DOI 10.51422/ren.v22i3.437

Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez | Revista de Enfermería Neurológica

Original article

Evaluación de la pronación consciente en el paciente oncológico con SARS-CoV-2

Evaluation of conscious pronation in cancer patients with SARS-CoV-2

Jorge Andrés Gómez Cisneros[1] Gandhy Ponce Gómez[2] Julio César Estrada Cadena[3]

Resumen

Introducción: El incremento de casos COVID con problemas respiratorios de complejidad variable y la inclusión actual de tratamientos farmacológicos y terapéuticos en la población oncológica son motivos de estudio para verificar los efectos de la posición prono en paciente consciente.
Material y métodos: Estudio cuantitativo de diseño retrospectivo, en el que se realizó una revisión de los expedientes clínicos. La muestra estuvo constituida de 100 expedientes que cumplieron con los criterios de inclusión. El análisis de datos descriptivo incluyó frecuencias y porcentajes, mientras que la hipótesis se realizó a través de la prueba T de Student para muestras relacionadas.
Resultados: El sexo femenino se representó en un 52%, donde predominó como tipo de cáncer el hematooncológico. De acuerdo con la capacidad de las personas con cáncer para realizar actividades, se mostró que 54% de la población podía vivir en casa y auto cuidarse.
Limitaciones del estudio: Falta de un grupo control, inclusión de algunas variables de estudio que podrían haber intervenido en los resultados.
Originalidad: Este articulo posee valor debido a la falta de información sobre el paciente con cáncer y COVID-19.
Conclusiones: La pronación es una opción de manejo en pacientes oncológicos que puede prevenir mayor daño o complicaciones, considerando que es una intervención que requiere una evaluación previa para determinar si las condiciones son favorables para aplicarla.

Palabras clave: Paciente oncológico, SARS-CoV-2, pronación.

Citation: Gómez Cisneros JA, Ponce Gómez G, Estrada Cadena JC. Evaluation of conscious pronation in cancer patients with SARS-CoV-2. Rev Enferm Neurol. 2023;22(3): pp. 220-229.

Correspondence: Gandhy Ponce Gómez
Email: gandhy_ponce@yahoo.com.mx
[1] Instituto Nacional de Cancerología
[2] Facultad de Enfermería y Obstetricia, UNAM
[3] Instituto Nacional de Cardiología Ignacio Chávez

Received: August 4, 2023
Accepted: November 8, 2023

Abstract

Introduction: The increase of COVID cases with respiratory problems of variable complexity and the current inclusion of pharmacological and therapeutic treatments in the oncologic population are reasons to study the effects of prone position in conscious patients.

Material and methods: A quantitative study of retrospective design, in which a review of clinical records was performed. The sample consisted of 100 files that met the inclusion criteria. The descriptive data analysis included frequencies and percentages, while the hypothesis was performed through Student's t-test for related samples.

Results: The female sex was represented in 52%, where hemato-oncologic cancer predominated as the type of cancer. According to the capacity of people with cancer to carry out activities, 54% of the population was able to live at home and take care of themselves.

Limitations of the study: Lack of a control group, and inclusion of some study variables that could have intervened in the results. Originality: This article has value due to the lack of information on the cancer patient and COVID-19.

Conclusions: Pronation is a management option in cancer patients that can prevent further damage or complications, considering that it is an intervention that requires a previous evaluation to determine if the conditions are favorable for its application.

Keywords: Cancer patient, SARS-CoV-2, pronation.

Introduction

In people who develop severe disease, the complications of SARS-CoV-2 imply an increase in the costs of care, longer hospital stay, and increased risk of mortality, especially in patients with vulnerability, comorbidities, or some type of immunosuppression caused by neoplastic disease or pharmacological treatments. Therefore, there is a need to improve the condition of cancer patients with COVID-19 to reduce their severity. To this end, specialized oncology institutions develop strategies to prevent complications and ensure that specific treatments for neoplastic diseases are not delayed.

