


Economic and Professional Impact of The Covid-19 Pandemic and Prevalence of Depression and Anxiety on Shoulder and Elbow Surgeons in Brazil

Impacto econômico e profissional da pandemia de COVID-19 e prevalência de depressão e ansiedade nos cirurgiões de ombro e cotovelo do Brasil

Marcos André Mendes da Silva^{1,2}  Jéssica Puchalski Trettim³

¹ Supervisor of the Medical Residency Service in Orthopedics-Traumatology, Hospital Universitário Miguel Riet Correa Júnior da Fundação Universidade Federal do Rio Grande, Rio Grande, RS, Brasil

² Graduate student in the Professional Master's Degree in Health in the Vital Cycle at the Health Sciences Center of the Universidade Católica de Pelotas, Pelotas, RS, Brasil

³ Assistant professor of the Professional Master's Degree on Health in the Vital Cycle at the Health Sciences Center of the Universidade Católica de Pelotas, Pelotas, RS, Brasil

Address for correspondence Rua Gonçalves Chaves, 373, sala 411C, 96010-000, Pelotas-RS, Brasil
(e-mail: marcos@cirurgiadeombrors.com.br; marcos.mendes@sou.ucpel.edu.br).

Rev Bras Ortop 2023;58(5):e727–e733.

Abstract

Objective To assess the economic and professional impact (including teaching and training) during the covid-19 pandemic, as well as the prevalence of major depressive episode and generalized anxiety disorder, on shoulder and elbow surgeons in Brazil.

Methods Cross-sectional study carried out with surgeons who are members of the Brazilian Society of Shoulder and Elbow Surgery (SBCOC). Sampling was non-probabilistic for convenience. The information was obtained through a self-administered online questionnaire, through the SBCOC members' registered e-mails, using structured questions and the Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder-7 (GAD-7) instruments to screening for major depressive episode and generalized anxiety disorder, respectively.

Results 119 participants were evaluated. The commitment in teaching was affirmed by 87.7% of the surgeons, there was a reduction above 50% of the surgical volume for about 4 out of 10 surgeons and reduction of the income above 50% for about 17.3%,

Keywords

- ▶ Covid-19
- ▶ orthopedics
- ▶ income
- ▶ work
- ▶ mental health

Work developed at the Health Sciences Center of the Catholic University of Pelotas, Pelotas, RS, Brazil.

received
May 1, 2022
accepted
October 27, 2022

DOI <https://doi.org/10.1055/s-0043-1770972>.
ISSN 0102-3616.

© 2023. Sociedade Brasileira de Ortopedia e Traumatologia. All rights reserved.
This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)
Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

due to the fact that 55.5% of professionals did not have professional stability. The major depressive episode had a prevalence of 26.7% in the sample, and generalized anxiety disorder was presented by 20% of the surgeons.

Conclusion The combination of the negative impact on professional and financial factors may have affected shoulder and elbow surgeons in Brazil, generating high rates of anxiety and depression.

Resumo

Objetivo Avaliar o impacto econômico e profissional (incluindo ensino e treinamento) durante a pandemia de covid-19, bem como a prevalência de episódio depressivo maior e de transtorno de ansiedade generalizada, nos cirurgiões de ombro e cotovelo do Brasil.

Métodos Estudo transversal realizado com os cirurgiões membros titulares da Sociedade Brasileira de Cirurgia de Ombro e Cotovelo (SBCOC). A amostragem foi não probabilística por conveniência. As informações foram obtidas por meio de questionário online autoaplicado, através de divulgação pelo e-mail cadastrado dos membros da SBCOC, utilizando questões estruturadas e os instrumentos Patient Health Questionnaire (PHQ-9) e Generalized Anxiety Disorder-7 (GAD-7) para rastreamento de episódio depressivo maior e transtorno de ansiedade generalizada, respectivamente.

Resultados Foram avaliados 119 participantes. O comprometimento no ensino foi afirmado por 87,7% dos cirurgiões, houve redução acima de 50% do volume cirúrgico para cerca de 4 em cada 10 cirurgiões e redução da renda acima de 50% para cerca de 17,3%, sendo que 55,5% dos profissionais não apresentavam estabilidade profissional. O episódio depressivo maior apresentou uma prevalência de 26,7% na amostra, e o transtorno de ansiedade generalizada foi apresentado por 20% dos cirurgiões.

