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# Impact of the COVID-19 pandemic on the dynamics of a university hospital's hemotherapy center

Impacto de la pandemia COVID-19 sobre la dinámica de un centro de hemoterapia en un hospital universitario

Impacto da pandemia COVID-19 na dinâmica do núcleo de hemoterapia de um hospital universitário

## ABSTRACT

Objective: describe threats and opportunities in the face of the COVID-19 pandemic at the Pedro Ernesto University Hospital Hemotherapy Center. Method: descriptive study and quantification of blood donation candidates before (2015-2019) and after the declaration of the COVID-19 pandemic (March/2020) describing strategies to safeguard blood supply. Results: there was a 25% reduction in the number of donation candidates between March 2nd and 16th, 2020. The implementation of several promotional initiatives increased the donor per day average in March 2020 by 20%. There was a 24% increase in the number of donation candidates in March 2020 (n = 536) compared to March 2019 (n = 431). Conclusion: In the face of a new disease, of a pandemic character, we have more questions than answers. It is necessary that more centers share their strategies for guaranteeing blood in times of crisis.

**DESCRIPTORS:** Covid-19; Pandemic; Hemotherapy; Public Health.

## RESUMEN

Objetivo: Describir las amenazas y oportunidades frente a la pandemia de COVID-19 en el Centro de Hemoterapia del Hospital Universitario Pedro Ernesto. Método: estudio descriptivo para cuantificar el número de candidatos a donaciones de sangre antes (2015-2019) y después de la declaración de la pandemia COVID-19 (marzo/2020) y describir estrategias para salvaguardar el suministro de sangre. Resultados: hubo una reducción del 25% en el número de candidatos para donación entre el 2 y el 16 de marzo de 2020. La implementación de varias iniciativas promocionales aumentó el número de donaciones/día promedio en marzo/2020 en un 20%. Hubo un aumento del 24% en el número de candidatos a donar en marzo/2020 (n=536) en comparación con marzo/2019 (n = 431). Conclusión: Ante una nueva enfermedad, de carácter pandémico, tenemos más preguntas que respuestas. Es necesario que más centros compartan sus estrategias para garantizar el suministro en tiempos de crisis.

**DESCRIPTORES:** Covid-19; Pandemia; Hemoterapia; Salud Pública.

## RESUMO

Objetivo: Descrever ameaças e oportunidades diante da pandemia de COVID-19 no Núcleo de Hemoterapia do Hospital Universitário Pedro Ernesto. Método: estudo descritivo com distribuição de frequência de candidatos à doação de sangue antes (2015-2019) e após declaração da pandemia COVID-19 (março/2020), e descrição de estratégias para manutenção do estoque de hemocomponentes. Resultados: houve redução de 25% no número de candidatos à doação entre os dias 2 e 16 de março de 2020. A implantação de diversas atividades de promoção à doação de sangue aumentou em 20% a média de doadores/dia em março/2020. Observou-se aumento de 24% no número de candidatos à doação em março/2020 (n=536) comparado a março/2019 (n=431). Conclusão: Diante de uma nova doença, de caráter pandêmico, temos mais perguntas que respostas. É necessário que mais centros compartilhem suas estratégias para a garantia de sangue em momentos de crise.

**DESCRIPTORES:** Covid-19; Pandemia; Hemoterapia; Saúde Pública.

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### Flavia Miranda Gomes de Constantino Bandeira

Physician. Hematologist and Hemotherapist. Adjunct Professor, Department of Internal Medicine, Faculty of Medical Sciences, State University of Rio de Janeiro. RJ / Brazil. <https://orcid.org/0000-0002-9499-7520>

### Jennifer Ribeiro da Cunha

Physician. Hematologist and Hemotherapist. University of the State of Rio de Janeiro. RJ / Brazil. <https://orcid.org/0000-0001-6725-8944>

## Samantha Veloso Baião

Nurse. Specialist in Family Health Strategy. Specialization in Hemotherapy in progress. University of the State of Rio de Janeiro. RJ / Brazil. <https://orcid.org/0000-0002-6730-6392>

