

Journal of a transfusion center in times of COVID-19

Diario de un centro de transfusión en tiempos de COVID-19

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Abstract

Introduction: The COVID-19 pandemic has resulted in several issues related to blood donation and supply. A blood transfusion center has to do an in-depth analysis and adapt quickly and effectively, reaching a balance between the patient's needs and the available donations. Contingency plans, the ability to adapt and develop teamwork, the communication and leadership mechanisms, and the optimal management of people must be tested. Our objective is to describe the actions taken by the Valencia Community Transfusion Center (CTCV) in the face of the COVID-19 pandemic situation. **Materials and methods:** We conducted a SWOT analysis as a tool to evaluate our risks and described communication and decision-making mechanisms, our contingency plan, changes in the organization of work, and blood donation, stock, and distribution evolution. **Results:** We identified some key points in our quality approach to face this crisis: rapid action of the working group, agile and up-to-date communication, message effectiveness for donors, safe donor selection process, no external supply problems, no increase in BC expiration rates and, the efficacy of protection mechanisms. **Conclusion:** The implementation of a contingency plan based on a SWOT analysis has been shown as an effective quality tool in times of crisis.

Keywords: Blood donors. Blood transfusion. Quality Management. Risk Management. COVID-19.

Resumen

Introducción: La pandemia de enfermedad por coronavirus 2019 (COVID-19) ha ocasionado problemas en la donación y el suministro de sangre en todo el mundo. Un centro de transfusión ha de hacer un análisis en profundidad y adaptarse de manera rápida y efectiva, alcanzando un equilibrio entre las necesidades y las donaciones. Se deben probar los planes de contingencia, la capacidad de adaptación y trabajo en equipo, la comunicación, liderazgo y gestión óptima de las personas, sin perder de vista la misión. Nuestro objetivo es describir las actuaciones del Centro de Transfusión de la Comunidad Valenciana (CTCV) ante la situación de pandemia de COVID-19. **Material y métodos:** Realizamos un análisis DAFO (debilidades, amenazas, fortalezas y oportunidades) para evaluar riesgos y describimos los mecanismos de comunicación, toma de decisiones, plan de contingencia, cambios en la organización del trabajo y evolución de la donación, stock y distribución. **Resultados:** Identificamos puntos clave en nuestro enfoque de calidad para enfrentar esta crisis: acción rápida del grupo de trabajo, comunicación ágil y actualizada, efectividad del mensaje para los donantes, proceso seguro de selección y eficacia de los mecanismos de protección, entre otros. **Conclusión:** La aplicación del plan de contingencia basado en análisis DAFO se ha demostrado como una herramienta de calidad eficaz en tiempos de crisis.

Palabras clave: Donantes de sangre. Transfusión de sangre. Sistema de gestión de calidad. Manejo de riesgos. COVID-19.

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Introduction

The Valencian Community Transfusion Center (CTCV) is an organization of the Healthcare Governing Body of the Valencia Community. Its main activity is to obtain and distribute blood and its components (it distributes blood components [BC] to 46 hospitals in the Valencia Community with heterogeneous transfusion activity). Back in 2020 160 000 donations were obtained including total blood and apheresis.

Also, it manages plasma donation to obtain hemoderivatives, cryopreservation of cells and tissues, the mother's milk bank and the umbilical cord blood (UCB) bank, among other processes.

For over 15 years it has had a quality management system that has been applied to all the processes according to the European Union Directives on Good Manufacturing Practices 2003/94/EC and on Commission Directive 2005/62/EC. Also, it has been certified by different accrediting boards such as ISO and FCAT, which favors working with a philosophy of quality, good practices, and safety across the entire chain, from donor to recipient.

The 2019 coronavirus disease (COVID-19) due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been the cause of a worldwide pandemic that started back in December 2019 and that, among many other things, has impacted significantly the healthcare system in general, and blood management and the transfusion of blood and its components across the world in particular.¹⁻⁶

A transfusion center (TC)—in exceptional circumstances like the ones we have gone through—should conduct an in-depth analysis to adapt in the most rapid and effective way possible to a complex situation like this. Reaching a balance between the patients' needs and effective donations poses a complex but achievable challenge.

Currently, we already have information on the experiences of how different countries managed this difficult situation,⁷⁻¹⁰ however, in the early days of March 2020 there was much uncertainty and lack of truthful information.

It is in situations like this that not only theoretical contingency and quality management plans are put to the test, but also—and above all—teamwork, communication, and leadership mechanisms, capacity of adaptation and flexibility, management of people, fear, and uncertainty, and particularly optimal management of our crucial mission: the uninterrupted and ongoing supply to hospitals while observing the following new variables:

- Convincing donors that donation is still necessary without creating a feeling of emergency while making them feel safe at the very moment of donation and favoring safe travels.
- Keeping optimal levels of infection control in health centers even though blood transmission is not confirmed.
- Protecting TC healthcare workers.
- Offering therapeutic alternatives through which we can contribute our experience.
- Letting the entire hospital know about the need for establishing close collaboration in the management of inventory.

Objective

Our objective is to describe the actions of the CTCV in the context of the COVID-19 pandemic.

Material and methods

Thanks to our solid quality management system we have put together contingency plans and documents for risk assessment and management to predict our actions under special and/or emergency situations, which fortunately have been based on theoretical concepts.

SWOT analysis

First, we perform a SWOT analysis (strengths, weaknesses, opportunities, and threats) to face this difficult situation as objectively as possible.

The SWOT analysis is a strategic tool to study how an organization faces a certain process. We use this tool to assess any possible risks (results are shown on [table 1](#)).

