

Strategies to recover blood donors during the COVID-19 pandemic: a tertiary level hospital experience

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Abstract

Background: The SARS-CoV-2 pandemic has challenged blood banks. In Mexico, donors decreased 22% between April and May 2020 compared to the same months in 2019. This study analyzed the effect of the strategies to recover donors (altruistic and family) in a tertiary pediatric care center during the pandemic. **Methods:** The Blood Bank of the Hospital Infantil de México Federico Gómez implemented strategies to obtain blood components to ensure self-sufficiency. The effect of these strategies on donor recovery was analyzed. **Results:** There were 7,315 eligible donors in 2019 and 5,070 in 2020. Blood component requirements decreased from 10,037 units in 2019 to 8,619 in 2020. The strategies aimed at attracting altruistic donors managed to increase the percentage of this type of donor when comparing the months in which these strategies were applied with the same months in 2019. In addition, it was observed that the greater the number of methods used simultaneously, the higher the percentage of altruistic donors ($\rho = 0.846$, $p = 0.002$). In contrast, strategies aimed at attracting family donors did not increase the number of this type of donor. **Conclusions:** Actions to recruit altruistic donors increased the number of this type of donor to meet the hospital's needs.

Keywords: Blood banks. Blood donors. COVID-19. SARS-CoV-2.

Estrategias para recuperar donantes de sangre durante la pandemia por COVID-19: experiencia de un hospital de tercer nivel

Resumen

Introducción: La pandemia por SARS-CoV-2 ha representado un reto en los bancos de sangre. En México, los donadores disminuyeron el 22% entre abril y mayo del 2020 en comparación con los mismos meses del 2019. Este estudio analizó el efecto de las estrategias realizadas para recuperar donantes, altruistas y familiares, en un centro de atención pediátrica de tercer nivel durante la pandemia. **Métodos:** El Banco de Sangre del Hospital Infantil de México Federico Gómez implementó estrategias encaminadas a la obtención de componentes sanguíneos para asegurar la autosuficiencia. Se analizó el efecto de dichas estrategias en la recuperación de donantes. **Resultados:** Se registraron 7,315 donadores aptos en el año 2019 y 5,070 en el 2020. Los requerimientos de componentes sanguíneos disminuyeron de 10,037 unidades

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en 2019 a 8,619 en 2020. Las estrategias que estaban destinadas a captar donadores altruistas lograron aumentar el porcentaje de este tipo de donadores al comparar los meses en que se aplicaron dichas estrategias con los mismos meses en el 2019. Además, se observó que, a mayor número de estrategias aplicadas de manera simultánea, mayor porcentaje de donadores altruistas ($\rho = 0.846$, $p = 0.002$). Por el contrario, las estrategias con la finalidad de atraer donadores familiares no lograron aumentar la cantidad de este tipo de donadores. **Conclusiones:** Las acciones para recabar donadores altruistas aumentaron la cantidad de este tipo de donadores para satisfacer las necesidades del hospital.

Palabras clave: Banco de sangre. Donadores. COVID-19. SARS-CoV-2.

Introduction

The pandemic from SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) began in Wuhan, the Republic of China. The first case was reported in December 2019, manifested with pneumonia, and was initially associated with activities in the Wuhan Huanan Seafood Wholesale Market¹. It was recognized as a pandemic by the World Health Organization (WHO) on March 11, 2020, and 118,000 deaths from this virus were reported in 114 countries².

In Mexico, the first case of COVID-19 (coronavirus disease 2019) was confirmed on February 27, 2020. As of March 26, non-essential activities were suspended, excluding those related to security, health, energy, and cleaning services. This measure was accompanied by requesting companies and agencies in the country to stop work involving mobilizing their employees from their homes to the corresponding work center^{3,4}. The Hospital Infantil de México Federico Gómez (HIMFG), a tertiary pediatric hospital, closed its outpatient care, except for hematology-oncology, nephrology, and the immunodeficiency clinic (CLINDI, for its Spanish acronym). As of March 28, 2020, on-call care began in different areas.

