



ISSN: 2230-9926

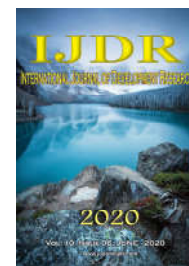
Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 10, Issue, 06, pp. 37300-37305, June, 2020

<https://doi.org/10.37118/ijdr.19149.06.2020>



RESEARCH ARTICLE

OPEN ACCESS

KNOWLEDGE, ATTITUDES AND PRACTICES OF BRAZILIAN PHYSICIAN REGARDING COVID-19 PANDEMIC: A QUICK ONLINE CROSS-SECTIONAL SURVEY

¹Pedro Henrique Alcântara da Silva, ^{*1}Talita Araujo de Souza, ¹Maria Helena Rodrigues Galvão, ^{1,2}Arthur de Almeida Medeiros and ¹Isabelle Ribeiro Barbosa

¹Postgraduate Program in Public Health, Federal University of Rio Grande do Norte, Natal, Rio Grande do Norte, Brazil

²Integrated Health Institute, Federal University of Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul, Brazil

ARTICLE INFO

Article History:

Received 08th March, 2020

Received in revised form

26th April, 2020

Accepted 11th May, 2020

Published online 30th June, 2020

Key Words:

Covid-19; Coronavirus; Physicians; Knowledge; Information.

*Corresponding author:

Talita Araujo de Souza,

ABSTRACT

To identify the knowledge, attitudes and practices of physician regarding COVID-19 pandemic. A cross-sectional study, using a public opinion survey, carried out with physician of different specialties in the state of Rio Grande do Norte. The sample consisted of 220 professionals, the data collection was made using electronic forms created on Google forms[®], distributed through social media (Whatsapp, Facebook and Instagram). Bivariate analysis was performed using the T-Student, Chi-square and ANOVA tests. 45.9% of respondents had up to 5 years of graduation; professionals reported feeling afraid for their own health and for the health of their families; 60.9% reported being in an institution that has a task force to fight infectious diseases; 44.1% say they have the ability to perform orotracheal intubation; 67.3% reported not being able to decide which patient should or should not receive advanced treatment; the average score of knowledge, attitudes and practices among physicians was 7.67 ± 1.38 points, the averages were similar between groups when assessing the gender, age and time since graduation of the respondent physicians, with averages greater than 7.00. It was possible to identify a good level of knowledge among physicians. These results point to the need to monitor and update information about the disease, mainly to provide adequate information for these professionals.

Copyright © 2020, Pedro Henrique Alcântara da Silva et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Pedro Henrique Alcântara da Silva, Talita Araujo de Souza, Maria Helena Rodrigues Galvão, Arthur de Almeida Medeiros and Isabelle Ribeiro Barbosa. "Knowledge, attitudes and practices of Brazilian physician regarding covid-19 pandemic: a quick online cross-sectional survey", *International Journal of Development Research*, 10, (06), 37300-37305.

INTRODUCTION

As of December 2019, all governmental public health entities in the world put themselves on alert in the face of information in regard to the registration of cases of pneumonia of unknown origin occurring in China. In January 2020, after the isolation of the etiologic agent, it was identified that these were infections resulting from a new coronavirus, which was later called Severe Acute Respiratory Syndrome 2 (SARS-CoV-2) (Guo et al. 2020; Chan et al. 2020). The disease caused by this new virus was called, by the World Health Organization (WHO), Coronavirus Disease 2019 (COVID-19), which identifies the etiologic agent and the year of appearance (Guo et al. 2020). The spread of this disease around the world took on geometric proportions, which led the WHO to declare a Public Health Emergency Situation of International Concern (World Health Organization, 2020) on January 30th, and a

pandemic situation (World Health Organization, 2020) on March 11th, when more than 118 thousand cases of the disease were registered in 113 countries with more than 4 thousand deaths. In Brazil, COVID-19 was registered for the first time on February 26th in the city of São Paulo in an elderly person with a history of having travelled to Italy (Cimerman, Chebabo, Cunha, Rodríguez-Morales, 2020). Since then, the epidemic in the country has grown exponentially, with 121 cases of the disease on March 15th with an average daily growth rate of 27.6% (Lima, Medeiros, Barbosa, 2020), a month later, on April 15th, the country had 25.262 cases (Ministério da Saúde, 2020), and the Ministry of Health records on COVID-19 indicate that on May 5th, the country had 114.715 confirmed cases, 7.921 deaths and the lethality rate was 6.9% (Ministério da Saúde, 2020). It is known that early and correct diagnosis is fundamental for the success in the treatment of any disease, and in the case of COVID-19, in which there is no specific treatment, that isolation measures

