

The impact of COVID-19 on blood transfusion services at Colonial War Memorial Hospital, Suva, Fiji

Nishal Murthi, Shamal Chand, Aruna Devi

Fiji National University, School of Health Sciences, Department of Pathology and Medical Laboratory Science, Suva, Fiji

Abstract

The aim of this study was to find the impact of COVID-19 on transfusion services at Colonial War Memorial Hospital, Suva. The objectives were to identify trends in blood donation and its management before and during the pandemic, and to look at strategies for recruiting donors during the pandemic.

The data collected demonstrated an 8.8% (n=690) decline in donations between the years 2019 to 2020 with a 4.69% (n=336) decline in donations between 2020 to 2021. The findings suggest that the major cause of the decline was due to COVID-19 lockdowns and movement restrictions. Demographics e.g. age of donors were also evaluated to find blood donor deferral and age of donors with the findings showing the age category of 16-45y to be common for deferrals as well as for donation.

A strategic approach needs to be formulated for scenarios like the COVID-19 pandemic to implement working policies.

Keywords: COVID-19, blood donations, deferrals

Introduction

Background

In December 2019, the first cases of coronavirus disease were reported in Wuhan, China and after countries around the world started reporting similar cases, a global pandemic was declared by the World Health Organization (Chen *et al* 2020). Increases in the case numbers led to various restrictions and measures being imposed. The imposed restriction impacted various sectors including health and one department in particular was the blood service department. The impact COVID-19 had on blood services was quite evident in Saudi Arabia as a severe disruption in blood supply and demand was noted in the five major cities (Hakami *et al* 2020). The impact faced was reported to be led by poor planning and management of blood stocks during the pandemic (Gehrie *et al* 2020). The adoption of new strategies in a resource-constrained blood center can lead to well-

managed blood stock levels and an improvement in blood supply (Biswas *et al* 2021). Fiji, like other Pacific countries, is resource-constrained and when pandemics like COVID-19 strike, a major burden falls on the transfusion service. To address the issues of blood supply and demand, new strategies and policies need to be adopted.

In March 2020, Fiji reported its first COVID-19 case, and as case numbers increased, restrictions and lockdowns were imposed. The country had two major lockdowns – one in 2020 and the other in 2021 (Ministry of Health and Medical Services, 2022). The restrictions greatly impacted the health sector. The country's largest medical facility, the Colonial War Memorial Hospital (CWMH), carries out numerous surgeries and transfusions daily. The blood required for these relies solely on the blood service department at CWMH. The constraints the blood services faced during the pandemic can be shown through the data available on the blood supply and demand within the period of the pandemic.

Blood donations save countless lives, however when pandemics like COVID-19 strike, the significant impact is faced by the blood service department along with the challenges that follow. To understand the magnitude of this impact, this study evaluated trends in blood donations while looking at the adoption of blood management policies and changes to donor recruitment. This study also evaluated common deferral causes along with donor

Address correspondence to:
Nishal Murthi
E-mail: nishal.murthi@gmail.com

demographics to potentially target the population for donor recruitment that could be undertaken during similar scenarios like the COVID-19 pandemic.

Aim

A systematic review by Chiem *et al* (2022) was conducted to find the impact COVID-19 had on blood transfusion services worldwide (Chiem *et al* 2022). Thirty-eight articles were reviewed and a significant decrease in blood donors was noted throughout the different regions of the world. The impact of COVID-19 on blood stocks around Fiji was highlighted in a news article in 2022 which described the challenges faced by blood services in donor recruitment as the pandemic kept donors away and the non-government organization, the Red Cross, had to intervene to help create awareness on the blood shortages faced (Critical blood shortage in Fiji, 2022).

While there is currently no available data or publications that can show the impact COVID-19 had on the blood stocks in the country, a comparative analysis of data from the pre-COVID phase and during the COVID phase will supply such evidence of the impact COVID-19 had on blood transfusion services at CWMH. This study evaluates the deferral reasons to find the common causes, and looks at strategies to undertake in response to this. The study also highlights the adoption of strategies that were taken in recruiting donors during the pandemic and how effective these strategies were. Lastly the study examines the major issues faced during the pandemic and recommends how these issues can be addressed to help prepare for a similar scenario.

Objectives

1. To determine the blood donation trends at CMWH before and during the pandemic.
2. To compare the management of blood components at CMWH before and during the pandemic.
3. To identify donor recruitment strategies undertaken during the pandemic at CMWH.

Methods

Collection of primary data

Approval of the research proposal from the College Human Health Research Ethics Committee (CHHREC) was undertaken. Upon approval from CHHREC (ID:036.22), the consent of the currently serving blood service staff for voluntary participation in the interview was gained. The staff being interviewed were given an information sheet (Figure 1) and reassured that their names were not used in this research; instead, a unique code was given. The participants had the option of opting out at any time

during the interview. The interview was conducted in the presence of the supervisor. The feedback collected through the interview questionnaire was compiled and evaluated in excel spreadsheets.

Collection of secondary data

The secondary data were collected in three separate log sheets for component usage, donation trend, and donor deferrals and this was also approved (CHHREC ID:036.22).

The data from the log sheet were entered into excel spreadsheets and checked for duplication. The data were analysed and used to evaluate the chi-square to find significance.

The analysed data were interpreted as below:

1. The data from blood services were used to determine the demographics, such as the age and gender, of donors during and before the COVID-19 Pandemic (January 2019–March 2022) while looking at the trend in donations.
2. Data collected on the donor deferral rates were used to show the common reason for deferrals during the pandemic (March 2020–March 2022).
3. The data collected from the blood bank were used to determine the usage of blood components: red blood cells, platelets, fresh frozen plasma, and cryo-precipitate during and before the COVID-19 pandemic (January 2019–March 2022).

The inclusion and exclusion criteria are shown in Table 1.

Study design

Mixed methods, which includes a cross-sectional and qualitative study.

Study setting

The study was conducted in the blood service and blood bank departments at CMWH.

Study population or sample

The data were collected from registers available in the blood service and blood bank departments, and an interview was carried out with the blood service staff.

Ethical consideration

Data collected was stored in an encrypted file on a USB; the USB was kept with the primary supervisor. All donor information collected is kept confidential. No donor name was used; instead, a unique code was given to each donor. There was no intervention or direct contact with donors as all the data were collected from the registers.

INTERVIEW INFORMATION SHEET

Research Title: The impact of COVID-19 on blood transfusion services at Colonial War Memorial Hospital Suva

Primary Investigator: Nishal Murthi

The details of the study are provided as below. If there are any clarifications or queries on any part of the study which is unclear you can ask me for the clarifications.

Purpose of Research

I wish to carry out an interview on your perspective on blood donor recruitment and the challenges faced during the COVID-19 pandemic. The information will be used to address the objective on strategies implemented and impact faced by the blood donor services during the pandemic.

Participant Selection

You are selected for this interview of being a blood service staff and having a first-hand encounter with donors during and prior to the pandemic.

Voluntary Participation

It is up to you to decide whether or not to take part. If you do decide to take part and approve in taking part in the interview, you will be given this information sheet to keep and be asked to sign a consent form. You are free to withdraw at any time and without giving a reason.

Risks

There is no risk involved. The interview sheet used will not have your name; instead a unique code will be given.

Benefits

The information provided by you in the interview will help in identifying the gaps and challenges faced during the pandemic in blood services and also help in describing the blood donor turnout trend.

Confidentiality

The information collected from this research project will be kept confidential. Your names will not be used in this research. The information provided will be kept with me and my research supervisors in a locked cabinet and will only be used as the intended research.

Thank you

Figure 1. Interview information sheet.

Table 1. Inclusion and exclusion criteria.

Inclusion	Exclusion
<ul style="list-style-type: none"> Data from January 2019–March 2022 was collected. Interview of blood service staff was Conducted. 	<ul style="list-style-type: none"> Data before January 2019 was not used. No interview of donors was conducted.

Confidentiality

All interviewees’ names were kept confidential and were not used in the study. The data collected will be stored in a locked cabinet for 7 years, after which the data will be shredded.