In the context of the health contingency due to SARS-CoV-2 in 2020, maintaining blood component reserves has represented a significant challenge for all countries of the world⁵⁻⁷. Mexico has been no exception, as the flow of donors to blood banks has decreased, according to information from the National Center for Blood Transfusion (CNTS, for its Spanish acronym)⁸.

In Mexico, the flow of donors in blood banks decreased during the COVID-19 pandemic. According to monthly reports sent by the country's blood banks to CNTS, a 63% decrease in donors was registered in April 2020 compared to the same month in 2019. In May 2020, 85% fewer donors were reported compared to May 2019. The Ministry of Health, through the CNTS, has guaranteed the supply of safe blood components to the entire National Blood Network,

following the Strategy for safe blood supply during the COVID-19 pandemic (*Estrategia para el abastecimiento de sangre segura durante la pandemia de COVID-19*). This means that, even with the decrease in blood donors and the supply of blood components, Mexico has guaranteed the fulfillment of the demand for blood transfusion, which has allowed, so far, access to transfusion in all hospitals in the country⁸. Despite this, HIMFG sought strategies to recover donors and maintain self-sufficiency in the supply of blood components.

Some of the strategies used globally to ensure blood component supply included deferring elective procedures, limiting routine transfusions, daily auditing of transfusion requests, maintaining a blood component reserve of at least two weeks, communicating with altruistic donors to encourage donation, use of external mobile blood donation centers, and changes in donation requirements, as well as changes in mass transfusion protocols⁹⁻¹³.

Although the above strategies have been implemented, the effect of each on donor flow has not been determined. Therefore, this study aimed to describe the strategy used at HIMFG for donor recruitment and assess its impact on recruiting altruistic and family donors.

Methods

We conducted an analytical, longitudinal, prospective, and quasi-experimental study to analyze the effect of various blood component donor recruitment strategies during 2020. Data on the number of donors, blood components, and rejections were collected routinely and prospectively by the blood bank.

Strategies were added as the need to increase the number of donors arose. Some aimed to attract altruistic donors, while others sought to attract family donors. An altruistic donor is a *person who provides blood or blood components for the therapeutic use of*

Table 1. Blood component donor recruitment strategies

Strategy	Description	Implementation period	Type of donor to whom it is directed
Awareness raising and promotion of blood donation	Awareness-raising talks and promotion of blood component donation were given to patients' families in the hematology-oncology service	March to October 2020	Family members
Updated criteria on the number of donors required for each procedure	Patients undergoing procedures or attending certain services are asked for blood donors as a preventive measure in case they need blood components. There is a ratio of the number of donors requested according to the procedure; this ratio changed after the onset of the pandemic, with more donors requested so that the blood bank would remain self-sufficient	October to December 2020	Family members
Locating recurrent altruistic donors	Altruistic donors were located with the help of the internal operating system "Blood Bank Diagnostic System" to request their support for blood donations	March to June 2020	Altruists
Campaign for HIMFG employees	HIMFG employees were invited by mail to donate blood components. Posters were also placed in the facilities with the same invitation	April to May 2020	Altruists
Partnership with the association Blooders	A partnership was signed with the Blooders association to be part of its digital platform for programming and recruiting altruistic blood donors	May to December 2020	Altruists

HIMFG: Hospital Infantil de México Federico Gómez.

anyone who requires it, with no intention of benefiting a particular person, motivated solely by humanitarian feelings and solidarity, without expecting any compensation in return, and without a specific request from healthcare personnel, family or friends of the patients^{14,15}. A family or replacement donor refers to a person who provides blood or blood components to a patient in response to a specific request from healthcare personnel, family members, or friends of patients^{14,15}.

Data from the 2019 HIMFG blood bank were compared with those from 2020, specifically in the months in which donor recruitment strategies were used, dividing the strategies into those focused on altruistic and family donation. Data from all accepted donors were considered.