Conclusão A combinação do impacto negativo sobre fatores profissionais e financeiros pode ter afetado os cirurgiões de ombro e cotovelo do Brasil, gerando elevados índices de ansiedade e depressão.

Palavras-chave

- ▶ Covid-19
- ▶ ortopedia
- ▶ renda
- ▶ trabalho
- ▶ saúde mental

Introduction

Cases of viral pneumonia caused by a previously unknown pathogen were reported in Wuhan, People's Republic of China, in December 2019. A new coronavirus has been identified, referred to as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease caused by SARS-CoV-2, called covid-19 (coronavirus disease 2019), has spread across the world. The World Health Organization (WHO) declared a pandemic situation on March 11, 2020, creating a global challenge, requiring the full attention of all governments, institutions, international organizations, health professionals and civil society.^{1,2}

The social isolation and lockdown advocated by the world health authorities were adopted, changing the dynamics of care in emergency units.³ The institution of the Red Zones, in addition to the fear of contracting the disease, limited activities and people's movement, reducing the incidence of orthopedic trauma. These epidemiological changes economically affected the institutions, professionals and teaching of the specialty.⁴⁻⁸ Even though they are not part of the front line of the pandemic, orthopedic surgeons were seriously affected by the reduction in the workday, functional adaptation, virtual care and a reduction in the number of

consultations and surgeries.⁹⁻¹¹ Unprecedented, this class witnessed the reduction of their earnings.^{12,13} The teaching activities necessary to have excellent orthopedists were also affected, suffering emergency adaptations to the virtual plan, a reduction in the volume of surgeries and consultations, in addition to difficulties in carrying out research. An increase in the levels of depression and anxiety of this generation of professionals was observed.^{14,15}

Health professionals are not immune to mental disorders arising from the psychological impact caused by a number of factors that affect their health and the care system.¹⁶ Despite high prevalence of mental illness in the general population during the pandemic, there are reports of even higher rates in healthcare teams.¹⁷ Similar to the severe acute respiratory syndrome pandemic in 2003, the psychology of medical teams was affected and exacerbated the prevalence of such illnesses.¹⁸⁻²¹ Following this trend, surgeons have high rates of depression and anxiety all over the world.²² Such an impact was reported in the United Kingdom, comparing orthopedic surgeons with the general population.²³ These indices have followed a worldwide trend.²

In Brazil, professional and income damage during the covid-19 pandemic, as well as the occurrence of mental disorders, were not reported in orthopedists, nor within a

subspecialty. The aim of the present study was to describe the economic and professional impact (including teaching and training) during the covid-19 pandemic and to evaluate the prevalence of major depressive episode (MDE) and generalized anxiety disorder (GAD) in shoulder and elbow surgeons from Brazil. Such a description will give visibility to the subject, without previous description in the national literature, allowing the dimensioning of these variables in the class of shoulder and elbow surgeons in our country.

Materials and methods

This is a cross-sectional study where the sampling process was non-probabilistic for convenience. Specialist shoulder and elbow surgeons who are members of the Brazilian Society of Shoulder and Elbow Surgery (SBCOC) were evaluated. This society originated from the Shoulder and Elbow Committee of the Brazilian Society of Orthopedics and Traumatology in 1988, being responsible for evaluating shoulder and elbow surgeons using strict criteria and awarding the title to its associate members. A posteriori power calculation was performed in OpenEpi (<https://www.openepi.com/Power/PowerCross.htm>) to verify the power of the sample size for cross-sectional studies. Based on the descriptive data on major depressive episodes and generalized anxiety disorder in the evaluated surgeons, it was found that power was greater than 99% for both disorders, based on a normal approximation.

Data was collected between October and November 2021, through an online anonymous self-administered survey, using the Google Forms platform. The questionnaires were sent by SBCOC to the institutional e-mail of all members of the society, after approval by the Research Ethics Committee of the university. Two consecutive approaches were carried out within a 15-day interval via e-mail. The questionnaire was available to participants for a period of 30 days.