THREATS

- Fewer donations due to disease, quarantine or fear in the population that is eligible for donation.
- Difficulty dealing with hospital BC needs.
- Excessive number of donations due to possible emergency and distress feelings in the population.
- Fewer workers due to disease or quarantine, which obviously has an impact on activity.
- Difficulty covering sick leaves.
- Problems associated with the safety of donors, the staff and BC.
- Lack of the necessary materials and reactive agents as well as personal protection equipment for the healthcare workers.

Table 1. SWOT analysis (strengths, weaknesses, opportunities, and threats)

SWOT Analysis	
Threats	Opportunities
– Reduction in the number of donations due to disease, quarantine or fear in the population capable of donating. – Difficulty dealing with the BC hospital needs. – Excess number of donations due to a feeling of emergency in the population. – Fewer workers due to disease or quarantine, and, therefore, less activity. – Difficulty covering the sick leaves. – Problems related with the safety of the donors, the staff, and the BC. – Shortage in the supply of necessary materials and reactive agents, as well as personal protection equipment for the workers.	– Demonstrating that we can keep on fulfilling our objectives despite the difficulties. – Implementing theoretical contingency plans and learning from this development. – Finding new ways of communication, both internal and external. – Improving the relation, understanding, and collaboration with colleagues from other transfusion units. – Being aware that we can and know how to «reinvent ourselves».
Strengths	Weaknesses
– We are a TC with over 30 years of experience and with proven results. – We have a hierarchical structure with great leadership and communication capabilities. – Our organization is centralized, with managers located at the three centers for close and decisive crossed leaderships – We keep a direct and fluid contact with both the local government and with the Spanish Ministry. – We have the autonomy to make decisions regarding many aspects of the donation, process, processing, and distribution. – Our health professionals are well trained and always try to meet the organization general objective. Also, they are used to teamworking.	– Managing an organization including 350 people from different cities and with very different professional categories is complicated. – There has been an increase in the number of sick leaves both due to disease and prevention. Leaves that have been difficult to cover. – It is not always possible to guarantee a certain number of donations anticipated in the collection centers. – It is not always possible to make people adapt to changes easily. – We have had moments of uncertainty and fear. – It is not always easy to distribute BC equitably in moments of shortages. – We manage BC that are very necessary but with short expiration dates. – On some occasions, collection centers have been overcrowded, which has given donors an image of poor organization. – We have not set up a system so donors can make appointments, which would have contributed to the proper management of mass blood collections.

BC, blood components.

OPPORTUNITIES

- Proving that we are still capable of meeting our goals despite difficulties.
- Implementing theoretical contingency plans and learning from this development.
- Finding new ways of communication, both internal and external.
- Improving the relation, understanding, and collaboration with colleagues from different hospital transfusion units (TU).
- Being aware that we can and know how to «reinvent ourselves».

STRENGTHS

- We are a TC with over 30 years of experience and with consolidated results.

- We have a hierarchized structure with great leadership and communication capabilities.
- Our organization is centralized with manager in our 3 different centers for a close and decisive leadership.
- We keep a direct routine contact with the regional government and the Ministry.
- We have the autonomy to make decisions regarding many of the aspects involved in the processes of donation, processing, and distribution.
- Our healthcare professionals are well trained and in tune with the organization general goal. Also, they all have the habit of teamwork.

WEAKNESSES

- Managing an organization of 350 people from different cities and with very different professional categories is complex.

- There have been more professional leaves due to both disease and prevention; leaves that have been difficult to cover.
- It is not always possible to guarantee a certainty the number of donations anticipated in blood collection centers.
- It is not always easy for people adapt to changes.
- We have had moments of uncertainty and fear.
- It is not always easy to carry out equitable BC distribution in moments of shortages.
- We manage BC that are very necessary but with short expiration dates.
- On some occasions, blood collection centers have collapsed giving donors a certain image of poor organization.
- We have not set up a system to give donors previous appointments, which would have contributed to the correct management of mass organ collections.

Risk analysis

After conducting the SWOT analysis, we considered the following important risks to implement proactive measures:

- Reduction of the number of donations due to disease, quarantine or fear.
- Excessive number of donations due to a certain emergency feeling in the population.
- Less workers due to disease or quarantine, and therefore a drop in the center activity.
- Problems associated with the safety of donors, the staff, and BC.
- Shortage in the supply of the materials, reactive agents required, and personal protection equipment for the healthcare workers.

Description of our actions

On the other hand, to describe the actions taken at our TC in this serious pandemic situation, we have considered the description of:

- Communication and decision-making mechanisms.
- Specific contingency plan.
- Changes in work organization and adaptation to the new situation in all departments of our center.
- Protection mechanisms for both the center personnel and blood donors.
- Evolution of blood donation, of the BC stock, and its distribution (compared to other periods).
- Program to obtain plasma from convalescent patients.

Results

Description of communication and decision-making mechanisms

LEADERSHIP, CENTER BOARD OF DIRECTORS, AND HEADS OF THE DIFFERENT UNITS

The center board of directors has been taking the initiative since the end of January 2020, and providing detailed, updated information on COVID-19 for the entire team from different sources of information:¹¹ the Healthcare Governing Body of the Valencian Community, international bodies (The World Health Organization, the European Center for Disease Prevention and Control), recent literature available from countries with previous experience, etc.

At the end of February, a task force was organized including the director of the CT, the different heads of the different units, the people responsible for the different processes and the management of the nursing staff, to lead the response to the pandemic with both virtual and on-site meetings.