are configured as the best therapeutic strategies, and which treats a disease with a high rate of transmissibility, it is essential that health professionals who are on the frontline of treatment have sufficient knowledge about the disease for proper therapeutic management. A recent study (Bhagavathula *et al.*, 2020) that sought to investigate the knowledge and perception of health professionals regarding COVID-19 observed that among the interviewees the level of knowledge was low and there was a divergence regarding the perceptions about the disease. In this sense, the present research aimed to identify the knowledge, practices and attitudes of Brazilian physicians regarding COVID-19.

MATERIALS AND METHODS

This is a cross-sectional study, using a public opinion survey. According to Resolution No. 510/2016 of the Ministry of Health, public opinion research is characterized by assessing preferences and meanings that are attributed to different topics, without identifying the subjects surveyed. Due to these characteristics, the resolution exempts this type of research from evaluation by the Research Ethics Committee (REC). All stages of the present study are in accordance with that resolution. The study population consisted of physicians working in the health services in the state of Rio Grande do Norte, Brazil. The sample size was calculated using the formula $n = [DEFF * Np (1-p)] / [(d^2 / Z^2_{1-\alpha/2} * (N-1) + p * (1-p))]$, through the Open Epi platform, considering the size of the population of physicians being 4400 individuals, 95% confidence interval, an error of 10%, the prevalence of the outcome of 70%, where 70% of physicians know how to recognize COVID-19 symptoms, considering a loss percentage of 30%, and the result of the sample size was 220 professionals. The data collection was carried out through electronic forms using Google forms[®], distributed through social networks such as Whatsapp, Facebook and Instagram. Upon reaching the sample number of professionals, the form was closed. The dependent variables of the study consisted of a questionnaire of knowledge, attitudes and practices of physicians in their performance in relation to COVID-19. The questionnaire was composed of 10 items, 4 items related to knowledge and 6 items related to attitudes and practices. The questionnaire was adapted from studies carried out by Zhong *et al.*(2020) and Khan *et al.*(2020) For each item, the professional, after evaluating the statement, indicated the options *agree* or *disagree*. Each item was judged based on the percentage of correct answers, in addition, the performance of the professionals was assessed by creating a score that reflected the knowledge, attitudes and practices of physicians in relation to COVID-19, where each item answered correctly corresponded to 1 point, with the score on a scale from 0 to 10, as shown in Table 1. The independent variables of the study were gender, age, time since graduation, perception of risk, prescription of Hydroxychloroquine, perceptions about the economic impact of isolation, perception about receiving fake news, and characteristics of the institution in which they operate in the fight against COVID-19. Statistical analyzes were performed using the Stata version 14 software. Descriptive analyzes were performed using absolute and relative frequencies. The Kolmogorov-Smirnov test was performed to verify the normality of the distribution of the dependent variable, which consists of the score of knowledge, attitudes and practices of physicians regarding COVID-19, and the value of $p = 0.191$ was obtained, which indicates the normal distribution of the data. From this, parametric tests

were performed to compare means, with the T-Student test for comparing means between two groups, and the ANOVA test for comparing means between three or more groups. The Chi-square test was performed with the aim of evaluating the association between the responses to the questionnaire and the time since graduation of physicians.

Frame 1. Scores by item of knowledge, attitudes and practices of physicians regarding COVID-19

Variables	Scores	
	Agree	Disagree
Knowledge		
I know the common signs and symptoms of COVID-19	1	0
Having a fever and cough means the patient is infected	0	1
It is possible to take Coronavirus from pets	0	1
Social isolation is the most effective measure to stem the rapid spread of the disease	1	0
I received adequate training to identify and treat patients with suspected COVID-19	1	0
I received adequate training for correct use of Personal Protective Equipment	1	0
Attitudes and practices		
I have the ability to perform orotracheal intubation in patients with severe respiratory symptoms	1	0
I am not able to decide which patient should or should not receive advanced treatment in a situation of limited therapeutic resources	0	1
I believe that patients should continue to seek emergency care for minor complaints, even after guidance from health agencies.	0	1
I would use prophylactic hydroxychloroquine to protect myself against Coronavirus	0	1

