

1 **An Analysis of the Perspective of People in Training**
2 **“Conscripted” to Manage COVID-19 Hospital Patients in**
3 **Mexico**

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6 **Short title: Perspective of Health Human Resources in the**
7 **Attention of COVID-19**

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39 **perception, feeling, information, PPE**

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41 Word Count: 2241

42

43 **Abstract**

44 **Background**

45 In order to address the COVID-19 pandemic, health systems have used all their
46 resources, including health care workers in training. Knowing the insights of these
47 workers is of the utmost importance to generate adequate educative/political
48 /administrative strategies.

49 **Methods**

50 An anonymous cross-sectional online survey was made by the General Directorate
51 of Quality and Health Education in Mexico, in a convenience sample of 6,020
52 participants who belong to personnel in training for the health area, which included
53 practitioners and professional technologists, undergraduate doctors, nursing, and
54 residents in several specialties.

55 **Results**

56 Different positive and negative feelings were identified by the health workers who
57 participated in facing this health emergency; emphasizing elements such as the
58 need for Personal Protection Equipment (PPE) that, when deficient or lacking,
59 generate concerns that raise questions about the medical/epidemiological attention
60 to the pandemic.

61 Based on an analysis of feelings, 8 main feelings were identified, which by
62 frequency of appearing were: distrust(24.83%), fear(21.97%), sadness(12.45%),
63 anticipation(11.65%), anger(10.71%), disgust(9.69%), joy(4.97%) and
64 surprise(3.72%) which influence health workers in training and their work
65 performance day to day.

66 Concerning their positive and negative evaluation of their experience facing this
67 health emergency, 13.83% of participants had a positive perception about
68 participating in this kind of health emergency to support the country, 49.94%
69 showed a negative evaluation, and 36.23% kept a neutral evaluation about their
70 participation.

71 **Conclusions**

72 The health workers in training in Mexico gave a negative evaluation of the
73 management of the health emergency. Distrust as a response to the absence of
74 timely information from the education/health institutions, as well as concern about
75 lack of personal protection equipment/inputs, are the main conflicts reported.

76 We must establish a credible globally relevant continuity plan for the education of
77 health care personnel in training, facing emergencies and disasters, so that next
78 time we are properly prepared.

79

80 **What we know**

81 In order to address the COVID-19 pandemic, health systems have used all their
82 resources including the health care workers in training.

83 Knowing the insights of these workers is of the utmost importance to generate
84 adequate educative, political and administrative strategies.

85

86 **What we have learnt**

87 Distrust as a response to the absence of timely information from the education and
88 health institutions, as well as concern about the lack of personal protection
89 equipment and inputs, are the main conflicts reported.

90 We must establish a credible globally relevant continuity plan for the education of
91 health care personnel in training, facing emergencies and disasters so that next
92 time we are properly prepared.

93

94 **Introduction**

95 The first case of novel coronavirus SARS-CoV-2, also known as COVID-19 in
96 Mexico was reported on February 28, 2020, and up to January 19, 2021, a total of
97 1,649,502 confirmed cases had been registered, 141,248 deaths, and 1,237,321
98 recoveries associated with the disease (1). The health systems of many countries,
99 including Mexico, have taken on board the structural modifications that the
100 pandemic has required, highlighting hospital conversion and extension, changes in
101 work routines, the implementation and optimization of Personal Protection
102 Equipment (PPE), and the strengthening of the disinfection techniques employed
103 (2,3).

104 COVID-19 has caused health institutions to improve the responsiveness in
105 economic and human resources, mainly with the recruitment of health workers who
106 possess the skills and capabilities that the pandemic merits (4). Nevertheless, this
107 response often varies, since it has been reported that middle income countries lack
108 enough personnel to face the pandemic. It has even required the participation of
109 health workers in training from careers related to medicine to deal with the demand
110 needed at this moment (5).