DECISION-MAKING PROCESSES

Decision-making processes are carried out by consensus by working groups with data provided by the heads of the different units, and from the specific literature and guidelines available, as well as from previous guidelines published by the Spanish Ministry of Health on Avian influenza.

INTERNAL COMMUNICATION

- Task force meetings.
- News bulletins, and specific sessions for the staff via e-mail, WhatsApp, and the Intranet.
- General information sessions held by the board of directors (targeted at the 3 different centers, via video call back on March 10th).
- Emergency information via WhatsApp, telephone call or orally when required.
- Daily meetings from the heads of blood donation and processing units to assess current needs based on entries and distribution.

EXTERNAL COMMUNICATION

- Hospitals. Initial on-site meetings with the heads of the different hospital transfusion units to present the

contingency plan (March 3rd), and further meetings via videocalls. Several key points are dealt with, among the most relevant ones, the importance of promoting the good use of BC, the commitment of the different hospital management units and transfusion committees and, finally, and if necessary, the creation of a common virtual hospital stock under the centralized board of directors of the TC to facilitate, in case of shortages, the sending of blood units to hospitals in urgent need.

- Donors. Information through social networks, telephone, SMS, and e-mail.
- Other institutions: Healthcare and Education Governing Bodies of the Valencian Community, city halls, health centers, companies, and schools.
- The media. Provision of accurate information on how important it is to keep donation going, without emergency, and on the mechanisms of donor protection.
- Providers. One of the first actions carried out by board of directors was to contact the different suppliers of materials and reactive agents to obtain their commitment to keep on providing these products (February 26-27).
- Spanish Ministry of Health. Meetings twice a week dealing on several issues such as the difficulties CTs are facing, stock management, measures implemented, information to be shared, and goals to be met.

Description of the COVID-19-specific contingency plan

- Draft. Drawn by board of directors based on the previous epidemic experiences with similar viruses (SARS-CoV-2, and influenza A [H1N1] virus infection) and agreed by consensus from the different working group, and the hospital TU board of directors. Internal and external factors were assessed as it was drawn to obtain one homogeneous, stable stock that should include the hospital distribution needs in a changing scenario (eg, cancellation of scheduled surgeries, treatment of onco-hematological patients, and momentary stops of the solid organ transplant program to release hospital space).
- Internal and external spreading. It was sent to the Healthcare Governing Body of the Valencian Community on March 9th, 2020. The CT staff of all hospitals with transfusion activity in our community was trained via talks and e-mails.

Description of the changes in work organization and adaptation to the new situation at all the center departments

These changes occur based on the new variables described above. Other specific variables of each department are added to the former.

The first organization change was to cancel the permits of the entire staff following the recommendations established by the Healthcare Governing Body of the Valencian Community regarding emergency situations to have 100% of the staff available and on active duty.

Below is a description of the specific changes made by the different departments.

BLOOD DONATION UNIT

Advertising section. «New variables»

- Advertising message:
 - Convincing donors that blood donation is still necessary avoiding a feeling of emergency (competing with the message: stay at home),...
 - Conveying safety to the donors involved in the donation process while complying with the recommendations of the Healthcare Governing Body of the Valencian Community (Fig. 1).
 - Promoting safe travel. A document/note was created to access blood collection centers, and to confirm such donation.
 - Blood collection centers:
 - Since the early days of March 2020 and following the early messages about social distancing, many of the usual collection centers were ruled out: universities, secondary education centers, schools, and companies.
- In addition, back in March 5th, 2020, after the state of alarm was declared, the Healthcare Governing Body of the Valencian Community briefed the CTCV board of directors on the need to eliminate health centers as donation suitable sites (which meant almost 70% of all donation suitable sites available).
- In this situation, the entire planning of previously scheduled blood collections changed for the following weeks in full compliance with the Healthcare Governing Body of the Valencian Community Decree 32/2020 of March 13th 2020 on the implementation of extraordinary healthcare measures to safeguard public health due to the COVID-19 pandemic.





THE MOST SOCIAL NETWORK

Coronavirus and donation

We need you more than ever. Donating blood is sharing life.

Every day 650 units of blood are needed in the Valencian Community to meet the hospital demand.



Safe spaces
Donation rooms are safe places. Healthy generous people go there to donate their blood.



Health professionals who take care of you
Health professionals follow instructions to meet the hygiene measures and self-care promoted by the WHO



Health protection
If you have had a respiratory condition or fever over the last 14 days you should not donate.



Distance
Keep social distance with the next donor.



General prevention
Wash your hands with hydroalcoholic gel upon arrival.



Safety measures
After donation, keep the pen!

If you have any doubts call this phone number (cost free)

900 300 555

Donation centers: www.centro-transfusion.san.gva.es

Figure 1. Information on safety during donation.

- The city halls of different cities were asked to co-operate and have alternative facilities available that should comply with the basic requirements for proper blood collection. Also, specific safety measures are added.
 - In addition, the Education Governing Body of the Valencian Community was asked to facilitate the use of educational centers (that would not be involved in any educational activity) as centers suitable for blood collection purposes.
 - New sites were assessed, and the necessary contacts are made regarding logistics (opening, closing, cleaning...).
 - The possibility that the facilities involved could be home to 2 simultaneous, totally independent teams was assessed (in blood collections requiring 2 different teams > 75 donations).
- Projection and arrangement of blood collections:
- On a routine daily basis and always in close contact with the processing unit in charge, the actual needs were always assessed in association with the blood collections projected.
 - From March 30th and given the situation of over-stock due to maintenance of blood donations, and the reduced hospital demand, it was decided to reduce projections by almost 40% by minimizing the number of blood collections. This facilitated the organization of the personnel involved in blood collection processes.
 - Afterwards, a gradual escalation of hospital activity occurred that led to a gradual increase in hospital demand that would eventually reach levels that were almost pre-pandemic.
- Donation area: permanent centers and mobile teams**
- Safety: both in donation rooms and in the mobile teams a new working system is implemented, described in a specific procedure, to protect both the donor and the staff. In conclusion, it regards the use of personal protection equipment (PPE) (masks, gloves), hand washing, safety distancing among people and, also, among the stretchers, safety distancing in lines, etc. In some

blood collections where there have been long lines, the metropolitan police has helped us.

