



# Teaching beyond skills: The psychological effect of a simulation training in the COVID 19 era

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## ABSTRACT

**Background:** Health professionals during the Covid-19 pandemic suffer significant anxiety and depression symptoms (42-71%). This study aimed to explore how a multilevel simulation-based training influences their perception of psychological well-being and distress. **Methods:** A pre-post quasi-experimental study evaluated a training intervention that included three phases: Pre-test, Simulation-based training and Post-test. The Simulation-based training consisted in a circuit of three hybrid simulation-based stations with role-plays and low-fidelity simulators about proper use of personal protective equipment, airway management and basic care of the COVID-19 patients. Descriptive statistics were used for the analysis of the quantitative variables. **Results:** The level of perceived distress facing the care of COVID-19 patients in the pretest was 21% (n=30). However, after the training, that perception was 32.4% (n=47) (p<0.05). Most of the participants perceived that the simulation-based training contributed to their psychological wellbeing and preparedness, 80% (n=117) versus 20% (n= 29) who considered little or nothing (p= 0.001). **Discussion:** Changes in the pre and post- intervention participants' perceptions in the different dimensions (preparedness) are consistent with the educational theories of learning. A positive influence of the training on the psychological wellbeing of the participants was evident.

## KEYWORDS

Simulation training, Covid-19, Mental health, Health professions

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**Enseñar más allá de las habilidades: el efecto psicológico de un entrenamiento de simulación en la era COVID 19**

## RESUMEN

**Materiales y métodos:** Estudio cuasi-experimental pre-post cuya finalidad era evaluar una intervención de

entrenamiento basado en simulación que incluía tres fases: Pretest, entrenamiento basado en simulación y Post-test. El entrenamiento consistió en un circuito de tres estaciones híbridas basadas en simulación con juegos de roles y simuladores de baja fidelidad enfocadas en el uso adecuado de equipos de protección personal, manejo de la vía aérea y atención básica de los pacientes COVID-19. Se utilizó estadística descriptiva para el análisis de las variables cuantitativas. **Resultados:** El nivel de angustia percibida frente a la atención de los pacientes con COVID-19 en el pretest fue del 76% (n = 107). Sin embargo, después del entrenamiento, esa percepción fue del 67% (n = 97) ( $p < 0,05$ ). La mayoría de los participantes percibieron que el entrenamiento basado en simulación contribuyó a su bienestar psicológico y preparación, 80% (n = 117) versus 20% (n = 29) que consideraron poco o nada ( $p = 0,001$ ). **Discusión:** Los cambios en las percepciones de los participantes antes y después de la intervención en las diferentes dimensiones (preparación) son consistentes con las teorías educativas del aprendizaje. Se evidenció una influencia positiva de la formación sobre el bienestar psicológico de los participantes.

## PALABRAS CLAVE

Simulación, Infecciones por coronavirus, Salud mental, Ciencias de la salud

## BACKGROUND

Since the first case of mysterious pneumonia was diagnosed in Wuhan health workers around the world have been facing the distress of COVID-19. (1) Karampelias *et al.*(2) highlight the psycho-emotional impact of the pandemic by describing various changes in the emotional profile, behavioral traits and personality of health workers, finding that the principal factors are increased levels of stress, alteration in the response to fear, depression and increased coping mechanisms related to feelings of helplessness, exhaustion and anxiety.

Jiambo-Lai *et al.*, in a survey of 1,250 health workers in Chinese hospitals with Covid-19 patients, found that a significant proportion reported symptoms of depression (50.4%), anxiety (44.6%), insomnia (34.0%) and distress (71.5%)(3). Another study reported mild anxiety disorder in 42.5% of health professionals (4).

Some publications in the last year have suggested a beneficial effect of simulation on the preparing health workers to face new situations in relation to the care of patients with Covid-19, such as the proper use of Personal Protective Equipment (5,6,7), basic and advanced airway management (8,9), and to a lesser degree training in emotional management and coping with stressful situations by the health team during the pandemic (10,11).