In the present study, the following economic and professional variables were evaluated: the length of professional practice as a shoulder and elbow specialist in complete years, the surgical volume (it got much worse, it got worse, it didn't change, it improved and it improved a lot), surgical volume reduction (reduced less than 25%, reduced 26-50%, reduced 51-75% and reduced 76-100%), average monthly income (it got much worse, got worse, did not change, improved and improved a lot), reduction in average monthly income (reduced less of 25%, reduced 26-50%, reduced 51-75% and reduced 76-100%), job stability (employee and non-employee), professional updating activities (more frequent, equal and less frequent) and impairment of teaching activities (no/yes).

The presence of MDE was assessed using the Patient Health Questionnaire (PHQ-9). The instrument brings together nine symptoms presented in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). The frequency of each symptom is scored on a four-point Likert scale from 0 (not at all) to 3 (nearly every day). The final score is obtained by a sum, ranging from 0 to 27 points. In the present study, a Portuguese version modified and validated by Santos

et al. in a Brazilian population-based study for the use of PHQ-9 in MDE screening. The presence of MDE was identified through the cutoff point ≥ 9 , proposed in such validation study, which presented maximum sensitivity and specificity of 77.5% and 86.7%, respectively.²⁴

The occurrence of GAD was estimated by the Generalized Anxiety Disorder-7 (GAD-7), an instrument aimed at screening and monitoring patients with anxiety and was developed by Spitzer and validated by Kroenke, Spitzer, Williams, Monahan and Löwe, consisting of seven items corresponding to anxiety symptoms according to DSM-IV criteria. Items are arranged on a four-point Likert scale from 0 (never) to 3 (almost every day), with scores ranging from 0 to 21. The translation into Portuguese was provided by Pfizer (Copyright © 2005 Pfizer Inc., New York, NY), with registration of evidence of validity in Brazil (MAPI RESEARCH INSTITUTE, 2006). The presence of GAD was identified through the cutoff point ≥ 10 .

Demographic information was also obtained, such as the region of work (North, Northeast, Midwest, Southeast and South), biological sex (male and female), age (complete years) and skin color (white, black, brown, yellow, indigenous).

Univariate analysis was performed describing demographic characteristics, variables related to the economic and professional impact of the covid-19 pandemic and the occurrence of depression and anxiety. For numerical variables, measures of central tendency and dispersion were presented, while for categorical variables, proportions were obtained, along with confidence intervals. Data were exported to the STATA v.17 program (StataCorp, College Station, TX, USA), in which the analyzes were performed.

Results

119 surgeons were evaluated. The regional distribution showed a greater concentration in the Southeast region, with 61 participants (51.2%). Most surgeons were male (94.1%) and declared white skin color (80.7%). Regarding age group, 42.8% were between 40-49 years old and the mean age was 43.9 years old. The average length of time working as a shoulder and elbow specialist was 13 years, and around 43% had less than 10 years of experience (► **Table 1**).

Regarding the professional and economic impact during the covid-19 pandemic, ► **Table 2** shows that 48.2% of surgeons specializing in shoulder and elbow revealed that the surgical volume worsened when compared to the pre-pandemic period, while for 38.2% the volume got a lot worse. About 35.4% of the surgeons indicated a reduction between 51 and 75% in the volume of surgeries and 7.3% reported a reduction of 76 to 100%. With regard to average monthly individual income, 60% and 20% of participants claimed that their income had worsened and greatly worsened, respectively, in relation to the pre-pandemic period. A reduction in average monthly income of more than 50% was perceived by approximately 17% of the surgeons. In addition, 55.5% of the shoulder and elbow surgeons did not have a formal job or public position/employment, and 61.3% stated that their

Table 1 Demographic characteristics and length of professional activity of the study participants. (N = 119)

Variables	N	(%)
<i>Sex</i>		
Male	112	(94,1)
Female	7	(5,9)
<i>Completed age (years)</i>		
Less than 40	41	(34,5)
40 to 49	51	(42,8)
50 or more	27	(22,7)
<i>Skin color or race</i>		
White	96	(80,7)
Brown	20	(16,8)
Indigenous/Yellow	3	(2,5)
<i>Region</i>		
Midwest	9	(7,6)
Northeast	26	(21,8)
North	2	(1,7)
Southeast	61	(51,2)
South	21	(17,7)
<i>Professional experience (years) *</i>		
5 or more	22	(18,6)
6 to 10	29	(24,6)
11 to 15	25	(21,2)
16 to 20	22	(18,6)
21 or more	20	(17,0)

*Working as a shoulder and elbow specialist

participation in events or refresher courses was less frequent in the last year. Of the surgeons who perform academic teaching activities, 87.7% claimed that these were compromised during the pandemic (► **Table 2**).