On the other hand, the World Health Organization (WHO) classified 55,924 cases of COVID-19, among which severe patients suffered dyspnea, respiratory frequency greater than 30 breaths per minute (rpm), and SPO2 < 93%, as well as PaO2/FiO2 < 300 mmHg, with an increase of pulmonary infiltrates greater than 50%, which was detected in radiographs taken in a period of 24 to 48 hours.[1]

Accordingly, an early review in China found a higher prevalence of COVID-19 in people with cancer. Similarly, the mortality rate of 5.6% in people with carcinomas suggests that they had a 3.5-fold increased risk of SARS-CoV-2 infection. Also, lung cancer and COVID-19 were more common. Consequently, these patients were at higher

risk of severe events such as death compared to non-oncology patients (39%), as they deteriorated more rapidly with a median time to severe events of 13 days.[2]

For this reason, the use of supplemental oxygen therapies and the application of evidence-based interventions are indispensable to avoid further complications. It should be recognized that mortality in those who come to require invasive mechanical ventilation (IMV) support is greater than 50%.[3] However, recommendations for initiation of oxygen therapy in cancer patients should be made when they present with hypoxemia plus dyspnea, as they will not benefit from supplemental therapy.[4]

Given this situation, the WHO proposed the prone position during invasive mechanical ventilation as a treatment for acute respiratory distress syndrome (ARDS) by COVID-19, with results of improved oxygenation and lower mortality. Oxygenation increases in this way since it is not compromised by the weight of the abdominal cavity and in the mediastinum, the alveoli are reopened and it leads to the recruitment of more efficient regions in gas exchange.[5]

Thus, American and European guidelines document the prone position as a treatment for patients with ARDS due to COVID-19. Of course, they recommend a variable duration time ranging from 12 to 16 hours in the prone position for subjects with a PAFI < 150 mmHg, according to the Berlin scale.[6]

Material and methods

A quantitative retrospective-documentary descriptive study of cross-sectional design, with analysis of clinical records of patients who were hospitalized from March 2020 to May 2021, to whom a measurement and control strategy was applied to evaluate or limit the complications of COVID-19 pneumonia.

The study was conducted in a tertiary-level hospital in Mexico City with care for patients infected with COVID-19. The sample consisted of a total of 100 files, selected by convenience and the inclusion criteria were cases of patients with cancer and positive SARS-CoV-2 test by PCR, in a conscious neurological state and with the presence of ARDS due to COVID-19. The main variables of this research are physiological and chemical measurements, such as PaO_2/FiO_2, $PaCO_2$, SpO_2, heart rate, and respiratory rate in pre and post-pronation and prone time measured in hours.

Likewise, intervening variables such as age, cancer stage, oxygen device, degree of dyspnea, Karnofsky scale, and advanced airway management were included. As for validation, the data collection instrument was specifically created and submitted to the judgment of experts with experience in the care and management of critically ill patients and COVID-19. In addition, it was developed using a critical review of the literature in scientific databases. The instrument was initially composed of 17 items, indicating the wording, relevance, and congruence according to the objective of the study. The statistical software SPSS version 25 was used to organize and analyze the information (nonparametric statistical tests). The description of the population was carried out using frequency tables and percentages. At the same time, the inferential statistics were performed through normality measures in the scalar variables and Student's t-test for related samples.

Results

Conscious patients were observed in prone position, among which the female sex predominated with 51% (see Table 1). The mean age was 56.4 ± 15.6 years, and the predominant diagnosis was hemato-oncologic cancer, in addition to leukemias and lymphomas with 24%. One variable studied was the stage of the cancer, with a higher incidence of I and IV at 27% (see Table 1). Likewise, the Karnofsky functionality scale was evaluated, in which people performed self-care and showed a 23.5% capacity to perform self-pronation (see Table 2).

Table 1. Descriptive statistics of oncology population with SARS-CoV-2.

n=100		
Variable	**RF (%)**	**Mean SD**
Sex		
Female	50 (51)	
Male	48 (49)	
Age	18-86 *	56.9 ± 15.7
Type of cancer		
Hematooncology	24 (24)	
Cervical uterine	13 (14)	
Breast cancer	16 (17)	
Gastric	12 (12)	
Prostate cancer	12 (12)	
Germinal tumors	4 (4)	
Renal	1 (1)	
C&C Cancer	2 (2)	
Sarcomas	5 (5)	
Central Nervous System Cancer	2 (2)	
Lung Cancer	4 (4)	
Melanoma	1 (1)	
Cancer stage	I*	
0	5 (5.1)	
I	18 (18.4)	
II	26 (26.5)	
III	23 (23.5)	
IV	26 (26.5)	
Karnofsky Scale		
Seriously ill	1 (1)	
Severely disabled	2 (2)	
Disabled	6 (6.1)	
Requires considerable assistance	10 (10.2)	
Needs occasional help	18 (18.4)	
Cares for itself	23 (23.5)	
Normal activity with effort	17 (17.3)	
Normal activity	15 (15.3)	
Asymptomatic	6 (6.1)	

*Note: trend

Table 2. Karnofsky scale grouped according to ability to perform activities.

n= 100	
Variable	**RF (%)**
Incapable of self-care, requires special care.	8 (8)
Unable to work, can live at home and self-care	54 (54)
Able to perform activities, requires no special care	38 (38)

Regarding the onset of COVID-19 symptoms, a range of 2 to 17 days was detected, with a mean of 6.8 ± 3.3 days. On the other hand, the use of anxiolytic drugs in patients was minimal, in which there were 5% of cases of haloperidol use, and 4% of others such as morphine or dexmedetomidine (see Table 3).