RESULTS

When evaluating the characteristics of the respondent physicians, it was observed that the majority were female (59.5%), aged between 25 and 50 years (87.3%), with time since graduation up to 5 years (45, 9%). The most frequently reported practice area was Generalist (25%), followed by professionals trained in Gynecology and Obstetrics (19.5%). Most professionals (95%) reported feeling afraid for their own health and for the health of their families due to their direct contact with symptomatic respiratory patients. Regarding the institutions in which they operate, 60.9% reported working in an institution which does not have a task force to fight infectious diseases, and only 39.1% of professionals reported that all employees of these institutions are properly following infection control policies, rules and guidelines (Table I). Regarding the knowledge of the respondent physicians, it was observed that all physicians reported being knowledgeable about the common signs and symptoms of COVID-19, presenting a 100% accuracy. Most physicians (87.7%) disagree that the symptoms of fever and cough confirm infection by the Coronavirus. Regarding the possibility of take the Coronavirus from pets, most of the respondent physicians disagreed with this premise, with 92.3% of correct answers being observed. Regarding epidemiological prevention measures, 90.5% agree that social isolation is the most effective measure to stem the rapid spread of the disease. Only half of the respondent professionals reported having received adequate training to identify and treat patients with suspected COVID-19 and for the correct usage of Personal Protective Equipment. Regarding the attitudes and practices of the respondent professionals, the highest percentage of correct answers (96.4%) was related to the professionals disagreement

Table I. Characterization, perception of health risks and institutional aspects of physicians working to fight COVID-19, Brazil, 2020.

Variables	n	%
Gender		
Female	131	59.5
Male	89	40.5
Age		
Less than 25 years	4	1.8
Between 25 and 50 years	192	87.3
Older than 50 years	24	10.9
Time since graduation		
Less than 5 years	101	45.9
Between 5 and 10 years	57	25.9
More than 10 years	62	28.2
Current specialty		
Generalist	55	25.0
Gynecologist and Obstetrician	43	19.5
Clinical Physician (without specialization)	26	11.8
Pediatrician	24	10.9
Family physician	17	7.7
Other specialties	55	25.0
I am afraid for my own health and that of my family because I am working directly with symptomatic respiratory patients		
Disagree	11	5.0
Agree	209	95.0
My institution has an infectious disease task force (dealing with outbreaks)		
Disagree	134	60.9
Agree	86	39.1
All employees at the health facility where I work are properly following infection control policies, rules and guidelines		
Disagree	134	60.9
Agree	86	39.1

Table II. Percentage of correct answers regarding the knowledge, attitudes and practices of physicians about COVID-19, Brazil, 2020

Variables	Correct answers	
	n	%
Knowledge		
I know the common signs and symptoms of COVID-19	220	100.0
Having a fever and cough means the patient is infected	193	87.7
It is possible to take Coronavirus from pets	203	92.3
Social isolation is the most effective measure to stem the rapid spread of the disease	199	90.5
I received adequate training to identify and treat patients with suspected COVID-19	110	50.0
I received adequate training for correct usage of Personal Protective Equipment	112	50.9
Attitudes and practices		
I have the ability to perform orotracheal intubation in patients with severe respiratory symptoms	97	44.1
I am not able to decide which patient should or should not receive advanced treatment in a situation of limited therapeutic resources	148	67.3
I believe that patients should continue to seek emergency care for minor complaints, even after guidance from health agencies.	212	96.4
I would use prophylactic hydroxychloroquine to protect myself against Coronavirus	194	88.2

as to the fact that patients should continue to seek emergency care for minor complaints after guidance from health agencies. Less than half of the respondents (44.1%) reported having the ability to perform orotracheal intubation in patients with severe respiratory symptoms, obtaining the lowest percentage of correct answers among the aspects evaluated. Faced with a limitation of therapeutic resources, 67.3% of physicians reported not being able to decide which patient should or should not receive advanced treatment. In addition, it was observed that 88.2% of respondents would not use prophylactic hydroxychloroquine to protect themselves against Coronavirus (Table II). The average score of knowledge, attitudes and practices among physicians was 7.67 ± 1.38 points, and it was observed that the averages were similar between groups when assessing the gender, age and time since graduation of the respondent physicians, with averages greater than 7.00 in all groups. Regarding the specialty in which they operate, although statistically significant differences were observed between the groups, it was observed that physicians working in the area of family medicine have a slightly higher average than the other groups (mean = 8.17, SD = 1.45). Physicians who reported that they would prescribe the Hydroxychloroquine + Azithromycin + Zinc regimen for

