Transfusion-Transmitted Infections in the Era of COVID-19: Revisiting Blood Safety Practices

Khalid Ibrahim Zawbaee[1]* and Numan Majeed[2]

[1]*Blood Bank, King Saud Medical City, Riyadh, Kingdom of Saudi Arabia*

[2]*Chemical Pathology, Indus Hospital and Health Network, Karachi, Pakistan*

Corresponding author: Khalid Ibrahim Zawbaee, Blood Bank, King Saud Medical City, Riyadh, Kingdom of Saudi Arabia

ARTICLE INFO

ABSTRACT

Blood transfusion has a well-documented clinical significance in several medical scenarios for instance severe anemia, massive blood loss caused by trauma, and major surgeries. Nevertheless, blood transfusion has been associated with post-transfusion complications, such as mismatch reactions, and transfusion-transmitted infections (TTIs). Fortunately, with the advent of medical advances, a safer supply of blood and blood products is now available. However, emerging infections, including Zika, Ebola, and coronaviruses, pose a risk to the safety of the blood supply. The major challenge faced at present is the selection of appropriate donors from all the donations. Because asymptomatic and apparently healthy carriers are the main source of transmission of infection, considerable effort is being made so that the recipients of blood and blood products can be protected. This study assesses the TTIs and screening policies of different blood banks across the Kingdom.

Keywords: COVID-19; Transfusion Practices; Blood Transfusion; Infections; Transfusion-Transmitted Infections (TTIs)

Abbreviations: TTIs: Transfusion-Transmitted Infections; COVID-19: Coronavirus Disease 2019; AABB: American Association of Blood Banks

Introduction

Blood transfusion has a well-documented clinical significance in several medical scenarios such as severe anemia, massive blood loss caused by trauma, and major surgeries [1]. Blood transfusion helps in saving millions of lives every year; however, maintaining the safety of recipients remains challenging [2]. There has been a growing trend of transfusion globally; in 2012, 85 million transfusions were reported, which increased to 112.5 million by 2019, as reported by the World Health Organization [3]. However, blood transfusion is associated with post-transfusion issues, such as mismatch reactions, and transfusion-transmitted infections (TTIs) [4]. Because of the latest coronavirus disease 2019 (COVID-19) outbreak, the guidelines laid down by the American Association of Blood Banks (AABB) have been revised. Although no definitive evidence regarding the transmission of COVID-19 via blood transfusion is available to date [5], AABB has suggested screening of viral RNA or associated antibodies on the basis that people infected with severe acute respiratory syndrome coronavirus 2 may not show signs of being carriers [6]. As a result, caution should be exercised owing to the contagious nature of COVID-19 and the fatalities caused by this infection. In addition, convalescent plasma therapy has shown higher efficacy than other drugs in treating COVID-19 infection. Thus, appropriate screening should be conducted until definitive evidence suggests otherwise [7].

The major challenge faced at present is the selection of appropriate donors from among all the donations because asymptomatic, and apparently healthy carriers are the main source of transmission of infection [2]. Having reported such a high prevalence of COVID-19 infections worldwide, its prevalence in donors is a public health alarm and a public health concern and warrants blood banks to rethink and revisit their screening procedure and protocols. This study discusses the current policies and how they can further be improved by taking into account the COVID-19 pandemic. These discussions were conducted with transfusion specialists from different blood banks.

Material and Methodology

In this cross-sectional study, an online interview was conducted (https://www.allcounted.com) using an online survey tool. The link to the survey was emailed to the target participants. On analyzing their responses, a summary was drawn on the basis of the observations recorded by the participants. A sample of 50 physicians was selected, and purposive sampling was conducted. The participants included physicians, technologists, and experts working in the field of transfusion medicine. A semi-structured questionnaire was used for data collection, and data were entered into statistical software (SPSS version 21). Frequencies and percentages were calculated for qualitative variables. The reliability of the questionnaire was assessed using Cronbach's alpha, and questions were deemed as reliable when values >0.95 were obtained.

Results

The total sample size of the study, which included participants from different departments, was 50. Among these participants, 30 provided appropriate responses, and the remaining participants were excluded because they provided incomplete responses. The mean age of the study participants was 42.4 ± 8.0 years (Table 1). Participants were found to belong to different educational backgrounds, with most being technicians holding a bachelor's degree. Although most study participants had <5 years of laboratory experience, the mean experience of the study participants was 10.12 ± 7.79 years. Educational status and work experience are summarized in (Table 2). When the participants were asked about their knowledge regarding infection due to transfusion reactions, some of them responded by stating that the most common infections caused due to blood transfusion are HIV and hepatitis. In contrast, others were unaware that transfusion could cause infection and about the type of infection it could cause. In addition, some participants were aware of allergic reactions and other disorders caused due to transfusion. The frequency of responses associated with transfusion-related infection is shown in (Figure 1). Every institute has its policy for infection control in the laboratory and transfusion reactions.