However, despite the well-documented anxiety pro-

duced by the pandemic in health workers, there are no studies that describe the impact of simulation on health professionals' perception of their own well-being during the pandemic.

The present study aimed to explore how a multilevel simulation-based training could influence health professionals' perception of their own well-being and distress.

## MATERIALS AND METHODS

This pre-post quasi-experimental study was carried out between March and May 2020. After the approval of the Institutional IRB (Faculty of Medicine, Universidad de Los Andes, Colombia), health professionals from three institutions were invited to participate. The inclusion criteria were the acceptance to participate in the study and sign the consent.

The study included three phases: Pre-test, Simulation-based training and Post-test (Figure 1).

A 3-item questionnaire including:

1. A 4 point- Likert item: Perceptions of the degree and quality of received information about PPE use
2. A 4-point Likert item: Readiness to care for COVID 19 patients
3. A 10-point Likert item: Level of perceived distress related to their care.

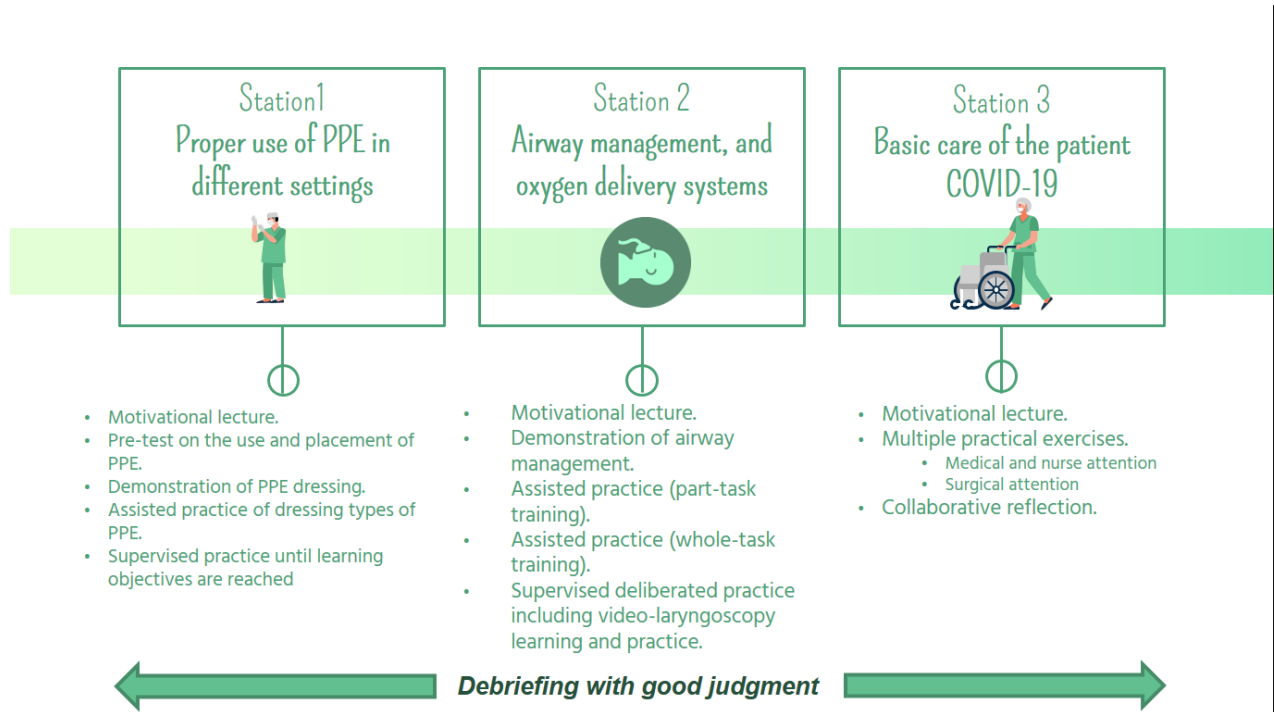
This instrument was designed by the authors and dis-

cussed in a group of experts for face-validity.