critically ill patients, had higher averages in the scores of knowledge, attitudes and practices ($p = 0.030$). It was observed that physicians working in institutions that have a task force for infectious diseases, had higher averages for the scores of knowledge, attitudes and practices about COVID-19 ($p = 0.001$). In addition, physicians working in institutions where all employees properly comply with infection control policies, rules and guidelines, also had a higher average than the assessed score ($p = 0.015$) (Table III). When assessing the time since graduation of physicians and their perception of the factors associated with the COVID-19 pandemic, there were statistically significant differences between the groups. When assessing professionals who would not use prophylactic hydroxychloroquine to protect themselves against the Coronavirus, most of these were professionals with up to 5 years since graduation (49.9%; $p = 0.033$). Statistically significant differences were also found in the perception that social isolation is the most effective measure to stem the rapid expansion of the disease, where most professionals who disagreed with this premise had worked more than 10 years since graduation (57.1%; $p = 0.007$). With regard to the premise that the economic situation in Brazil justifies finishing the measure of social distancing, most (52.0%; $p < 0.001$) of

the professionals who disagree with this premise had graduated less than 5 years ago (Table IV).

McKenney, Elkbuli, 2020; Walton, Murray, Christian, 2020; Tsamakis *et al.*, 2020).

Table III. Comparison of means of the knowledge, attitudes and practices (KAP) score of physicians working in health services, Brazil, 2020

Variables	KAP score	P value
	Mean ± SD	
Gender		
Female	7.53 ± 1.36	0.057 [†]
Male	7.89 ± 1.39	
Age		
Less than 25 years	7.50 ± 0.58	0.854 ^{††}
Between 25 and 50 years	7.69 ± 1.38	
Older than 50 years	7.54 ± 1.53	
Time since graduation		
Less than 5 years	7.81 ± 1.26	0.265 ^{††}
Between 5 and 10 years	7.44 ± 1.39	
More than 10 years	7.66 ± 1.55	
Current speciality		
Generalist	7.65 ± 1.32	0.410 ^{††}
Gynecologist and Obstetrician	7.39 ± 1.98	
Clinical physician (without specialization)	7.88 ± 1.29	
Pediatrician	7.50 ± 1.74	
Family physician	8.17 ± 1.45	
Other specialties	7.73 ± 1.46	
I am afraid for my own health and that of my family because I am working directly with symptomatic respiratory patients		
Disagree	7.36 ± 1.80	0.448 [†]
Agree	7.69 ± 1.36	
My institution has an infectious disease task force (dealing with outbreaks)		
Disagree	7.42 ± 1.41	0.001 ^{†*}
Agree	8.06 ± 1.26	
All employees at the health facility where I work are properly following infection control policies, rules and guidelines		
Disagree	7.49 ± 1.28	0.015 ^{†*}
Agree	7.95 ± 1.49	
I prescribe the Hydroxychloroquine + Azithromycin + Zinc regimen for critically ill patients		
Disagree	7.57 ± 1.39	0.030 ^{†*}
Agree	8.06 ± 1.29	
I have already received news about treatments for Coronavirus that I found to be false or not scientifically valid		
Disagree	7.00 ± 1.67	0.228 [†]
Agree	7.69 ± 1.37	
The economic situation in Brazil justifies finalizing the measure of social distancing		
Disagree	7.69 ± 1.30	0.760 [†]
Agree	7.61 ± 1.63	

[†]T-Student test; ^{††}ANOVA test for independent samples; *statistically significant.