Strategies implemented

Strategies were applied to recruit donors and ensure the self-sufficiency of blood components at the HIMFG (Table 1).

Awareness raising and promotion of blood donation

Informative and awareness-raising talks were given at the hematology-oncology and short-stay

chemotherapy outpatient clinic, where bone marrow aspiration and lumbar puncture procedures have been performed on an outpatient basis since March 2020. As many of these patients only come for one procedure and are sometimes transfused before the procedure is completed, the number of transfusions performed and the number of donors requested when the patient is hospitalized increase. In each of the presentations and educational sessions, information was provided on the requirements and need for blood donation in times of pandemic, inviting and encouraging more active participation. Data for the talks was obtained from the Technical Guide of the Blood Bank and Transfusion Medicine Service (*Guía técnica del servicio de banco de sangre y medicina transfusional*)¹⁶, which is an official HIMFG document (reference code HIM-LC-MT-PR.15-DE.01). This document contains a script of what to say to family members, which includes topics such as the following:

- Handling of personal data at the Blood Bank
- Process, screening, and evaluations before donation
- Types of blood component donation
- Average duration of the different donation processes
- Foods and beverages that can be consumed during the donation process
- Promotion of altruistic donation

Table 2. Donors requested according to their condition or procedure

Condition or procedure	Donors required
Hospitalization	Two
Minor surgery or endoscopic procedures	Two
Plastic surgery (cranial advancement)	Five
Orthopedic major surgery	Five
Bone marrow transplant	Five for blood and five for apheresis
Liver transplant	Ten
Kidney transplant	Five
Extracorporeal circulation pump surgery	Eight
Nasopharyngeal angiofibroma	Fifteen
Neurosurgery	Five
Liver biopsy	Two for apheresis

- Hemovigilance
- Myths and benefits of blood donation
- Self-exclusion form
- Care and recommendations after donation.

Updated criteria for requesting blood donors per patient according to procedure

On October 20, 2020, the number of blood donors requested from patients based on the condition or procedure to undergo was updated (Table 2).

Any patient who had met the minimum donation requirements and, having been transfused, required a larger quantity of blood components had to complete the missing blood units.

Locating repeat altruistic donors

Tracking and locating eligible repeat altruistic donors by telephone was performed with the help of the blood bank's internal system. Appointments were scheduled for eligible donors of different blood groups between March and December 2020.

Campaign for HIMFG employees

An altruistic blood donation campaign was conducted for HIMFG personnel in April and May 2020. The campaign was publicized with the support of social networks, the union section 84, and the Institute's commuter. Images of the campaign can be found in Annex 1.

Collaboration with the Blooders association

In May 2020, HIMFG formed a link with the association Blooders to be part of their digital platform for registration and scheduling blood donation appointments. On this platform, donors can choose our institution for donation, and they can schedule an appointment. Blood bank social work was in charge of confirming the appointment, reviewing the donation status, and following up with donors for subsequent donations.

It should be noted that all donors were asked to strictly wear valve-less N-95 or tri-layer masks, as recommended by the Ministry of Health and CNTS. In addition, alcohol gel was constantly provided. Donors were seated in the waiting room, maintaining a safe distance during the blood donation process.

Donors had at their disposal the Integral Privacy Notice of the Blood Bank and Transfusion Medicine Service (*Aviso de Privacidad Integral del Servicio de Banco de Sangre y Medicina Transfusional*)¹⁷.

Statistical analysis

SPSS version 21 was used for statistical analysis. For the baseline characteristics of the eligible donors, frequencies and percentages were used for qualitative variables, and median and interquartile ranges for quantitative variables.

The number and percentage of altruistic and family donors in the months of 2020 in which the strategies were applied were compared with the same months of 2019 using the χ^2 test.

Spearman's test calculated the correlation between the number of altruistic donor recruitment strategies and the percentage of altruistic donors.