## Cristiane Magalhães Costa

Nurse. Master in Family Health. Specialist in Hemotherapy, Occupational Health and Public Management. University of the State of Rio de Janeiro. RJ / Brazil. <https://orcid.org/0000-0001-5927-6528>

## Regina Márcia Rangel de Oliveira

Social Worker at the Herbert de Souza Blood Bank, Pedro Ernesto-HUPE Hospital, State University of Rio de Janeiro. RJ / Brazil. <https://orcid.org/0000-0002-6920-1164>

## Kallic Borba Fonseca

Physician. Hematologist and Hemotherapist. University of the State of Rio de Janeiro. RJ / Brazil. <https://orcid.org/0000-0002-0338-1705>

## Tatiana de Araujo Eleuterio

Nurse. PhD in Epidemiology and Public Health. Sanitary. Specialist in Family Health. Adjunct Professor in the Department of Public Health Nursing at the Faculty of Nursing, State University of Rio de Janeiro. RJ, Brazil. <https://orcid.org/0000-0002-8043-2350>

## INTRODUCTION

The city of Wuhan, in the province of Hubei, China, emerged as the epicenter of severe pneumonia caused by a new coronavirus in December 2019. In January 2020 there were already reports of thousands of people affected in several cities in China and the world<sup>(1,2)</sup>. On February 25, 2020, the first case of infection with the new coronavirus (SARS-CoV-2) was confirmed in Brazil. The first notifications, initially restricted to the state of São Paulo, comprised indigenous cases among people with a history of travel to countries with community transmission of the virus. On March 11 this year, the World Health Organization (WHO) declared COVID-19 as a pandemic<sup>(3)</sup> and, since March 16, the Brazilian government and the federation units have faced the same with mitigation measures, with a view to community transmission throughout the country, reinforcing the guidelines of social distance that, in turn, directly and directly impacted negatively in the stocks of blood banks, throughout the national territory<sup>(3-10)</sup>.

As of April 6, 2020, 1,210,956 cases of infection with the new Coronavirus (COVID-19) and 67,594 deaths worldwide had been confirmed, with a lethality rate of 5.6%<sup>(11)</sup>. In Brazil, 12,056 cases of COVID-19 and 553 deaths were confirmed, with a lethality rate of 4.6%<sup>(12)</sup>.

There is, at first, no direct implication of the pathophysiology of COVID-19 in the increase in the need for transfusion support, other diseases of considerable prevalence in the country are still ongoing, as well as emergency surgeries, cardiac and oncological surgeries, among others. The imminent reduction in the number of blood donations has become a worldwide and national concern, and may be affected not only by the social isolation imposed by several governments, but also by the temporary inaptitude of donors, whether through COVID-19 or due to the region affected by the pandemic.

Considering the fact that the Pedro Ernesto University Hospital (HUPE), a health unit at the State University of Rio de Janeiro (UERJ), was appointed by the State Department of Health to act as one of the reference centers for assistance in cases of COVID-19, a challenge arose for managers and those responsible for maintaining the stock of blood components, who should prioritize social distance and, at the same time, encourage donors to continue attending the service for regular donations.

Anticipating the supply and maintenance crisis of blood components, the Hemotherapy Nucleus of the Pedro Ernesto University Hospital (NHHUPE) sought to assess threats and opportunities to face the COVID-19 pandemic, regarding the maintenance of hemotherapeutic assistance at HUPE.

The objective was to reflect on threats and opportunities in the face of the COVID-19 pandemic and its potential impact on blood donations at the Hemotherapy Center of Pedro Ernesto University Hospital and to evaluate the impact of implementing donor recruitment strategies in times of crisis.

## METHODOLOGY

Quantitative, descriptive and comparative evaluation of the number of blood donation candidates, before and after the declaration of the pandemic COVID-19, obtained from the computerized system routinely used in the service to evaluate performance indicators (Hemote Plus System® - SOFIS Informática Ltda.). The analysis period covered the years 2015 to 2019 for historical comparison with the month of March 2020, when the pandemic COVID-19 was declared by WHO. Description of donation promotion strategies, with analysis of threats and opportunities in the face of the pandemic. Such analyzes were carried out from the secondary database of the service and constitute a section of a research project submitted to the Research Ethics Committee of the Pedro Ernesto University Hospital (CEP / UERJ), opinion no. 3.971.133, CAAE: 30649020.1.0000.5259, in compliance with the provisions of CNS Resolution No. 466/2012 on research involving human beings.

