

## RESEARCH ARTICLE

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# Impact of the COVID-19 pandemic on whole blood donation: Perspective of a Portuguese Hospital Blood Bank

Filipa Martins Pereira, Luís Moura, Liliana Fonseca, Arnaldo Brito, Filipe Lobo, Ana Palmira Amaral, Marina Costa

## ABSTRACT

**Aims:** COVID-19 brought shortages in blood stocks worldwide. To try to understand the distribution of the number of donations throughout the pandemic, we carried out a study to assess our donors' sense of security and fear.

**Methods:** Retrospective study that includes all blood donors in our blood bank between July and August 2021. We surveyed the number of blood donations at our center since 2015 and applied a questionnaire to assess motivation, fear, feeling of security, and satisfaction in the implemented security measures and in the access to information about COVID-19 and donation.

**Results:** A total of 558 donors were included in the study, most were men (313), and the median age was 41 years. There was a drop in the number of donations in March and April 2020, but no differences were found in the total number of donations over the years and in 2020. Some donors (n=136) reported being afraid to donate blood during the pandemic. Seventy-one participants had COVID-19 and 425 were vaccinated. Donors felt safer and less fearful after vaccination or illness. Overall donors felt safe during blood donation.

**Conclusion:** Although donors overcome the fear of donating blood during COVID-19 pandemic and feel safe with the implementation of procedures to prevent the transmission of infection, we must implement and review

donor safety measures that increase their trust in the blood bank and guarantee their return.

**Keywords:** Blood donation, COVID-19, Donor motivation, Donor satisfaction

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## INTRODUCTION

COVID-19 is an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus that courses with acute respiratory distress syndrome and was first described in Wuhan, China, in late 2019 [1]. Since March 2020, it has been considered a pandemic by the World Health Organization [2].

The COVID-19 pandemic has affected blood stocks worldwide and several calls have been made over the last two years to keep reserves above minimum stocks [3–5]. Although there was less need for blood components in some moments of the pandemic, with the suspension of routine surgeries and elective procedures, these coincided with a lower influx of blood donors to collection points, imposed by travel restrictions, as well as a higher percentage of donor suspensions due to tighter selection criteria [3]. With the acquisition of knowledge about SARS-CoV-2 infection and modes of transmission, the criteria were adapted over time [6, 7].

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Several publications have described the measures implemented to ensure safety in the transfusion circuit and to motivate and mobilize donors in times of low blood reserves [8, 9]. In our blood bank we adopted several measures to protect the blood donor, the professionals involved and the recipients of blood components. Contacts were made, by telephone and by letter, to the center's regular donors to encourage them to donate.

With this study we intend to understand how the pandemic affected the motivation of donors to donate blood, as well as how the different waves of the pandemic affected our collections and reserves compared to data from previous years. With this study, we intend to improve the satisfaction of our donors by adopting measures that meet their interests.

## MATERIALS AND METHODS

We carried out a retrospective epidemiological study between July and August 2021 at the Blood Bank of the Centro Hospitalar Tondela-Viseu (CHTV), a central hospital, with 35 medical specialties, that serves a population of approximately 300,000 inhabitants. We conducted a retrospective study in which we evaluated the evolution of the number of donations over the last 5 years and pandemic. We also assessed the motivation of whole blood donors during the pandemic and their satisfaction with the measures adopted for safety during donation. The evolution of the number of donations was carried out by consulting the information system for managing the blood bank.

Questionnaires were answered from July to August 2021 and include all candidates for whole blood donation from the CHTV Blood Bank.

Participation in the study was voluntary and all participants gave written consent. The study was approved by the CHTV Ethics Committee.

### Survey instrument

All donors were asked to answer a self-administrate questionnaire with questions about age, gender, occupation, education level, number of previous donations, number of donations since the beginning of the pandemic, history of COVID-19, vaccination against COVID-19, fears associated with blood donation during the pandemic.