Results

Donations

In 2019-2020, 17,003 donors were registered; mean monthly donations were 706.42 (standard deviation (SD) 34.42). Since the beginning of the pandemic, no COVID-19 infection was recorded in donors during the study. The total number of donors in 2020 (6,747) decreased from 2019 (9,787). Of these donors, 7,274 (74.2%) in 2019 and 5,071 (75.16%) in 2020 were accepted.

Table 3. Baseline characteristics of eligible donors

	Total (n = 12,385)	2019 (n = 7,315)	2020 (n = 5,070)	p-value*
Female, n (%)	4,728 (38.18)	2,765 (37.80)	1,963 (38.72)	0.300
Age, median (IQR)	33 (26-42)	34 (26-42)	33 (26-41)	0.002**
Schooling, n (%)				
– Illiterate	65 (0.52)	40 (0.55)	25 (0.49)	0.684
– Reads and writes	132 (1.07)	76 (1.04)	56 (1.10)	0.727
– Primary school	1,173 (9.47)	731 (9.99)	442 (8.72)	0.015
– Junior High school	4,016 (32.43)	2,434 (33.27)	1,582 (31.20)	0.015
– High school	3,633 (29.33)	2,107 (28.80)	1,526 (30.10)	0.119
– Technical career	350 (2.83)	211 (2.88)	139 (2.74)	0.637
– Bachelor's degree	2,838 (22.91)	1,626 (22.23)	1,212 (23.91)	0.029
– No data	178 (1.44)	90 (1.23)	88 (1.74)	0.0201
Blood type, n (%)				
– O+	8,765 (70.77)	5,218 (71.33)	3,547 (69.96)	0.099
– A+	2,368 (19.12)	1,375 (18.80)	993 (19.59)	0.272
– B+	831 (6.71)	490 (6.70)	341 (6.73)	0.950
– AB+	107 (0.86)	60 (0.82)	47 (0.93)	0.528
– O-	211 (1.70)	110 (1.50)	101 (1.99)	0.039
– A-	71 (0.57)	46 (0.63)	25 (0.49)	0.235
– B-	15 (0.12)	9 (0.12)	6 (0.12)	0.944
– AB-	1 (0.01)	1 (0.01)	0 (0)	0.854 (Yates)
Collection, n (%)				
– Whole blood	9,839 (79.44)	5,889 (80.51)	3,950 (77.91)	0.0004
– Apheresis	2,546 (20.56)	1,426 (19.49)	1,120 (22.09)	

* χ^2 -test; **Mann-Whitney U test.
IQR: interquartile range.

The requirement for blood components decreased, as 10,037 units were transfused in 2019 and 8,619 in 2020, thus maintaining self-sufficiency in donations. It is worth mentioning that the components obtained from donors can be fractionated into different blood components.

Regarding the characteristics of eligible donors, they mainly remained the same in 2019 and 2020 (Table 3). Throughout the study, most donors were males between 26 and 42 years of age who had completed high school. Consistent with the prevalence of blood types worldwide, the most frequent blood type was O+.

In 2019, the rejection rate was 25%, while in 2020, it was 29.6%. Approximately 75% of the rejections in both years were due to medical causes (Table 4). The other rejection causes were illicit substance use, acupuncture, and breastfeeding. While the first two causes of rejection remained the same in 2019 and 2020, in 2020, the third cause of rejection was the common cold, while in 2019, it was leukocytosis.

Altruistic donations

Altruistic donors increased in 2020 compared to 2019. A total of 604 altruistic donors were registered during

the study: 246 in 2019 and 358 in 2020. The mean number of altruistic donors per month increased from 20.58 (SD 8.00) in 2019 to 29.83 (SD 13.59) in 2020 ($p = 0.05$). Of the total number of donors, 3.65% were altruistic. Similarly, this figure increased in 2020 compared to 2019: 2.5% altruistic donors in 2019 and 5.3% altruistic donors in 2020 ($p < 0.001$).

