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Ivan Cherrez-Ojeda
Universidad Espíritu Santo, Samborondón, Ecuador

Emanuel Vanegas
Respiralab Research Group, Guayaquil, Ecuador

Miguel Felix
Respiralab Research Group, Guayaquil, Ecuador

María José Farfán Bajaña
Respiralab Research Group, Guayaquil, Ecuador

Azza Sarfraz
Aga Khan University, azza.sarfraz@aku.edu

See next page for additional authors

Authors

Ivan Cherrez-Ojeda, Emanuel Vanegas, Miguel Felix, María José Farfán Bajaña, Azza Sarfraz, Zouina Sarfraz, Genesis Camacho, Alanna Barrios-Ruiz, and Jack Michel

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SHORT REPORT

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Physician's attitudes on pulmonary rehabilitation following COVID-19: a brief perspective from a developing country

Ivan Cherrez-Ojeda,[1,2] Emanuel Vanegas,[1,2] Miguel Felix,[1,2] María José Farfán Bajaña,[1,2] Azza Sarfraz,[3] Zouina Sarfraz,[2,4] Genesis Camacho,[5] Alanna Barrios-Ruiz,[6,7] Jack Michel[6]

[1]Universidad Espíritu Santo, Samborondón, Ecuador
[2]Respiralab Research Group, Guayaquil, Ecuador
[3]Department of Pediatrics and Child Health, the Aga Khan University, Karachi, Pakistan
[4]Research and Publications, Fatima Jinnah Medical University, Lahore, Pakistan
[5]División de Estudios para Graduados, Facultad de Medicina, Universidad del Zulia, Maracaibo, Venezuela
[6]Division of Clinical and Translational Research, Larkin Community Hospital, South Miami, FL, USA
[7]Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey, México

ABSTRACT

Despite the uncertainty about the follow up of COVID-19 survivors, there is a growing body of evidence supporting specific interventions including pulmonary rehabilitation, which may lead to a reduced hospital stay and improved overall respiratory function. The aim of this short report was to assess the attitudes toward pulmonary rehabilitation following COVID-19 among Ecuadorian physicians. A cross-sectional study was conducted, in which a 5-question survey was used to assess the level of agreement to specific statements with a 5-point Likert scale. Out of the 282 participants, 48.2% (n=136) were male, with a mean of 12.6 (SD=11.3) years of experience. More than half of physicians (63.8%, n=180; $\chi^2(2) = 139.224$, p=0.000) considered that diagnosis and treatment of patients with sub-acute and chronic COVID-19 pulmonary sequelae is not clear. Additionally, 94.3% (n=266; $\chi^2(2) = 497.331$, p=0.000) agreed that pulmonary rehabilitation must be considered as a relevant strategy in long-term care following an acute infection, with 92.6% (n=261; $\chi^2(2) = 449.772$, p=0.000) stating it will improve the likelihood of survival and return to baseline health. In conclusion, we found that considerable majority of physicians held positive attitudes to the role of pulmonary rehabilitation and considered it as a relevant strategy in long-term care following COVID-19. However, most of them also conveyed that the diagnosis and treatment of chronic pulmonary sequalae is unclear, and that guidelines for assessing pulmonary function should be established.

Key words: attitudes; developing countries; pulmonary rehabilitation; COVID-19.

Correspondence: Ivan Cherrez-Ojeda, Universidad Espíritu Santo, Km. 2.5 Vía La Puntilla Samborondón 0901-952, Ecuador. Tel. +593.999981769. E-mail: ivancherrez@gmail.com

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Ethics approval and consent to participate: This study was conducted in accordance with the Declaration of Helsinki and was approved by the ethics committee: Comité de ética e Investigación en Seres Humanos (CEISH), Guayaquil-Ecuador (#HCK-CEISH-18-0060). Informed consent was obtained from all participants prior to their voluntary participation.

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Introduction

To date, millions of patients have recovered from COVID-19; however there are growing concerns related to potential long-term complications and persistent symptoms. A significant number of patients are reporting fatigue, dyspnea, anxiety, and depression even 2-3 months after recovery [1,2]. As documented in a previous report by the European Respiratory Society Task Force, these prolonged symptoms can affect daily life activities, and it appears that age and initial disease severity correlate with long-term sequalae [3]. Based on current evidence, these prolonged symptoms may impair daily life activities, thus requiring comprehensive evaluation and systematic follow up of COVID survivors with unresolved or new progressive symptoms [4].