## RESULTS

The historical average of applicants for

donation at NHHUPE in the last 5 years is 20 candidates/day, totaling 25,300 candidates between 2015 to 2019 (Figure 1). The

fractionation index in the period was 2.8 (target = 3), with an average annual production of 10,814 blood components.

In the first two months of 2020, NHHUPE assisted 896 donors, with an average of 24/day, between donors of whole blood and platelets. Figures 2 and 3 show the daily evolution of the number of donors in the months of February and March 2020.

In February 2020, 375 candidates appeared for donation, with an average of 22 donors/day, while in March/2020 there were 536 candidates, making a daily average of 24.4 donors/day. Comparing the historical average of 20 donation candidates/day there was an increase of 20% in the average donation/day in March/2020. There was also a 24% increase in the number of candidates for donation in March 2020 ( $n = 536$ ) when compared to March/2019 ( $n = 431$ ) (Figure 4). Considering the historical average of 20 donation candidates/day, there was a 25% drop in the number of donation candidates between March 2 and 16, 2020, with the peak of this drop being March 16, 2020, first working day after the Government of the State of Rio de Janeiro published Decree no 46.966 of 03/11/2020, published on 03/13/2020, which provided for measures to deal with the public health emergency of international importance resulting from the coronavirus, and took other measures (Figure 3).

## DISCUSSION

HUPE is the university hospital of the State University of Rio de Janeiro (UERJ). It is a medium and high complexity hospital, with about 450 beds, working on several fronts of teaching, research, and extension, with the HUPE Hemotherapy Center (NHHUPE) being one of its practice scenarios. NHHUPE has a team of health professionals formed by teachers, doctors, nurses, social workers, biologists, pharmacists, nursing and laboratory technicians, administrative support staff, cleaning and hygiene support, referral and security, members of the dynamics of the blood cycle in this hospital.

The NHHUPE transfusion agency (AT), located inside the hospital, is responsible for the pre-transfusion routine and

Figura 1. Número de candidatos à doação no NHHUPE no período 2015 a 2019.

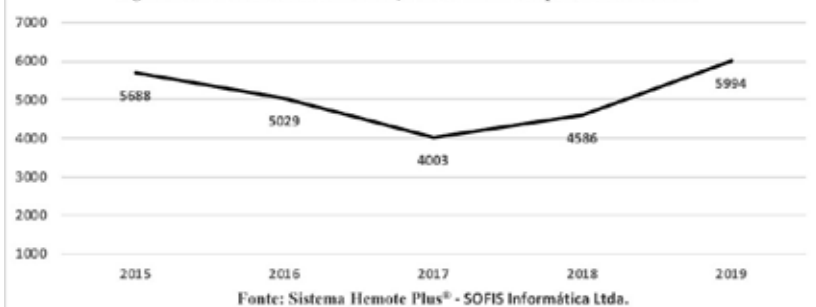


Figura 2. Número de doadores por dia no NHHUPE/UERJ, fevereiro 2020.