Table 1: Age distribution of the study participants.

Age	
25–35 years	8 (27%)
36–45 years	12 (40%)
46–55 years	9 (30%)
>55 years	1 (3%)

Table 2: Educational status and experience of study participants.

Educational status		Experience	
Bachelor	10 (33%)	Less than 5 years	12 (40%)
Master	9 (30%)	6–10 years	5 (17%)
Doctorate (Ph. D)	8 (27%)	11–15 years	5 (17%)
Pathologist	1 (3%)	More than 15 years	8 (27%)
Other	2 (7%)		

Table 3: Response frequency to improve currently practiced policies.

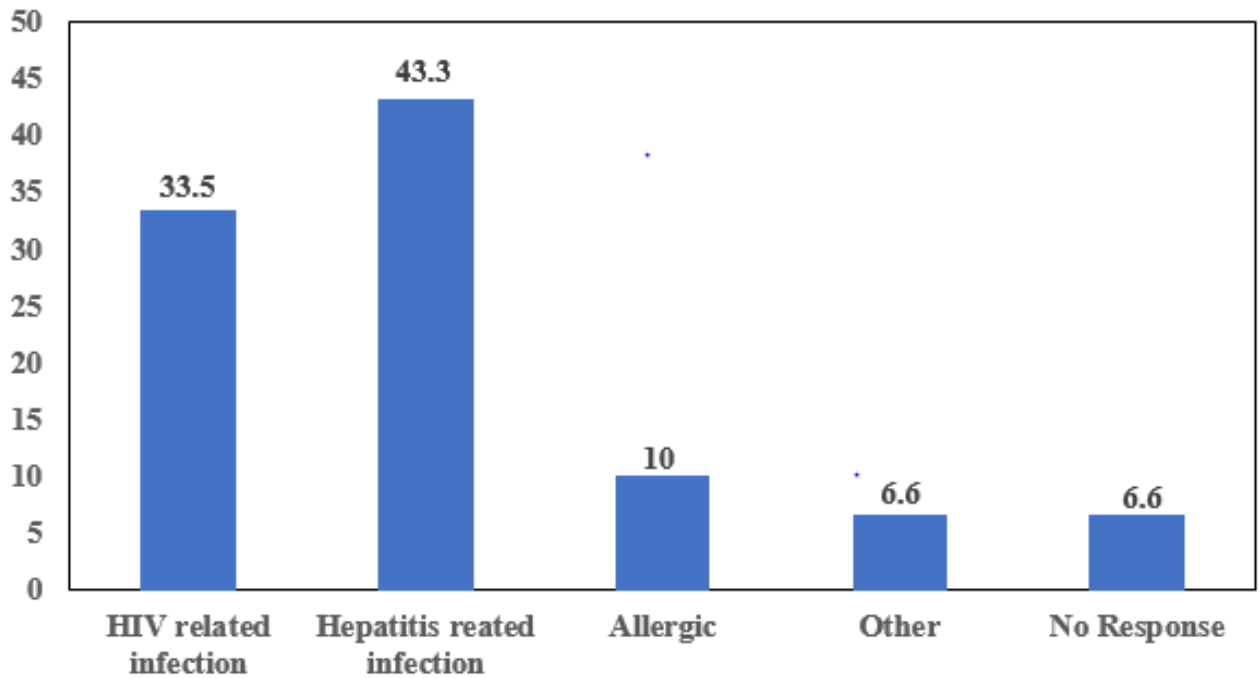| Comments	Response (%)
Update policy annually as per pandemic	2 (40%)
Need to add more screening tests, such as those for COVID-19 and dengue	2 (40%)
Staff capacity building	1 (20%)