► **Table 3** shows that the prevalence of MDE in shoulder and elbow surgeons in Brazil during the covid-19 pandemic was 26.7%, while GAD was found in 20% of surgeons. The concomitant presence of both mental disorders was observed in 16.5% of the sample (► **Fig. 1**).

Discussion

Elevated levels of depression and anxiety have been found in British, Italian, French and Latino orthopedic surgeons.^{10,15,25} In the present study, the prevalence of depression and anxiety among shoulder and elbow surgeons in Brazil was higher than that found among British orthopedists,²³ where financial stability is more evident. The level of anxiety similar to that found by Sharma et al.² in Indian orthopedists demonstrates that in countries with similar conditions, anxiety values were similar. Also, levels of depression found in Brazilian surgeons were higher than those found in spinal surgeons in Latin America.²⁶

Table 2 Professional and economic impact on surgeons during the covid-19 pandemic. (N = 119)

Variables	N	%	(IC95%)
<i>Surgical volume</i>			
Much worse	42	38,2	(29,5-47,6)
Worse	53	48,2	(38,9-57,5)
Remained the same	11	10	(5,6-17,2)
Improved	4	3,6	(1,3-9,4)
<i>Surgical volume reduction</i>			
No reduction	15	13,6	(8,3-21,4)
Less than 25%	10	9,1	(4,9-16,1)
26 to 50%	38	34,6	(26,1-43,9)
51 to 75%	39	35,4	(27,0-44,9)
76 to 100%	8	7,3	(3,6-13,9)
<i>Individual monthly income</i>			
Much worse	22	20,0	(13,4-28,6)
Worse	66	60,0	(50,4-68,8)
Remained the same	12	10,9	(6,2-18,3)
Improved	10	9,1	(4,9-16,1)
<i>Monthly income reduction</i>			
No reduction	22	20,0	(13,4-28,6)
Less than 25%	28	25,5	(18,1-34,5)
26 to 50%	41	37,2	(28,6-46,7)
51 to 75%	18	16,4	(10,5-24,5)
76 to 100%	1	0,9	(0,1-6,2)
<i>Formal employment/public employment</i>			
No	66	55,5	(46,4-64,2)
Yes	53	44,5	(35,8-53,6)
<i>Participation in events</i>			
Less frequent	73	61,3	(52,2-69,7)
Same	22	18,5	(12,4-26,5)
Most frequently	24	20,2	(13,8-28,4)
<i>Impact in teaching</i>			
No	10	12,3	(6,7-21,6)
Yes	71	87,7	(78,4-93,2)

Table 3 Prevalence of major depressive episode and generalized anxiety disorder in surgeons during the covid-19 pandemic. Brazil, 2021. (N = 116)

Variables	N	%	(IC95%)
<i>Major depressive episode</i>			
No	85	73,3	(64,4-80,6)
Yes	31	26,7	(19,4-35,6)
<i>Generalized anxiety disorder</i>			
No	92	80,0	(71,6-86,4)
Yes	23	20,0	(13,6-28,4)

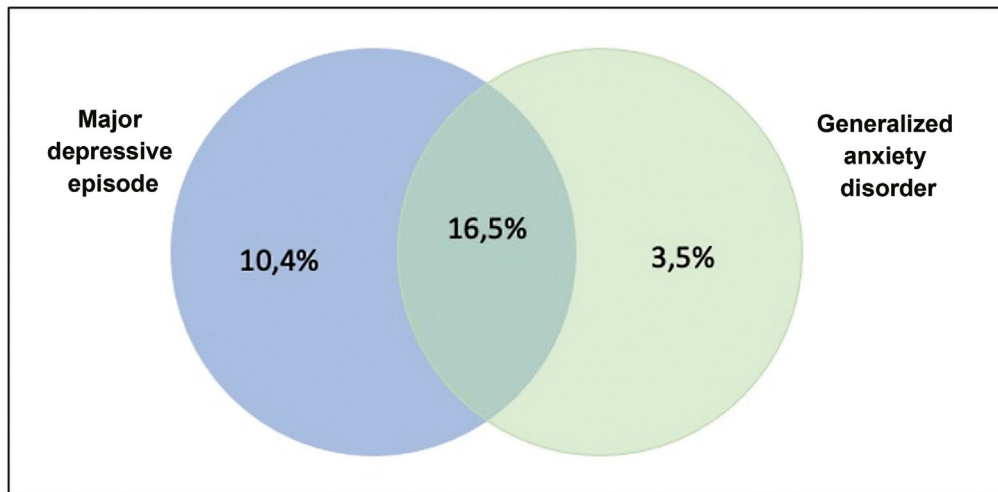


Fig. 1 Venn diagram showing the overlap between major depressive episode and generalized anxiety disorder in surgeons during the covid-19 pandemic. Brazil, 2021. (N = 116).