To assess motivation to donate whole blood during the pandemic, associated fear, sense of security and confidence in procedures implemented to decrease the risk of SARS-CoV-2 transmission, nine questions were asked. A 5-point Likert scale was offered. The scale ranged from strongly disagree, disagree, undecided, agree, strongly agree or never, rarely, occasionally, often, and always.

The weight and height of the donors were evaluated at the medical appointment for selection of potential donors for blood donation.

## Statistical analysis

For analysis of questions about the feeling of security, satisfaction with information about COVID-19 provided and measures implemented to increase security during donation these were categorized into strongly disagree-neither (1–3), agree (4), and strongly agree (5), or were categorized into never-often (1–3), frequently (4), and always (5), as well as age was stratified into age groups (18–29, 30–55, >55 years).

Chi-square test or Fisher's exact test were used for categorical variables. Continuous nonparametric variables were assessed by Mann–Whitney *U* test. Statistical significance was defined at  $p < 0.05$ . Statistical analysis was performed using SPSS software version 27.

## RESULTS

During the two months of the study 648 potential whole blood donors signed up for whole blood donation at CHTV, of these 558 agreed to participate in the study. All donors who agreed to participate in the study were included. The participation rate was 86.11%. Most donors were male (male–female: 313–245) and the median age was 41 years. Most whole blood donors were armed forces or public security personnel ( $n=103$ , 18.5%). Among the professions at higher risk for SARS-CoV-2 infection, 49 (8.8%) donors were health care professionals and 10 (1.8%) donors worked in nursing homes. The educational level of the study population was medium-high, with 44.8% of donors having completed high school and 30.8% have an academic degree (bachelor, master, or doctorate). Table 1 summarizes donor population characteristics.

Table 1: Characterization of the donor population

Variable	Measurement
Male gender, n (%)	313 (56.1)
Age in years, median [interquartile range]	41.0 [15]
Body mass index, kg/m <sup>2</sup> , median [interquartile range]	25.65 [5.07]
<b>Blood groups</b>	
A, n (%)	234 (41.94)
B, n (%)	41 (7.35)
AB, n (%)	13 (2.33)
O, n (%)	258 (46.24)
Rh (D), n (%)	438 (78.49)
First time donors, n (%)	43 (7.7)
Number of donations, median [interquartile range]	9.5 [17]
COVID-19, n (%)	71 (12.7)
COVID-19 vaccine, n (%)	425 (76.2)

Of the study participants, 43 were first-time donors (7.7%). Among regular donors the median donation was 9.5 whole blood donations. The minimum number of previous donations was 1 and the maximum number of donations was 92. From the start of the pandemic to the date of the study, 404 (72.4%) donors gave whole blood at least once. The maximum number of donations performed from the start of the pandemic was 6.

In this population 71 (12.7%) whole blood donors had COVID-19 and 425 (76.2%) received at least one dose of COVID-19 vaccine. Regarding donors who had COVID-19 (n=71), when asked about feeling safer and less afraid to come to the hospital to donate blood after the disease, most reported that they felt safer (62.9% vs 37.2%, p<0.001) and less fear (60.6% vs 39.4%, p<0.001). Regarding vaccination, most donors who received at least one dose of the vaccine felt safer (69.9% vs 29.8%, p<0.001) and were less afraid (55.9% vs 43.9%, p<0.001) about donating blood.

Of the 136 donors who reported being afraid to go to the hospital to donate blood since the beginning of the pandemic, 73 (55.3%) said they felt more fear during the first wave, 43 (32.6%) during the entire pandemic, and the rest during the other waves.

One hundred twenty-seven (22.8%) donors consider that coronavirus can be transmitted by transfusion and 26 donors (4.7%) declare that they did not want to receive blood, of which 13 referred to COVID-19 as a reason for refusal.

Half of the donors (50.5%) of whole blood were informed about the travel permission for blood donation during the emergency state and mandatory confinement.