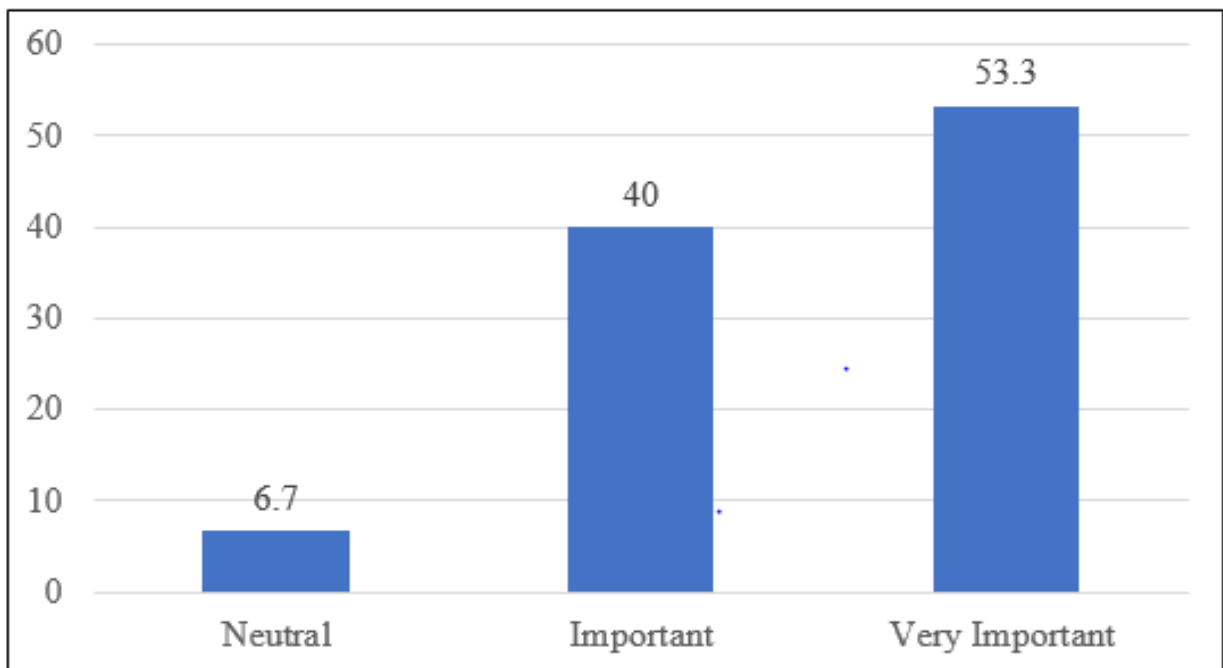**Figure 1:** Frequency of responses related to transfusion.

Figure 2: How important participants think about TTI as a separate entity in the provincial surveillance system.

Based on the participants' responses in this context, we assessed whether the current policy was sufficient to cater to the needs of transfusion-related infection control. As such, 25 (83.4%) participants responded that the current policy is sufficient to control transfusion-related infections, whereas 5 (16.6%) responded that it is insufficient. Participants who deemed the current policies insufficient for transfusion-related infection prevention provided the following suggestions and comments (Table 3). Participants were interviewed to provide insights on which protocols can be used for preventing TTIs at blood banks. The participants highlighted the following protocols: performing screening tests, including those for HIV, COVID-19, dengue, and hepatitis, as per the new guidelines; following AABB guidelines; introducing questionnaires and examination of donors for variables such as weight, hemoglobin level etc; and following sterilized phlebotomy protocols. The percentage and number of responses are 14 (46.6%), 1 (3.3%), 11 (36.6%), 1 (3.3%), and 3 (10.2%), respectively. In this COVID-19 pandemic era, participants believed that COVID-19 testing should be added to the panel of donor's screening tests, and their responses were gauged using the Likert scale (Figure 2).

The participants suggested that screening for COVID-19 should be performed in transfusion medicine. They were asked to provide insights on which screening test should be introduced in transfusion screening policy. Most of them 13 (43.6%) suggested reverse transcription–polymerase chain reaction test, 3 (10.0%) suggested immunochromatographic tests, 11 (36.6%) suggested qualitative antibody test, and 3 (10%) suggested quantitative antibody test for screening purposes. The participants who opposed screening for COVID-19 before transfusion were asked which preventive measures, they would suggest avoiding this infection. Responses are shown in (Table 4).

Table 4: Preventive measures to be taken to avoid COVID-19 infection during transfusion.

Responses	N	%
Use of personal protective equipment (PPE) by staff who deal with transfusion	23	76.80%
Focus on selection criteria of the donor	4	13.30%
Donor questionnaire	3	10%

Discussion

The COVID-19 pandemic has had a global impact on social activities and the economy [8]. In addition, it has affected the health system, particularly surgical and transfusion services for emergency patients. A study by Soreid, et al. [9] showed COVID-19 to have profoundly affected surgical and transfusion medicine [9]. Transfusion of blood and blood products is considered lifesaving if utilized appropriately. However, the side effects of transfusion of blood and/or blood products can cause morbidity and mortality. In addition, blood transfusion can act as a source of infection in case of HIV, hepatitis B and C, and allergic infections, which can ultimately lead to death [10]. Numerous strategies have been elaborated nationally and internationally to reduce the risk of infection and risks associated with transfusion medicines [11]. This study evaluated whether current policies associated with transfusion medicine are appropriate as per expert staff or those working in the field of transfusion medicine. This study also assessed whether the current policies are effective in COVID-19 infection prevention. Many questions have arisen about transfusion medicine regarding its protection and shortage, which has led to extensive research on the availability of substitutes for blood transfusion.