Table 3. Descriptive statistics of drugs and symptomatology in the oncology population with SARS-CoV-2.

n= 100			
Variable	**RF (%)**	**Mean SD**	
Dyspnea Scale (NYHA)			
I	21 (21.4)		
II	39 (39.8)		
III	25 (25.5)		
IV	13 (13.3)		
Types of anxiolytic drugs			
None	89(89)		
Haloperidol	5 (5)		
Midazolam	2 (2)		
Other	4. (4)		
Days of symptom onset	2-17 *	6.8±3.3	Note: *Range

The oxygen therapy inherent to the treatment during the hospitalization of the patient and before conscious pronation was carried out by means of nasal prongs in the first place (43%), and reservoir mask in the second. After the use of the prone position, it was observed that the number of people without some type of oxygen device increased by up to 21%, and the reservoir mask decreased by 17%, which would indicate that the oxygen requirement after the prone position decreased. The estimated duration of the prone position ranged from 2 to 16 hours, with a mean of 8.6 ± 3.45 hours (see Table 4).

Table 4. Pre- and post-pronation oxygen therapy data of the conscious oncology patient.

n= 100		
Variable	**Pre-pronation RF (%)**	**Post-pronation RF (%)**
O_2-Device		
None	16 (16)	21(21)
Nasal prongs	43 (43)	46(46)
Reservoir mask	40(40)	17(17)
PNAF	1(1)	3 (3)
Hemlett (cephalic helmet)		6(6)
NIV		7(7)
Duration of prone position (Hrs.)		
2	2 (2)	
3	10(10)	
4	7(7)	
5	2(2)	
6	10(10)	
7	1(1)	8.6 ± 3.45
8	21(21)	
10	6(6)	
12	40(40)	
16	1 (1)	
Advanced airway management		
No	74(75.5)	
Yes	24(24.5)	

With the estimated time in the prone position, together with the different oxygen therapy devices, of the total population with cancer and COVID-19, the mean number of advanced airway management events was only 24.5%, i.e., the rate of serious events decreased and, consequently, so did the possible complications associated with mechanical ventilation, such as infections, increased mortality, etc. (see Table 4).

According to the clinical descriptive data, a significant increase in SpO_2 was observed with a mean pre-measurement of 86 7 % and post-measurement of 90 ± 8 %. Similarly, clinical significance was observed with decreased HR in pre-pronation and post-pronation, with 98 ± 15 and 83 ± 18 beats per minute (bpm) respectively. Consequently, HR had clinical significance with a pre-strategy decrease of 22 ± 5 breaths per minute (bpm), compared to post-strategy which registered 21 ± 6 bpm. This indicates a good response to the prone position with a decrease in symptomatology (see Table 5).

Table 5. Pre- and post-pronation clinical values of the conscious oncologic person.

	n=100	
Variable	**Pre-pronation Mean SD**	**Post-pronation Mean SD**
$PaFiO_2$	174.5 ± 93.48	218.81 ± 113.98
SpO_2	86 ± 7	90 ± 8
FiO_2	48 ± 25	44 ± 27
$PaCO_2$	28.31 ± 5	30.40 ± 6.5
PaO_2	64.5 ± 16.02	72.73 ± 14.90
HR	98 ± 15	83 ± 18
RR	22 ± 5	21 ± 6

Note: heart rate (HR), respiratory rate (RR), oxygen saturation (SpO_2), arterial oxygen pressure (PaO_2), arterial carbon dioxide pressure ($PaCO_2$).

Thus, among the biochemical values measured in arterial gases, $PaCO_2$ pre (28.31 ± 5 mmHg) and post (30.40 ± 6.5 mmHg), and PaO_2 pre (64.5 ± 16.02 mmHg) and post (72.73 ± 14.90 mmHg) were found. As a result, the calculation of $PaFiO_2$ pre (174.5 ± 93.48 mmHg) and post (218.81 ± 113.98 mmHg) was improved following the use of the strategy (see Figure 1 and Figure 2).