Figure 1 shows the evolution of the number of potential blood donors, from 2015 to 2021, and Figure 2 shows the number of units of whole blood collected between 2015 and 2021 in CHTV. During the months of March and April 2020 there was a decrease in the number of potential blood donors and of blood units collected compared to previous years. This trend did not occur in 2021. At the end of 2020 there was also a decrease in the number of whole blood donations. There was a peak in donations

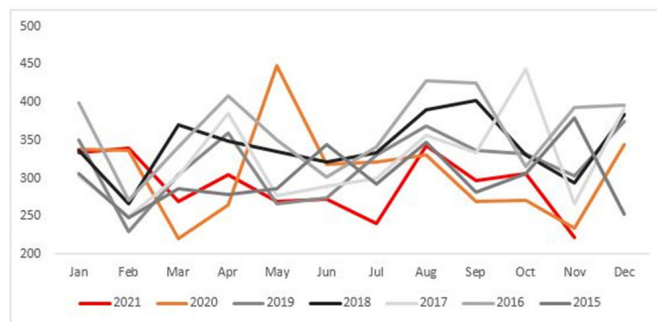


Figure 1: Variation in the number of potential donors enrolled in the Centro Hospitalar Tondela-Viseu Blood Bank between 2015 and 2021.

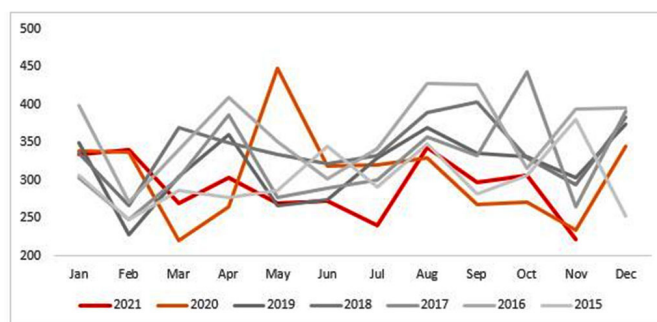


Figure 2: Variation in the number of whole blood donations collected in the Centro Hospitalar Tondela-Viseu Blood Bank between 2015 and 2021.

in May 2020. Despite the decrease in the number of donations in some months of 2020, the total number of donations per year does not differ from other years. The total number of whole blood donations in 2020 was 3698, with the average donation over the previous 5 years being 3965.

Tables 2–4 show the association between different donor characteristics and the donor's sense of security during the donation, agreement with the measures implemented to protect the donor and adequacy of

Table 2: Donor's sense of security during the donation accordingly to donor characteristics

Variable	"Did you feel safe during blood donation?"			Chi <sup>2</sup> ; p
	Never-often (%)	Frequently (%)	Always (%)	
Total	4.3	17.0	76.2	
<b>Gender</b>				
Male	5.2	20.7	74.1	6.587; 0.037
Female	3.3	13.4	83.3	
<b>Age</b>				
18–29	7.6	14.4	78.0	6.369; 0.167
30–55	3.9	18.8	77.4	
>55	0.0	13.5	86.5	

Table 2: (Continued)

Variable	“Did you feel safe during blood donation?”			Chi <sup>2</sup> ; p
	Never-often (%)	Frequently (%)	Always (%)	
<b>Educational qualifications</b>				
Basic school	5.4	12.4	82.2	6.718; 0.151
High school	5.3	19.3	75.3	
Academic degree	1.8	18.7	79.5	
<b>COVID-19 vaccine</b>				
No	2.7	11.6	85.7	4.77; 0.097
Yes	4.7	19.1	76.1	
<b>COVID-19</b>				
No	4.7	17.4	77.9	0.740; 0.691
Yes	2.9	20.3	76.8	

Table 3: Donor’s impression of the adequacy of information received about impact of COVID-19 and blood donation