111 The pandemic, in turn, has caused in education and health institutions, the
112 generation of strategies for the acceleration of education and training of new
113 recruits for their integration into the growing demand of care for patients, who
114 require general and also specialized consultations in COVID-19 in urban and rural
115 areas (6).

116 In this sense, their participation has been key to managing the situation. However,
117 the probability that a student in training or resident internship is exposed to COVID-
118 19, has implied a change in their education, service responsibilities, continuous
119 training and daily medical practice. (7).

120 In order to know how the health personnel in training from the different health
121 areas are facing this health emergency and the needs that have arisen, an on-line
122 anonymous survey was carried out. We asked about the academic and ethical
123 conflicts that appeared in the response to this health emergency.

124

125 **Methods**

126 **Design of the Study, Population, and Environments**

127 This study consisted of a cross-sectional online survey, with a convenience sample
128 of 6,020 people in training in the healthcare delivery area. Among them, workers
129 who were in technical and professional training, undergraduate intern doctors,
130 social service intern doctors and nurses, and resident doctors from the 32 states of
131 the country were included.

132

133 **Data Collection**

134 The survey was anonymous and online, sent via e-mail to the personnel in training
135 registered in the platform of the General Directorate of Quality and Health
136 Education (Dirección General de Calidad y Educación en Salud in Spanish). It was
137 available from June 25 until July 25, 2020. Participation was voluntary and only
138 one answer per person was allowed.

139 The survey was based on that made by the Washington University School of
140 Medicine (6), composed of 3 open questions, in order to obtain the opinions and
141 attitudes of the health personnel to the COVID-19 pandemic in Mexico:

142

- 143 • Describe the academic or ethical conflicts that you have experienced
144 because of the COVID-19 pandemic.
- 145 • ¿What conflicts have you experienced in your practice as a health
146 worker in training caused by the COVID-19 pandemic?

147 • ¿Is there anything else you would like to mention about your
148 experience as a health worker in training while the COVID-19
149 pandemic?
150

151 **Statistical Analysis**

152 The data collected in the survey were analyzed applying diverse techniques of
153 processing of natural language, with the implementation of algorithms in language
154 R 4.0.2 for Windows. Subsequently, a data repository was built in CSV format to
155 process the information statistically and with a qualitative approach, that is,
156 syntactically to obtain an analysis of feelings.

157

158 Additionally, a word cloud was built applying data mining functions on the *corpus*
159 generated by the answers to the open question to obtain tendencies, defining a
160 maximum number of 80 words, with a minimum frequency of occurrence of 3
161 (Figure 1). A transformation was performed to obtain a matrix of terms, where the
162 number of rows m is equal to the number of different words of the *corpus*, and the
163 number of columns n is equal to the number of documents (each document is an
164 entry of the corpus that represent the total size of the sample). The sum of vectors
165 of the surveys were determined and were transformed into a bi-dimensional array
166 that confirmed the *corpus*, using the Pearson's Correlation Coefficient for the
167 association of words. Afterward, hierarchical clustering was performed using the
168 Ward method (8), in order to observe the partitions generated in a hierarchy based
169 on the most frequent terms. For the analysis of feelings, we identified and
170 classified the reactions, attitudes, the context, and the emotions of the participants
171 based on the NRC Emotion Lexicon dictionary (9) to classify each word in the
172 following feelings: positive, negative, anger, anticipation, disgust, fear, joy,
173 sadness, surprise, and distrust.

174

175

176 **Results**

177 The survey was answered by the health area personnel in training a total of 6,020
178 times. 70.3% of respondents were women with an average age of 24 years. The
179 interns and technicians in nursing were the people with the highest participation in
180 the survey, with a percentage of 27.7% and 16.4%, respectively, followed by
181 resident doctors with 13.3% and social service intern doctors 12.7% (Table 1).