Figure 1. $PaFiO_2$ values pre- and post-pronation in the person with cancer and COVID-19.

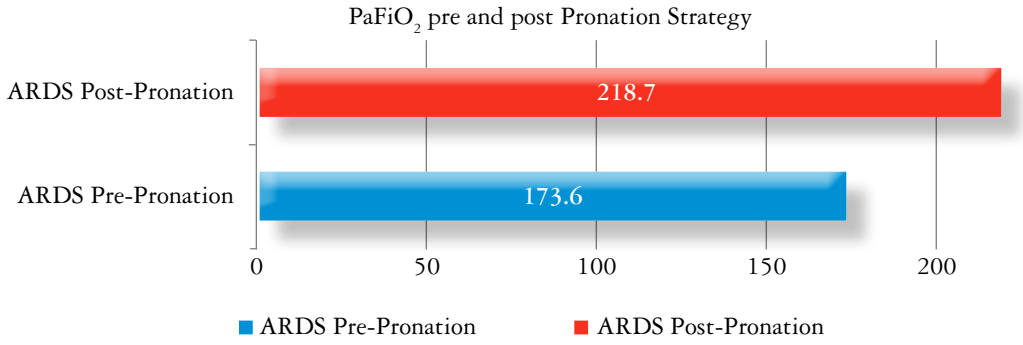
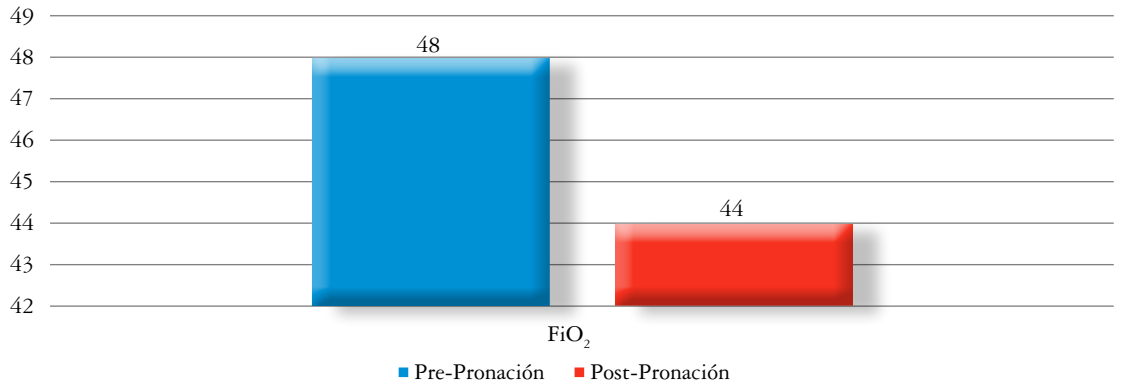


Figure 2. FiO_2 values pre- and post-pronation in the person with cancer and COVID-19.



Note: The mean amount of FiO_2 provided to the patient before and after the prone position is shown, with a slight decrease in the amount required by the oncology patient. Own source.

Analysis of results

Parametric statistical tests were performed using the Student's t-test. According to the statistical analysis, we can observe that clinical and chemical variables such as $PaFiO_2$, SpO_2, PaO_2, and HR resulted statistically significant by the applied test, so that each of the clinical results, together with those already mentioned, improves after pronation (see Table 6).

Table 6. Student´s t-test for related samples of the use of the conscious pronation strategy in the oncology patient (p< O.005).

Variable	*Inferior*	*Subsequent*	*df*	*p*
PaFiO2	-12.07	-4.28	99	0.001*
SpO2	-6.5	-2.05	99	0.001*
FiO2	-1.96	7.96	99	0.233
PaCO2	-3.64	-.61	99	0.006
PaO2	-12.07	-4.28	99	0.001*
Fc	11.51	18.74	99	0.001*
Fr	-3.64	-.61	99	0.203

Note: 95% CI (confidence interval), df (degrees of freedom), p (level of significance)

Discussion

Through the strategy of conscious pronation, it is estimated to improve the clinical condition of the oncological patient with SARS-CoV-2, as well as the values of the biochemical indicators that indicate or give us an approach to the severity of the person. Thus, it is possible to resolve the ARDS in those who have cancer early and, therefore, avoid severe complications or those resulting in death.