Variable	“Do you think you’ve received enough information about COVID-19 and blood donation?”			Chi <sup>2</sup> ; p	
	Disagree-neither (%)	Agree (%)	Strongly agree (%)		
Total	16.1	25.0	58.4	0.148; 0.941	
<b>Gender</b>					
Male	16.2	24.8	59.1		
Female	17.1	25.4	57.5		
<b>Age</b>					
18–29	27.1	16.9	55.9	16.869; 0.002	
30–55	13.8	28.2	57.9		
>55	11.4	17.1	71.4		
<b>Educational qualifications</b>					
Basic school	7.6	26.7	65.6	10.374; 0.034	
High school	18.1	24.7	57.2		
Academic degree	20.8	24.4	54.8		
<b>COVID-19 vaccine</b>					
No	15.0	23.0	61.9	0.682; 0.717	
Yes	16.7	25.7	57.6		
<b>COVID-19</b>					
No	17.2	24.7	58.1	1.031; 0.590	
Yes	14.3	30.0	55.7		

Table 4: Donor’s level of agreement with the measures implemented to protect the donor

Variable	“Do you agree with measures implemented to protect you and other donors during blood donation?”			Chi <sup>2</sup> ; p	
	Disagree-neither (%)	Agree (%)	Strongly agree (%)		
Total	7.5	19.7	69.9	5.555; 0.630	
<b>Gender</b>					
Male	9.2	22.8	68.0		
Female	5.9	17.2	77.0		

Table 4: (Continued)

Variable	“Do you agree with measures implemented to protect you and other donors during blood donation?”			Chi <sup>2</sup> ; p
	Disagree-neither (%)	Agree (%)	Strongly agree (%)	
<b>Age</b>				
18–29	8.5	21.2	70.3	
30–55	8.0	20.9	71.1	3.946; 0.414
>55	2.8	11.1	86.1	
<b>Educational qualifications</b>				
Basic school	9.4	14.1	76.6	
High school	7.0	22.5	70.5	4.448; 0.351
Academic degree	7.1	21.9	71.0	
<b>COVID-19 vaccine</b>				
No	5.4	15.2	79.5	
Yes	8.6	21.9	69.6	4.274; 0.121
<b>COVID-19</b>				
No	8.2	20.7	71.1	
Yes	5.8	18.8	75.4	0.688; 0.713

information received about COVID-19 and total blood donation. Men felt less secure during blood donation than women, this difference is statistically significant (p=0.037). No other gender differences were found in this analysis. Donors over 55 years old felt safer during the donation. They also thought that they received sufficient and clarifying information from the blood bank about COVID-19, its impact on donation and safety during whole blood donation in time of pandemic (p=0.002).

When the total donor population was analyzed, no differences were found between the total number of donations by the donor and the sense of security during the donation since the beginning of the pandemic (p=0.550). Blood donors who, prior to the questionnaire, had given blood during the pandemic felt significantly safer than donors who had not given blood during the pandemic (p<0.001).

**DISCUSSION**

This study describes the evolution of blood donations in our blood bank, the fear and satisfaction of donors when donating blood during the pandemic. We performed a retrospective survey including 558 whole blood donors from the CHTV Blood Bank. The results showed that despite possible fears and limitations to donating blood since the beginning of the pandemic, most donors had already donated blood at least once during the pandemic. In our initial study design, we did not consider the assessment of the motivation reason for blood donation, which we currently consider a limitation of our study.