The financial and professional impact is being discussed all over the world and it was possible to perceive it through the results found. Orthopedic surgeons have suffered a reduction in their daily workload, with cancellation of elective surgeries and outpatient consultations, a reduction in the incidence of acute trauma worldwide due to the reduction in the circulation of people and displacements for non-ordinary clinical and/or administrative activities.^{5,6,10,23} In our study, 9 out of 10 professionals claimed that surgical volume had worsened or greatly worsened within the shoulder and elbow specialty. The same proportion of professionals showed some reduction in the average surgical volume in the last year. Such findings are consistent with the elective characteristics of an orthopedic subspecialty.

The reduction in surgical volume was above 50% for half of the professionals in this research. Kale et al.⁹ demonstrated an even greater decrease in income and/or surgical volume. In the US state of Alabama, Paul et al.²⁷ found a halving of the revenue of 1 out of 2 orthopedists, approximately 3 times more than what the present study found. Especially in this American state, the social conditions differ from the rest of the USA and can justify such a discrepancy. Significant reduction in the surgical volume of an orthopedics-traumatology service in Brazil was documented, also confirming the national reality.²⁵

Numerous other studies have cited decreases in orthopedic surgical volumes around the world,^{3,11} but there are no reports on the reduction in surgical volume or financial impact within the specialty of shoulder and elbow surgery. In a continental study with orthopedists from Latin America, Giordano et al.¹⁰ stated that 91.8% had some financial concern, and 62.7% had their main source of income autonomously. The present study demonstrated that 55.5% of specialist shoulder and elbow surgeons had self-employment as their only source of income, without professional stability and/or public employment, which probably had an impact on this result. However, we did not reach the ideal sample number to demonstrate an association between the

variables professional stability, decrease in income, decrease in surgical volume and prevalence of mental disorders.

The reduction in participation in professional updating events demonstrated that there are still factors impacting the performance of surgeons in these events. With the decrease in the volume of work due to the factors mentioned above, it was to be expected that there would be an increase in participation in virtual professional updating events, since the limitation of face-to-face activities was extended for many months. This research showed that 61.3% attended fewer professional updating activities during the questioned period, possibly motivated by the cancellation of face-to-face events or by mental disorders, which may be related to the unmotivated behavior of this class during the study period. Only 20.2% increased their holdings. The change to online activities was a sudden and necessary reality for such activities to remain,^{6,28} however, it seems that many professionals still have some limiting factor for their participation in this new format, including in the class of resident physicians in training.²⁹

The vast majority of surgeons who work with some educational participation declared that the training of new professionals in the area of orthopedics/traumatology and/or shoulder and elbow surgery was compromised. Upadhyaya et al.¹⁴ found similar values in India, with 94% of residents of this country having their clinical and surgical training affected, and 71.6% having difficulties in finishing their final papers.

The academic restructuring governed by virtual didactic supplementation for an effective training of these professionals was something practiced worldwide. But its limitations led to the need for an additional year to complete the graduate course being considered, something that was never discussed in our country.^{6,30} It is undeniable that the advent of the internet and its educational platforms that emerged and were rapidly improved in view of the situation experienced, were fundamental for the virtual relationship between students and teachers, allowing the maintenance of

teaching safely. But the practical limitations imposed by the absence of hands-on surgical training were inevitable.

The medical class deserves attention due to the high rates of mental disorders it presents. The context in which they were inserted in the pandemic was certainly something favorable for mental illness.²² During the period of the covid-19 pandemic, due to the severity of this illness, attention was directed to physical illness, leaving aside important conditions such as mental health, seriously affected as a result of changes in health systems and routines of care previously described.²³ Therefore, the delay in diagnosing anxiety and depression, for example, in shoulder and elbow surgeons, may be a facilitating circumstance for the decline in the quality of services provided in this area, affecting both surgeons and patients.