In the **pre-test phase**, participants were asked to complete the questionnaire.

The Simulation-based **training** consisted in a circuit of three hybrid simulation-based stations with role-

plays and low-fidelity simulators (Laerdal® airway Management Trainer). The three stations were designed considering the following contents and teaching principles (7) (Figure 1):



**PROPER USE OF PERSONAL PROTECTIVE EQUIPMENT IN DIFFERENT SETTINGS: CONTENTS: ELEMENTS AND PROPER USE OF THE DIFFERENT TYPES OF PERSONAL PROTECTION EQUIPMENT (PPE)**

*Teaching principles:* Zone of Proximal Development and Scaffolding model (Social constructivism theory). (4) Participants went through stages I (help provided by others) and II (help provided by themselves) in the training session. Participants on their own drilled stages III (internalization) and IV (de-automation) the following two months after training. (4)

**AIRWAY MANAGEMENT AND OXYGEN DELIVERY SYSTEMS:**

*Contents:* Principles of airway management, changes in airway management, airway management in different settings and contexts, management and training

in devices for airway management according to the role of care in patients with COVID-19.

*Teaching principles:* Model of Domain Learning (MDL) using clear learning objectives and deliberate practice for the acquisition of skills in different contexts. (5, 6)

**BASIC CARE OF THE PATIENT COVID-19:**

*Contents:* Taking care of patients with suspected or diagnosed COVID -19 in different contexts.

*Teaching principles:* Situated learning model and Cognitive apprenticeship by modeling, tutoring, scaffolding, articulating and reflecting.(7)

Participants were trained in groups of five per station. The total time of training was 5 hours. After completing the circuit, they participated in a 30 minute-debriefing session (*debriefing with a good judgment model*) with the instructors (8). Five instructors were trained in this methodology.

Finally, in the **post- test phase**, the participants completed the questionnaire again. Two more items with a 5- point Likert scale were included asking for:

1. The preparedness to care for COVID 19 patients after the training
2. The contribution of the training to psychological well-being (it refers to the extent to which people experience positive emotions and feelings of happiness. Sometimes this aspect is referred to as subjective well-being (9)

Descriptive statistics were used for the analysis of the quantitative variables. The  $p$  value  $<0,05$  was considered significant. Data were analyzed using the SPSS Version 16 (IBM).

## RESULTS

In the period from March to May 2020, 196 health professionals were trained in three University hospitals in Bogotá, Colombia. Participants were recruited from the operating rooms, emergency rooms and hospitalization areas. Only data from 145 were analyzed because of missing data. The 90% of the participants were between 31-48 years old and 85% were women.

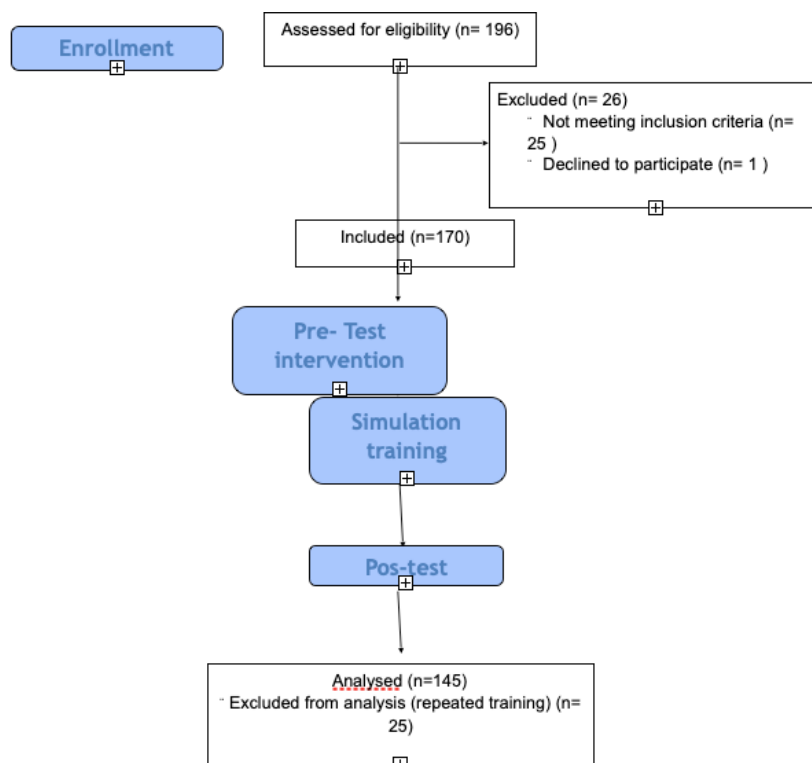
Most of them were physicians (57 %) and nurses (34%). Administrative staff and respiratory therapists also participated. (Figure 2)