182 The presence of conflicts in their education and daily practice as the result of the
183 pandemic was mentioned in 39.5% of responses. The social service intern doctors
184 and undergraduate intern doctors were the health workers in training with the

185 highest frequency of academic conflicts, with a percentage of 79.4% in the first
186 group and 56.0% in the second group. Likewise, the residents and the nursing
187 practitioners had a high percentage of conflicts with 46.8% and 37.9%,
188 respectively. The personnel in training from careers related to health education
189 experienced conflicts in a slightly lower proportion than the medical and nursing
190 sector, ranging from 20 to 30% (Table 1).

191 The percentage based on the total terms used in the answers to each open
192 question was 98.3%. From the 6,020 analyzed documents, 4,249 common terms
193 were defined, obtaining 4,252 different words.

194 According to the syntactic analysis of the open questions and their frequency of
195 distribution, the main concerns of the health workers in training were:
196 *lack* (11.95%), *patients* (8.26%), *protection* (7.35%), *personnel* (7.28%), social
197 service intern doctors (7.25%), *covid* (5.79%), health (5.55%), practitioners
198 (5.17%), *material* (4.64%), and *equipment* (4.50%) (Figure 1).

199

200 In order to observe the semantic relationship between the terms with a higher
201 frequency, a dendrogram was built composed of 6 clusters, where each cluster
202 represents the direct association between the terms. Cluster 1 "patient", is related
203 with the partitions "attention" and "risk". The second cluster is composed of terms
204 that reflect the needs. The third and fourth clusters associate information given by
205 institutions, where it is observable that the term "lack" has a *strong* semantic
206 relationship. The fifth and sixth clusters describe actions presented due to the
207 pandemic, such as "suspension of classes" and "service" (Figure 2).

208

209 Based on an analysis of feelings, 8 main feelings were identified, which by
210 frequency of appearing were: distrust (24.83%), fear (21.97%), sadness (12.45%),
211 anticipation (11.65%), anger (10.71%), disgust (9.69%), joy (4.97%) and surprise
212 (3.72%).

213 Concerning their positive and negative evaluation of participation in this health
214 emergency, 13.83% of participants had a positive perception about participating in
215 this kind of health emergency to support the country, 49.94% showed a negative
216 evaluation, and 36.23% kept a neutral evaluation about their participation.

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218

219 **Discussion**

220 Since the notification of the existence and quick spread of the novel coronavirus
221 SARS-CoV-2 in Mexico, the organization and implementation of hospital
222 conversion in the country's Health National System has been instrumental in facing

223 this emergency, as well as maximizing the nation's attention and facing the
224 pressures of COVID-19 cases (10-12).

225 For the health crisis, it was considered necessary to enlist the participation of
226 health workers in their last years of education, assigning them to non-COVID-19
227 hospitals, in order to discharge their academic and social functions (13). In this
228 context, the strategies implemented were essential to fulfilling the demand that
229 emerged in this situation, as well as to enable the health workers to complete their
230 education efficiently (14).

231 The deficit of information provided by the academic institutions and the health
232 sector, together with the lack of timely and efficient training about COVID-19 have
233 seemed to mediate insecure behaviors, affecting not only the effective prevention
234 measures but also the effectiveness of measures to lower the rate of infected
235 people (15). Importantly high scores in knowledge tests about COVID-19 were
236 significantly associated with a lower probability of negative attitudes and potentially
237 dangerous practices to face the COVID-19 epidemic (16).

238 The COVID-19 virus has had a worldwide impact directly on the physical and
239 mental health of millions of people (17). The COVID-19 pandemic has caused a
240 generalized climate of caution, uncertainty, and stress, due to a wide variety of
241 causes, particularly among health professionals (18) as we describe here.

242 The most recognized reported factors in our survey are the concern about the lack
243 of personal protection equipment, exhaustion, worries about not being able to
244 provide competent care if the disease extends to new areas, concerns about the
245 scientific and clinical information that changes quickly, lack of access to information
246 and up-to-date communications, the absence of specific medications, the shortage
247 of ventilators and beds in the intensive care unit to address the emerging of
248 critically ill patients, and a significant change in their social and family life plus
249 education / training (19).