- Transportation of mobile teams to blood collection centers: complying with Royal Decree 32/2020 of March 13 2020 from the Healthcare Governing Body of the Valencian Community, our mobile teams are included in the emergency team category. Therefore, they are authorized to circulate with up to 7 people in each track (using PPE). Each worker has a note signed by management. They should not come from their homes wearing their work clothes. It is mandatory for them to wash their own work clothes on a daily basis as well as the vehicles that transport the team to the blood collection centers.
- Continuing and updated information for all team members: via internal communication mechanisms.
- Selection of donors: to select donors, both for the TU and apheresis, the routine clinical procedure is used while focusing on possible suggestive symptoms, trips to outbreak regions, contact with infected people, etc. (all this was shown in a procedure based on a document published during the 2003 coronavirus epidemic: selection of donors and Coronavirus, published back on February 26th, 2020. Updated on March 9th, 2020).

On this regard and as the pandemic moved forward, the protocol underwent some variations: within the first few days and given that the initial focus was on China and some Italian regions, stays were actively checked within the previous 4 weeks in such areas.

Since the epidemic was spreading geographically, areas were gradually widened and when focus was on our country, a decision was made to look for specific symptoms and contacts with infected or symptomatic people. Let's see a few examples of this:

- On February 24th a 28-day quarantine was imposed on people returning from certain Italian regions (Lombardy, Veneto, Italy).
 - On March 4th, it was widened to include China, Iran, Northern Italy, South Korea, Japan, and Hong Kong. On March 6th, the quarantine period was reduced to 14 days after returning from problematic regions without any symptoms. When the pandemic was declared, the travel criterion disappeared.
- Regarding post-donation monitorization, donors should notify the TC if they suffer from any symptoms that may be indicative of infection 2 weeks after donation.^{12,13} Afterwards (July 2021) this period was reduced to 48 h after donation. A total of 25 donors contacted the center for having been in close contact with the disease or after a diagnosis of COVID-19.

- In 10 out of the first 12 donors (until May 2021) the products were destroyed after diagnosis confirmation. In 5 cases, some of the products had already been distributed to different hospitals (3 platelet pools and 2 packed red blood cells) so they were informed. No side effects were reported in connection with the 5 recipients.
- All the 13 donors who contacted us after July 2021 within the first 48 hours after donation were diagnosed with COVID-19, and products had to be destroyed (none of them had been supplied).

PROCESSING UNIT

Blood component preparation section

- Packed red cell expiration date was extended from 35 to 42 days (since April 16th, 2020).
- The entire blood processing process was centralized at the Valencia center.
- BC distribution was centralized from the Valencia center.
- Daily joint meetings with the blood donation unit to analyze distribution and its adaptation to blood collection.
- Daily analysis of distribution with reports to the heads of staff (management, blood donation, Alicante, and Castellón).
- Virtual computer unification of the stock in a computer application.
- Development of a computer tool online to know the stock available in all the hospitals from the Valencian Community.
- Development of an operational process for the management of convalescent plasma together with its computer development.
- Contact with hospitals to develop a protocol to collect and indicate convalescent plasma.
- Stop the plasma quarantine program as an infectious safety measure.
- Contact with healthcare professionals from different countries to know about the evolution of the pandemic situation, and their actions (Italy, United Kingdom).

Cryopreservation area (hematopoietic progenitor cells and tissues)

- Cryopreservation of allogenic hematopoietic progenitors was started from both related and unrelated donors. The usual pre-COVID standard at the hospitals was to perform transplantation by infusing the product while fresh.

- Dramatic drop of multiorgan donations and, therefore, of tissues. In turn, decrease in tissue implantation activity.

Umbilical cord blood bank

- UCB stopped being collected for a few months.
- Afterwards, the polymerase chain reaction (PCR) test was mandatory for the donor mother to accept donation.

Mother's milk bank

- PCR screening of mothers to rule out coronavirus was added.
- No activity variation was seen regarding the pre-COVID period (same number of donors, volume of donated and processed milk, as well as milk supplied to neonatology units).

Description of protection mechanisms for the center personnel and blood and plasma donors

THE CENTER PERSONNEL

Individual protection measures

According to the recommendations established by the Healthcare Governing Body of the Valencian Community.

Measures to prevent group contagions.

- For the entire center personnel. Organization of work shifts: due to the lower activity reported, part of the staff was able to remain in their homes through «on call» groups with their comeback to work already scheduled while their coworkers remained resting or due to medical leave of a group of coworkers.
- In blood donation teams (both fixed and mobile). Organization of fixed working teams.
- In the remaining units of the center:
 - Changing shifts was cancelled to establish fixed shifts per week in specific centers with the same coworkers.
 - Identification of trained personnel in different areas for substitution purposes when necessary.

Measures to face situations of infected personnel

- Quick hiring of substitution personnel made easy.
- Addition of people «on call».