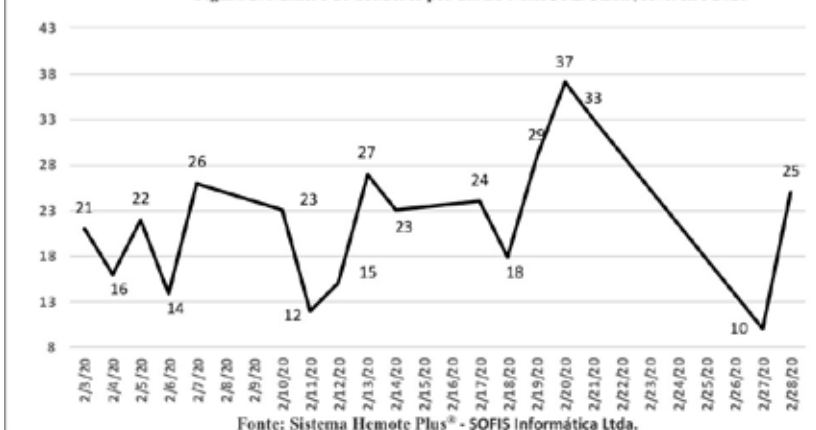
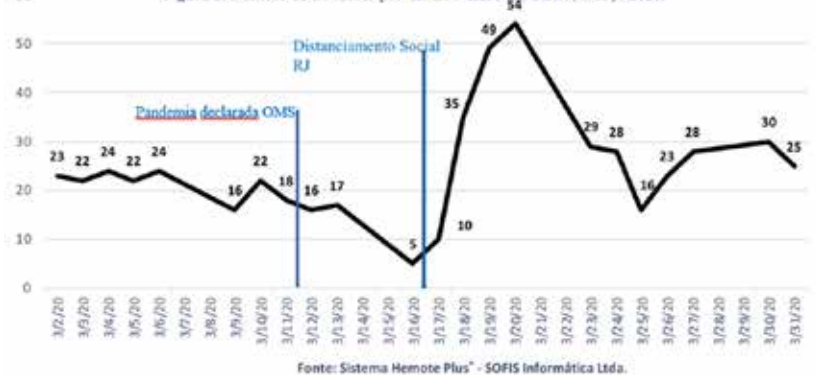
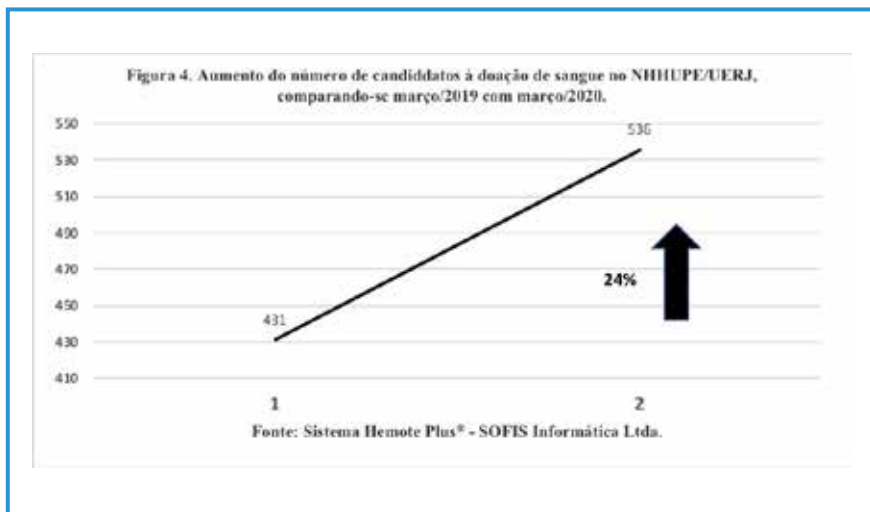


Figura 3. Número de doadores por dia no NHHUPE/UERJ, março 2020.





the delivery of blood components to surgical, clinical and outpatient patients. The surgical routine at HUPE comprises an average of thirty (30) procedures/day, 50% of which are medium and large.

The routine of promoting blood donation is led by a nurse and a social worker, with the support of the sector team and the communication advisors of HUPE (COMHUPE) and UERJ (COMUNS), TV UERJ, UERJ radio, teaching staff and university student. Actions, such as raising awareness about the importance of blood donation to HUPE professionals, patients and family members; partnerships with institutions and companies; articulation with sectors of the university; promotion of donation via telephone contacts, e-mail, social media and donation campaigns alluding to important dates in the annual calendar, are some that aim to motivate and retain the blood donor.