DISCUSSION

The research identified that professionals who work in the frontline with symptomatic patients fear for the condition of their health and that of their families, which demonstrates one of the stressful situations experienced daily by these professionals. At this time of pandemic, health professionals are frequently subjected to stressful situations, which negatively affects their physical and mental health, as observed in a study (Chew *et al.*, 2020) that identified the association of physical symptoms with psychological suffering in this population, and in a recent literature review (Bohlken, McKenney, Elkbuli, 2020) that pointed out that among the studies analyzed, one third of the research participants had experienced mild to moderate stress. In addition to working as health promoters, many professionals were deprived of family life, and in some situations, they were stigmatized by society because of the possibility of being in daily contact with the Coronavirus. Associated with this situation, there are other stressors, such as: the increase in the demand for work; the experience of caring for teammates with COVID-19 and in many cases having to deal with the loss of these colleagues; the lack of cooperation on the part of some patients in the treatment or non-adherence to the preventive measures, and the moral injury that is related to the fact of “betraying what is right”, either by themselves or by the authorities (Santarone,

The current scenario, in which there is an intense exposure of health professionals to stressors, especially physicians, reinforces the need to strengthen the care actions for the mental health of health professionals (Chew *et al.*, 2020; Santarone, McKenney, Elkbuli, 2020; Walton, Murray, Christian, 2020; Tsamakis *et al.*, 2020; Spoorthy *et al.*, 2020). Although the participants in this research have a good level of knowledge, practice and attitude regarding COVID-19, there is a fragility of health institutions at this moment, evidenced by the fact that most do not have institutional units for the planning of local control actions to fight the pandemic. This aspect was similar to that found in the study by Khan *et al.* (2020), carried out in Pakistan. These researchers pointed out that the highest scores regarding the level of knowledge occurred among professionals who develop their functions in establishments that already have these units in place, suggesting, therefore, that the institutional units to fight the pandemic, in addition to being spaces for decision making, are configured especially as a space for multiplication and dissemination of the correct information about the pandemic. A recent publication from the Cochrane Database of Systematic Reviews sought to identify barriers and facilitators to health professionals adherence to the guidelines for the prevention and control of infections for respiratory infectious diseases identified 26 situations related to adherence to the guidelines.

Table IV. Time since graduation and perception of physicians regarding the factors associated with the pandemic of COVID-19, Brazil, 2020

Variables	Time since Graduation						P value
	Less than 5 years		Between 5 and 10 years		More than 10 years		
	n	%	n	%	n	%	
I know the common signs and symptoms of COVID-19							
Disagree	0	-	0	-	0	-	NC
Agree	101	100	57	100	62	100	
Having a fever and cough means the patient is infected							
Disagree	88	45.6	52	26.9	53	27.5	0.615
Agree	13	48.1	5	18.5	9	33.3	
It is possible to take Coronavirus from pets							
Disagree	96	47.3	53	26.1	54	26.6	0.177
Agree	5	29.4	4	23.5	8	47.1	
I received adequate training for correct usage of Personal Protective Equipment							
Disagree	47	42.0	28	25.0	37	33.0	0.252
Agree	54	50.0	29	26.9	25	23.1	
I received adequate training to identify and treat patients with suspected COVID-19							
Disagree	50	45.5	25	22.7	35	38.1	0.386
Agree	51	46.4	32	29.1	27	24.5	
I have the ability to perform orotracheal intubation in patients with severe respiratory symptoms							
Disagree	44	45.4	23	23.7	30	30.9	0.671
Agree	57	46.3	34	27.6	32	26.0	
I am not able to decide which patient should or should not receive advanced treatment in a situation of limited therapeutic resources							
Disagree	72	48.6	33	22.3	43	29.1	0.208
Agree	29	40.3	24	33.3	19	26.4	
I prescribe the Hydroxychloroquine + Azithromycin + Zinc regimen for critically ill patients							
Disagree	26	56.5	9	19.6	11	23.9	0.258
Agree	75	43.1	48	27.6	51	29.3	
I would use prophylactic hydroxychloroquine to protect myself against Coronavirus							
Disagree	95	49.9	46	23.7	53	27	0.033*
Agree	6	23.1	11	42.3	9	34.6	
I have already received news about treatments for Coronavirus that I found to be false or not scientifically valid.							
Disagree	1	16.7	3	50.0	2	33.3	0.274
Agree	100	46.7	54	25.2	60	28.0	
I am afraid for my own health and that of my family because I am working directly with symptomatic respiratory patients							
Disagree	4	36.4	3	27.3	4	36.4	0.774
Agree	97	46.4	54	25.8	58	27.8	
Social isolation is the most effective measure to stem the rapid spread of the disease							
Agree	96	48.2	53	26.6	50	25.1	0.007*
Disagree	5	23.8	4	19.0	12	57.1	
The economic situation in Brazil justifies finalizing the measure of social distance							
Disagree	89	52.0	45	26.3	37	21.6	<0.001*
Agree	12	24.5	12	24.5	25	51.0	
I believe that patients should continue to seek emergency care for minor complaints, even after guidance from health agencies.							
Disagree	100	47.2	54	25.5	58	27.4	0.146
Agree	1	12.5	3	37.5	4	50.0	
My institution has an infectious disease task force (dealing with outbreaks)							
Disagree	61	45.5	34	25.4	39	29.1	0.926
Agree	40	46.5	23	26.7	23	26.7	
All employees at the health facility where I work are properly following infection control policies, rules and guidelines							
Disagree	67	50.0	37	27.6	30	22.4	0.057
Agree	34	39.5	20	23.3	32	37.2	