Results

Blood donation trend

A total of 23436 blood donations were recorded from January 2019 to March 2022. The data demonstrated a decline of 8.8% (n=690) in donation between the years 2019 (n=7860) to 2020 (n=7170) and a 4.69% (n=336) decline in donation between 2020 to 2021 (n=6834) as restrictions were imposed upon the increase of COVID-19 cases in the country.

The re-emergence of COVID-19 in the community caused lockdowns and donations of blood declined from March 2021 as the blood services faced a critical low.

June has shown to be the month with the least donations throughout the years (Figure 2). A notable change in donation was seen as of July 2021 with the uplifting of certain borders and hospitals returning to normal operation with rescheduled surgeries. The contingency plan for recruiting donors showed promising results as more donors stepped in to donate.

Blood donations increased after January 2022 (n=1572) this was a result of the uplifting of complete lockdowns and a gradual return to normalcy (Figure 2).

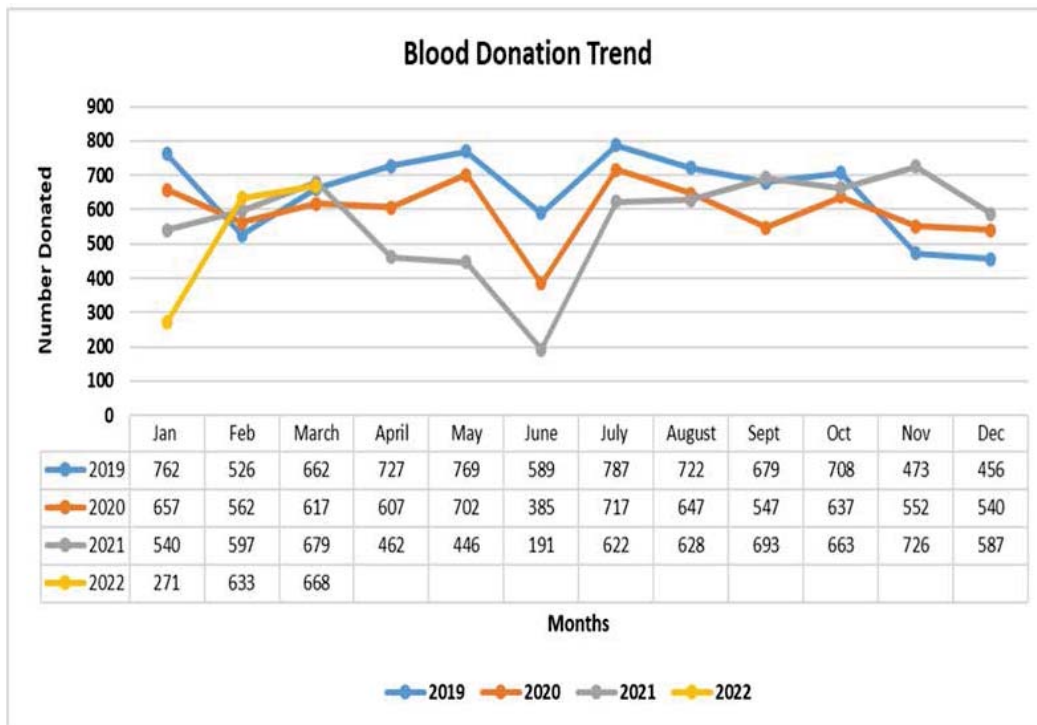


Figure 2. Blood donation trend: January 2019–March 2022.

Blood component usage

A decline in all blood component usage was noted each year as the outbreak of COVID-19 led to a decrease in elective surgeries. The limited supply in blood components led to the prioritization of components to the treatment of patients depending on need.

An 89% (n=641) reduction in packed red cells were noted between 2019 (n=7233) to 2020 (n=6592) and an 88% reduction (n=581) was noted between the periods of 2020 to 2021 (n=6011). Red cell components show the most decline in usage from the month of May to July 2021 as this was commonly used in elective surgeries that had to be rescheduled due to the pandemic.

Platelet concentrate showed a 28% (n=460) decline between 2019 (n=1620) to 2020 (n=1160) however there was an increase of platelet use of 0.09% (n=1) between the years 2020 to 2021 (1161). Platelet usage did not show a decline during the pandemic period as the usage increased slightly from the previous year.

Fresh frozen plasma showed a reduced use of 20% (n=343) between 2019 (n=1739) to 2020 (n=1396) and a 18% (n=245) reduced use between 2020 to 2021 (n=1151). Cryoprecipitate showed a 30% (n=136) decline in usage from 2019 (n=451) to 2020 (n=315) and a 19% (n=60) reduced use from 2020 to 2021 (n=255). Both fresh frozen plasma and cryoprecipitate showed a decline in usage during the pandemic period with the reduced supply components prepared on as need basis. The decline was noted due to the lockdowns imposed and the rescheduling of most elective surgeries. However, all blood component usage tends to increase after January 2022 as blood donation returns to pre-pandemic level (Figure 3).

Donor deferral: March 2020-March 2022

A total of 2066 deferrals were recorded during the pandemic period from March 2020 to March 2022. The deferrals were categorized into three causes; physical, history and personal as shown in Table 2.

Physical causes were the main reason for most deferrals during this period. The common deferrals due to physical causes comprised of donors having low haemoglobin levels and low or high blood pressure. Low haemoglobin was noted to be slightly common in the female donor population. In contrast, low and high blood pressure was shown to be more common in the male donor population.

Donors on medication was the common reason for deferral in the history cause as this comprised of individuals taking medication for chronic conditions like diabetes, high blood pressure and with some taking medication for flu-like symptoms.

Personal causes varied from self-deferral, donor not having enough rest or donor did not have a meal before donation. These were due to lack of awareness on the criteria required for blood donation and this prevented potential donors from donating.

The highest number of deferrals were recorded in 2021, as in this year COVID-19 cases peaked in the central division (Table 3) Uncertainty and fear set in, fewer donors turned up, and restrictions brought a halt to donations, and most donations were through mobile drives in unrestricted areas.

Donor demographics

The following figures show the number of donations of the two genders against their age categories. Age categories between 16-25, 26-35 and 35-45 have shown to be the common categories for most donation in both genders when compared to age categories 46-55 and 56-65. The following results indicate that donation was common in the younger to the middle age category regardless of gender.

Males tend to show a higher donation of blood compared to female donors and this may be a result of females being deferred mostly due to the low haemoglobin (Table 2).

Figures 5-7 demonstrate the donations trend by age during and before the pandemic and as shown in the figures, a significant decline of donations was noted in all age categories following March 2021 as restriction were imposed and COVID-19 cases started to increase.

The male donor population recorded its highest number in blood donations in March 2021 across all age categories. This was due to scheduled elective surgeries; however, after the announcement of community outbreaks of COVID-19, blood donations decreased drastically. A steady decline was noted on the female donor population across all age groups as the cases peaked.

There was a significant peak in the age category between 56-65 in June 2019 as this shows the highest blood donation of the male population and this was due to the recruitment of healthy donors for family-based replacements of donor units.