The beginning of the school year is the time when the fundraising team, in partnership with the university extension project of the Faculty of Nursing at UERJ, academic centers and directories, intensifies campaigns to reach the community through media and social networks. NHHUPE, in partnership with the extension project of the Faculty of Nursing entitled "Blood: losing fear guaranteeing life", had scheduled an agenda of activities so that freshmen from seven undergraduate courses at UERJ could attend the beginning of the school year. nucleus to apply for blood and bone marrow donation. A conversation

about basic conditions for blood donation and student awareness for this event took place on March 3, 2020, in an auditorium of UERJ involving students from the Law, Nutrition and Physics courses at the university, as published on a Facebook® page "Projeto Sangue: overcoming fear guaranteed to life" and Instagram® "@projetosanguer" (13).

The blood donation campaign, scheduled by groups of students, would start on March 16, 2020. However, on 03/13/2020, Decree No. 46,966 of 03/11/2020 was published (4) by the State Government, making available the measures to confront the SARS-CoV-2, among which the need to implement measures of social distance and suspension of activities in schools and universities stood out. The Rectory of UERJ, on 03/13/2020, as noted on its official website (14) and in accordance with the Executive Administrative Decision Act (AEDA) No. 13 / Rectory / 2020 (15), suspended classes and other on-site academic activities, initially, for 15 days, starting on March 16, 2020.

In view of this context, so that there would be no crowding of people at the NHHUPE and respecting the social distancing measures, the "Solidarity Trot" campaign was canceled, while the management of the HUPE started the contingency plan to face the pandemic, canceling surgeries elective, keeping cardiac, oncological and urgent surgeries active. Access was also guaranteed to critically ill patients and those with hematological, oncological, hemodialysis

diseases, considered as urgent.

Considering MS Ordinance No. 428, of March 19, 2020 (5), the pandemic has had an impact on the work processes and on the lives of the professionals who work in the service, occasionally causing the removal of employees and employees from their work activities. The guarantee of personal protective equipment (PPE) and compliance with biosafety rules and good practices have become fundamental requirements for the proper functioning of the service and maintenance of the physical integrity of the professionals. It was also necessary to establish a contingency plan for absenteeism, caused by the withdrawal of employees, due to legal issues and eventual confirmation or suspicion of contamination by SARS-CoV-2. It is worth mentioning the feeling of "fear" and "fear" faced by the entire health team, also reinforcing the need for emotional support to all professionals involved in this front line in facing the pandemic.

In view of the above, the NHHUPE needed to reinvent itself and, according to the guidelines of health authorities in the country, the state and scientific entities, keep the doors open for donors, reinforcing the rules of hygiene, social distance, protection of donors and collaborators, without forgetting that the measures of social distance and quarantine, could negatively impact the stock of blood components and hemotherapeutic assistance to HUPE patients.

In the third week of March 2020, the first week of social isolation in Rio de Janeiro, there was a need to cancel surgeries at HUPE, due to the low stock of Rh negative and type O positive blood. At the same time, vaccination campaigns against measles and, subsequently, against influenza, reinforced causes of temporary inability to donate, being yet another limiting factor and a threat to an efficient promotion of donation.

In the world, guidelines began to emerge from several organizations, such as the American Association of Blood Banks (AABB), the International Society of Blood Transfusion (ISBT), the Food and Drug Administration (FDA), the Brazilian Association of Hematology, Hemotherapy and Therapy Celular (ABHH) and the Brazilian Ministry of Health, stressing the importance



of maintaining blood stocks. Several blood centers in the country called for the stock of blood components to be maintained, prioritizing respect for social distance, without prejudice to protection for donors, who had to leave home to make their donation. In the case of NHHUPE, in several calls to donors, it was emphasized that those over 60 years old could remain at home in order to avoid community exposure to SARS-Cov-2, since, according to data in the literature, are most vulnerable to COVID-19.

Based on transfusion safety guidelines, Technical Note 5/2020-CGSH-DAET/SAES/MS at the time<sup>(16)</sup> and No. 13/2020-CGSH-DAET/SAES/MS<sup>(10)</sup>, NHHUPE established strategies that included scheduling donations, protecting employees and donors with social distance measures, hand hygiene with soap and water or gel alcohol, observing the rules of respiratory etiquette, strict hygiene of environments and equipment, use of PPE by health professionals and guidelines for donors to contact them if they experience flu-like symptoms within 14 days of donation.