BLOOD AND PLASMA DONORS

Individual protection measures

Based on the recommendation established by the Healthcare Governing Body of the Valencian Community.

Measures to prevent group contagions

We should mention here:

- Separation among different stretchers.
- Interpersonal distance in lines and rooms.
- Management of lines.

Description of the evolution of blood donation, stock of blood components and their distribution

Comparison of input and output data since the end of February until present time, and the evolution of stock.

EVOLUTION OF BLOOD DONATION

initially and in view of the results of the lower BC distribution that increased our stock, it was decided to reduce the number of blood collections. Therefore, this was followed by an obvious decrease of blood donation starting on the week of March 16th, which became an even greater decrease from March 30th onwards. However, we observed an increase in the number of blood donations per collection (Figs. 2 and 3).

Comparing the number of rejected donors between the same periods of 2019 and 2020, the results were very similar. However, rejection due to infections (fever or contact with sick people) went up from 7.11% in 2019 to 12.10% in 2020. Also, we should mention that during this period the number of first-time donors dropped significantly (< 21%) (Fig. 4). That is, donation was maintained thanks to regular donors.

EVOLUTION OF STOCK

there is an obvious and gradual increase of stock from March 15th onwards compared to the stability of the month of February reported (Fig. 5).

After reaching a peak on April 7th, a progressive reduction is noticed that is associated with a higher hospital demand. We should mention that we kept our stock in adequate numbers throughout the entire time.

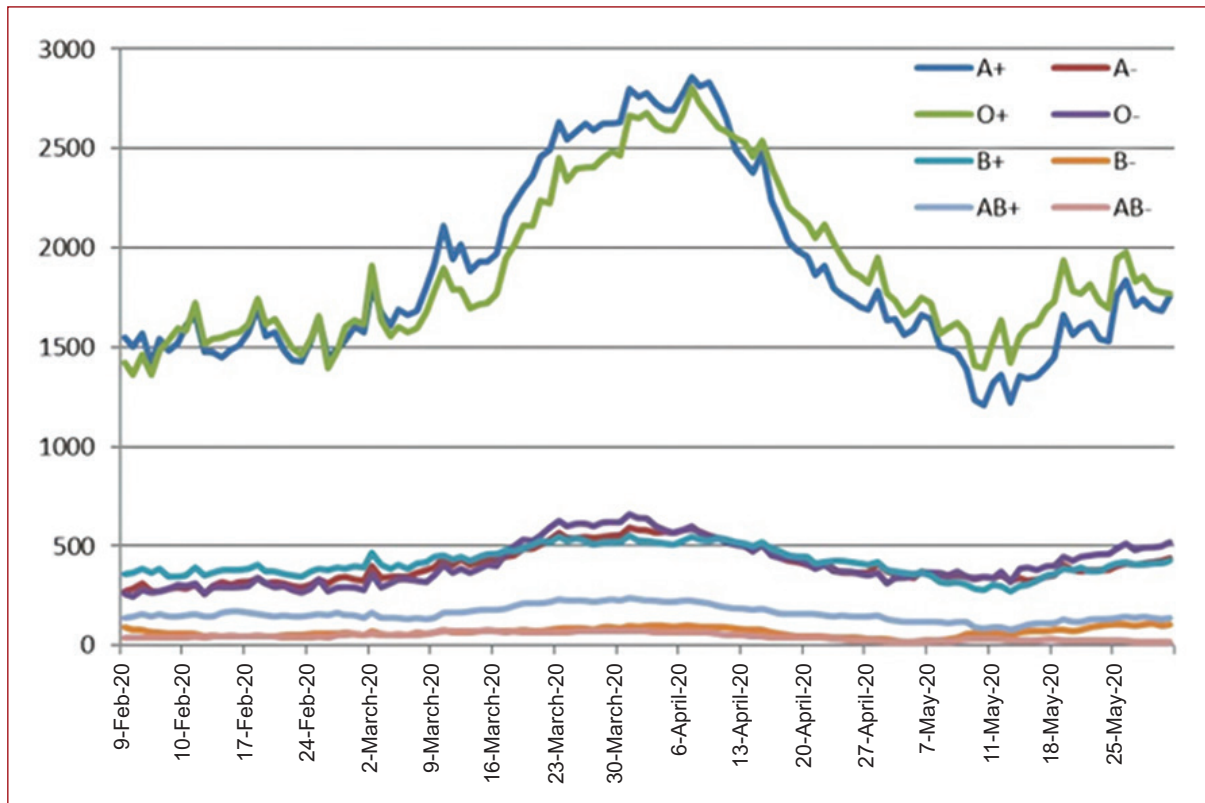


Figure 2. Evolution of stock from February through May 2020.