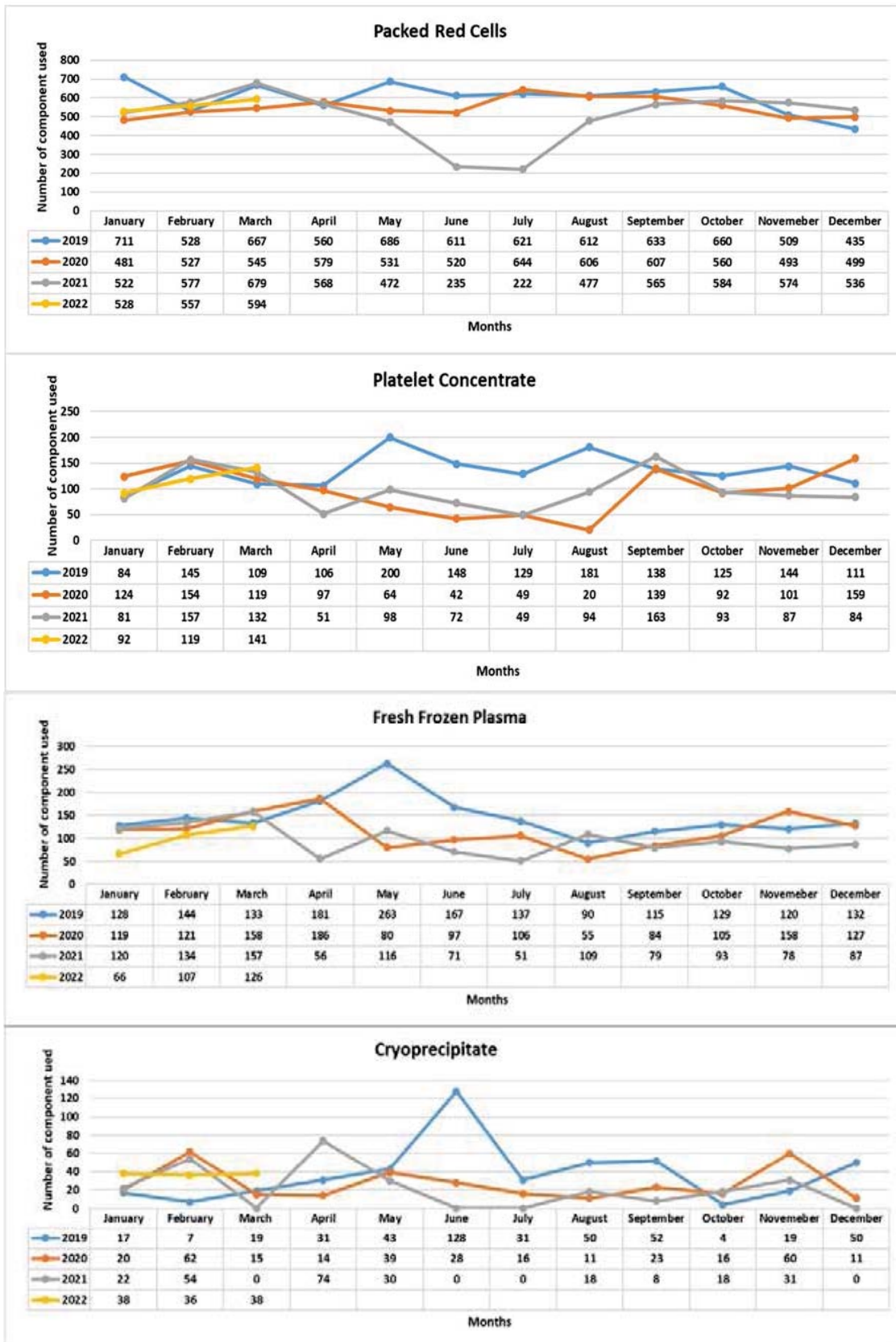


Figure 3. Blood component usage January 2019 to March 2022.

Table 2. Causes of deferral.

Personal Cause			
	2020	2021	2022
Did not have a meal	8	8	2
Did not have enough rest	10	4	0
Difficult vein	1	2	2
Fasting	0	0	1
Feeling weak	0	0	1
Over age limit	2	0	1
Self-deferred	7	8	3
Total	28	22	10

History Cause			
	2020	2021	2022
Abscess	7	10	0
Accident	0	1	0
Admitted	4	0	0
Allergy	1	3	0
Asthma	10	6	2
Attending medical clinic	2	0	0
AVI	1	0	0
Blisters	2	0	0
Bloody stool	1	0	0
Breast feeding mum	3	7	1
Bruise	0	0	1
Chest pain	2	1	1
Chronic cough	21	6	6
Cold	1	0	1
Cold sores	0	1	0

Consumed alcohol	0	4	0
Diabetic	4	4	2
Drugs	1	0	0
Ectopic pregnancy	0	1	0
Eye infection	0	1	0
Fish poisoning	1	0	0
Gout	1	0	0
Heart problem	0	1	0
History of transfusion	1	0	0
HTN	0	2	0
Infected wound	0	1	0
Infectious disease	15	2	2
Injury	1	2	3
Knee swelling	0	1	0
Lapse in menstruation	0	21	8
Last donation less than 3 months	12	6	1
Lesion on finger	1	0	0
Liver abscess	1	0	0
Lump	1	0	1
Medical condition	11	1	0
Menstruation (not 2 weeks)	31	41	15
Mild stroke	1	0	1
Miscarriage	1	0	0
Not ABO blood group specific	23	17	10
On antibiotic	4	6	0
On medication	68	24	11
Open wound	33	12	5
Piercing	2	2	2
Pregnant	1	1	0

Pregnant delivered less than 6 weeks	1	0	0
RHD	1	1	0
Ringworm	1	0	1
Sinuses	1	0	0
Skin disease/rash	23	8	2
Sore throat	2	0	2
Surgery	3	2	0
Swabbed for COVID	0	1	0
Swollen LEG	0	2	0
Symptomatic of COVID	0	0	1
Tattoo (less than 6 months)	14	12	5
Tooth extraction	1	0	0
Travel history	2	0	0
Underwent medical treatment	0	1	0
Total	318	212	84

Physical Cause			
	2020	2021	2022
Body pain and fatigue	1	0	0
High blood pressure	90	181	80
High blood pressure and low Hb	0	1	0
High blood pressure and on medication	0	1	0
High body temperature	1	0	0
High temperature and low Hb	0	1	0
Low blood pressure	91	77	43
Low Hb	290	355	120
Low Hb and High blood pressure	0	8	12
Low Hb and Low blood pressure	7	9	0

Overage limit	0	5	0
Underage limit	0	2	0
Underweight	5	7	0
Vein collapsed	2	3	0
Total	487	650	255

Table 3. Number of deferred donations by year and cause.

Causes	2020	2021	2022	Total
Personal	28	22	10	60
History	318	212	84	614
Physical	487	650	255	1392
Total	833	884	349	2066

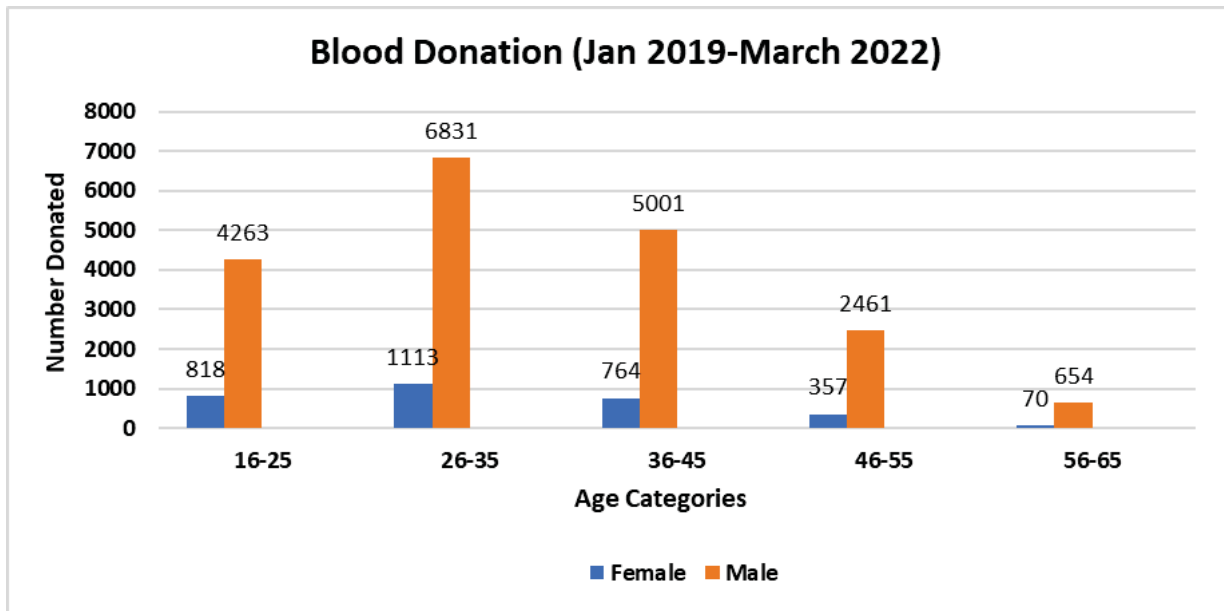


Figure 4. Donation age and gender category (January 2019-March 2022).

