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General Medicine: Open Access

Research Article

Impact of a Virtual Training for Laboratory Medicine Professionals in an Infodemic Stage Due to the SARS-Cov-2 Pandemic. Lima-Peru 2020

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ABSTRACT

Aim and background: The objective of the study was to carry out a virtual training for Laboratory Medicine Professionals (LMP) in an infodemic stage due to the SARS-COV-2 pandemic and to evaluate the impact of this training.

Materials and methods: A quasi-experimental pre-post study was designed to compare the means of the performance scores before and after the training, using the Student's t test for related samples.

Results: 72 participants were included. The mean of the first evaluation was 18.67, before the training. In the second evaluation, after the training, a mean of 27.24 was obtained ($p<0.001$).

Conclusion: The findings suggest that training in Laboratory Medicine professionals, given for the purposes of evidence-based education, generates a positive impact for the benefit of their skills, where final benefit of which will be reflected in the patients.

Keywords: Coronavirus; Serologic tests; COVID-19 serological testing; Clinical laboratory testing

INTRODUCTION

In the month of July, through a webinar, different experts in epidemiology and public health; applied mathematics and statistics; digital health and technological applications; Among others, they met in seven inspiring conferences, where they analyzed the effects of the infodemic caused by the SARS-COV-2 pandemic, in order to reflect on the best way to manage this problem . An infodemic is an overabundance of information "that may or may not be correct" during an epidemic. This makes it difficult to find reliable sources and reliable guidance when needed. Even when you have access to quality information, there are still obstacles that must be overcome to take the recommended actions. Like pathogens in epidemics, misinformation spreads faster and faster and adds complexity to responding to health emergencies [1].

The fast progression of medical knowledge in diagnosis and treatment is driving a greater need for the constant training of the professional, to maintain the clinical competencies of the professionals. In low and middle-income countries, there are limitations for continuous training and skills improvement, among the main reasons we have: reduced number of teaching health facilities, few teachers, lack of systems to evaluate professional and labor competencies, systems recertification programs, poor professional networks and insufficient financial support for these activities. Therefore, there is an urgent need to develop integrated education training programs [2, 3].

In Peru, as well as other middle and low-income countries, the use of qualitative serological tests (Rapid Diagnostic Test –RDT) against SARS-COV-2 was implemented as part of their strategies to contain the advance of the pandemic, despite its limitations. This approach has allowed large numbers of symptomatic individuals and contacts to undergo testing in the community, alleviating delays, reducing wait time for molecular testing, and preventing the healthcare system from being overwhelmed [4].

However, the massive use of these qualitative serological tests generated much uncertainty in their interpretation in the different actors, such as health professionals, laboratory medicine professionals, the communication media, and patients.

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Received: June 1, 2021; **Accepted:** June 14, 2021; **Published:** June 21, 2021

Citation: Figueroa-Montes LE, Yalta Iraola Y (2021) Impact of a Virtual Training for Laboratory Medicine Professionals in an Infodemic Stage Due to the SARS-Cov-2 Pandemic. Lima-Peru 2020. Gen Med (Los Angeles). 9: 343.

For these reasons, we conducted a virtual training for Laboratory Medicine Professionals (LMP) in an infodemic stage due to the SARS-COV-2 pandemic and we evaluated the impact of this training.

METHODS

Study design

A pre-post quasi-experimental study was designed, where the results obtained before and after a virtual training aimed at LMP (Laboratory Medicine Professionals) were compared.

Study subjects

The participants included in this study belong to the scientific community of LMP in the Latin American region (Peru and other countries). As this virtual training was developed from Peru, most of its participants were from Peru (92%). A call for this training was made through the social networks of the private organizations Medicina del Laboratorio and SIMED being in the end a non-probabilistic sampling for convenience. The inclusion criteria were: 1) to be professionals of laboratory medicine, 2) to carry out a pre-post evaluation related to the training 3) To register voluntarily.

Study variables

A data collection sheet was used that included descriptive information about the patients, such as profession and country of origin. When measuring the impact of the training in the study, the global scores obtained in the two evaluations were considered. In relation to the evaluations, each one consisted of 40 questions, with a single answer, the perfect score being 40 points (1 point per question).

Data collection

Data was recorded in a spreadsheet with the information of both evaluations (pre and post). These procedures were carried out for data collection:

For their registration in the training, the participants entered their information in a G suite tool in enterprise version (Google documents) via the web.

To enter the virtual classroom, confirming their data and voluntary registration for the course, the participants entered to the virtual classroom of SIMED company (Chamilo © 2020).

A question bank was created for the evaluations in the virtual classroom. There were 40 questions related to the training topics.

Regarding the pre and post training evaluations, all the participants who answered the 40 pre-training questions also answered the same questions after the training.

Procedure

First evaluation: The participants entered to the virtual classroom with their accesses and answered 40 questions of the course content. Each question contained a statement with an unique answer of four options.