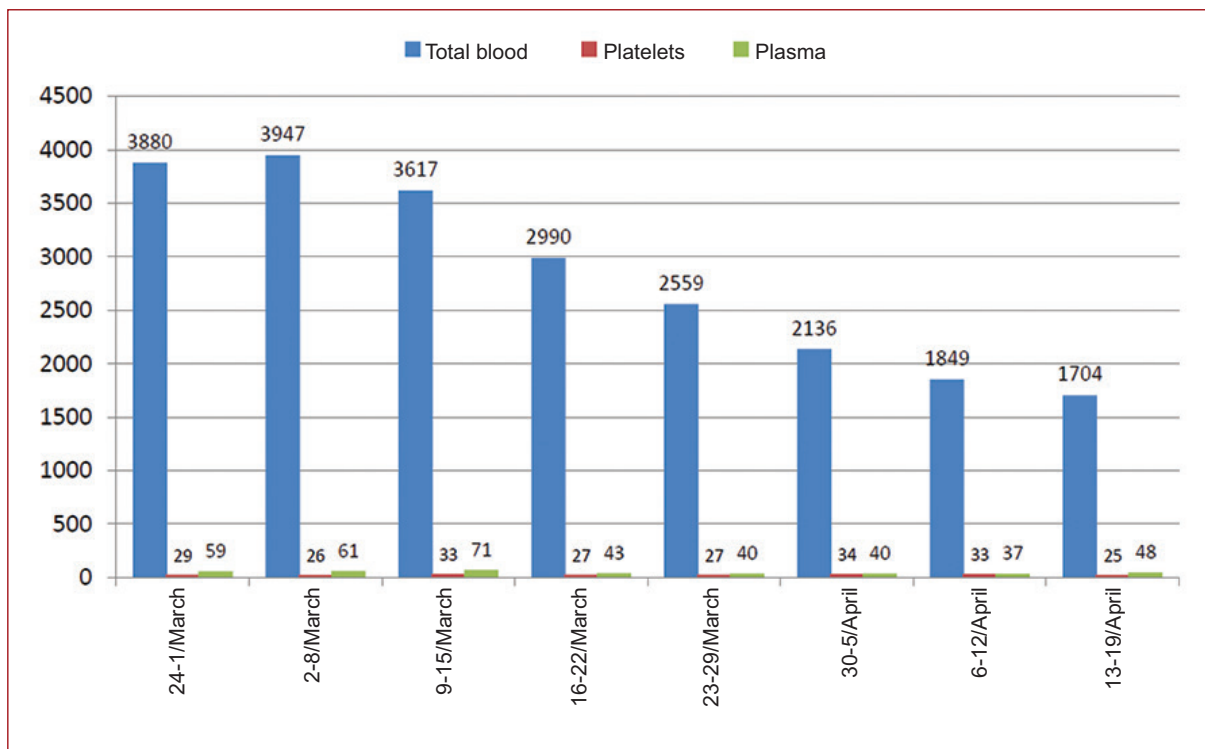


Figure 3. Donations per product (February 24, 2020 through April 19, 2020).

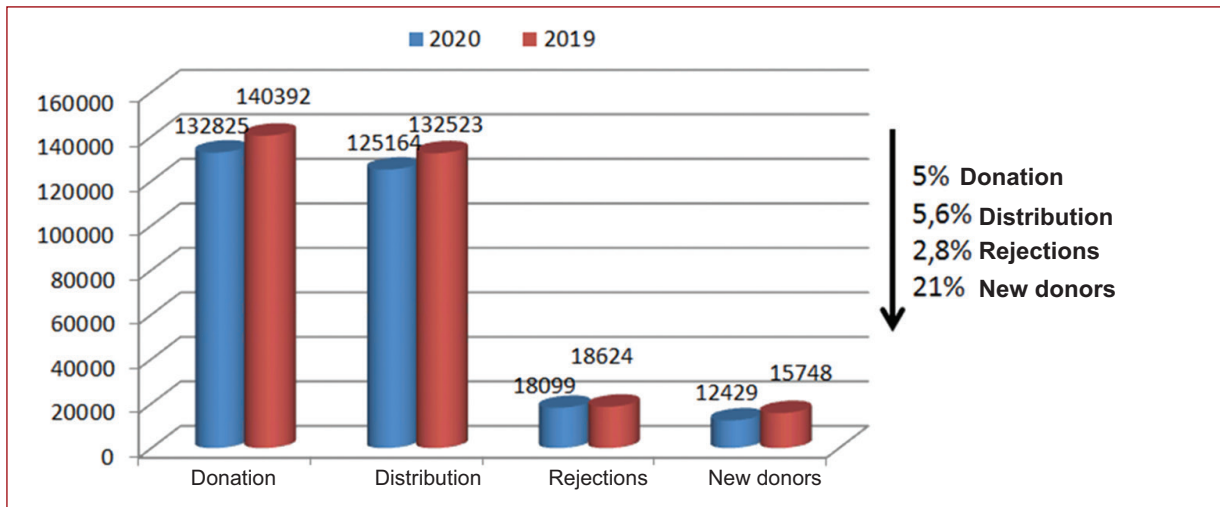


Figure 4. Comparison of the activities carried out regarding donation, distribution, new donors, and number of rejections between 2019 and 2020.