Studies have also reported impairment in lung function, and reduced exercise capacity, which ultimately may contribute to the observed diminished quality of life [5,6]. In relation to changes in pulmonary function, a recent metanalysis found that roughly a third of patients presented abnormalities following initial infection, mainly a restrictive spirometry pattern, and a reduced diffusing capacity for carbon monoxide (DL_{CO}) [7]. Despite the uncertainty about the follow up of COVID-19 survivors, there is a growing body of evidence supporting specific interventions including pulmonary rehabilitation, which may lead to a reduced hospital stay and improved overall respiratory function [8]. With this in mind, our study aimed to assess the attitudes toward pulmonary rehabilitation following COVID-19 among Ecuadorian physicians.

Methods

Study design

We conducted a cross-sectional study involving 282 Ecuadorian physicians. To be recruited, participants were required to have an active medical practice including COVID-19 patients, regardless of specialization. Physicians filled a non-validated 5-question survey of attitudes and perceptions toward pulmonary rehabilitation in post-COVID-19 patients. Demographic and general characteristics were reported.

Questionnaire

The survey was comprised of two parts: i) questions regarding general characteristics, and ii) questions aimed to assess attitudes and perceptions. With respect to the latter, questions Q_1, $Q_{4\text{-}5}$ measured agreement on certain aspects of pulmonary rehabilitation through a Likert scale whose options were: "strongly disagree", "disagree", "neutral", "agree" and "strongly agree". Meanwhile, to assess perceived relevance, questions $Q_{2\text{-}3}$ employed a Likert scale as follows: "not relevant", "slightly relevant", "neutral", "moderately relevant" and "extremely relevant". For questions $Q_{1\text{-}5}$ participants could only choose one option as an answer.

Ethical statement

This study was approved by the ethics committee Comité de ética e Investigación en Seres Humanos (IRB #HCK-CEISH-18-0060) in accordance with the principles established by the Declaration of Helsinki. All participants were informed of the study aims and gave informed consent prior to filling the survey.

Statistical analyses

Descriptive statistics were applied for general characteristics. Prior to be analyzed, the Likert scale categories were compiled in 3 groups. For questions Q_1, $Q_{4\text{-}5}$ answers were assembled as "agree" (agree and strongly agree), "neutral" or "disagree" (strongly disagree and disagree). Furthermore, for questions $Q_{2\text{-}3}$, answers were categorized as: "relevant" (moderately and extremely important), "neutral" or "irrelevant" (slightly important, not important). Chi square goodness of fit was applied to determine if the observed frequencies of the former categories differed with the expected ones.

Results

Out of the 282 participants, 48.2% (n=136) were male while 46.5% (n=131) were female. The majority of physicians (59.2%, n=167) were not specialized; mean years of experience was 12.6 (SD=11.3). More details about general characteristics are summarized in Table 1.

Attitudes toward pulmonary sequalae and guidelines

More than half of physicians (63.8%, n=180; $\chi^2(2) = 139.224$, p=0.000) considered that diagnosis and treatment of patients with sub-acute and chronic COVID-19 pulmonary sequelae is not clear (Figure 1A). As such, 92.2% (n=260; $\chi^2(2) = 463.818$, p=0.000) appraised it is relevant to establish standardized guidelines on pulmonary testing after COVID-19 pneumonia infection (Figure 1B).

Attitudes toward pulmonary rehabilitation following COVID-19

A large majority (94.3%, n=266; $\chi^2(2) = 497.331$, p=0.000) of physicians agreed that pulmonary rehabilitation must be considered as a relevant strategy in long-term care following an acute infection. In fact, 9 in 10 participants agreed pulmonary rehabilitation following COVID-19 pneumonia will improve the likelihood of survival and return to baseline health (92.6%, n=261; $\chi^2(2) = 449.772$, p=0.000) and that standardized pulmonary testing guidelines are required to prescribe pulmonary rehabilitation for these patients (90.8%, n=256; $\chi^2(2) = 420.511$, p=0.000).

Discussion

The COVID-19 pandemic has brought an unprecedented rate of scientific publication that has overwhelmed healthcare providers and the public health community [9]. Understandably, most participants in our study agreed that the diagnosis and treatment of chronic pulmonary sequalae is not clear and that guide-

Table 1. Demographic and general characteristics of surveyed population (n=282).

Characteristics	% (n)
Gender	
Male	48.2 (136)
Female	51.8 (146)
Years of practice (mean, SD)	12.6 (11.3)
Medical specialty	40.8 (115)
Pulmonary medicine and critical care	9.9 (28)
Internal medicine	8.5 (24)
Pediatrics	8.2 (23)
Other	73.4 (207)

lines for assessing pulmonary function following COVID-19 should be established. Regarding the latter, several expert organizations have already proposed recommendations detailing specific indications and procedures to be followed [8]. For example, in the U.K an expert panel recommends that respiratory complications should be considered in post COVID-19 patients, and that low-intensity exercise (≤3 METs) with increased intensity according to symptoms is indicated in patients on oxygen therapy [10]. Guidelines in Turkey stress the need to individualize the approach in patients with mild disease and recommend pulmonary rehabilitation either at a specialized center or at home for patients who experienced moderate disease [11].