NC: Not calculated; *statistically significant.

These situations were classified into: (a) organizational factors - safety climate, communication of guidelines, availability of training programmes; (b) environmental factors - physical environment, availability of personal protective equipment; and (c) individual factors - individual knowledge, attitudes and beliefs, and discomfort with personal protective equipment (Houghton *et al.*, 2020). Such situations can explain the fact why the majority of the professionals of the teams do not follow the established guidelines for prevention and control of the infection. The development of clear and objective guidelines, the conduction of training on the specific infection and on the use of personal protective equipment, and the mandatory conduct of training provide high evidence for the adherence of professionals to the established guidelines (Houghton *et al.*, 2020), and consequently the level of individual knowledge is raised, which supports the findings of the present research in which the highest knowledge scores regarding COVID-19 occurred among professionals who believe that their team follows the established guidelines.

Another situation that in this research possibly contributed to the high level of knowledge of physicians is related to the shorter time since graduation. Medical training for many years was based on the Flexnerian, biomedical, curative and hospitalocentric model (Maués *et al.*, 2018), however, from 2001 with the publication of the National Curricular Guidelines (NCG) (Ministério da Educação, 2001) for medical courses, the process of reorienting medical training began in Brazil. In 2014, the publication of the new NCG (Ministério da Educação, 2014) reaffirms the commitment of medical training based on social determination and the health-disease process, and mainly, through curricular integration with the adoption of active teaching methodologies that place the student as the main actor in their learning process, and that contribute to the formation of a critical, reflective, proactive, creative and prepared professional able to act at different levels of complexity based on people's health needs. Despite not having been the object of this study, it is believed that the transformation of the training process of these new

professionals, in which they are encouraged to learn to learn constantly, may have contributed to the high level of knowledge among the most recently graduated.

Conclusion

Most of the physicians participating in this research have a good level of knowledge, attitude and practice in relation to COVID-19. The analysis taking into account the time since graduation showed that the most recently trained professionals recognize social isolation as the best strategy for controlling the spread of the disease, that the economic situation of the country would not justify the end of the social distancing measures, and that they would not use prophylactic hydroxychloroquine. These results alert us to the importance of monitoring information and daily updates about the disease, as these health professionals need to incorporate into their daily routine the acquisition of relevant and quality information on current health topics. The data collected in this study may be subject to selection bias, despite being within the sample parameters, and may not characterize the totality of physicians in the city of Natal. However, the data presented here are useful to represent the situation of these professionals regarding knowledge, attitudes and practices and provide information to identify the weaknesses and strengths in this pandemic moment, with a view to guiding qualified actions directed at these professionals.

Acknowledgements: This work was supported by Coordination of Superior Level Staff Improvement (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES – Brazil) with doctoral scholarship for Maria Helena Rodrigues Galvão and postdoctoral scholarship for Arthur de Almeida Medeiros, and by Federal University of Mato Grosso do Sul (UFMS/MEC). We thank all physicians for their contribution towards the survey.