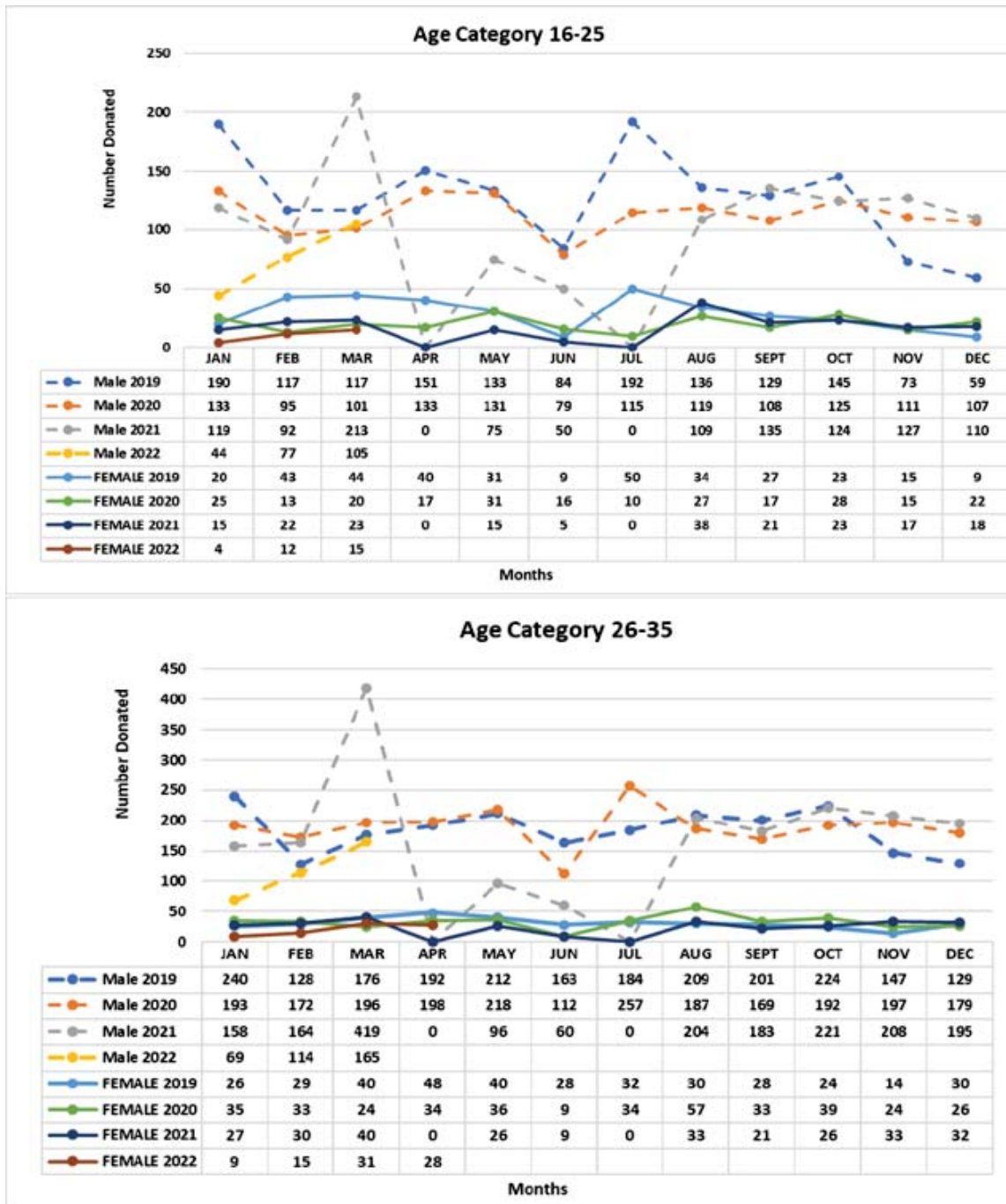


Figure 5. Age category donations 16-25y and 26-35y.

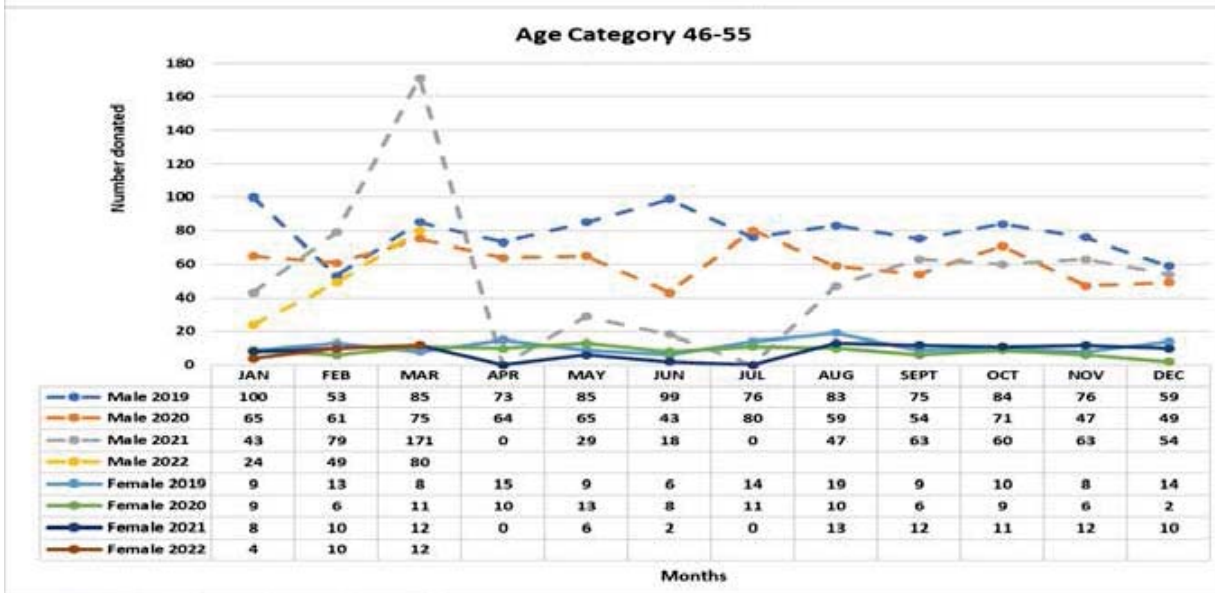
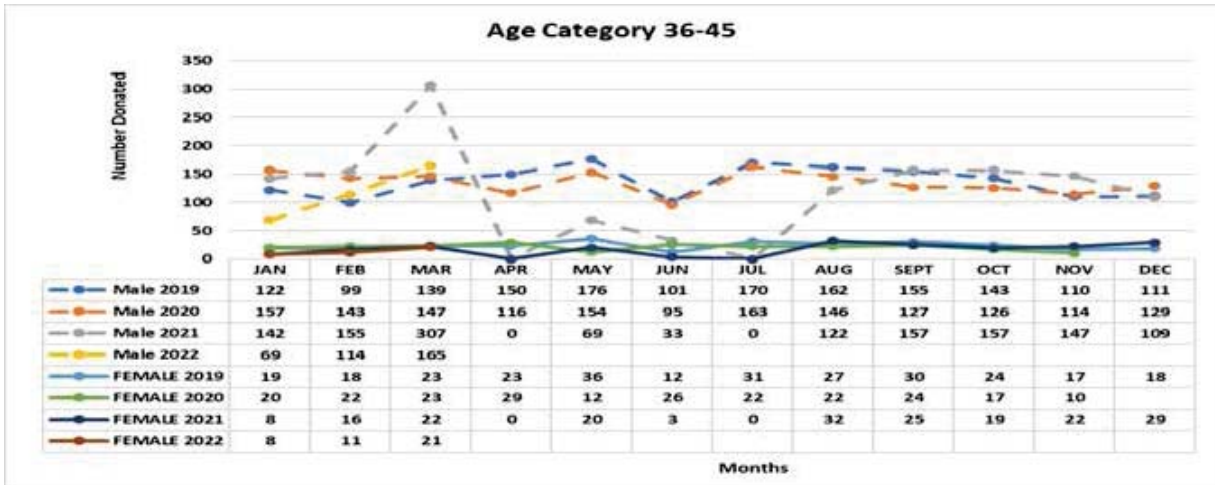


Figure 6. Age category donations 36-45y and 46-55y.

