Blood supply sufficiency and safety management in Iran during the COVID-19 outbreak

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Background COVID-19 first appeared in Iran on 19 February 2020, and then spread rapidly over the country. In this article, we review the action plan of the Iranian Blood Transfusion Organization with respect to this disease.

Method and materials We collected data on blood donations and RBC inventory for the first 8 weeks of the outbreak. We also evaluated the trend of blood donations and RBC inventory and compared them with the data of the past year. We include a summary of actions taken by the National Committee on Management of COVID-19 outbreak.

Results Blood donations decreased from 33 275 to 23 465 units during the first 2 weeks of the outbreak with a corresponding decrease in the RBC inventory. But after that, donations gradually increased from 23 465 to 29 665 units. RBC inventory levels improved at the same time. Then, the Iranian New Year’s holiday resulted in another downward trend. After the holiday, blood donations revived, along with the RBC inventory.

Discussion Although it appears that this virus cannot be transmitted through transfusion, changes in lifestyle had a significant impact on reducing blood supply. Following implemented measures, we saw an upward trend in blood donations and an adequate supply of RBC units in blood centres, helped by a reduction in demand by hospitals. Blood centres need to be more prepared to manage future viral disasters, especially in case of transfusion-transmissible infections.

Key words: blood collection, blood safety, donors.

Introduction

On 31 December 2019, China first reported to the World Health Organization (WHO) a pneumonia of unknown cause in the city of Wuhan [1]. The disease is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This virus spread rapidly, first in China then throughout the world. WHO declared the COVID-19 outbreak to be a pandemic on 12 March 2020 [2].

Blood component safety is a main concern in viral outbreaks, yet no evidence exists of transmission of respiratory viruses through blood transfusions. One study in China showed that 15% of patients with severe COVID-19 symptoms had RNA in their plasma [3]. However, the presence of infectious virus was not reported [4]. The main challenge for blood establishments is recruitment of healthy blood donors in a time of pandemic, ensuring the safety of staff and blood donors, and providing an adequate blood supply. Therefore, we need an emergency plan to manage the blood supply. To provide a safe environment for blood donation, The American Association of
Blood Banks (AABB) has recommended certain measures and US blood centres can voluntarily implement them [4]. The WHO has released guidance on maintaining a safe and adequate blood supply during the COVID-19 outbreak [5].

Iran had its first case of confirmed positive COVID-19 on 19 February 2020. Subsequently, the disease spread rapidly throughout the country. Public events were then cancelled and schools, universities, shopping centres and holy shrines were closed down by the government. People were also encouraged to stay at home. Because of these measures, the Iranian Blood Transfusion Organization (IBTO) suffered a drop in the number of blood donors. There was also concern about the adequacy and safety of blood components. Another worry was the safety of staff members who had to deal with volunteers in the blood centres. In order to manage these concerns, the IBTO headquarters formed a National Committee on Management of COVID-19 outbreak.

This Committee constantly monitored the RBC inventory and blood donations, made decisions based on the results obtained through monitoring, and updated international and national evidence and facts. The aim of this article is to review the trend of blood donations and blood supply during the COVID-19 outbreak in Iran, illustrating the leadership of the National Committee on Management of COVID-19 outbreak and the resulting blood centre practices.

Method and materials

Data collection

We obtained data pertaining to the year 2019 from weekly reports received from all blood centres throughout the country. The data sent to the main headquarters of IBTO included the numbers of weekly blood donations and the available RBCs for distribution to hospitals (blood inventory). Blood centres extracted these data from provincial databases. The Donor Recruitment Department at the main headquarters verified and monitored the data.

We designed statistical software and implemented it shortly before the first case of COVID-19 was reported in Iran. The data entry started from 20 February 2020, the day after the first officially confirmed case of COVID-19 in Iran. The software enabled blood centres to send data on daily blood donations and RBC inventory levels.

In this article, we report the action plan and activities of National Committee on Management of COVID-19 outbreak in IBTO. We also evaluate the trend of weekly whole blood donations and RBC inventory throughout the country from 20 February to 19 April 2020 and compare it with the data of last year.