To overcome the unfavorable scenario, the NHHUPE fundraising team intensified the approach via social media, e-mails and phone calls to donors and public agencies, such as the Municipal Guard of the Mu-

nicipality of Rio de Janeiro, and obtained an important and significant partnership with communication from HUPE, UERJ (COMMUNS, TV UERJ, and the university extension project of the Faculty of Nursing, the result of which was seen in the resumption of donations, peaking on March 20, keeping the average of donations this month above average. These actions did not add expense to the service, as they involved the workforce of people regularly involved in the process; however, it brought up the need for a contingency plan for times of crisis.

## CONCLUSION

When we think about supplying blood products, we ask: Who are the donors? How are they? How will they reach us, or how will we reach them?

During a pandemic, when quarantine and social detachment are proposals that can save lives, measures that focus on the safety of the donor, recipient and health professionals must be reinforced and discussed widely among the team. Approaches on the rational use of blood or "patient blood management" are more than ever necessary and should be the focus of the hemotherapist with the clinical and surgical staff, as well as the sharing of strategies for maintaining sto-

cks and transfusion safety. Studies evaluating the impact of COVID-19 on transfusion demand and hemovigilance actions aimed at these patients, may shed light on the role of transfusions and possible transfusion reactions during the "inflammatory storm" described in other articles<sup>(17)</sup>. Hemotherapy may be involved in strategies to combat COVID-19, by obtaining immune plasma for passive infusion of neutralizing antibodies<sup>(18-21)</sup> and, also, in a possible possibility of using plasmapheresis in severe cases, with intense inflammatory activity, if there is evidence of its effectiveness<sup>(22,23)</sup>.

In the face of a new disease, of a pandemic character, we have more questions than answers, but as long as there is no substitute for blood, the attraction of donors and the ability to adapt to adverse situations can make a difference. We suggest that more and more centers share their blood guarantee strategies in times of crisis.

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## REFERENCES

1. Qun L, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med* [Internet]. 2020 Mar 24; 382:1199-1207. doi: <http://doi.org/10.1056/nejmoa2001316>.
2. Wu Ym Chen C, Chan Y. The outbreak of COVID-19: An overview. *Journal of the Chinese Medical Association* [Internet]. 2020; 83(3):217-220. doi: <https://doi.org/10.1097/JCMA.000000000000270>.
3. WHO Director-General's opening remarks at the media briefing on COVID-19 [Internet]. Genebra: World Health Organization; 2020 [citado em 10 abr 2020]. Disponível em: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.
4. Rio de Janeiro (Estado). Decreto n.º 46.966, de 11 de março de 2020. Dispõe sobre as medidas para enfrentamento da emergência de saúde pública de importância internacional de corrente do coronavírus, e dá outras providências. Diário Oficial do Estado do Rio de Janeiro [Internet]: parte 1: Poder Executivo, Rio de Janeiro, 46(45-A):1 [citado em 10 abr 2020]. Disponível em: [http://www.ioerj.com.br/portal/modules/conteudoonline/mostra\\_edicao.php?session=VFhwVWk0wNXJ5a1p0UkdKMFVYcEdRMDVUTURCT2FsVXpURIZGTIU1NINyUk5hMFPdV-FhwcmQwMXJUWGROZW1NeQ==&p=MQ==&tb=RGVjcm-V0byB0wrogNDY5NjYmlzAxMzs=](http://www.ioerj.com.br/portal/modules/conteudoonline/mostra_edicao.php?session=VFhwVWk0wNXJ5a1p0UkdKMFVYcEdRMDVUTURCT2FsVXpURIZGTIU1NINyUk5hMFPdV-FhwcmQwMXJUWGROZW1NeQ==&p=MQ==&tb=RGVjcm-V0byB0wrogNDY5NjYmlzAxMzs=).
5. Ministério da Saúde (BR). Portaria n.º 428, de 19 de março de 2020. Dispõe sobre as medidas de proteção para enfrentamento da emergência de saúde pública de importância internacional decorrente do coronavírus (covid-19) no âmbito das unidades do Ministério da Saúde no Distrito Federal e nos Estados. Diário Oficial da União. [Internet]. 20 mar 2020; Seção 55(1):149 [citado em 10 abr 2020]. Disponível em: <http://www.in.gov.br/en/web/dou/-/portaria-n-428-de-19-de-marco-de-2020-249027772>.
6. Agência Nacional de Vigilância Sanitária (BR). Nota técnica GVIMS/GGTES/ANVISA n.º 04/MZs=0. Orientações para serviços