The virtual training was carried out in four hours, with the following academic content, which can be accessed (in Spanish):

Serological immune response against the virus SARS-COV-2

Considerations for the correct use of qualitative serological tests against SARS-COV-2

Interpretation of serological tests and uncertainties about immunity against the virus SARS-COV-2

Second evaluation: The participants entered the virtual classroom for the second time after the virtual training and answered the same 40 questions of the course content.

The quality of the information is supported by the traceability of the computer records in the G suite enterprise systems and the SIMED virtual classroom. These computer records are not manipulated from registration to extraction for secondary analysis.

Ethical aspects

Due to the features of the study evaluating the impact of a training activity, it was not necessary for the study to enter a research ethics and bioethics committee. All the participants included in the study voluntarily carried out their evaluations in the virtual classroom, to see the impact of this training on their skills. The confidentiality of the data was guaranteed in all processes. The criteria of social value, scientific validity, adequate selection of participants, risk-benefit evaluation, and no conflicts of interest were met [5,6].

Statistical analysis

Being a quasi-experimental pre-post study, the results of the first and second evaluation were compared after the online training. The data obtained from the computer records of the virtual classroom were entered into a systematization matrix built in Microsoft Excel. For the descriptive analysis of the qualitative variables, frequency tables and percentage calculations were used. For the analysis of the results of the first and second evaluation, the T test was performed for related samples. A p-value<0.05 was considered significant. The analysis was carried out with SPSS software (PASW Statistics version 25). The results, applying T-student statistic, indicates that there is a statistically significant difference of the mean score obtained between both evaluation times.

RESULTS

We received a total of 207 applications, of which only N=100 participants were included, from different professions related to Laboratory Medicine who voluntarily registered and met the inclusion criteria. At the end, a total of 72 participants took both evaluations, the other participants were not included (n=28) in the analysis.

Population characteristics

Of the participants who carried out both evaluations (n=72), we observed that n=50 (70%) were women and n=66 (92%)% from Peru, with the other participants (n=6) from other countries (Mexico, Colombia, Ecuador and Chile). We can observe the distribution of the Laboratory Medicine Professionals who participated in both evaluations (Table 1).

Profession	n	%
Medical technologist	37	51.39
Physician	27	37.50
Lab technicians	3	4.17
Biologist	2	2.78
Biomedical engineer	1	1.39
Pharmaceutical chemist	1	1.39
Bacteriologist	1	1.39
Total	72	100.00

Table 1: Laboratory medicine professionals.

Scores of first and second evaluation

In the first evaluation, a mean of 18.67 was obtained, before the training. In the second evaluation after the training, a mean of 27.24 was obtained. When making the comparison using the T test for related samples, we obtain p<0.001 (Table 2).

Evaluation	Average Score	N	t	p value*
Pre-Conference	18.67	72	65.44	<0.001
Post-Conference	27.24	72		

Note: *Difference of means with student's T test for related samples.

Table 2: Impact of the training in both evaluations.

Outcome of training according to maximum scores achieved

When we distribute the participants in two groups, a group that exceeded 50% of the minimum passing score, as well as another group that exceeded the level of excellence of 75% of the maximum score, a notable difference is observed between the values obtained in the stages pre-conference and post-conference. While 42% of those who answered the pre-conference assessment passed the low hurdle of correctly answering at least half of the questions, no participant managed to pass the high hurdle of 75% before the training. In contrast, after the training, 81% of the participants exceeded the minimum hurdle of half of the correct answers and 31% exceeded the excellence level of 75%. That is, the training influenced that almost twice the relative number of participants (81% vs. 42%) exceed at least half of the minimum passing score and that almost 1 in 3 participants (31%) qualify at the level of excellence above of 75% of correct answers (Figure 1).

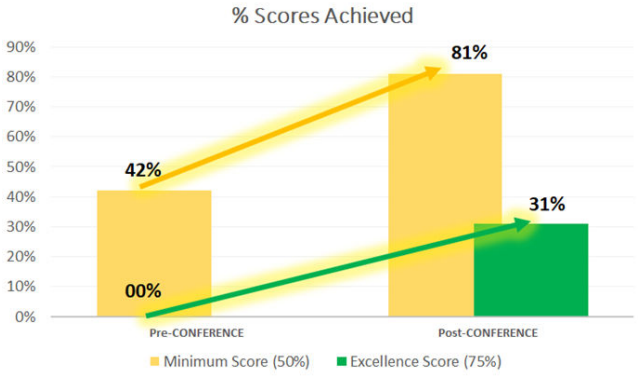

Figure 1: Participants who passed the minimum passed score (50%) and participants who reached at least the excellence level (75%) in stages pre and post-conference.

Outcome of training according to quartiles

According to the box and whisker graph, the most relevant data is shown in terms of quartiles of knowledge and the displacement after the training provided to health professionals. It is worth noting the notable improvement of the main group (green boxes between the first and third quartiles of the evaluated participants) as well as the data that shows that the third quartile (highest level of knowledge of the initial pre-conference group) does not overlap at no point with the first quartile of the post-conference group (lowest level of knowledge in this group). The above described clearly indicates that both groups show us an evolution from the initial knowledge, which is clearly distinguished by increasing post-training knowledge, transforming it into a new group very different from the one that started the study (Figure 2).