Conclusion

Faced with an unprecedented health crisis, a great learning opportunity arises for management qualification and organization. The impact of the covid-19 pandemic on health systems has had unquestionable repercussions on the professional, financial and mental health of orthopedic surgeons around the world. The combination of these factors may have affected shoulder and elbow surgeons in Brazil, generating high rates of anxiety and depression. The mental health impact on health professionals during the pandemic is complex and must be tracked and addressed in a sustained and interdisciplinary way by governments and health systems, designing prevention strategies.

Due to the design adopted in this research and the reduced sample size, future studies with greater causality power are suggested. The virtualization of care and training of new surgeons quickly became a reality, but with no certainty that these practices will be definitively incorporated into post-pandemic life. The persistence in educating without practicing still seems to have an uncertain future, but the hope of personal and professional growth resulting from the necessary adaptations to maintain teaching and professional activities seems to be the only great certainty.

The vast majority of shoulder and elbow surgeons in Brazil claimed some worsening of the surgical volume (86.4%), with 42.7% of them suffering reductions above 50%. The reduction in monthly income affected 80% of the surgeons, with 17% of the sample suffering a reduction of more than 50% of their income. The prevalence of mental disorders (MDE and GAD) was above the average for the class of general orthopedists and other health professionals found in the literature (26.7% and 20%, respectively).

Financial Support

There was no financial support from public, commercial, or non-profit sources.

Conflict of interests

The authors declare no conflict of interest.

References

- Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. *Acta Biomed* 2020;91(01):157–160
- Sharma V, Kumar N, Gupta B, Mahajan A. Impact of COVID-19 pandemic on orthopaedic surgeons in terms of anxiety, sleep outcomes and change in management practices: A cross-sectional study from India. *J Orthop Surg (Hong Kong)* 2021;29(01):23094990211001621
- Nia A, Popp D, Diendorfer C, et al. Impact of lockdown during the COVID-19 pandemic on number of patients and patterns of injuries at a level I trauma center. *Wien Klin Wochenschr* 2021; 133(7-8):336–343
- Murphy T, Akehurst H, Mutimer J. Impact of the 2020 COVID-19 pandemic on the workload of the orthopaedic service in a busy UK district general hospital. *Injury* 2020;51(10):2142–2147
- Maniscalco P, Ciatti C, Gattoni S, et al. The impact of COVID-19 pandemic on the Emergency Room and Orthopedic Departments in Piacenza: a retrospective analysis. *Acta Biomed* 2020;91(14-S): e2020028
- Mo AZ, Mont MA, Grossman EL, et al. The Effect of the COVID-19 Pandemic on Orthopedic Practices in New York. *Orthopedics* 2020;43(04):245
- Best MJ, McFarland EG, Anderson GF, Srikumaran U. The likely economic impact of fewer elective surgical procedures on US hospitals during the COVID-19 pandemic. *Surgery* 2020;168(05): 962–967
- Hashmi P, Fahad S, Naqi Khan H, Zahid M, Sadruddin A, Noordin S. Covid-19 pandemic: Economic burden on patients with musculoskeletal injuries in a tertiary care hospital of LMIC; retrospective cross sectional study. *Ann Med Surg (Lond)* 2020;60:5–8
- Kale NN, Patel AH, Leddy MJ 3rd, Savoie FH 3rd, Sherman WF. The Effect of COVID-19 on Orthopedic Practices and Surgeons in Louisiana. *Orthopedics* 2020;43(06):351–355
- Giordano V, Belangero W, Godoy-Santos AL, Pires RE, Xicara JA, Labronici P. Clinical Decision Rules (CDR) Study Group. The hidden impact of rapid spread of the COVID-19 pandemic in professional, financial, and psychosocial health of Latin American orthopedic trauma surgeons. *Injury* 2021;52(04):673–678
- Earp BE, Zhang D, Benavent KA, Byrne L, Blazar PE. The Early Effect of COVID-19 Restrictions on an Academic Orthopedic Surgery Department. *Orthopedics* 2020;43(04):228–232
- Simon MJK, Regan WD. COVID-19 pandemic effects on orthopaedic surgeons in British Columbia. *J Orthop Surg Res* 2021;16(01): 161
- Randau TM, Jaenisch M, Haffer H, et al. Collateral effect of COVID-19 on orthopedic and trauma surgery. *PLoS One* 2020;15(09): e0238759
- Upadhyaya GK, Jain VK, Iyengar KP, Patralekh MK, Vaish A. Impact of COVID-19 on post-graduate orthopaedic training in Delhi-NCR. *J Clin Orthop Trauma* 2020;11(Suppl 5):S687–S695
- Vallée M, Kutchukian S, Pradère B, et al. Prospective and observational study of COVID-19's impact on mental health and training of young surgeons in France. *Br J Surg* 2020;107(11):e486–e488
- Mattila E, Peltokoski J, Neva MH, Kaunonen M, Helminen M, Parkkila AK. COVID-19: anxiety among hospital staff and associated factors. *Ann Med* 2021;53(01):237–246
- González-Sanguino C, Ausín B, Castellanos MÁ, et al. Mental health consequences during the initial stage of the 2020 Coronavirus pandemic (COVID-19) in Spain. *Brain Behav Immun* 2020; 87:172–176
- Milgrom Y, Tal Y, Finestone AS. Comparison of hospital worker anxiety in COVID-19 treating and non-treating hospitals in the same city during the COVID-19 pandemic. *Isr J Health Policy Res* 2020;9(01):55
- Wong KC, Han XA, Tay KS, Koh SB, Howe TS. The psychological impact on an orthopaedic outpatient setting in the early phase of