250 Around the world, there have been studied different surveys to understand and
251 observe the behavior of health workers while facing the COVID-19 pandemic. Most
252 of the studies in Latin America concluded that the surveyed health personnel feel
253 uncertainty, fear, and anguish, but also there emerged a feeling of responsibility
254 and a wish to face COVID-19 (20). This accords with our findings as described.

255 Among these large scale surveys to health personnel, there stand out concerns
256 about lack of institutional resources and availability of personal protection
257 equipment. There are concerns about government measures like the absence of
258 strategies of containment for the health workers and clear and standardized
259 institutional communication, together with disquiet about creation of the necessary
260 conditions to face the pandemic, access to information, and lack of integration

261 among the subsectors of the system (21). Added to this, there are negative or
262 neutral valuations of their participation as health personnel in this health
263 emergency.

264 This study shows evidence that the health workers in training, who have
265 experienced conflicts in their professional practice because of the COVID-19
266 pandemic, agree that the personal protection equipment and inputs are not
267 enough. Despite having been placed in lower-risk areas, the social service intern
268 doctors were assigned to biologically dangerous tasks, not having the appropriate
269 equipment. This reinforces the feelings of fear, anger, sadness, distrust, and
270 repulsion, which causes interpersonal conflicts with their coworkers, generating
271 negative perceptions of their professional development and the need for
272 continuous education, as implemented in other countries (22).

273 The role played by e-learning, especially the educational platforms is important in
274 these situations. Nevertheless, there still is a significant gap in the facility of this
275 kind of teaching to enable the development of abilities and skills that this kind of
276 emergency requires.

277 Knowing the insights of the health personnel is important in order to be able to
278 generate community awareness and to develop the necessary social discipline to
279 face the COVID-19 epidemic. As in other places in the world, there is annoyance
280 and physical, social, emotional, and mental exhaustion in the health workers, which
281 impacts directly on their personal and professional development.

282

283 *We suggest the following interventions in the light of the findings in this survey*

284 1. An action plan and continuity plan for the education of the health care
285 personnel in training, facing emergencies and disasters by the education
286 authorities of medical units, in which there are established the instructions
287 and functions that the health personnel in training must perform, as well as
288 the necessary provisions that the recipient unit considers about the material,
289 personal protection equipment, training, etc.

290

291 2. To develop these guidelines based on the experience of the COVID-19
292 pandemic.

293

294 3. Interventions like timely information through the use of information
295 technology (IT), mentoring by qualified and experienced personnel and
296 support in the self-education material by the Educational Institutions.

297 4. Protection of the safety of undergraduate intern doctors and practitioners,
298 and the deployment of training actions during the confinement, as well as a
299 controlled plan of reincorporation once the emergency is over.

300

301 5. The need for psychological and social attention to human resources in
302 training. The offering of psychological support could be made through
303 helplines and chats in the different health services of each state and through
304 the “Capas” or Psychological Attention Centres.

305

306 **Conclusion**

307 This survey highlights the concerns and needs related to the perception of the
308 absence of enough input / educational support and mentoring, to face the
309 Coronavirus pandemic and its impact on the mental health of health care
310 professionals in training.

311

312 This study shows the need for developing action strategies that allow adequate
313 training, orientation and mentoring of mental wellbeing in this kind of event.

314

315 This is the first study in the world to assess the perception of health personnel in
316 training from the different health areas directly related to the care of COVID-19
317 patients in clinical or administrative activities who face the pandemic. In the light of
318 the results, we must establish a credible globally relevant continuity plan for the
319 education of health care personnel in training, facing emergencies and disasters
320 now and in the future.

321

322

323 **Figure Legends**

324

325 Figure 1: Word cloud applying data mining functions on the *corpus* generated by
326 the answers

327

328 Figure 2: Dendrogram of the semantic relationship between the terms

329

330

331 **Conflict of Interest**

332 No author has any conflict of interest.

333

334 **Data Availability Statement**

335 The data are not available to other researchers, given the sensitive nature of this
336 area in relation to what health care workers have told us.

337

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