Impact of strategies on altruistic donors

The strategies associated with an increase in the percentage of altruistic donors were “Locating altruistic donors” alone, as well as the combination of two or more strategies aimed at obtaining altruistic donors. The collaboration with the Blooders association had no significant impact *per se* (Table 5).

The percentage of altruistic donors was higher when the three strategies were applied simultaneously (Figure 1).

A positive correlation was found between the number of strategies and the percentage of altruistic donors ($\rho = 0.846$, $p = 0.002$). In addition, a tendency for donors to increase with the number of strategies applied simultaneously was detected (Figure 2).

Table 4. Causes of medical rejection

Variables	Total (n = 4,618) n (%)	2019 (n = 2,482) n (%)	2020 (n = 2,136) n (%)	p-value*
Risky sexual practices	878 (19.0)	504 (20.3)	374 (17.5)	0.016
Low hemoglobin	643 (13.9)	381 (15.4)	262 (12.3)	0.003
Leukocytosis	235 (5.1)	128 (5.2)	107 (5.0)	0.820
High hemoglobin	218 (4.7)	145 (5.8)	73 (3.4)	0.0001
Common cold	210 (4.5)	57 (2.3)	153 (7.2)	< 0.0001
Lipemia	184 (4.0)	85 (3.4)	99 (4.6)	0.036
Caries 4 G	172 (3.7)	90 (3.6)	82 (3.8)	0.703
Low weight	168 (3.6)	101 (4.1)	67 (3.1)	0.091
Thrombocytopenia	150 (3.2)	69 (2.8)	81 (3.8)	0.053
Hypertension	122 (2.6)	61 (2.5)	61 (2.9)	0.400
Leukopenia	116 (2.5)	38 (1.5)	78 (3.7)	< 0.0001
Tattoos	103 (2.2)	60 (2.4)	43 (2.0)	0.353
Vaccinations	82 (1.8)	34 (1.4)	48 (2.2)	0.024
Perforations	76 (1.6)	43 (1.7)	33 (1.5)	0.618
Medications	71 (1.5)	29 (1.2)	42 (2.0)	0.028
Difficulty accessing vein	51 (1.1)	41 (1.7)	10 (0.5)	0.0001

* χ^2 -test.**Table 5.** Percentage of altruistic donors during the interventions directed to this population

Number of interventions	Interventions	2019 n (%)	2020 n (%)	p-value
1	Location of altruistic donors ¹	657 10 (1.52)	550 25 (4.36)	0.0030
2	Location of altruistic donors+Donation campaign directed to HIMFG staff ²	707 19 (2.69)	254 47 (18.50)	< 0.0001
3	Localization of altruistic donors + Donation campaign directed to HIMFG staff + BLOODERS ³	554 13 (2.35)	235 39 (16.60)	< 0.0001
2	Localization of altruistic donors + BLOODERS ⁴	1340 62 (4.63)	781 88 (11.27)	< 0.0001
1	BLOODERS ⁵	2739 102 (3.72)	2099 88 (4.19)	0.4058

The months during which the intervention was carried out in 2020 were compared against the same months in 2019.

¹March 2019 vs. March 2020; ²April 2019 vs. April 2020; ³May 2019 vs. May 2020; ⁴June-July vs. June-July 2020; ⁵August-December 2019 vs. August-December 2020. HIMFG: Hospital Infantil de México Federico Gómez.

Also, the results showed a decrease in blood donor refusal in 2020 compared to the previous year. In 2019, the percentage of rejection was 24.9% (mean 203.67, SD 31.84), while in 2020 it was 22.01% (mean 123.75, SD 84.97) ($p = 0.005$). [Table 3](#) shows the number of donors rejected with and without each strategy applied.

