with the average CCI score for COVID-19 patients in 2-month increments. Patient outcomes were obtained across the entire population.

**Results.** A clear surge of infected patients was seen in almost all states in the data set from May 2020 onward except in Colorado and Louisiana where the percentage of COVID-19 positive encounters decreased until July 2020. As summer 2020 progressed, the highest percentage of COVID-19 positive encounters among HCA Healthcare facilities was in Florida and Texas. However, despite the fact that more patients were COVID-19 positive in these states, the CCI score was the lowest (Figure 1). The highest average CCI throughout the 9-month period was 7.66 in Colorado. The highest average CCI score was in Colorado. In the first two months of the pandemic, patients who tested positive for COVID-19 had higher CCI scores on average than those who became COVID-19 positive later in the pandemic.

**Conclusion.** We observed an inverse correlation between CCI score and COVID-19 incidence while seeing that, on average, COVID-19 positive patients had higher CCI score in the first few months of the pandemic when incidence rate was lower. CCI score did not correlate to ICU admission, but a higher CCI score correlated to higher admission rate.

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453. Neutralizing Antibody Responses to SARS-CoV-2 in Professional Soccer Players

Jorge Pagura, MD1; Clewis Arns de Cunha2; Roberto Nishimura, MD3; Sergio Wey, MD, PhD4; André Pedrinelli, MD1; Sergio Cimerman, MD, PhD3; Andreia Picanço, MD1; Sérgio Freire, MD1; André Guerreiro, MD5; Edilson Thiele, MD5; Carlos Starling, MD, MSc5; Bráulio R.G.M. Couto, PhD5; 1Comissão Científica da Confederação Brasileira de Futebol - CBF, São Paulo, Minas Gerais, Brazil; 2Universidade Federal do Paraná; 3Brazilian Society of Infectious Diseases, Sao Paulo, Brazil; 4Sociedade Mineira de Infectologia - SM1, Belo Horizonte, Minas Gerais, Brazil; 5Centro Universitário de Belo Horizonte - UniBH, Belo Horizonte, Minas Gerais, Brazil

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**Background.** The Brazilian Football Confederation (CBF) protocol to control the spread of COVID-19 among professional soccer players is based on four cornerstone measures: (1) Tracing all symptomatic and asymptomatic COVID-19 cases by clinical monitoring and nasal swab SARS-CoV-2 RT-PCR testing up to 3 days before the
soccer games; (2) Respiratory isolation of all SARS-CoV-2 positive players for at least 10 days, regardless of symptoms; (3) All player with clinical suspicion of COVID-19 were immediately quarantined; (4) If a player became SARS-CoV-2 positive after the game, the other players were allowed to play the next game, if they remained asymptomatic and SARS-CoV-2 RT-PCR negative. Understanding how antibody responses to SARS-CoV-2 evolve can provide insights into therapeutic and testing approaches for COVID-19. In the present study we profile the antibody responses of players up to nine months from a SARS-CoV-2 positive RT-PCR test.

Methods. Serum samples were obtained from 955 soccer players, and analyzed at the same laboratory in São Paulo city, in the Hospital Israelita Albert Einstein. It was used the cPas Technology, the sVNT kit for detecting and measuring circulating neutralizing antibodies against the SARS-CoV-2 virus.

Results. Neutralizing antibody was positive for 416 samples (416/955=44%; C.I. 95%=[40%;47%]). From the 955 soccer players, 454 had RT-PCR+ previously, up to nine months until the neutralizing antibody tests. From this 454 players, 172 (38%) had neutralizing antibody below 20% (C.I. 95%=[34%;42%]), 30 (7%) between 20% and 30% (C.I. 95%=[5%;9%]), and e 252 (56%) above 30% (C.I. 95%=[51%;60%]). Antibody responses to SARS-CoV-2 were significantly higher in individuals RT-PCR+ (Table 1). There was no difference between the neutralizing antibody responses status to SARS-CoV-2 and the time between the RT-PCR+ and the neutralizing antibody test (p-value = 0.423; Figures 1 and 2, Table 2).