## REFERENCES

- de saúde: medidas de prevenção e controle que devem ser adotadas durante a assistência aos casos suspeitos ou confirmados de infecção pelo novo coronavírus (SARS-CoV-2). [Internet]. Brasília, DF: Anvisa, 2020 [atualizada em 21 mar 2020; [citado em 07 abr 2020]. 73 p. Disponível em: <http://portal.anvisa.gov.br/documents/33852/271858/Nota+T%C3%A9cnica+n+04-2020+GVIMS-GGTES-ANVISA/ab598660-3de4-4f14-8e6f-b9341c196b28>.
7. Ministério da Saúde, Secretaria de Vigilância em Saúde (BR). Plano de Contingência Nacional para Infecção Humana pelo novo Coronavírus COVID-19. [Internet]. Brasília, DF: Centro de Operações de Emergências em Saúde Pública COVID-19, fev 2020. 24 p [citado em 07 abr 2020]. Disponível em: <https://portalarquivos2.saude.gov.br/images/pdf/2020/fevereiro/13/plano-contingencia-coronavirus-COVID19.pdf>.
8. Rio de Janeiro (Estado). Secretaria Estadual de Saúde. Nota técnica SVS/SES-RJ n.º 08/2020. Doença pelo Coronavírus (COVID-19). [Internet]. Rio de Janeiro: Subsecretaria de Vigilância em Saúde, 2020 [atualizada em 18 mar 2020; [citado em 08 abr 2020]. 7 p. Disponível em: <https://www.saude.rj.gov.br/comum/code/MostrarArquivo.php?C=Mjk3Njc%2C>.
9. Rio de Janeiro (Estado). Secretaria Estadual de Saúde. Nota técnica SVS/SES-RJ n.º 09/2020. Doença pelo Coronavírus (COVID-19). [Internet]. Rio de Janeiro: Subsecretaria de Vigilância em Saúde, 2020. [atualizada em 24 mar 2020]; [citado em 07 abr 2020]. 2 p. Disponível em: <https://www.saude.rj.gov.br/comum/code/MostrarArquivo.php?C=Mjk5NDE%2C>.
10. Ministério da Saúde, Departamento de Atenção Especializada e Temática, Coordenação Geral de Sangue e Hemoderivados (BR). Nota técnica n.º 13/2020-CGSH/DAET/SAES/MS. Atualização dos critérios técnicos contidos na Nota Técnica N.º 5 /2020-CGSH/DAET/SAES/MS para triagem clínica dos candidatos à doação de sangue relacionados ao risco de infecção pelo SARS-CoV-2, (vírus causador da COVID-19). [Internet]. Rio de Janeiro: CGSH, 2020. [atualizado em: 27 mar 2020]; [citado em: 9 abr 2020]. 4 p. Disponível em: <https://www.saude.gov.br/images/pdf/2020/marco/27/SEI-MS---0014052636---Nota-T--cnica--n---13-2020.pdf>.
11. Johns Hopkins University. Center for Systems Science and Engineering [Internet]. Coronavirus COVID-19: global cases [Internet]. 2020 [citado em 24 mar 2020]. Disponível em: <https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>.
12. Ministério da Saúde, Secretaria de Vigilância em Saúde (BR). Boletim Epidemiológico [Internet]. Brasília, DF: Secretaria de Vigilância em Saúde. N. 7, abr 2020 com título: Especial Doença pelo Coronavírus 2019. [citado em 7 abr 2020] Disponível em: <https://www.saude.gov.br/images/pdf/2020/Abril/06/2020-04-06---BE7---Boletim-Especial-do-COE---Atualizacao-da-Avaliacao-de-Risco.pdf>.
13. Universidade do Estado do Rio de Janeiro. Faculdade de Enfermagem. Projeto Sangue: vencendo o medo garantindo a vida [Internet]. Rio de Janeiro, 2020. [citado em 07 abr 2020]. Disponível em: <https://www.facebook.com/Projeto-Sangue-vencendo-o-medo-garantindo-a-Vida-451682228188410/>.