Impact of strategies on family donors

No statistically significant differences were observed when comparing the months in which the strategies aimed at obtaining family donors were applied in 2019 compared with the same months in 2020. The only significant difference was found with the strategy "Awareness and promotion in hematology and

Table 6. Percentage of family donors during interventions directed to this population

Number of interventions	Interventions	2019 No intervention n (%)	2020 Intervention n (%)	p-value
1	Awareness raising and promotion in hematology and oncology ¹	4431 4297 (96.98)	2600 2353 (90.50)	< 0.0001
2	Awareness raising and promotion in hematology and oncology + Update of criteria for the number of donors ²	630 604 (95.87)	406 397 (97.78)	0.0966
1	Update of criteria for the number of donors ³	936 890 (95.09)	913 883 (96.71)	0.0778

The months during which the intervention was carried out in 2020 were compared against the same months in 2019.

¹March-September 2019 vs. March-September 2020; ²October 2019 vs. October 2020; ³November-December 2019 vs. November-December 2020.

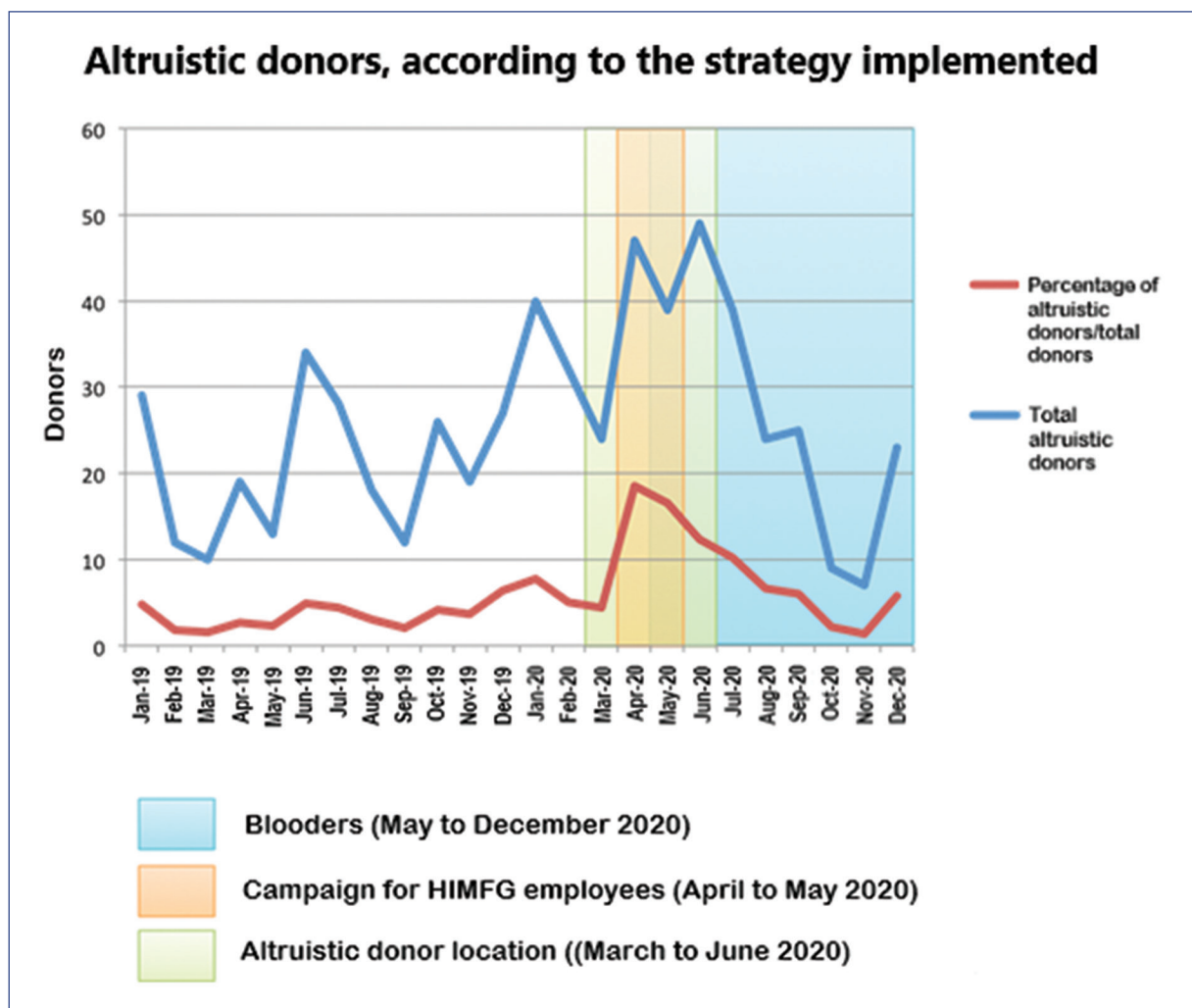


Figure 1. Altruistic donors per month in 2019 and 2020.

oncology.” However, more family donors were identified in 2019 than 2020 when comparing the same months in which the strategy was applied (Table 6).

Discussion

The COVID-19 pandemic significantly decreased the flow of blood donors worldwide⁵⁻⁷; the same occurred

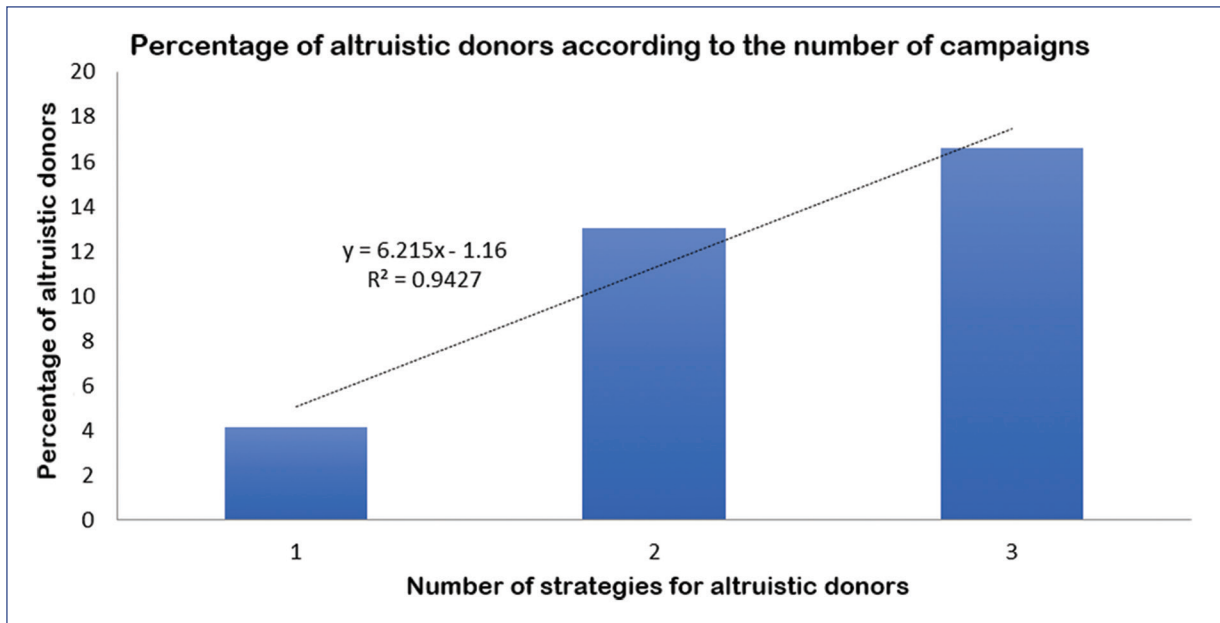


Figure 2. Percentage of altruistic donors according to the number of campaigns.

in the HIMFG blood bank. Although the strategies implemented throughout 2020 to attract donors failed to increase their number, they did manage to increase the percentage of altruistic donors. However, it is impossible to know whether they came willingly or because of any strategies to attract them. Fear of contagion was, however, known to be a factor present at the beginning of the pandemic that caused donors to limit their attendance at the blood banks¹². Regardless, this study demonstrates that strategies to attract altruistic donors had a positive outcome: the more simultaneous strategies were applied, the higher the percentage of altruistic donors.