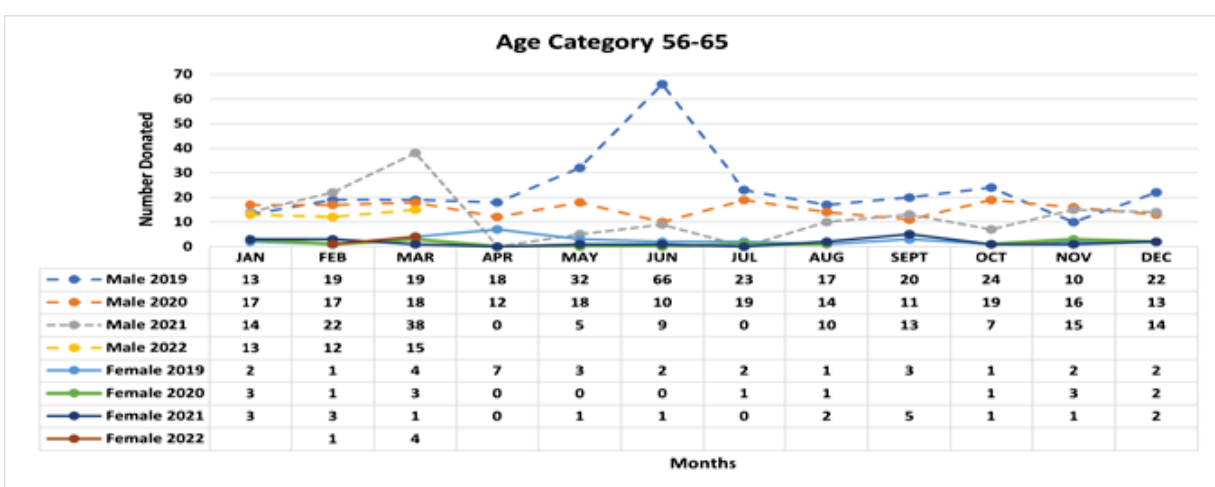


Figure 7. Age category donations 56-65y.

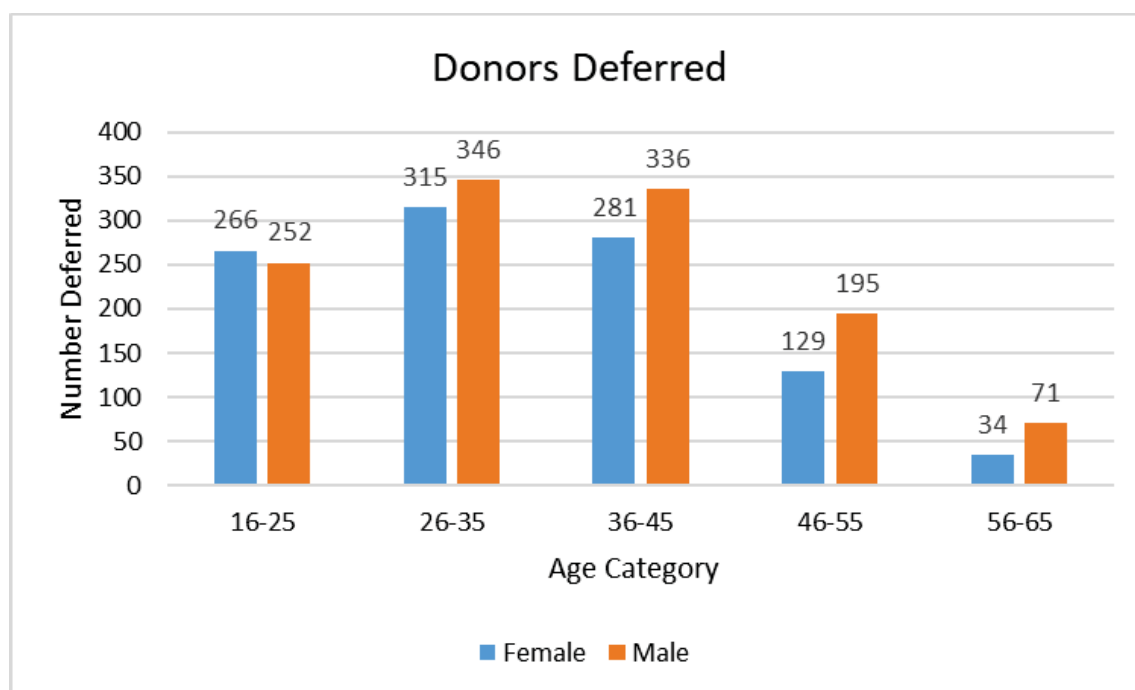


Figure 8. Donor deferrals during the pandemic (March 2020-March 2022).

Age and gender deferrals

Figure 8 shows the deferral rates seen in the two genders against different age categories during the pandemic period. It is evident that deferral rates of some age categories varied from others across both the genders during the pandemic.

The two genders show that the age categories with the highest deferral rates were ages between 16-25y, 26-35y, and 36-45y. This is shown to be similar to the age categories with the highest blood donations made during the period, and this indicates a potential correlation between the deferral rates and those willing to donate.

Interview

The interview was conducted with the five members of staff that made up the Department of Blood Services on the impact of COVID-19 on blood donation and the strategy undertaken to recruit donors.

The interview response was coded on common themes and evaluated to show the common response among the interviewees. Fear of infection and restrictions showed a similar cause for lower blood donor turnout. The fear of contacting COVID during the visit was highlighted in the interview as the individuals were also not aware of the safety measures that were set up for a safer donation (Table 4).

Discussion

The first cases of COVID-19 were reported in March 2020 which led to the major cities and towns of the larger island of Fiji into a lockdown. The cases declined and by December 2020 the nation was on the verge of re-opening to international travel and return to normal day-to-day operations. On April 19th, 2021, the first case of community transmission was announced and a nationwide lockdown was imposed again. During the periods of lockdown, restrictions were in place such as no gathering, maintaining social distances, and the closing of schools and non-essential businesses (Ministry of Health and Medical Services, 2022).

This study aimed at evaluating the impact COVID-19 had on the blood transfusion services by analyzing the supply and demand of blood products during and before the pandemic. The data collected from blood services on blood donations showed a decline each year, as an 8.8% decline was noted between the years 2019 to 2020 and a 4.69% decline between the 2020 and 2021 period. A notable decline in blood donations was captured during the period of lockdown from April 2021 to June 2021, in which blood donations were critically low (Figure 2). A similar result was noted in Maharashtra, India, where blood donor turnout dropped as social distancing and restrictions were imposed. This also led to a decline in blood components (Dhote & Srivastava, 2021). Social restrictions, lockdowns, and the closure of schools, universities, and workplaces had put a halt to blood drives also seen in Hong Kong, which led to a decline in

Table 4. Perspective of blood service staff on blood donor recruitment during the pandemic.

Questions	Participants' response	Outcome % (n)
1. What impacts donors from donating during the COVID-19 pandemic?	Fear of infection	100 (n=5/5)
	Lock-down	60 (n=3/5)
	Restrictions	100 (n=5/5)
2. In your opinion, how can donors be recruited for emergency blood needs?	Through donor databases	100 (n=5/5)
	Home to home donor recruitment	40 (n=2/5)
3. In your opinion, what is the suggested solution to overcome the blood shortage?	Awareness	80 (n=4/5)
	Targeting age specific groups	40 (n=2/5)
	Family-based replacement	40 (n=2/5)
4. Is there any strategy in place for recruiting donors in the COVID-19 pandemic?	Hospital staff donations	60 (n=3/5)
	Screening (Temperature check, app etc.)	80 (n=4/5)
	Target non-restricted areas	20 (n=1/5)
5. Are there any changes implemented on the donor criteria form, following the COVID-19 pandemic. If so, what changes have been implemented?	NO	100 (n=5/5)
	COVID-19 vaccination status to be included	60 (n=3/5)

blood donations (Leung & Lee, 2020).

In addition to the lockdown, a major contributing factor was fear as this deterred donors from donating and the majority of donations that came were family-based replacement donors. The other contributing factors were restrictions and lock-down (Table 4). A study by Saud *et al* (2022) on the Saudi population addressed the knowledge and awareness of blood donors on COVID-19 as well as the reasons preventing individuals from donating. The findings showed that most potential donors feared the risk of COVID-19 transmission (Saud *et al* 2021). Similarly, in Greece, following the first cases of COVID-19, a drastic decline in blood supply was noted. This was driven by imposed restrictions and the fear of the unknown (Gkirtsou *et al* 2022).