Restrictive transfusion therapies, acute normovolemic hemodilution techniques, or patient blood management are potential solutions for prothrombin complex or fibrinogen concentrate erythropoiesis-stimulating means may show a corresponding pharmacologic role. Blood transfusion or any other form of transfusion is a universal clinical procedure in developed countries, but it is considered unsafe owing to the risk of infections and bacterial contamination. However, current donor-screening methods and improved laboratory techniques minimize the risk of infection [12]. This study also pointed out that donor screening and advanced laboratory techniques can help reduce infection, which correlates with the findings of Schoettler, et al. [12]. The review body of the Italian National Blood Center and the Ministry of Health discussed problems that blood, and blood products have, a number of measures aimed at keeping great principles of blood transfusion, the contribution of blood and blood safety as in this country. In Italy, the incidence of COVID-19 was observed to be higher, after which the Italian advisory board accordingly issued a notification about strengthening the surveillance measures for individuals in contact with COVID-19 patients and having exposure history. It has deferred blood transfusion from a person who has a history of national or international travel. In addition, all human resources working in transfusion medicine and this department are advised to strictly follow the infection prevention protocols [13].

The present study was conducted to evaluate and obtain insights from human resources working in transfusion medicine and those considered as experts in COVID-19 infection prevention. Most of the participants in the present study shared their insight stating that personal protective equipment, including gloves, N95 masks, aprons, and shoes, should be mandatory for staff. Similarly, surveillance of individuals in the form of detailed donor history pro forma and screening of patients having a travel history in the last 14 days should be mandatory. These insights are the same as those suggested by the Italian Board and shown in a study by Baron, et al. [13].

Conclusion

Coronavirus infection is the biggest global challenge at present, requiring collaborative efforts to attain positive consequences. This study proves that a patient-centered approach, proven, evidence-based principle, and good practices can prevent COVID-19 infection during blood transfusion.

References

1. Sapkota A, Poudel S, Sedhain A, Khatiwada N (2018) Blood transfusion practice among healthcare personnel in Nepal: An observational study. J Blood Transfus.

2. Mohamud HS, Mohamed DH, Alqahtani FH, Aglajid FM, Alswat K, et al. (2016) Two years' experience of implementing molecular screening of hepatitis B virus, hepatitis C virus and human immunodeficiency virus 1, 2 in Riyadh blood donors. Transfus Apher Sci 54: 262-265.

3. (2017) WHO IJWHO, International Water Association: Global Status Report on Water Safety Plans: A review of proactive risk assessment and risk management practices to ensure the safety of drinking-water.

4. (2017) Organization WHOJGWH: Global status report on blood safety and availability 2016.

5. Cai X, Ren M, Chen F, Li L, Lei H, et al. (2020) Blood transfusion during the COVID-19 outbreak. Blood Transfus 18: 79.

6. Chang L, Yan Y, Wang L (2020) Coronavirus disease 2019: Coronaviruses and blood safety. Transfus Med Rev 34: 75-80.

7. 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: 1778-1784.

8. Abbas S, Hayat A, Majeed N, Jaffar SR, Asghar J, et al. (2020) Comparison of inflammatory markers with different levels of severity of COVID-19 disease. Pakistan Armed Forces Medical Journal 70: 455-458.

9. Søreide K, Hallet J, Matthews JB, Schnitzbauer AA, Line PD, et al. (2020) Immediate and long-term impact of the COVID-19 pandemic on delivery of surgical services. Br J Surg.

10. Garraud O, Sut C, Haddad A, Tariket S, Aloui C, et al. (2018) Transfusion-associated hazards: A revisit of their presentation. Transfus Clin Biol 25: 118-135.

11. Moussaoui L, Naef D, Tissot JD, Desrichard O (2016) Save lives arguments might not be as effective as you think: A randomized field experiment on blood donation. Transfus Clin Biol 23: 59-63.

12. Schoettker P, Marcucci CE, Casso G, Heim C (2016) Revisiting transfusion safety and alternatives to transfusion. Presse Med 45: e331-e340.

13. Baron D, Franchini M, Goobie S, Javidroozi M, Klein A, et al. (2020) Patient blood management during the COVID–19 pandemic: A narrative review. Anaesthesia 75: 1105-1113.

Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles

https://biomedres.us/