeneously shared information to be applied on the field. In these circumstances, e-learning offers an important tool to improve the quality of assistance and the activities of prevention.

A previous experience showing the potentials of e-learning during pandemics is represented by the TELL ME (Transparent communication in Epidemics: Learning Lessons from experience, delivering effective Messages, providing Evidence) project funded by the European Union Seventh Framework Programme, aimed at designing models for improved risk communication during infectious disease crises, which developed two online learning course focused the first on communicating with patients and counteracting the risk of stigmatization during epidemics and the second on addressing the Ebola health crisis [4].

During the COVID-19 pandemic, several sovranational or national institutions, e.g. the World Health Organization (WHO), the European Centre for Disease Prevention and Control (ECDC), the Italian National Institute of Health (ISS) relied on e-learning to train healthcare workers [5,6,7]. In particular, the WHO made available on the OpenWHO platform multilingual courses on different topics of interest periodically updated [5]. Also the ISS offered to Italian healthcare workers on the platform EDUISS training activities and events according to a continuous and permanent training schedule [7].

In this context it has to be considered the experience of FadInMed (<https://www.fadinmed.it>) which is an e-learning platform for physicians, dentists and nurses managed by the Italian National Federation of the Associations of Doctors, Surgeons and Dentists (FNOMCeO) and the National Federation of Orders for Nursing Professions [8].

More specifically, FadInMed has trained more than 450,000 healthcare professionals over ten years providing evidence-based materials and rolling updates. Furthermore, during the COVID-19 health emergency, this platform offered the first continuously updated e-learning course titled 'COVID-19, the disease caused by the new coronavirus (SARS-CoV-2)' targeted to all Italian physicians and pharmacists. This course was made promptly available by the FNOMCeO and the Federation of Orders of Italian Pharmacists (FOFI) immediately after the confirmation of the first cases of local transmission in Italy. It was free of charge for all FNOMCeO and FOFI affiliates and soon became the flagship of the FadInMed Programme [9].

During the COVID-19 pandemic, additional courses were made available on the platform and successfully contributed to satisfying healthcare professionals' emerging learning needs by providing timely and trustworthy scientific information in a constantly evolving scenario and counteracting the misleading 'infodemic'. Here, we report on the development of this COVID-19 educational project and its results over a period of approximately nine months until the end of 2020.

## Methods

### Structure of the courses

All e-learning courses included a dossier (learning modules) and a series of multiple-choice questions (one correct answer out of four) to test the acquired knowledge (see supplementary materials, Table 1S). The answer options for each question were randomised in compliance with the guidelines of the Italian Continuing Medical Education (CME) system [10]. At the end of the course, the participants were required to complete an anonymous customer satisfaction questionnaire on the relevance of the topic, the efficacy of the e-learning system and the quality of the course. Additionally, participants had the option to include free comments about the completed course.

The courses were made available on the FadInMed ([www.fadinmed.it](http://www.fadinmed.it)) [8] and Saepe ([www.saepe.it](http://www.saepe.it)) [11] e-learning platforms, which are based on the open-source Moodle Learning Management System (<https://moodle.org/?lang=en>) [12].

## Content of the courses

The course titled 'COVID-19, the disease caused by the new coronavirus (SARS-CoV-2)' included sections on epidemiology of the pandemic, SARS-CoV-2 transmission, testing, treatment, tracing, public health strategies, communication during disease outbreaks (see supplementary materials, Table 2S). The course has been updated fortnightly up to May 2020. Subsequently, the course was updated monthly or in real-time whenever relevant national/international guidance, regulatory documents or research papers were published.

Two different versions of the course titled 'COVID-19, the disease caused by the new coronavirus (SARS-CoV-2)' were developed: a standard version for all healthcare professionals and a pharmacist-targeted version, supplemented with information of specific interest to the pharmacist profession. However, for the purpose of the present communication, we present aggregated data to show the dissemination of a multitargeted educational project aimed at providing homogeneous and updated content.

The course titled 'Guidelines on COVID-19 treatment options' aimed to offer a complete overview of all therapeutic options for the emerging disease. A drug formulary was developed; a separate page was dedicated for each medicine or class of medicine used for COVID-19, explaining the rationale of use, completed and ongoing trials (and their outcomes), posology, adverse effects, precautions, and interactions. With the evolution of the pandemic, the approach of the course has turned from an initial drug repurposing strategy to the current evidence-based approach. This course was updated fortnightly or in real-time, whenever considered necessary.

Finally, a course in plain language titled 'The new coronavirus pandemic: a *vade mecum* for volunteers in the field' was developed in collaboration with ANPAS (Pubbliche Assistenze, Italian Associations that aid the general population, currently representing 880 associations) and made available for the Italian volunteers engaged in the COVID-19 emergency on the Formars e-learning platform ([www.formars.it](http://www.formars.it)) [13]. Like FadInMed, Formars e-learning platform is based on Moodle technology [12].