Table 1. Neutralizing antibody responses to SARS-CoV-2.

| RT-PCR for SARS-CoV-2 | Neutralizing Antibody Between 20% | p-value |
|-----------------------|----------------------------------|---------|
| +                     | sample size                      | Below 20% | Above 30% |         |
|                       | 454                              | 172 (38%) | 30 (7%)   | 252 (56%) | < 0.01  |
| -                     | 501                              | 367 (73%) | 17 (3%)   | 117 (23%) |         |

Figure 1. Scatter plot with Time between RT-PCR+ and neutralizing antibody (days) versus Neutralizing antibody levels.

Table 2. Time between RT-PCR+ and neutralizing antibody (days) versus Neutralizing antibody levels.

| Time between RT-PCR+ and neutralizing antibody (days) | sample size | Below 20% | Between 20% and 30% | Above 30% | p-value |
|------------------------------------------------------|-------------|-----------|---------------------|----------|---------|
| Up to three months                                   | 179         | 74 (41%)  | 8 (4%)              | 97 (54%) | 0.423   |
| Between three and six months                         | 100         | 71 (37%)  | 15 (8%)             | 104 (55%)|         |
| Between six and nine months                          | 85          | 27 (32%)  | 7 (8%)              | 51 (60%) |         |

Conclusion. This study found neutralizing activity of infection against SARS-CoV-2 in 63% RT-PCR+ individuals, but only in 26% in RT-PCR(-) players. Level of neutralizing antibody responses maintained stable until up to nine months after a RT-PCR+.

Figure 2. Percentage of soccer players at each antibody level (below 20%, between 20% and 30%, and above 30%) versus time between the positive RT-PCR test and neutralizing antibody test (days).

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454. Impact of Covid-19 on Infectious Disease Fellows in the United States: A National Survey to Identify Targets for Intervention.

Shuba Balan, MD1; Shweta Anjan, MD2; Alison Ohrringer, MPH, MS3; Jose Gonzalez-Zamora, MD4; Deborah Jones Weiss, PhD5; Michele I. Morris, MD2; Marta L. Alcaide, MD5; Paola Lichtenberger, MD6; Paola Lichtenberger, MD6; 1Department of Infectious Diseases, University of Miami, Miami, Florida; 2University of Miami / Jackson Memorial Hospital, Miami, Florida; 3University of Miami/Jackson Health System, Miami, Florida; 4University of Miami, Miller School of Medicine, Miami, Florida; 5University of Miami Miller School of Medicine, Miami, Florida; 6University of Miami Miller School of Medicine, Miami, FL

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Background. The Coronavirus disease of 2019 (COVID-19) global health crisis has resulted in an unprecedented strain on healthcare systems, reorganization of medical training programs and disruption in professional and personal lives of medical trainees. The impact of COVID-19 on infectious disease (ID) fellows, who are frontline healthcare professionals, has not been assessed.

Methods. We conducted a national survey of adult and pediatric ID fellows to assess impact on educational activities, availability of personal protective equipment (PPE), well-being, and career prospects. Anxiety and burnout were assessed by 7-item generalized anxiety disorder scale and abbreviated Maslach burnout inventory respectively. Invitations to participate in the survey were sent via email to all ID fellows through Accreditation Council for Graduate Medical Education (ACGME) fellowship directors. Survey responses collected from August 1 to September 30, 2020 have been reported.

Results. 136 fellows completed the survey (Table 1). 84% reported their institution provided evidence-based didactics for management of COVID-19 and 53% indicated their general ID didactics were affected by the pandemic. 86% of fellows were involved in care of patients with COVID-19, and 31% reported a shortage of PPE affecting their clinical duties. Those living in highly impacted states (CA, FL, NY, TX) at the time of the survey were 1.70 times as likely to experience moderate to severe anxiety (vs. minimal to moderate) than those in other states; similarly, those who saw ≥11 COVID-19 patients weekly and reported PPE shortages were 2.5 and 2.0 times as likely,