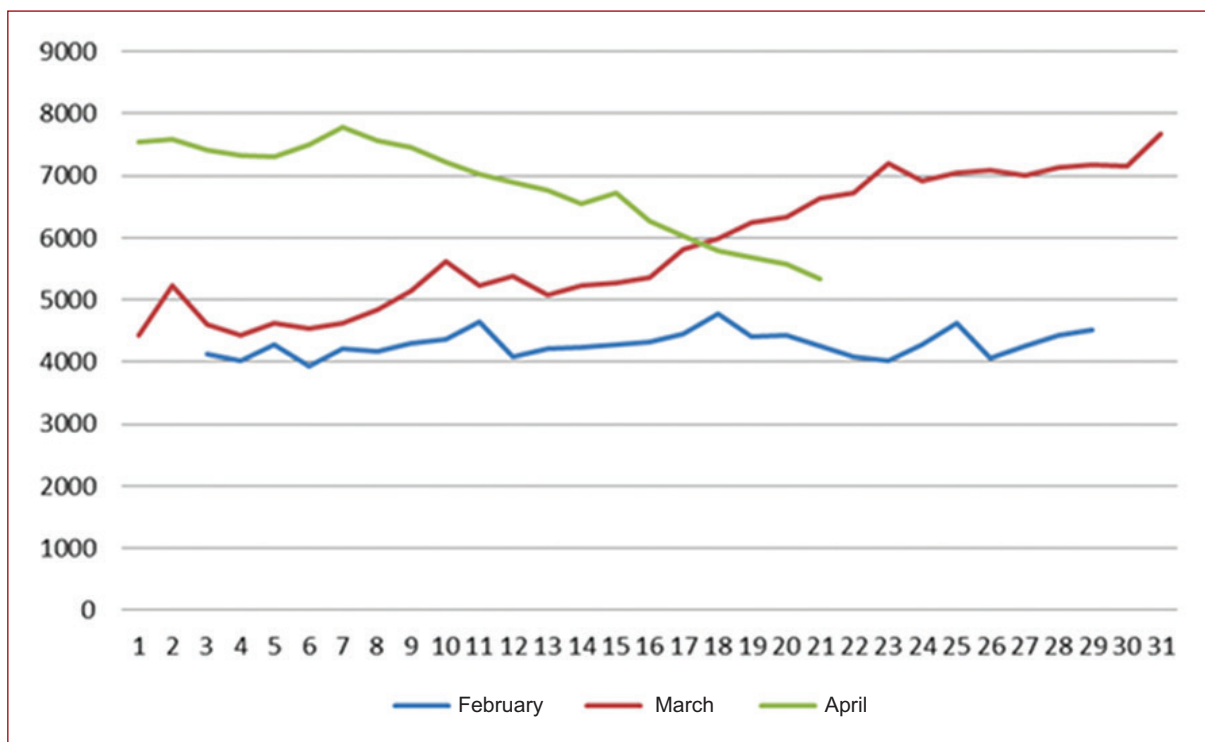


Figure 5. Evolution of the overall stock of blood components (February 2020 through April 2020).

EVOLUTION OF THE DISTRIBUTION OF BLOOD COMPONENTS

– Starting from the week of March 8th, it was obvious there was a significant reduction in the distribution of

BC, above all packed red cells (35%), but also plasma and platelets (25%) (Fig. 6).

– Starting from the week of April 6th onwards, there was a noticeable comeback in demand, which would be confirmed during the week of April 13th.

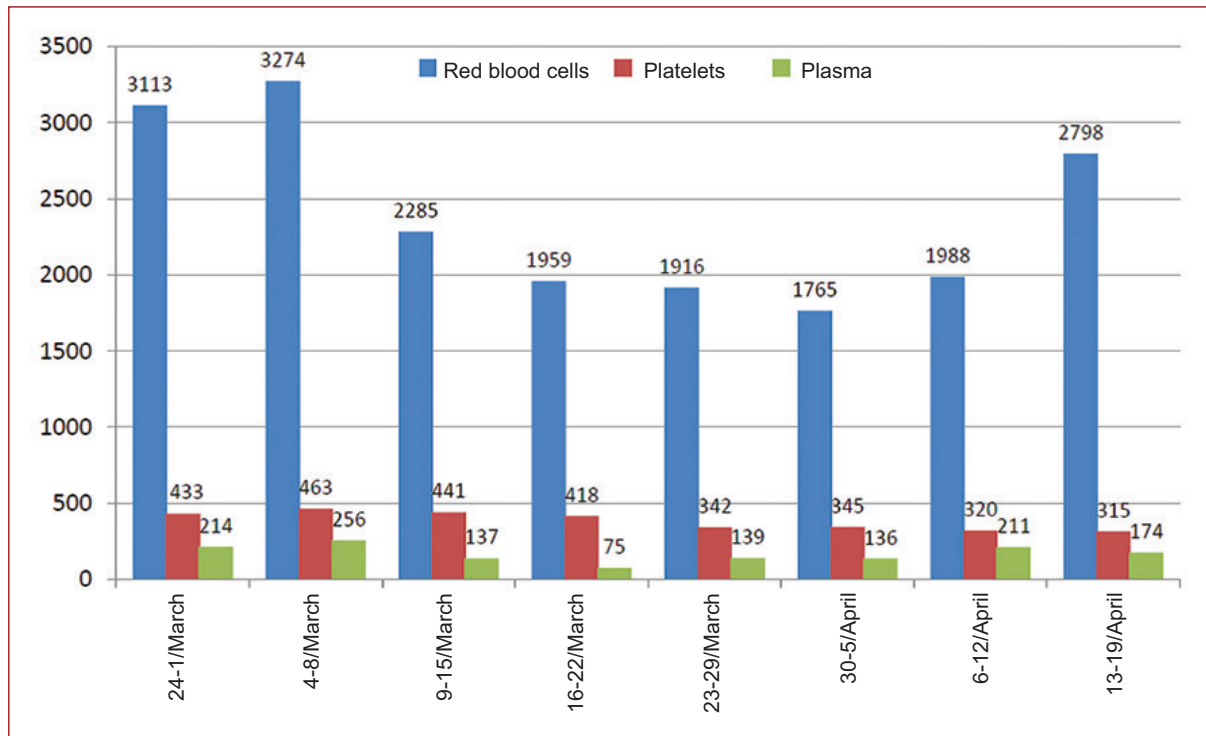


Figure 6. Distribution of blood components to hospitals (March 200 through April 2020).