## Results

### Core course

From February 22<sup>nd</sup> to December 31<sup>st</sup>, 2020, 70,825 healthcare professionals enrolled in the 'COVID-19, the disease caused by the new coronavirus (SARS-CoV-2)' course and 67,103 (94.7%) of them passed, obtaining the CME credits (Table 1). The participants accounted for approximately 19% and 12% of all Italian practicing physicians/dentists and pharmacists, respectively.

Over 99.5% of participants considered the contents of high quality, relevant and appropriate for their immediate educational needs. As of December 3<sup>rd</sup>, 2020, twenty-two course editions have been published, three of which resulted in a substantial reorganisation of the contents. In this regard, the contents have expanded threefold from the first to the last edition, from approximately 14,000 to 45,000 words. Similarly, the number of included references has increased fivefold, from about 120 to over 600.

### Additional courses

From April 16<sup>th</sup> to December 31<sup>st</sup>, 2020, 21,587 health professionals enrolled in the course titled 'Guidelines on COVID-19 treatment options' (Table 1) and 20,394 (94.5%) passed, obtaining the CME credits. As FNOMCeO made the course available free of charge, the larger group of participants was represented by physicians and dentists. Over 99.5% of participants considered the contents of high quality, relevant and appropriate for their immediate educational needs.

As of December 31<sup>st</sup>, 2020, nine editions have been published. The length of the course and, consistently, the number of cited references have almost doubled. More importantly, some drastic changes of the content occurred due to uncertainties and controversies related to the indications for use. For example, the case of chloroquine and hydroxychloroquine was extensively debated requiring the learning materials to be duly updated.

Lastly, the course in plain language was attended by 6,831 participants (approximately 10% of ANPAS volunteers), 93.9% of whom completed the course. This course has also undergone a rolling update (once substantial); the most important changes were related to the emerging recommendations on the use of personal protective equipment.

## Discussion

Our findings suggest that the e-learning offer developed in the first 9 months of the pandemic achieved wide dissemination and excellent acceptance by the healthcare professionals working in the field. Notably, the 'COVID-19, the disease from the new coronavirus (SARS-CoV-2)' course was included by the Italian Ministry of Health among the recommended resources of good quality information on COVID-19 [14]. This core e-learning course is the first one to provide continuous updating of the contents. The additional courses herein described successfully contributed to satisfy the healthcare professionals learning needs emerging during COVID-19 pandemic.

Based on the experience of the recent months, we are confident in confirming the list of ten key points for the development of e-learning courses for healthcare professionals during epidemics/pandemics reported in our previous communication [9]:

1. Choosing e-learning as an educational tool, to prevent close contacts and transfers
2. Being prompt and responsive, to provide healthcare professionals with adequate information on time

3. Developing brief courses tailored to the participants, to optimise the shortage of time available to healthcare professional
4. Using e-learning platforms that do not require broadband (especially in low resource countries), to facilitate participation
5. Offering the course free of charge, to promote participation
6. Providing information on regulatory sources, to standardise professional behaviours
7. Referring to evidence-based scientific literature, to ensure high quality of information and education
8. Including a section on risk communication in epidemics/pandemics, to make healthcare professionals competent in answering people's questions and needs
9. Listing institutional websites, to counteract misinformation
10. Continuously updating the educational contents, to follow the evolution of the situation and the progression of the scientific knowledge.

The first key point is that e-learning prevents large people gathering. Indeed, as demonstrated by the TELL ME project, e-learning can overcome many challenges during epidemics or pandemics, allowing all healthcare workers to be similarly trained, without requiring physical attendance. Furthermore, a second advantage of online education is time flexibility. E-learning courses enable healthcare professionals to study and review course materials at their best convenience, compatibly with their intensive involvement in the field [4].

In such a quickly evolving context of emergency, a promising approach consists in the 'rolling e-learning'. The rolling approach has been widely used by the scientific community during the COVID-19 pandemic with two main aims: 1. to promptly respond to the need for continuous and timely update of knowledge and activities or provide living guidance [15,16,17]; 2. to evaluate and identify potential treatments for COVID-19 in clinical trials [18,19]. Even the regulatory agencies adopted the rolling reviews as a tool to speed up the assessment/authorisation of promising medicines or vaccines during such a public health emergency [20,21,22].

Our findings confirm the success of the FadInMed programme in training healthcare professionals, even during a pandemic. The two courses herein outlined were developed based on the rolling approach to counteract the COVID-9 health emergency and achieved successful results. They will still be available online in the forthcoming months in response to the evolution of the pandemics. Currently, the challenge of healthcare professional training has now moved to the topic of vaccines, on which we have prepared a course titled 'COVID-19 vaccines: from research to practice' (INMI Lazzaro Spallanzani) that is being continuously updated as new vaccines become available and evidence of efficacy and safety is acquired.

Lastly, within this area of learning, it is also important to educate healthcare professionals in communicating with citizens to overcome the hesitancy and counteract 'fake-news'. Furthermore, as already mentioned in our previous communication published in the British Medical Journal [9], the citizens could greatly benefit from a lay version of the available e-learning courses. Expanding the training model to the general public in the future could help to increase awareness providing reliable and informative answers.