The ages and genders of donors were evaluated to find the common age category of the blood donor population. The evaluation showed that 86% (n=19210) of the donations were recorded by male donors between January 2019 and March 2022, whereas 14% (n=3112) of the donations were recorded by female donors during the same period (Figure 4).

This finding demonstrated a statistically significant difference in donations by gender distribution (P=0.01826). This could be due to more males presenting for blood donations before and during the pandemic. The results have shown to be common in other studies such as India as male donors tend to show the highest number in total blood donations (Raghuwanshi *et al* 2022).

The higher number of blood donations were the age groups 16-25y, 26-35y and 36-44y when compared to 45-55 and 56-65 years old (P < 0.00001) in the male blood donor population. The age category of female donors between 16-25y, 26-35y and 36-44y demonstrated statistical significance (P=0.004416) when compared to the 45-55y and 56-65y age group (Figures 5-7). The same age category showed the highest number of deferrals during the pandemic (Figure 8). A similar result was noted in Iran on the deferral of donors during the COVID-19 pandemic, as the same age category of 25-34y and 35-44y showed the highest rates of deferrals when compared to the other age groups (Mohammed *et al* 2020). A study in the University of Calabar teaching hospital compared donation trends between the COVID

and pre-COVID periods in which they noted that the age category that had the highest number of blood donations was between 15-29y and 30-44y (Ogar *et al* 2021). It can be concluded that this donor population category in Fiji is quite similar to that seen in other countries. The age category between 16y and 25y needs to be targeted as this can help to increase blood donations. This age category also tends to show the least number of deferrals when compared to the number of turnouts in other age categories and with proper education and awareness, donor turnout could increase.

The management of blood component usage was evaluated and a significant reduction in blood component usage was noted during the period of pandemic. An 89% reduction in red cell usage was noted between the years 2019 to 2020 and an 88% was noted between the periods 2020 to 2021. Platelet concentrates showed a 28% decrease in usage between 2019 and 2020. However, there was a slight increase in platelet use of 0.09% between the years 2020 and 2021. Fresh frozen plasma showed a 20% reduced use between the years 2019 to 2020 and an 18% reduced use between 2020 to 2021. Cryoprecipitate showed a 30% reduction in use between 2019 and 2020 and a 19% decrease between 2020 and 2021 (Figure 3). The main reasons for the reduced usage were due to the COVID restrictions in place as there were only admissions of patients with critical conditions or in dire need of a blood transfusion. Surgeries had to be re-scheduled due to the restrictions and availability of blood products. Other contributing factors were hospital outbreaks and staff getting infected with the virus.

The measures taken by countries in studies showed the adoption of policies to reduce blood component usage during the pandemic. Policies implemented to decrease elective surgeries demonstrated reduced blood product usage (Gniadek *et al* 2020). A similar result was noted in a study conducted by Flegel (2020) as blood supply declined. Alternative options such as lowering the number of elective surgeries and component usage have been established through the adoption of new policies. A study conducted at Tan Tock Seng Hospital in Singapore also saw a decrease in blood supply demand during the pandemic as effective measures such as postponing elective surgeries and lowering bed occupancy were undertaken (Fan *et al* 2020). Studies have shown that effective measures taken resulted in a well-managed blood supply level. However, no adoption of policies or strategy was in place during the pandemic at CMWH. Surgeries were rescheduled due to restrictions and a decline in blood stock levels. and blood component usage tends to increase after January 2022, as surgeries were rescheduled, with overseas medical teams conducting major surgeries in the country.

The deferral causes were also evaluated to find the common reasons for deferral during the pandemic in which physical causes showed the highest deferral rate 67% with low haemoglobin and low blood pressure as the commonest causes. During the pandemic, high blood pressure was also seen to increase by 50% from 2020 to 2021. This was also highlighted during the interview of the blood service staff, in which it was noted the blood pressure of the regular donors during the pandemic showed an increase when compared to previous donations before the pandemic. The age category that showed an increase in blood pressure was between 36-45y and 46-55y. This was shown to be common in male donors as a 79% of total high blood pressure deferral rate was recorded between the two genders.

Low haemoglobin deferral was shown to be common in females in 2020, but in 2021 the deferral rate due to low haemoglobin was high in males when compared to females. The deferral trend seen in 2022 followed a similar trend; as of March 2022, high blood pressure alone reached 44% of total deferrals while low haemoglobin had reached 66% of total deferrals when compared to 2021. Low blood pressure deferrals were noted to decrease by 15% between 2020 and 2021.

Through the interview, the perspective of the blood service staff provided an understanding of donor motivation and recruitment during the pandemic. It was identified that donors were recruited through donor databases (100%) and home-to-home donations (40%) during the pandemic. The blood service staff raised issues that there was a lack of awareness (100%) of the public on the safety measures in place for a safe donation with minimal risk of infection and protocols on social distancing maintained. A similar scenario was seen when a survey was conducted in seven European countries (Denmark, Germany, France, UK, Italy, Portugal, and Netherlands) by Torsten *et al* (2021) to understand the motivation of blood donors during the pandemic. The results showed a decline in the donation trend, in which the researchers noted that the cause was this lack of awareness (Torsten *et al* 2021).

The approach undertaken by the blood services at CWMH was to defer donors during the pandemic on temperature screening and symptoms that were related to COVID-19. Other implementations were to target non-restricted areas for donor recruitment. In the pandemic, the hospital underwent a lockdown due to an outbreak of COVID-19 amongst hospital staff. A suggested measure was to take blood donations from staff that were within the premises. This would have been through a set of screening measures along with the donor criteria adopted during the pandemic to identify potential donors.

Through the interview it was noted that there were no changes made to the donor criteria form following the pandemic. It was highlighted that there are suggestions for looking into changing some of the donor recruiting criteria. A major setback in the criteria form was recruiting donors after vaccination, as it was still unclear when donors could donate after getting their vaccination dose. A well-structured form can therefore help identify potential donors during times of pandemics or major outbreaks.

Limitations

There was no data available on donors recruited for the month of May and August at blood services due to the data being lost during transition from tent (out-center) screening to in-center. The data from the blood bank was utilized on the number of donors screened during these months, this limited the study as there was no age and gender information captured.

Conclusions

The world underwent a devastating pandemic that caused economic and social disruption. The health sector was one of the major sectors affected as supplies were running low and the number of patients hospitalized was increasing daily. The blood service department at CWMH faced a similar situation as seen around the world; blood stock levels drastically declined with a lower donor turnout. The fear of the unknown deterred people from coming forward to donate. Other imposed restrictions made it difficult for those who were willing to donate. Blood donations were solely relied on by family replacement, and most family members were hesitant to come out during the pandemic.

Blood component usage rates declined with the pandemic as major surgeries were rescheduled; however, no policies were in place that controlled the regulation of blood components during the pandemic. Adoption of policies have been evident in other studies to manage blood products during the pandemic and a structured system can be beneficial not just for COVID but other similar scenarios the country undergo like a measles outbreak and natural disasters like cyclones.

Donor deferral rates saw a drastic incline as the community outbreak increased. The common causes of deferral were low haemoglobin and low or high blood pressure. The age categories of 16-25y, 26-35y and 36-45y showed the highest numbers of donations as well as deferral rates. Other age categories like 16-25y can be targeted in getting potential donors. This can be achieved through proper education and planning.

The study has highlighted the major impacts of COVID on blood transfusion services at CWMH in which a strategic approach needs to be adopted for scenarios such as the pandemic, as studies have shown that the adoption of policies has worked in combating the pandemic regarding blood supply and demand.

Recommendations

A strategy or a policy should be in place for the regulation of blood components and elective surgeries during the pandemic or in other such scenarios. The adoption of guidelines has shown to work during these times, as studies have revealed that the approaches taken have been effective in showing a well-managed blood stock.

Blood donor recruitment guidelines need to be established. These guidelines can help in identifying potential donors as well as provide safety to the blood service staff and make the recruitment process less stringent. The process of donor recruitment was quite a challenge as the protocols were not documented.