The purpose of the study was to evaluate the strategy of pronation in oncology patients with SARS-CoV-2, an emerging measure during the

pandemic and in the face of the critical situation that arose due to COVID-19.

In the exposed results and according to what was observed demographically, age coincides with what was described in the article by Weinkove *et al.* from 2020,[6] in which COVID-19, in this severe case, occurs mainly in people over 50 years of age. Similarly, the presentation of cases according to the type of neoplastic disease resulted in higher susceptibility for patients with hematological cancer, according to reviews by Hirsch *et al* (2013),[7] Einchenberg *et al* (2019)[8] and Herrera *et al* (2021).[9] In turn, respiratory virus infections had a higher incidence in people with this type of oncologic disease, as in the study conducted. Therefore, the nursing professional needs to promote self-care in the hemato-oncological person, emphasizing safety measures such as the use of masks, hand washing, and maintaining a healthy distance of 1.5 meters from other people, among others, to reduce serious events due to respiratory viral infections.

Concerning the population›s sex, the study was similar to that described by Fuentes *et al*. in 2014, according to the presentation and description of cases of respiratory infections in oncologic adults, where the prevalence was higher in the female sex.[10] The prevalence of this type of infection was estimated in people with neutropenia in the aforementioned article, a situation that was not measured in the present study and would indicate a limitation for the research.

According to the results found, the functionality of the patients and the capacity to carry out activities influences the presence of serious events and their development, as reported by Martín-Moro et al, who associated them with death in a series of 34 cases of hematological neoplasia in Madrid.[11] Although the number of patients who died is not estimated, it could be considered that the decrease in the severity of clinical values resulted in a lower risk of mortality due to COVID-19 in those who had cancer. The promotion of self-care or education for the care of a person with cancer who can perform daily activities could help to reduce its severity, so it is an important point to deepen in clinical nursing practice, as well as in the field of research and knowledge.

The frequency of intubation in the oncologic population is observed at 24.5%, similar to that described in the study by Perez *et al* with a rate of 23.6%,[12] so that the characteristics of the general and cancer population are similar in terms of the risk of intubation during the implementation of pronation. Since the risk is therefore virtually the same for cancer patients, disease characterization by COVID-19 does not distinguish between these types of populations in terms of severity.

On the other hand, the mean pronation time is similar to the results published in 2022 by Fralick *et al*., in which the median was six hours, directly reflected in the FiO_2 with a representation of 30%,[13] that is, less than 15% of the requirement in the population with neoplasms. This contradicts what was previously described regarding the similarity in the different types of populations, although this variable could have been affected by the treatment provided in each hospital center.

Likewise, variables of interest such as $PaFiO_2$ increased, in agreement with Cherian *et al*.[14] After an average of four hours of conscious pronation, the ratio of oxygen saturation and arterial oxygen pressure (SpO /PaO_2) increased, with statistical significance ($p=<0.001$) and an approximate increase of up to 100 mmHg, taking into account that SpO_2/Fio_2 of 235 corresponds to $PaO2/FiO_2$ of 200.[14] In comparison with Elharrar, who did

not obtain improvement of these values and of $PaCO_2$ without statistical significance,[5] this can be related to time, in which the mean was one hour, which would suggest that the pronation time determines the improvement of the gasometric values.[7]

Similarly, like Sartrini et al., the mean respiratory frequency decreased with statistical significance. It is established that this study was only performed with invasive mechanical ventilation devices in a non-oncologic population, carrying out a comparison in the control and intervention group, in which the number of patients resulted in low respirations. It is worth noting that the control group, not considered in the present study, may have added data with greater statistical weight and may have integrated greater findings in the person with cancer.

To date, the effects of COVID-19 have been based on several epidemiological and clinical measures, which have shaped the recommended protective measures. However, this study is not free of limitations, since only two measurements were made and a control group was not established. In addition, some other variables that may intervene in the analysis, such as BMI, weight, height, and comorbidity, were not included, since they may or may not affect the patient›s improvement. It should be taken into account that this study was only carried out in patients with cancer, which gives us a gap in its treatment.