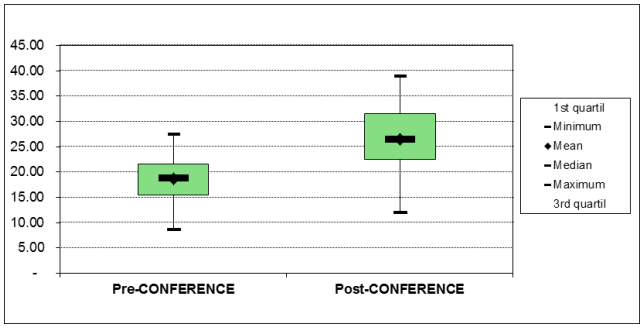

Figure 2: Box and whisker diagram, where the change in knowledge is evident.

DISCUSSION

In the present study it is shown that about a third of the trained professional staff reach a level of excellence that they did not

have before the training, while 80% reach the minimum approval level after the training. This acquired knowledge contributes to reducing the massive infodemic, where health and Laboratory Medicine Professionals decide to acquire more reliable information that broadens their knowledge. Therefore, when comparing between the first and second evaluation, a favorable performance of the participants is shown in relation to the knowledge acquired.

One area in which students can serve and have a positive effect is as educators for their peers, patients and communities, using the tools available through social media and other modalities to help influence behaviors in a positive way [7].

Cognitive and social congruence are considered key factors for an efficient peer-assisted learning experience, between students (participants) and teachers (mentors, tutors). Cognitive congruence is represented by the knowledge base and familiar language, as well as efficient knowledge transfer with detailed knowledge from teachers to students (interpersonal level); while social congruence is a relaxed learning atmosphere, with a pleasant tutorial, with an empathic behavior for an exchange of learning experiences (pleasant learning level and accessibility) [8].

The so-called knowledge society is synonymous of accelerated and constant changes, characterized by the development and dissemination of information, and especially, by the production and commercialization of knowledge; the latter becoming the basis of the mode of production and, therefore, the capital that moves the world today [9].

With this training the authors promoted the provision of the most up-to-date knowledge in relation to serology issues on SAR-CoV-2 and the importance of the verification of qualitative serum tests, which continue to be, used as part of the state's strategy for combat this pandemic [4].

Leaders of the professional and organizational development network in higher education have developed eight principles to guide colleges and universities in the adoption, implementation, and development of education such as online courses and webinars. In principle 6, they consider evaluating the impact of the resources provided, where teachers must demonstrate the impact of the resource provided and in the principle 7, it mentions evaluating the suitability for several needs, considering that the provided resource can satisfy the majority of students. Therefore, digital technologies, with educational development resources, can improve the experience of students [10].

For all the above, we made a teacher training model for virtual learning environments, specifically constituted by a virtual classroom with virtual pre and post training evaluations, where we include the three dimensions mentioned: technological dimension, with the technical production of the training where it has been carried out following the appropriate usability and accessibility procedures in order to promote learning in accordance with the goals and objectives of the course within the open and virtual learning modality; dimension of the evaluation, where the evaluation processes of the course were individualized, using the necessary technical and human resources, through varied training strategies that favor the achievement of the goals and objectives of the course and the follow-up dimension, where a direct contact between participants and teachers, offering the possibility of permanent advice and support to ensure that learning is consolidated, overcoming difficulties of practical application in their work environment [9].

The limitations of the study are related to the fact that the type of evaluation was multiple questions with a single answer, where only theoretical and not practical knowledge was evaluated. Neither was a follow-up carried out if the knowledge acquired had an impact on their daily work skills. Another limitation was that participation was limited to a symbolic economic amount, not being able to obtain a greater number of participants. Consider that the effective number of academic hours was 4 hours.

In conclusion, the findings suggests that conducting training in professional groups of health and Laboratory Medicine, taught for the purposes of evidence-based education, generate a positive educational impact with a greater degree of reliable information acquired through these trainings for the benefit of competences professionals and labor, whose final benefit would be reflected in the patients.

CONCLUSION

In conclusion, the findings suggests that conducting training in professional groups of health and Laboratory Medicine, taught for the purposes of evidence-based education, generate a positive educational impact with a greater degree of reliable information acquired through these trainings for the benefit of competences professionals and labor, whose final benefit would be reflected in the patients.

GRATEFULNESS

To all Laboratory Medicine Professionals, who day by day are fighting against this pandemic by SARs-COV-2.

AUTHORSHIP CONTRIBUTIONS

The authors carried out the planning, execution, discussion, and conclusions of the manuscript.

CONFLICTS OF INTEREST

The authors declare that we have no conflicts of interest.

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