Blood donations need to be targeted with age categories as the donor age criteria has changed from 18-60y to 16y to 65y. The age category 16y to 25y needs to be targeted as a significant rise was shown as the change in donor age criteria was implemented. This can be achieved by targeting secondary schools and university students, with proper awareness and information provided about blood donation.

Common causes of deferral such as low haemoglobin and high blood pressure need to be addressed while recruiting donors; this could be by recommendations made on their diet or lifestyle. This could not only be as a recommendation but also as a motivation for donors to return for donation after making these changes with a follow-up sent through email or messages to the deferred donors.

Acknowledgements

The authors would like to show their gratitude to the staff of the Blood Services department at CWMH, HOD blood bank CWMH, HOD-Pathology & Medical Laboratory Science Mrs Taina Naivalu, and the staff of DPMLS.

References

- Almalki S, Asseri M, Khawaji Y, Alqurashi R, Badawi M, Yakout N, Elgemmezi T, Hindawi S 2021. Awareness about Coronavirus (COVID-19) and challenges for blood services among potential blood donors. *Transfusion and Apheresis Science*, 60(6), p.103211.
- Al-Riyami AZ, Abdella YE, Badawi MA, Panchatcharam SM, Ghaleb Y, Maghsudlu M, Satti M, Lahjouji K, Merenkov Z, Adwan A, Feghali R 2021. The impact of COVID-19 pandemic on blood supplies and transfusion services in Eastern Mediterranean Region. *Transfusion Clinique et Biologique*, 28(1), pp.16-24.
- Biswas D, Maiti C, Talukder B, Azharuddin M, Saha S, Pandey S, Das A, Adhikari SD, Ray Y, Sarkar BS, Paul SR 2021. A prospective study on COVID-19 convalescent plasma donor (CCP) recruitment strategies in a resource constrained blood centre. *ISBT Science Series*, 16(4), pp.276-283.
- Bouhou S, Benajiba M 2020. Ensuring a safe and adequate blood supply during the COVID-19 pandemic: the Moroccan National Blood Center experience. *Pan African Medical Journal*, 37(1).
- Cai X, Ren M, Chen F, Li L, Lei H, Wang X 2020. Blood transfusion during the COVID-19 outbreak. *Blood Transfusion*, 18(2), p.79.
- Chandler T, Neumann-Böhme S, Sabat I, Barros PP, Brouwer W, Van Exel J, Schreyögg J, Torbica A, Stargardt T 2021. Blood donation in times of crisis: early insight into the impact of COVID-19 on blood donors and their motivation to donate across European countries. *Vox Sanguinis*, 116(10), pp.1031-1041.
- Chen S, Yang J, Yang W, Wang C, Bärnighausen T 2020. COVID-19 control in China during mass population movements at New Year. *The Lancet*, 395(10226), pp.764-766.
- Chiem C, Alghamdi K, Nguyen T, Han JH, Huo H, Jackson D 2022. The impact of COVID-19 on blood transfusion services: a systematic review and meta-analysis. *Transfusion Medicine and Hemotherapy*, 49(2), pp.107-118.
- Choudhury N, Mathur A, Smit Sibinga CT, On behalf of AATM 2020. COVID-19 Pandemic–blood supply challenges and approaches in AATM member countries. *ISBT Science Series*, 15(4), pp.353-361.
- Critical blood shortage in Fiji. RNZ. (2022). Retrieved 29 March 2022, from <https://www.rnz.co.nz/international/pacific-news/448904/critical-blood-shortage-in-fiji>.
- Delabranche X, Kientz D, Tacquard C, Bertrand F, Roche AC, Tran Ba Loc P, Humbrecht C, Sirlin F, Pivot X, Collange O, Levy F, 2021. Impact of COVID-19 and lockdown regarding blood transfusion. *Transfusion*, 61(8), pp.2327-2335.
- DeSimone RA, Costa VA, Kane K, Sepulveda JL, Ellsworth GB, Gulick RM, Zucker J, Sobieszcyk ME, Schwartz J, Cushing MM 2021. Blood component utilization in COVID-19 patients in New York City: transfusions do not follow the curve. *Transfusion*, 61(3), pp.692-698.
- Dhiman Y, Patidar GK, Arora S 2020. Covid-19 pandemic-response to challenges by blood transfusion services in India: a review report. *ISBT Science series*, 15(4), pp.365-373.
- Dhote SW, Srivastava AR 2021. Trends of Blood Transfusion Services before and during COVID-19 Pandemic-A Retrospective Study from Maharashtra, India. *Journal of Clinical & Diagnostic Research*, 15(12).
- Elsafi SH 2020. Demographical pattern of blood donors and pre-donation deferral causes in Dhahran, Saudi Arabia. *Journal of Blood Medicine*, pp.243-249.
- Fan BE, Ong KH, Chan SSW, Young BE, Chong VCL, Chen SPC, Lim SP, Lim GP, Kuperan P 2020. Blood and blood product use during COVID-19 infection. *American Journal of Hematology*, 95(7), p.E158.
- Flegel WA 2020. CoVID-19 insights from transfusion medicine. *British Journal of Haematology*, 190(5), p.715.
- García-Erce JA, Romón-Alonso Í, Jericó C, Domingo-Morera JM, Arroyo-Rodríguez JL, Sola-Lapeña C, Bueno-Cabrera JL, Juárez-Vela R, Zalba-Marcos S, Abad-Motos A, Gea-Caballero V 2021. Blood donations and transfusions during the COVID-19 pandemic in Spain: impact according to autonomous communities and hospitals. *International Journal of Environmental Research and Public Health*, 18(7), p.3480.
- Gehrie E, Tormey CA, Sanford KW 2020. Transfusion service response to the COVID-19 pandemic. *American Journal of Clinical Pathology*, 154(3), pp.280-285.
- Gkirtsou C, Konstantinidis T, Cassimos D, Konstantinidou EI, Kontekaki EG, Rehari V, Bezirtzoglou E, Martinis G, Stergiannis P, Thrace Study Group on Blood Donors' Attitude during the COVID-19 Pandemic 2022. Views and attitudes of blood donors toward blood donation during the COVID-19 pandemic in Thrace Region, Greece. *International Journal of Environmental Research and Public Health*, 19(9), p.4963.
- Gniadek TJ, Mallek J, Wright G, Saporito C, AbiMansour N, Tangazi W, Rogers G, Zahara Z, Cummings G, Kaul K, Kang J 2020. Expansion of hospital-based blood collections in the face of COVID-19 associated national blood shortage. *Transfusion*, 60(7), pp.1470-1475.
- Grandone E, Mastroianno M, Caroli A, Ostuni A 2020. Blood supply and transfusion support in southern Italy: findings during the first four weeks of the SARS-CoV-2 pandemic. *Blood Transfusion*, 18(3), p.230.