Beginning of the program to obtain plasma from convalescent patients

- On March 29th work begins in a program to obtain plasma from convalescent patients.
- An inter-hospital COVID-19 working group is organized between the TC and the different hospital TUs. The group goes over the scientific evidence on this issue¹⁴⁻²⁰ and drafts a protocol to be implemented in our community. The protocol consists of 2 different parts: one to be carried out in hospitals (indication, doses, and donor selection) and the other to be developed at the TC (collection of apheresis plasma, pathogen reduction, testing, and labeling, and supply).
- On April 6th the protocol is sent to the hospitals for hospital coordination.
- On April 14th the first donation of COVID-19 convalescent plasma is performed.
- At the beginning of May, the hospital ethics committee approves the protocol and on May 4th the first transfusion is performed.

Conclusions

- Maintaining production and distribution of BC during the COVID-19 pandemic has been extremely challenging for TCs across the world.^{11,21}

- The rapid spread of the disease has led to the need for preventive isolation of the population, which has had a tremendous impact in the reduction of donation that several countries have reported (Italy, Iran, China, United States, and Brazil, among others).^{2,7,22-24} If we compare the reduction of donations in other countries we can see surprising numbers (China, 33%;²⁵ India, 64%²⁶) as opposed to those obtained in our setting (at the CTCV numbers are much more moderate: 20%).
- The adoption of measures to deal with the pandemic has also been analyzed and published by TCs from different countries.²⁷⁻³¹ In general, measures have been adopted to both alert the population about the need to continue donating blood, and to convey that donation is a safe process. In our case, the message of need, but not emergency, has been very effective, since although we have observed an increase in the number of donations in some blood collection centers, it has been a controlled and manageable demand. Donors have trusted us and in the application of safety measures at the very moment of donation. The issue of justification notes for safe travels has contributed to creating a certain feeling of donor protection. As a matter of fact, we can conclude that the mechanisms put into place have been effective/efficient since a larger number of contagions have not

been detected among the center personnel or donors themselves compared to the general population.

- If we focus on the mobile team staff that included a total of 129 people, only one worker became infected (with origin in dates previous to the declaration of the state of alarm).
- Regarding donors, we have only received alerts from 6 donors 24 hours after donation (respiratory infection symptoms in two of them and digestive symptoms in another) and in all the cases the transfusion of their BC was prevented.
- Management of BC stocks during the pandemic was also a very complex task. The drop in the number of donations did not imply a decrease in the stock because, as it has been reported in most countries, it has been accompanied by a parallel drop in the transfusion activity developed because of different factors, above all, delays performing elective surgery.
- In many countries actions have been carried out to optimize BC management, such as daily monitoring of inventory including the stocks found at the hospitals, discussion with hospitals regarding suspension of elective surgeries, and priority in the use of BC with shorter expiration dates. These measures have also been implemented in our center with good results. In some periods the stock has been high, but it did not translate into increased expiration dates.
- The daily meetings with the processing unit have turned out to be crucial for a proper assessment of the needs and estimates in blood collections, as well as the number of these.
- The drop in the planning of blood collections from March 30 onwards following an obvious drop in distribution was very effective to adjust to the actual needs and have availability of a security stock.
- In this context, in our community data on donation, stock, and distribution during the most critical period of the pandemic triggered a logical response to fight back while in pandemic: fewer donations due to less blood collections, yet more donors per blood collection, as well as less distribution to hospitals.
- Information on a post-donation COVID 19 diagnosis (above all in an early manner) has helped reduce the delivery of BC from these donors despite the fact that there is not a single piece of evidence of transmission via blood. No evidence has been reported that the transfusion of BC from positive COVID donors has been associated with adverse events in the recipient/s.
- This situation has also affected the rest of the processes managed by the TCs such as mother's milk

banks, UCB banks, and the hematopoietic progenitor cell cryopreservation unit.

- These results suggest that the measures that were adopted by the CTCV, very similar to those implemented by other TCs from across the world, turned out to be useful to manage the drop in blood donations occurred even in the most critical moments.

Key takeaways

To conclude we should mention the following key takeaways in our quality-based approach to face this crisis:

- The rapid actions carried out by the center board of directors and working group developing and spreading the contingency plan including information to the different TUs and the remaining TC healthcare personnel has been essential to manage the situation appropriately.
- Rapid and updated communication through different methods to the TC personnel has been a basic tool to promote teamwork and favor adaptation mechanisms while avoiding fake news.
- The heads of the TUs have understood the situation perfectly well and, in general, they have been active, understanding collaborators.
- The TC personnel received the contingency plan as an important working tool and a clear, practical action framework.
- Thanks to the shift system implemented there have not been any problems to deal with daily work. Moreover, due to the controls and the staff protection measures implemented, the personnel worked safely at all time.
- Looking for alternative centers to perform the blood collections received help from the different city halls of most towns in the community, as well as from the Education Governing Body of the Valencian Community. The description of the basic requirements to select these centers has been a facilitating tool.
- The donor selection process has been completely safe.
- The start of the COVID convalescent plasma donation program has begun to prove beneficial since it has been possible to recruit a series of recovered COVID-19 patients who have made different plasma donations following the CTCV procedure that have been supplied to hospitals in need.
- The implementation of a quality system to the current crisis can explain, in part, the success of the measures adopted. The activities associated with hemotherapy are strongly regulated, essentially RD

1088/2005, by virtue of which we are obliged to have quality systems implemented in our TCs and TUs. These quality systems provide us with very agile situation and contingency analysis systems. Also, they allow us to face the crisis from the perspective of quality with already-known objectives and indicators that cannot be improvised. In the sections discussed above we have tried to explain this application in a practical way in our context. Also, we have tried to justify that it has been the existence of a culture of quality that has made it possible for us to successfully overcome the crisis caused by the pandemic.

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Conflicts interests

None whatsoever.

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