## Conclusions

Our experience shows that rolling e-learning provides healthcare professionals with updated, evidence-based and tailored information and are effective tools that offer the opportunity to share reliable sources of information, to standardise professional behaviours and counteract misinformation. During epidemics/pandemics, e-learning courses provide time flexibility and prevents people gatherings. They should be offered free of charge to promote participation and should also include a section on risk communication to train healthcare professionals in answering people's questions and needs.

## Abbreviations

**ANPAS:** Pubbliche Assistenze, Italian Associations

**CME:** Continuing Medical Education

**COVID-19:** Coronavirus Disease 19

**ECDC:** European Centre for Disease Prevention and Control

**FNOMCeO:** Italian Federation of Medical Professional Associations

**FOFI:** Federation of Orders of Italian Pharmacists

**ISS:** Italian National Institute of Health

**SARS-CoV-2:** Severe Acute Respiratory Syndrome CoronaCirus 2

**TELL ME:** Transparent communication in Epidemics: Learning Lessons from experience, delivering effective Messages, providing Evidence

**WHO:** World Health Organization

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# Declarations

## Ethics approval and consent to participate

All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on medical research and with the Helsinki Declaration of 1975, as revised in 2008.

Moreover, Italian national CME providers have to follow rules of good practice included in the guidelines of the Italian Continuing Medical Education (CME) system (link [https://ape.agenas.it/documenti/Normativa/Manuale\\_formazione\\_continua\\_professionista\\_sanitario/Manuale\\_sulla\\_formazione\\_continua\\_professionista](https://ape.agenas.it/documenti/Normativa/Manuale_formazione_continua_professionista_sanitario/Manuale_sulla_formazione_continua_professionista) also present as reference 10).

Ethics approval is not required by regulatory authorities in Italy [23,24,25,26,27] due to:

- the nature of study (analysis of the participation and satisfaction data about an e-learning course developed as an online questionnaire without any analysis of the individual achievements);
- full anonymization of the study participants and of their activities on the platform. In addition, the participants agreed to their anonymous responses to the questionnaire and data being used for statistical purposes;
- enrollment of health professionals and not of patients, without any collection of health-related data.

Consistently, the Ethics Committee of the University of Milan is informed of the study without envisaging the need for any ethical approval due to its design and conduction.

In addition, ethics approval during this pandemic was not required according to the “Ethics and data protection” regulations of the European advisory body and European Commission.

Also according to the Italian Data Protection Authority in the context of the COVID-19 health emergency, it is indicated that, in the event of the impossibility of obtaining the informed consent of the interested parties, observational studies take advantage of a derogation regime for the duration of the COVID-19 emergency (art. 110 of the Code regarding the protection of personal data, link <http://www.privacy.it/archivio/privacocode-en.html#sect110>). However, all participants, when registering for the course gave informed consent to their anonymous data being used for statistical purposes.

## Consent for publication

Not applicable

## Availability of data and materials

The datasets generated and analysed during the current study are not publicly available as they include personal data of users registered on the platforms. The use of the data is regulated by the GDPR 2018 in application of EU Regulation 2016/679. Upon registration, the user agrees on data processing in terms of collection, recording, organisation, storage, processing, modification, selection, extraction, comparison, use, interconnection, blocking, communication, dissemination, cancellation, destruction of the same including the combination of two or more of the above activities. However, they can be made available in anonymous form from the corresponding author on reasonable request.

## Competing interests

The authors report no conflict of interest

## Funding

The authors confirm that they have not received any funding to support this work

## Authors' contributions

All authors contributed to the project and the study design. MRV, NS, and PD contributed to data collection and analysis. MRV drafted the original manuscript. FP, PD, NS contributed to subsequent revisions and editing. All authors read and approved the final manuscript.

## Acknowledgements

The authors acknowledge Raffaella Daghini,<sup>b</sup> Christian Deligant,<sup>b</sup> Silvia Emendi,<sup>b</sup> for their work on the e-learning project and Lucia Massi for her assistance as medical writer.

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## Tables

**Table 1.** Profile of participants in CME e-learning courses.

	'COVID-19, the disease caused by the new coronavirus (SARS-CoV-2)' course	'Guidelines on COVID-19 treatment options' course
Participants, n (% passed)	70,825 (94.7%)	21,587 (94.5%)
Age, years		
mean $\pm$ SD	49.2 $\pm$ 12.7	51.9 $\pm$ 11.8
median	50	48
Females, n (%)	37,911 (53.5%)	10,101 (46.8%)
Males, n (%)	32,914 (46.5%)	11,486 (53.2%)
Professional profile, n (%)		
Physicians	50,030 (70.6%)	19,345 (89.6%)
Pharmacists	12,351 (17.4%)	38 (0.2%)
Dentists	7,414 (10.5%)	2,090 (9.7%)
Dentists	607 (0.9%)	75 (0.3%)
Nurses	423 (0.6%)	39 (0.2%)
Others		

CME: continuous medical education; COVID-19: coronavirus disease 19; SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; SD: standard deviation

## Supplementary Files

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