- Hakami NY, Al-Sulami AJ, Alhazmi WA, Qadah TH, Bawazir WM, Hamadi AY, Owaidah AY, Alhefzi RA, Hamdi FY, Maqnas A, Alghassab GF 2022. Impact of COVID-19 on blood donation and supply: a multicenter cross-sectional study from Saudi Arabia. *BioMed Research International*, 2022.
- Kandasamy D, Shastry S, Chenna D, Mohan G 2022. COVID-19 pandemic and blood transfusion services: The impact, response and preparedness experience of a tertiary care blood center in southern Karnataka, India. *Hematology, Transfusion and Cell Therapy*, 44, pp.17-25.
- Leung JN, Lee CK 2020. Impact of the COVID-19—a regional blood centre's perspective. *ISBT Science Series*, 15(4), pp.362-364.
- Li Z, Lei S, Li X, Zhao Y, Dai Y, Jin S, Fu Q, Cai X, Lin Z, Tu X 2021. Blood donation fear, perceived rewards, self-efficacy, and intention to return among whole blood donors in China: A social cognitive perspective. *Frontiers in Psychology*, 12, p.683709.
- Loua A, Kasilo OMJ, Nikiema JB, Sougou AS, Kniazkov S, Annan EA 2021. Impact of the COVID-19 pandemic on blood supply and demand in the WHO African region. *Vox Sanguinis*, 116(7), pp.774-784.
- Lu W, Yazer M, Li N, Ziman A, Wendel S, Tang H, Tsang H, Titlestad K, Thibodeaux SR, Shih AW, Poisson JL 2022. Hospital red blood cell and platelet supply and utilization from March to December of the first year of the COVID-19 pandemic: The BEST collaborative study. *Transfusion*, 62(8), pp.1559-1570.
- Masser BM, Hyde MK, Ferguson E 2020. Exploring predictors of Australian community members' blood donation intentions and blood donation-related behavior during the COVID-19 pandemic. *Transfusion*, 60(12), pp.2907-2917.
- Ministry of Health & Medical Services 2022. Retrieved 29 March 2022, from <https://www.health.gov.fj/>.
- Miskeen E, Omer Yahia AI, Eljack TB, Karar HK 2021. The impact of COVID-19 pandemic on blood transfusion services: a perspective from health professionals and donors. *Journal of Multidisciplinary Healthcare*, pp.3063-3071.
- Mohammadi S, Yazdi SMT, Eshghi P, Norooznezhad AH 2020. Coronavirus disease 2019 (COVID-19) and decrease in blood donation: experience of Iranian Blood Transfusion Organization (IBTO). *Vox Sanguinis*, 115(7), p.595.
- Ngo A, Masel D, Cahill C, Blumberg N, Refaai MA 2020. Blood banking and transfusion medicine challenges during the COVID-19 pandemic. *Clinics in Laboratory Medicine*, 40(4), pp.587-601.
- Noordin SS, Yusoff NM, Karim FA, Chong SE 2021. Blood transfusion services amidst the COVID-19 pandemic. *Journal of Global Health*, 11.
- Ogar CO, Okoroiwu HU, Obeagu EI, Etura JE, Abunimye DA 2021. Assessment of blood supply and usage pre-and during COVID-19 pandemic: a lesson from non-voluntary donation. *Transfusion Clinique et Biologique*, 28(1), pp.68-72.
- Ondrasik RM, Khan J, Szczepiorkowski ZM, Levy JJ, Dunbar NM 2022. Passive order auditing associated with reductions in red blood cell utilization: National blood shortage experience. *Transfusion*, 62(8), pp.1551-1558.
- Ou-Yang J, Li SJ, Bei CH, He B, Chen JY, Liang HQ, Fu YS 2020. Blood donor recruitment in Guangzhou, China, during the 2019 novel coronavirus (COVID-19) epidemic. *Transfusion*, 60(11), pp.2597-2610.
- Pagano MB, Hess JR, Tsang HC, Staley E, Gernsheimer T, Sen N, Clark C, Nester T, Bailey C, Alcorn K 2020. Prepare to adapt: blood supply and transfusion support during the first 2 weeks of the 2019 novel coronavirus (COVID-19) pandemic affecting Washington State. *Transfusion*, 60(5), pp.908-911.
- Pagano MB, Rajbhandary S, Nunes E, Cohn CS 2020. Transfusion services operations during the COVID-19 pandemic: Results from AABB survey. *Transfusion*, 60(11), p.2760.
- Pandey HC, Coshic P, CS C, Arcot PJ, Kumar K 2021. Blood supply management in times of SARS-CoV-2 pandemic—challenges, strategies adopted, and the lessons learned from the experience of a hospital-based blood centre. *Vox Sanguinis*, 116(5), pp.497-503.
- Quaglietta A, Nicolucci A, Posata R, Frattari A, Parruti G, Accorsi P 2021. Impact of Covid-19 epidemic on the activities of a blood centre, transfusion support for infected patients and clinical outcomes. *Transfusion Medicine*, 31(3), pp.160-166.
- Rafiee MH, Kafiabad SA, Maghsudlu M 2021. Analysis of blood donors' characteristics and deferrals related to COVID-19 in Iran. *Transfusion and Apheresis Science*, 60(2), p.103049.
- Raghuwanshi B, Behera P, Singh P, Khan R, Munshi R, Patil A, Chouhan S 2022. Blood supply management amid COVID 19 pandemic: Challenges and strategies. *Journal of Family Medicine and Primary Care*, 11(6), p.2363.
- Routray SS, Ray GK, Prakash S, Sahu A, Naik A, Mukherjee S 2022. Impact of COVID-19 on blood donor deferral patterns during the COVID-19 pandemic: A retrospective analysis. *Vox Sanguinis*, 117(5), pp.656-663.
- Sachdev S, Kishore K, Singh L, Lamba DS, Hans R, Dhawan HK, Grover S, Sharma RR 2021. Exploration of COVID-19 related fears deterring from blood donation in India. *ISBT Science Series*, 16(2), pp.147-157.

-
- Schirotti D, Merolle L, Molinari G, Di Bartolomeo E, Seligardi D, Canovi L, Pertinhez TA, Mancuso P, Giorgi Rossi P, Baricchi R, Marraccini C 2022. The impact of COVID-19 outbreak on the Transfusion Medicine Unit of a Northern Italy Hospital and Cancer Centre. *Vox Sanguinis*, 117(2), pp.235-242.
- Shander A, Goobie SM, Warner MA, Aapro M, Bisbe E, Perez-Calatayud AA, Callum J, Cushing MM, Dyer WB, Erhard J, Faraoni D 2020. Essential role of patient blood management in a pandemic: a call for action. *Anesthesia and Analgesia*.
- Silva-Malta MCF, Rodrigues DDOW, Chaves DG, Magalhães NNS, Ribeiro MA, Cioffi JGM, Martins, ML 2021. Impact of COVID-19 in the attendance of blood donors and production on a Brazilian Blood Centres. *Transfusion Medicine*, 31(3), pp.206-212.
- Stanworth SJ, New HV, Apolseth TO, Brunskill S, Cardigan R, Doree C, Germain M, Goldman M, Massey E, Prati D, Shehata N 2020. Effects of the COVID-19 pandemic on supply and use of blood for transfusion. *The Lancet Haematology*, 7(10), pp.e756-e764.
- Tagny CT, Lendem I, Ngo Sack F, Ngo Balogog P, Ninmou C, Dongmo A, Ndoumban A, Tante E, Ateba N, Ndemanou M, Tapko JB 2021. Trends in blood donations, blood donors' knowledge, practices and expectations during the COVID-19 pandemic in Cameroon. *Vox Sanguinis*, 116(6), pp.637-64.
- Turner TR, Olafson C, Mykhailova O, Xu A, Acker JP 2020. Evaluating blood product quality post expiry to mitigate blood shortages during the COVID-19 pandemic in Canada. *Transfusion*, 60(12), p.3072.
- Velázquez-Kennedy K, Luna A, Sánchez-Tornero A, Jiménez-Chillón C, Jiménez-Martín A, Vallés Carboneras A, Tenorio M, García García I, López-Jiménez FJ, Moreno-Jiménez G 2021. Transfusion support in COVID-19 patients: impact on hospital blood component supply during the outbreak. *Transfusion*, 61(2), pp.361-367.
- Wang Y, Han W, Pan L, Wang C, Liu Y, Hu W, Zhou H, Zheng X 2020. Impact of COVID-19 on blood centres in Zhejiang province China. *Vox Sanguinis*, 115(6), pp.502-506.
- Warner MA, Patel PA, Hensley NB, Mazzeffi M 2022. COVID-19-Related Blood Shortages and Cardiac Surgery: Do We Have Too Many Eggs in One Basket?. *Journal of Cardiothoracic and Vascular Anesthesia*, 36(7), pp.1823-1826.
- Warner MA, Patel PA, Hensley NB, Mazzeffi M 2022. COVID-19-Related Blood Shortages and Cardiac Surgery: Do We Have Too Many Eggs in One Basket?. *Journal of Cardiothoracic and Vascular Anesthesia*, 36(7), pp.1823-1826.
- Yahia AIO 2020. Management of blood supply and demand during the COVID-19 pandemic in King Abdullah Hospital, Bisha, Saudi Arabia. *Transfusion and Apheresis Science*, 59(5), p.102836.
- Yuan Z, Chen D, Chen X, Wei Y 2020. Estimation of the number of blood donors during the COVID-19 incubation period across China and analysis of prevention and control measures for blood transfusion transmission. *Transfusion*, 60(8), pp.1778-1784.