14. Universidade do Estado do Rio de Janeiro. Atenção: Uerj prorroga suspensão de atividades não essenciais por mais 15 dias [Internet]. Rio de Janeiro, 2020. [citado 16 mar 2020]. Disponível em: <https://www.uerj.br/noticia/10477/>.
15. Universidade do Estado do Rio de Janeiro. Reitoria. Ato Executivo de Decisão Administrativa n.º 013/2020, de 16 de março de 2020. Regulamenta o Decreto .º 46.970, de 13 de março de 2020 e a Resolução Conjunta SCTI/UERJ n.º 9, de 13 de março de 2020, que tratam das medidas temporárias de prevenção ao contágio e de enfrentamento da propagação decorrente do novo coronavírus (COVID-19) [Internet]. Rio de Janeiro, 2020. [citado em 08 abr 2020]. Disponível em: [http://www.boluerj.uerj.br/pdf/aeda\\_00132020\\_16032020.pdf](http://www.boluerj.uerj.br/pdf/aeda_00132020_16032020.pdf).
16. Ministério da Saúde, Departamento de Atenção Especializada e Temática, Coordenação-Geral de Sangue e Hemoderivados (BR). Nota técnica n.º 5/2020-CGSH/DAET/SAES/MS. Atualização dos critérios técnicos para triagem clínica de dengue (DENV), chikungunya (CHIKV), zika (ZIKV) e coronavírus (SARS, MERS, 2019-nCoV) nos candidatos à doação de sangue. [Internet]. Rio de Janeiro: CGSH, 2020. [atualizado em 21 fev 2020]; [citado em 08 abr 2020]. 5 p. Disponível em: <https://www.saude.gov.br/images/pdf/2020/fevereiro/21/SEI-MS---0013484477---Nota-T--cnica.pdf>.
17. Mehta P, McAuley DF, Brown M, Sanchez E, Tattersall RS, Manson JJ, et al. COVID-19: consider cytokine storm syndromes and immunosuppression. *Lancet*. [Internet]. 2020 Mar 28 395(10229):1011-1088, e54-e61. doi:10.1016/S0140-6736(20)30628-0.
18. Duan K, Liu B, Li C, Zhang H, Yu T, Qu J, et al. Effectiveness of convalescent plasma therapy in severe COVID-19 patients. *Proc Natl Acad Sci U S A* [Internet]. 2020 Apr 6. doi: 10.1073/pnas.2004168117.
19. Chen L, Xiong J, Bao L, Shi Y. Convalescent plasma as a potential therapy for COVID-19. *Lancet Infect Dis*. [Internet]. 2020 Apr 1; 20(4):398-400. doi:10.1016/S1473-3099(20)30141-9.
20. Roback JD, Guarner J. Convalescent plasma to treat COVID-19: possibilities and challenges. *JAMA* [Internet]. 2020 Mar 27. doi:10.1001/jama.2020.4940.
21. Shen C, Wang Z, Zhao F, Yang Y, Li J, Yuan J, et al. Treatment of 5 critically ill patients with COVID-19 with convalescent plasma. *JAMA*. [Internet]. 2020 Mar 27. doi: 10.1001/jama.2020.4783.
22. Keith P, Day M, Perkins L, Moyer L, Hewitt K, Wells A. A novel treatment approach to the novel coronavirus: an argument for the use of therapeutic plasma exchange for fulminant COVID-19. *Crit Care*. [Internet]. 2020 Apr 2; 24(128). doi:10.1186/s13054-020-2836-4.
23. Ma J, Xia P, Zhou Y, Liu Z, Zhou X, Wang J, et al. Potential effect of blood purification therapy in reducing cytokine storm as a late complication of critically ill COVID-19. *Clin Immunol*. 2020 Apr 1;214; 108408. doi:10.1016/j.clim.2020.108408