References

1. **Phua J, Weng L, Ling L, Egi M, Lim C-M, Vasistha J, et al.** Intensive care management of coronavirus disease 2019 (COVID-19): challenges and recommendations. Lancet Respir Med [Internet]. 2020 [cited 2022 Apr 22]; 8(5):506-17. Doi: 10.1016/S2213-2600(20)30161-2.
2. **Liang W, Guan W, Chen R, Wang W, Li J, Xu K, et al.** Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. Lancet Oncol [Internet]. 2020 [cited April 22, 2022]; 21(3):335-7. Doi: 10.1016/S1470-2045(20)30096-6.
3. **Martínez O, Nin N, Esteban A.** Evidence for the prone position in the treatment of acute respiratory distress syndrome: an update. Arch Bronchopneumol [Internet]. 2019 [cited 2022 Apr 22, 2022]; 45(6): 291-6. Doi: 10.1016/j.arbres.2008.05.010
4. **Yamaguchi T, Goya S, Kohara H, Watanabe H, Mori M, Matsuda Y, et al.** Treatment Recommendations for Respiratory Symptoms in Cancer Patients: Clinical Guidelines from the Japanese Society for Palliative Medicine. J Palliat Med. 2016; 19(9):925-35. Doi: 10.1089/jpm.2016.0145.
5. **Sartini C, Tresoldi M, Scarpellini P, Tettamanti A, Carcó F, Landoni G, et al.** Respiratory Parameters in Patients With COVID-19 After Using Noninvasive Ventilation in the Prone Position Outside the Intensive Care Unit. JAMA [Internet]. 2020; [cited 2022 Apr 22, 2022]; 323(22):2338-40. Doi: 10.1001/jama.2020.7861.
6. **Weinkove R, McQuilten Z, Adler J, Agar M, Blyth E, Cheng A, et al.** Managing haematology and oncology patients during the COVID-19 pandemic: interim consensus guidance. Med J Aust [Internet]. 2020 [cited 2022 May, 2022]; 212(10):481-9. Doi: 10.5694/mja2.50607
7. **Hirsch H, Martino R, Ward KN, Boeckh M, Einsele H, Ljungman P.** Fourth European Conference on Infections in Leukaemia (ECIL-4): guidelines for diagnosis and treatment of human respiratory syncytial virus, parainfluenza virus, metapneumovirus,

rhinovirus, and coronavirus. Clin Infect Dis [Internet]. 2013 [cited November 2022]; 56(2):258-266. Available from: https://doi.org/10.1093/cid/cis844

8. **Eichenberger E, Soave R, Zappetti D, Small CB, Shore T et al.** Incidence, significance and persistence of human coronavirus infection in hematopoietic stem cell transplant recipients. Bone Marrow Transplant [Internet]. 2019 [cited November 2022]; 54(7):1058-66. Doi: 10.1038/s41409-018-0386-z
9. **Herrera F, Bues F, Rojas R, Temporiti E, Videla C, Dupont J, et al.** ISARS-COV-2 infection in patients with hematologic malignancies and transplants. Medicine (B. Aires) [Internet]. 2021 [cited November 2022]; 81(3):396-400. Available from: https://cutt.ly/UwLWh55c.
10. **Fuentes G, Venegas C, Ortega M, Briceño C, Dreyse J, Rabagliati R, et al.** Characterization of respiratory infections in adult oncologic patients. Rev. Chil. Chil. Respir [Internet]. 2014 [cited November 2022]; 30(2):75-80. Available from: http://dx.doi.org/10.4067/S0717-73482014000200003.
11. **Martín-Moro F, Marquet J, Piris M, Michael B, Sáez A, Corona M, et al.** Survival study of hospitalized patients with concurrent Covid-19 and haematological malignancies. Br J Haematol. [internet] 2020 [cited November 2022]; 190(1). Doi: 10.1111/bjh.16801.
12. **Pérez O, Escarraman D, Guerrero M, Zamarron E, Mancilla J, Kammar A, et al.** Awake prone positioning and oxygen therapy in patients with COVID-19: the APRONOX study. Eur Respir J [Internet]. 2022 [cited November 2022]; 59(2). Doi: 10.1183/13993003.00265-2021.
13. **Fralick M, Colacci M, Munshi L, Venus K, Fidler L, Hussein H, et al.** Prone positioning of patients with moderate hypoxaemia due to covid-19: multicentre pragmatic randomised trial (COVID-PRONE). BMJ. 2022; núm. 376. Doi:10.1136/bmj-2021-068585
14. **Cherian S, Li C, Roche B, Reyes S, Karanth S, Lal A, et al.** Predictive factors for success of awake proning in hypoxemic respiratory failure secondary to COVID-19: A retrospective cohort study. Respir Med [Internet]. 2021 [cited November 2022]; núm. 181. Doi: 10.1016/j.rmed.2021.106379.