Another factor that may have influenced the flow of altruistic donors to the bank was pandemic activity. According to data from the National Council of Science and Technology (CONACYT, for its Spanish acronym), in 2020, the highest infection peaks were recorded during July and December¹⁸. In July 2020, two strategies to attract altruistic donors were active at HIMFG. When comparing the percentage of donors between July 2019 and July 2020, we found an increase in July 2020 (4.1% to 10.2%; $p < 0.0001$). Despite being under a wave of contagion, donors came to help, which may have resulted from the strategies implemented. This was not the case during December, as the percentage of altruistic donors in December 2019 and December 2020 did not differ. It should be noted that, during this

month, only the Blooders association linkage strategy was active, which did not show any effect on the increase in altruistic donors.

Strategies focused on family donor recruitment were not entirely successful, as the percentage of family donors was maintained; however, this may be related to several factors. As part of the “Strategy for the safe blood supply during the COVID-19 pandemic” implemented by the CNTS⁸, donor selection and deferral criteria were updated from the onset of the pandemic to avoid COVID-19 transmission. The deferral of elective procedures could have influenced the decrease in the demand for blood components since the beginning of the pandemic, which would explain the reduction of family donors.

Although the various strategies used to maintain self-sufficiency in blood banks have been reported worldwide⁹⁻¹³, we have not found studies that report either the impact or the increase in altruistic donors when implementing simultaneous strategies. The strategies implemented worked in a tertiary pediatric hospital during the COVID-19 pandemic. However, it is essential to mention that these interventions can be extrapolated for future studies. Awareness talks can be given, with the same topics, in other hospitals or institutes. Depending on the procedures or surgeries, the donation criteria requested may vary according to the type of patients; however, they can also be applied.

Locating frequent altruistic donors depends on the records of each blood bank; if a registry exists, reminders can be created to maintain contact with them. If not, it can be made for this purpose. In any work environment, employees can be invited to become donors with information sheets (Annex 1). Finally, organizations such as Blooders serve as a link between altruistic donors and blood banks.

Among the limitations of this study is that being a real-time study, it was impossible to isolate the impact of each strategy since several were applied simultaneously. However, more strategies exponentially affected the number of altruistic donors.

Another limitation was that the scope of the strategies was not quantified. Measuring the direct and indirect impact of each strategy (communication from one person to another, the visual impact of posters, among others) is highly complicated in a hospital, during and outside the context of a pandemic; it is also difficult to measure the persistence of their effect.

Each of the strategies aims to attract donors, but the intention is that they become recurrent donors. A limitation of the study is that there is no way of knowing whether successfully recruited donors donated once or more times during the study, nor whether they continued to do so afterward. Therefore, studies aimed at measuring outreach and continuity are needed.

Finally, the cost of each strategy was not calculated. Although the exact cost of calls, mailings, brochures, posters, and other materials used was not calculated, we consider that the strategies implemented are not costly since most of them depend on the goodwill of those involved.

In conclusion, we can state that altruistic donors are vital in a health emergency to achieving blood bank self-sufficiency. Their participation is of utmost importance since, thanks to them, it is possible to provide adequate care to patients requiring hematological components for their medical treatment.

This study demonstrates that applying simple strategies to recover altruistic donors effectively maintains blood bank self-sufficiency in a pediatric hospital, even in a pandemic. Furthermore, the results suggest the importance of encouraging the implementation of similar strategies in different blood banks in this context.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author has this document.

Conflicts of interest

The authors declare no conflict of interest.

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Supplementary data

Supplementary data are available at *Boletín Médico del Hospital Infantil de México* online (<https://10.24875/BMHIM.21000237>). These data are provided by the corresponding author and published online for the benefit of the reader. The contents of supplementary data are the sole responsibility of the authors.

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