REFERENCES

- Bhagavathula AS, Aldhalei WA, Rahmani J, Mahabadi MA, Bandari DK. Novel Coronavirus (COVID-19) Knowledge and Perceptions: A Survey of Healthcare Workers. *JMIR Preprints* 2020 doi: 10.1101/2020.03.09.20033381
- Bohlken J, Schömig F, Lemke MR, Pumberger M, Riedel-Heller ST. COVID-19-Pandemie: Belastungen des medizinischen Personals. *Psychiat Prax* 2020; 47(04): 190-197. doi: 10.1055/a-1159-5551
- Brasil. Ministério da Saúde. Painel de casos de doença pelo coronavírus 2019 (COVID-19) no Brasil pelo Ministério da Saúde [Internet]. 2020 [Accessed on 2020 May 05]. Available at: <https://covid.saude.gov.br/>
- Chan JFW, Yuan S, Kok KH, To KKW, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*. 2020; 395: 514-23. doi: 10.1016/S0140-6736(20)30154-9
- Chew NWS, Lee GKH, Tan BYQ, Jing M, Goh Y, Ngiam NJH, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun* 2020. doi: 10.1016/j.bbi.2020.04.049
- Cimerman S, Chebabo A, Cunha CA, Rodríguez-Morales AJ. Deep impact of COVID-19 in the healthcare of Latin America: the case of Brazil. *Braz J Infect Dis* 2020 doi: 10.1016/j.bjid.2020.04.005
- Guo YR, Cao QD, Hong ZS, Tan YY, Chen SD, Jin HJ, et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak – an update on the status. *Military Medical Research*. 2020; 7:11. doi: 10.1186/s40779-020-00240-0
- Houghton C, Meskell P, Delaney H, Smalle M, Glenton C, Booth A, et al. Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis. *Cochrane Database Syst. Rev* 2020; 4:CD013582. doi: 10.1002/14651858.CD013582.
- Khan S, Khan M, Maqsood K, Hussain T, Noor-ul-Huda, Zeeshan M. Is Pakistan prepared for the COVID-19 epidemic? A questionnaire-based survey. *J Med Virol* 2020;1–9. doi: 10.1002/jmv.25814
- Lima KC, Medeiros AA, Barbosa IR. Análise da tendência de casos e óbitos por Coronavírus Disease-2019 (COVID-19) nos principais países afetados e no Brasil: uma análise dos primeiros 50 dias da pandemia. *J. Health BiolSci*. 2020;8(1):1-5. doi: 10.12662/2317-3219jhbs.v8i1.3233.p1-6.2020
- Maués CR, Barreto BAP, Portella MB, Matos HJ, Santos JCC. Formação e Atuação Profissional de Médicos Egressos de uma Instituição Privada do Pará: Perfil e Conformidade com as Diretrizes Curriculares Nacionais. *Rev braseduc med* 2018; 42(3):129-145. doi: 10.1590/1981-52712015v42n3rb20170075.r1
- Ministério da Educação. Conselho Nacional de Educação. Câmara de Educação Superior. Resolução n.4, CNE/CES de 07/11/2001. Diretrizes curriculares nacionais do curso de graduação em medicina. *Diário Oficial da União*. Brasília 09 Nov 2001, Section 1, p.38.
- Ministério da Educação. Conselho Nacional de Educação. Câmara de Educação Superior. Resolução n.3, CNE/CES de 20/06/2014. Diretrizes curriculares nacionais do curso de graduação em medicina. *Diário Oficial da União*. Brasília 23 June 2014, Section 1, p.8-11.
- Santarone K, McKenney M, Elkbuli A. Preserving mental health and resilience in frontline healthcare workers during COVID-19. *Am J Emerg Med* 2020. doi: 10.1016/j.ajem.2020.04.030.
- Spoorthy MS. Mental health problems faced by healthcare workers due to the COVID-19 pandemic – A review. *Asian J Psychiatr* 2020; 51:102119. doi: 10.1016/j.ajp.2020.102119
- Tsamakis K, Rizos E, Manolis AJ, Chaidou S, Kypouroupoloulos S, Spartalis E, et al. COVID-19 pandemic and its impact on mental health of healthcare professionals. *Exp Ther Med* 2020; 19: 3451-3453. doi: 10.3892/etm.2020.8646
- Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care* 2020; 0(0):1–7. doi: 10.1177/2048872620922795
- World Health Organization. Coronavirus disease 2019 (COVID-19). Situation Report – 10 [Internet]. 2020 [Accessed on 2020 March 18]. Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>
- World Health Organization. Coronavirus disease 2019 (COVID-19). Situation Report – 51 [Internet]. 2020 [Accessed on 2020 March 18]. Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>
- Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci* 2020; 16(10): 1745-1752. doi: 10.7150/ijbs.45221