- the COVID-19 pandemic: a cross-sectional study. *J Orthop Surg Res* 2020;15(01):322
- 20 Sahu D, Agrawal T, Rathod V, Bagaria V. Impact of COVID 19 lockdown on orthopaedic surgeons in India: A survey. *J Clin Orthop Trauma* 2020;11(Suppl 3):S283-S290
 - 21 Zaçe D, Hoxhaj I, Orfino A, Viteritti AM, Janiri L, Di Pietro ML. Interventions to address mental health issues in healthcare workers during infectious disease outbreaks: A systematic review. *J Psychiatr Res* 2021;136:319-333
 - 22 Tan YQ, Wang Z, Yap QV, et al. Psychological Health of Surgeons in a Time of COVID-19: A Global Survey. *Ann Surg* 2021;•••. Doi: 10.1097/SLA.0000000000004775 [published online ahead of print, 2021 Jan 22]
 - 23 Thakrar A, Raheem A, Chui K, Karam E, Wickramarachchi L, Chin K. Trauma and orthopaedic team members' mental health during the COVID-19 pandemic: results of a UK survey. *Bone Jt Open* 2020;1(06):316-325
 - 24 Santos IS, Tavares BF, Munhoz TN, et al. Sensibilidade e especificidade do Patient Health Questionnaire-9 (PHQ-9) entre adultos da população geral. *Cad Saude Publica* 2013;29(08): 1533-1543
 - 25 Motta Filho GDR, Leal AC, Amaral MVGD, Maia PAV, Duarte MEL, Bähr GL. Impact of the Strategies Adopted to Face the COVID-19 Pandemic in a Brazilian Reference Institute for High Complexity Surgery in Orthopedics and Traumatology. *Rev Bras Ortop* 2021; 56(02):161-167
 - 26 Guiroy A, Gagliardi M, Coombes N, et al. COVID-19 Impact Among Spine Surgeons in Latin America. *Global Spine J* 2021;11(06): 859-865
 - 27 Paul KD, Levitt E, McGwin G, et al. COVID-19 Impact on Orthopedic Surgeons: Elective Procedures, Telehealth, and Income. *South Med J* 2021;114(05):311-316
 - 28 Giordano L, Cipollaro L, Migliorini F, Maffulli N. Impact of Covid-19 on undergraduate and residency training. *Surgeon* 2021;19 (05):e199-e206
 - 29 Barik S, Paul S, Kandwal P. Insight into the changing patterns in clinical and academic activities of the orthopedic residents during COVID-19 pandemic: a cross-sectional survey. *Knee Surg Sports Traumatol Arthrosc* 2020;28(10):3087-3093
 - 30 Megaloikonomos PD, Thaler M, Igoumenou VG, et al. Impact of the COVID-19 pandemic on orthopaedic and trauma surgery training in Europe. *Int Orthop* 2020;44(09):1611-1619