As previously stated, there was a decrease in the number of units of whole blood collected in 2020, when the first case of COVID-19 appeared in Portugal,

mandatory restriction was recommended there [9] and the WHO declared COVID-19 as pandemic [2]. All these situations and the uncertainty about the disease increase the donor's fear of going to the hospital to donate blood and separated the donor from the blood bank. The increase in blood donations in May was due to the promotion of donation by the CHTV Blood Bank and the national appeal campaign carried out by the Portuguese Institute of Blood and Transplantation. The lower number of whole blood units collected at the end of 2020 compared to previous years can be explained by the increasing number of confirmed COVID-19 cases, as well as the increasing number of hospitalized patients. It should be noted that compared to the rest of the year, usually in December the number of blood donations is higher as people at Christmas time feel more willing to help. The high number of donations in October 2017 corresponds to fires that occurred in the central region of Portugal, in which a large part of the territory of the CHTV's area of operation was affected. Given the high number of accidents and injuries at this time, the population was ready to help the affected people, and among various actions they donated blood. This finding is in line with studies that, in times of catastrophe, people feel more motivated to donate blood, as they are aware of blood shortage [10]. Considering that only half of the population was aware of being allowed to travel to donate blood during mandatory confinement, we feel that we do not effectively provide this information to our donors. It should be noted that a large part of our donors are armed forces or public security personnel, who already had access to this information. We believe that having assessed whether national donation promotion campaigns motivate the donor to donate blood would have been important to assess the evolution of the number of donations since the beginning of the pandemic.

Although an increase in the number of first-time donors is described in times of crisis [10–12], our data are not very consistent. We had 43 (7.75) first-time donors in the two months of the study. However, we do not compare the number of first-time donors since the start of the pandemic with previous years.

With the onset of the pandemic, several measures to prevent the transmission of SARS-CoV-2 infection were implemented in our center. Mask use was mandatory, body temperature was assessed at hospital and blood bank entrance, creation of a flow for donors separate from patients, donation appointment and waiting time, limited number of donors in the facilities, distance between people, evaluation of risk contacts before facility access. Several studies have described similar measures. In the global analysis, our donors felt safe during the donation. This finding is in line with the literature that states that donors felt safe during donations in pandemic period [10, 11]. The fact that donors felt more afraid to donate blood during the first wave of COVID-19 can be explained by the lack of knowledge that society had about the disease and all the restrictive measures that were implemented worldwide. A limitation of the study was that it did not assess the donor's motivation to return.

Most donors consider that they were given sufficient information about blood donation and COVID-19, with less educated donors more in agreement with this statement. This may be due to the fact that people with less education do not need a lot of information and feel informed with simple and short messages, where people with higher academic degrees are more demanding on the information provided to them. Weidmann et al. found similar results with men and younger donors expressing a desire to receive more information [11].

Despite the high satisfaction with the procedures implemented for donor safety during whole blood donation, we believe that there is room for improvement. Donors felt safer and less afraid after COVID-19 or vaccination, which makes us question whether our actions were enough to mobilize the donor. Thus, we consider that in future situations of pandemic or even catastrophe, we can provide more information to our usual donors, have closer contact with them and carry out donation promotion campaigns that build loyalty of donors.

## CONCLUSION

One of the consequences of COVID-19 was the decrease in blood reserves nationally and worldwide. Considering the fears of donors and the insecurity that they may feel, we recommend that preventive measures be adopted in future pandemics and that the current ones adapt to the evolution of COVID-19, as well as carrying out information campaigns to educate donors about the risks and safety of donation to increase blood donor retention in these periods.

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### Author Contributions

Filipa Martins Pereira – Conception of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Filipe Lobo – Acquisition of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Ana Palmira Amaral – Conception of the work, Design of the work, Acquisition of data, Drafting the work, Revising

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### Consent Statement

Written informed consent was obtained from the patient for publication of this article.

### Conflict of Interest

Authors declare no conflict of interest.

### Data Availability

All relevant data are within the paper and its Supporting Information files.

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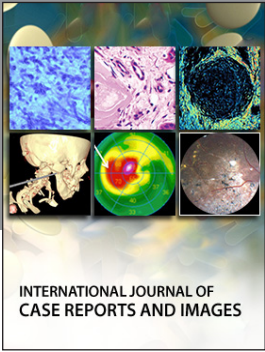
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