In the pre-test, 80% ( $n=117$ ) of participants considered that they had enough information (videos, readings, protocols, etc.) regarding the use of PPE. However, in the post- test, only 20% ( $n=29$ ) considered that the received information before training was useful in contrast to 80% ( $n=117$ ) who considered it not at all or little useful

When asked about their perceived readiness for taking care of COVID- 19 patients, the results showed that 51% ( $n=73$ ) of participants were sufficiently prepared in the pre- test. However, in the post- test, 89% ( $n=129$ ) perceived that they were prepared or very well prepared. ( $p<0.001$ ).

When they were asked about their level of distress facing the care of COVID-19 patients in the pretest, 21% ( $n=30$ ) of the participants perceived no distress. However, after the training, that perception was 32.4% ( $n=47$ ) ( $p<0.05$ ).

When evaluating the contribution of the simulation to their psychological well being, 80% ( $n=117$ ) of the participants considered that the training contributed a lot versus 20% ( $n= 29$ ) who considered little or nothing ( $p= 0.001$ )



## DISCUSSION

The importance of an educationally well-founded training is shown in this study. Changes in the pre and post- intervention participants' perceptions in the different dimensions are consistent with the educational theories of learning.

First, most participants considered that they had received or consulted enough information before training, but they judged that such information was not so useful after the training. This finding can be interpreted as a meaningful insight according to the theories of **Significant and adult learning** (9). In this theory, the meaning of learning is in the integration and practical application of concepts to solve real-life problems such as the management of the airways, adequate use of protective equipment or comprehensive COVID-19 patient care.

Second, one of the most suggestive results is the pre and post-training significant difference in their perception of preparedness to care for COVID-19 patients. This change could be explained by the **Dunning-Kruger effect** (10). According to this theory, people with substantial deficits in their knowledge or expertise are not able to recognize those deficits. Besides, there is a significant shift in the standard against which the knowledge is evaluated, that is, after the training participants can contrast their "real" level of knowledge with the new and more precise standard (response-shift bias) (11)

Third, the evidence shows that the training with simulation produces significant improvement in participants' perceived ability to function as a team and confidence in their own performance with real patients. In addition, a positive influence of the training on the psychological wellbeing of the participants was evident. Both findings (decrease in anxiety and an improvement in psychological wellbeing) are consistent with results in the literature. (12)

One of the limitations of this research are the few measured variables, the participant's perception and the use of non-validated scales. This shortcoming is justified by the limited time to complete the form, since the training took place in the very real scenario of COVID-19 pandemics. However, self-perception of anxiety and emotional wellbeing are valid measures considering that they finally show how a person feels about themselves in a situation, according to the *self-perception theory*. (13)

## CONCLUSIONS

This simulation-based training, grounded on educational theories, is a cardinal contribution to the health professional training in pandemic times; not only for technical skill acquisition and perception of preparedness but also for favoring the prevention of psychological distress and the promotion of psychological wellness when taking care of COVID-19 patients.

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