Pulmonary rehabilitation includes thorax mobilizing exercise, expectoration therapy, and respiratory training to improve symptoms [8]. A previous study among patients in the post-acute phase of mild to severe COVID-19 found an improvement in the 6 minute walk test (6MWT), functional vital capacity (FVC), and the mental component of the SF-36 health survey among patients who completed a 3-week pulmonary rehabilitation program [12]. No adverse event was observed in the aforementioned study, indicating that it is a feasible, safe, and effective options in COVID-19 patients independent of disease severity [12]. In our study, a large majority of respondents agreed that pulmonary rehabilitation must be considered in post COVID-19 patients and that it will improve the likelihood of survival and return to baseline health. Thus, their attitude towards pulmonary rehabilitation reflects what it is known to date on the subject, which may prove useful when designing and implementing a local protocol for the follow up of COVID-19 patients. On a final note, despite the growing number of recommendations from expert panels we believe that guidelines should be adapted according to the limitations and resources of each region for them to be successful, and this is of utmost importance in developing countries.

Limitations

There are some limitations to our study. For instance, we used a non-validated survey to assess a limited set of circumstances regarding attitudes and perceptions towards pulmonary rehabilitation. In addition, about 60% of the participants had no specialization in any medical field, while 9.9% were specialized in pulmonary medicine or critical care. Accordingly, familiarity with pulmonary rehabilitation may have been limited in the sample. Consequently, the reported results may have undervalued the perceptions of pulmonary rehabilitation. However, to the best of our knowledge, our study is among the first to assess the attitudes to pulmonary rehabilitation among Ecuadorian physicians, providing valuable insights that might be useful to design future interventions.

Conclusions

We found that considerable majority of physicians held positive attitudes to the role of pulmonary rehabilitation and considered it as a relevant strategy in long-term care following COVID-19. However, most of them also conveyed that the diagnosis and treatment of chronic pulmonary sequalae is unclear, and that guidelines for assessing pulmonary function should be established.

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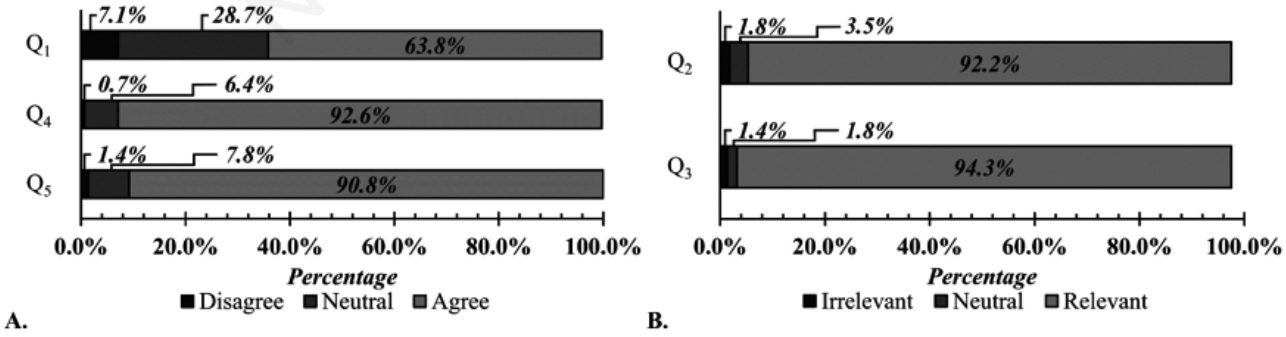

Figure 1. Proportions of physicians expressing their attitudes and perceptions towards pulmonary rehabilitation in post-COVID-19 acute infection. A) Proportion of physicians according to their level of agreement regarding their attitudes and perceptions towards pulmonary rehabilitation in post-COVID-19 acute infection. B) Proportion of physicians according to their level of perception of relevance regarding pulmonary rehabilitation in post-COVID-19 acute infection. Q_1, diagnosis and treatment of patients with sub-acute and chronic COVID-19 pulmonary sequelae is not clear; Q_2, How relevant is it to establish standardized guidelines on pulmonary testing after COVID-19 pneumonia infection?; Q_3, How relevant is pulmonary rehabilitation after COVID-19 pneumonia infection?; Q_4, Pulmonary rehabilitation following COVID-19 pneumonia will improve likelihood of survival and return to baseline health; Q_5, Standardized pulmonary testing guidelines are required to prescribe pulmonary rehabilitation in COVID-19 pneumonia patients.

Abbreviations

DL_{CO}: diffusing capacity for carbon monoxide;
6MWT: 6-minute walk test;
FVC: functional vital capacity;
SF-36: 36-item short form survey.

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