Strategies to provide safe and adequate blood

Iranian Blood Transfusion Organization took the following actions to assure the availability of a safe and sufficient blood supply as well as to provide a healthy environment for its blood donors and personnel:

- The first step was to correspond with the Shanghai Blood Transfusion Centre in order to learn from their experiences with the management of blood centres during the COVID-19 outbreak. Special thanks to Dr. Ming for sending us their ‘Recommendations for Blood Establishments regarding the Novel Coronavirus Disease’ from Chinese Society of Blood Transfusion.
- A group consisting of faculty members of the Institute for Research and Education in Transfusion Medicine (IRETM) was formed to review and evaluate the latest findings and research about the effects of COVID-19 on blood transfusion.
- We approved and implemented mandatory changes in the eligibility criteria for blood donation in all blood centres.
  (a) A 28-day deferral after complete resolution of symptoms for blood donors diagnosed with COVID-19 or suspected respiratory infections.
  (b) A 28-day deferral for blood donors who have had close contact with COVID-19 patients.

The changes in eligibility criteria were inserted into the blood donor information software, and validation process was completed.

- To protect blood donors and staff, a station for measuring body temperature and mask distribution was established in each blood collection centre. We provided disinfecting materials for the reception area, physician’s room, blood collection hall and refreshment area. Distancing was set up between the chairs of the reception area and blood collection beds. Posters instructed about the use of masks and disinfection of hands.
- Personnel were trained about methods for individual and public prevention of COVID-19. The training included issues on keeping social distance, cleaning surfaces and hands, and covering the mouth and nose.
- We held several webinars with the participation of all provincial managers and key staff members to discuss necessary actions and changes; insights and feedbacks were received.
- We activated an online blood donation appointment system throughout the country.
We put out extensive information on the need for blood components and encouragement of eligible people to donate blood during the COVID-19 outbreak. This went out through mass media, social media and patient advocacy groups representing patients in need of blood transfusion. Some of the slogans used were as follows:

(a) Our blood centres consider all safety issues and have adopted all new scientific guidelines.
(b) Patients are awaiting your life-saving blood donations during COVID-19.
(c) Excuses for coronavirus? No. Do not forget blood donation to save lives.
(d) When out of your home, remember to donate blood at one of the blood centres near you.

We provided Personal Protective Equipment (PPE) such as masks, gloves, sanitizers, and disinfecting materials for blood centres' staff and blood donors.

A meeting was organized with members of the Association of Thalassaemia and Haemophilia Patients in order to assure them that blood supply is safe during the outbreak and to attract their cooperation in recruiting blood donors.

We started plans to audit blood centres directly and without notice. Considering that it was not possible for auditors to be present in all blood centres due to travel limitations, we used alternative methods including a 'Blood Donor Auditors Program'.

We involved regular and experienced blood donors in this program. Thus, in each province, three regular blood donors were identified who met the following criteria:

(a) Adequate experience in blood donation.
(b) Sufficient knowledge of the blood donation process.
(c) Maintaining team spirit.

Finally, we chose one of the three nominated regular blood donors in each province. These donors were then informed by phone about the importance of this program and invited to participate in audits. They were trained to complete a checklist in the blood donation centres. They undertook the responsibility of making unscheduled visits to blood centres and filling out the checklist with precision and honesty. The completed checklists were forwarded to the IBTO main headquarters for analysis and corrective actions.

We asked hospitals to minimize the number of RBCs in their inventories and encouraged them to implement patient blood management strategies.

We arranged a national project to collect COVID-19 convalescent plasma (CCP) from all the eligible, recovered patients who have been free of symptoms at least for 28 days. This followed a national randomized clinical trial on treatment of COVID-19 patients with convalescent plasma which had been approved by the Research Council of IRETM. We took into consideration the recommendations of the USA Food and Drug Administration (FDA) and of European countries, based on the promising news of efficacy of CCP therapy.

Results

The trend of weekly blood donations during the 8 weeks following the outbreak is shown in Fig. 1. This shows a decrease from 33 275 in the beginning to 23 465 blood units after the first 2 weeks of the outbreak. Although the number of blood donations decreased about 29.4%, the number of RBC units in inventory only decreased 19%. The trend of weekly blood donations then gradually increased from 23 465 to 29 665 blood units (26.4%) within the next two weeks. National RBC inventory levels reached a peak (35 747 blood units) at the same time.

The 3rd and 4th weeks of March are the New Year's holiday in Iran and schools, universities, and offices are closed. Therefore, a significant drop normally occurs in the rate of blood donations each year during this period. This year, the government adopted stricter policies and health regulations to manage people during the holidays because of the COVID-19 outbreak. As a result, IBTO was confronted with a significant reduction of blood donations again during the 3rd and 4th weeks of March. This showed in RBC inventory levels.

After the holiday, weekly blood donations recovered from 23 670 to 40 114 blood units (76.9%). Simultaneously, the trend of RBC inventory levels went up rapidly as well (Fig. 2).

Discussion

We drew several conclusions after analysing the trend of weekly blood donations and RBC inventory levels. First of all, there was a sudden drop of about 30% in donations in the beginning of COVID-19 outbreak. The percentage was variable among different blood centres based on the severity of the outbreak in each province. It was due to the fact that people were frightened by the outbreak and preferred to stay home. They were also afraid of being infected in blood centres. Wang et al. reported a drop of 67% at the beginning of the outbreak in Zhejiang.
Fig. 1 Weekly blood donations in 2019 and 2020.

Fig. 2 RBC inventory levels in 2019 and 2020.
province of China [6]. Franchini et al. [7] showed a 10% drop in blood donors during the first week of COVID-19 outbreak. Lee et al. found a 16.9% reduction in blood donation due to a decrease of donors in blood centres and cancellation of mobile sessions during SARS outbreak in 2003 [8].

Second, we saw an upward trend in weekly blood donations 2 weeks after the outbreak, while the prevalence and incidence of COVID-19 was increasing in Iran [9]. It shows that the National Committee on Management of COVID-19 outbreak in IBTO could manage the blood donor recruitment process and quickly build trust among the general population. As previously discussed, IBTO activities were focused on three aspects: (1) donor recruitment, (2) donor safety and (3) blood centre staff safety. All of these aspects had either a direct or indirect impact on blood donation.

Finally, although the number of blood donations was less than it had been at the same time in 2019, the number of stored RBCs did not drop below 28 000 units throughout the first 8 weeks of the outbreak. Based on IBTO’s current policy, the acceptable RBC inventory is sufficient for 4 to 5 days. This amount is normally equal to the demand of 4 days of all hospitals throughout the country. Inventory levels remaining in the acceptable range may have been due to a simultaneous decrease in hospitals’ demand during COVID-19; most patients other than COVID-19 were not admitted in order to prevent further spread of the virus. In addition, elective surgeries were cancelled by the Ministry of Health regulation. People suffering from chronic diseases also preferred to postpone their treatment. However, patients with haemoglobinopathies who needed regular blood transfusions did not have to avoid or postpone their transfusions.

There were many challenges in the CCP program. The main one was the limited availability of antibody test kits. Once these kits reached the market, 14 blood centres started to collect CCP based on the authorized protocol of IBTO. More blood centres are interested in joining this program. The accuracy of antibody tests was another challenge. The final challenge was recruitment of recovered patients as plasma donors, which is ongoing. Blood centres need to gain more experience in this field.

This study had a few limitations that need to be considered. A major limitation was that information pertaining hospital RBC requests were not included. These data existed in all blood centres throughout the country, but were not included in the weekly reports to headquarters, so we could not analyse them. Lacking knowledge of hospital requests made it difficult to interpret the data. Another limitation in this study is that Iran is a large country and the severity of COVID-19 varied in different parts of the country. Therefore, it was better to analyse the data by severity of disease in different part of the country.

In summary, blood donations were affected at the beginning of the COVID-19 outbreak. With all of the above-mentioned measures and participation of dedicated people, trend of weekly blood donations (with notable fluctuation) increased by 26.4% during the 3rd and 4th weeks compared with the first week of the outbreak. In addition, the RBC inventory remained adequate in blood centres, mainly due to a reduction in blood demand by hospitals. Finally, SARS-CoV2 is not considered a transfusion-transmitted infection (TTI). However, it was a challenging problem for blood centres. It seems that in this era, blood centres need to be more prepared to manage future viral disasters, especially one involving a transfusion-transmissible infection.

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Conflict of Interests

The authors declare no conflict of interest.

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