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### Challenges associated with blood banks and blood donations during the COVID-19 pandemic



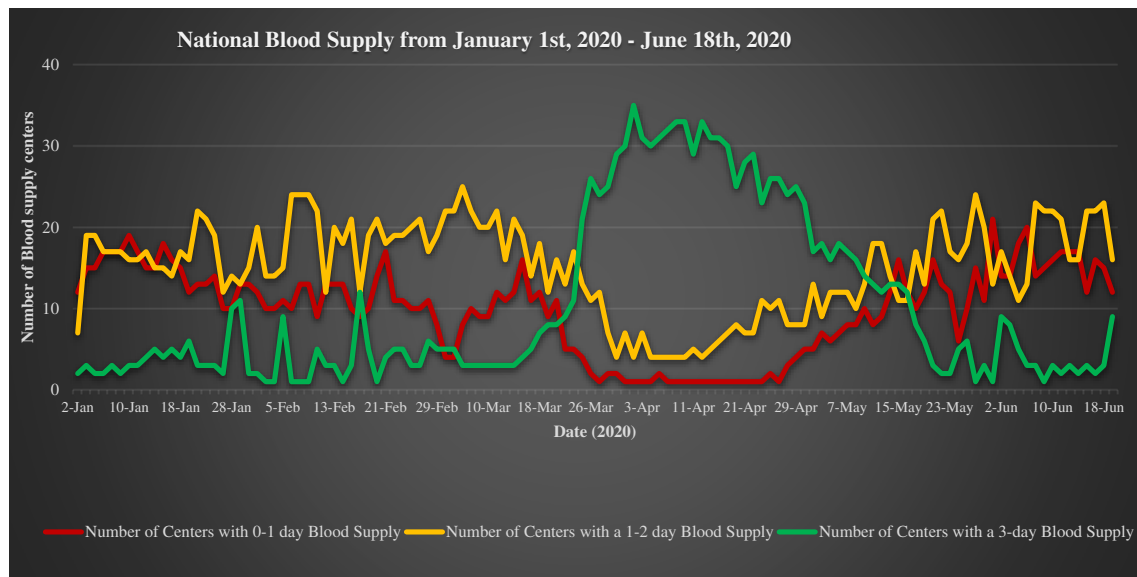
Every 2 seconds, a patient in the United States (US) needs a red blood cell (RBC) transfusion [1,2]. Almost 5000 platelet units and 6500 units of plasma are required every day [2]. As the aging population advances along with developments in medical treatment and procedures, there is a constant need for blood and blood components.

In 2017, 12.2 million units of whole blood were donated [3]. Whole blood is usually separated into its different components such as RBCs, plasma, platelets and cryoprecipitated antihemophilic factor (CAF) [2]. Blood separation enables a single blood donation to be transfused into different patients, depending on their needs. For example, it is common to treat cases of blood loss with an infusion of RBCs [4] whereas the infusion of platelets may be indicated in some cancer patients [5]. In contrast, plasma, which contains antibodies, antibodies against COVID-19 for example, could be infused into severely ill patients with COVID-19 as an alternate treatment [6,7]. Thus, each component of blood has the potential for a wide range of use in diverse sets of medical conditions.

On the other hand, the relatively short shelf-life of blood products raises a concern for a shortage during the pandemic. Plasma and CAF may be frozen for one year, however, the acute use of these products is limited, as it takes hours to thaw them for use [2]. In contrast, the shelf-life of whole blood and RBCs is 35 and 42 days, respectively, while the shelf-life of platelets is 5 days [2]. In the case of the pandemic, this means that all donated blood prior to the pandemic is expired.

By May 2020, a stay at home order (SAHO) was enacted in all 50 states, forcing many businesses to close [8]. As a result, 86,000 American Red Cross (ARC) blood drives were cancelled [9]. This poses a large problem for patients requiring blood transfusions because more than 80% of the blood collected by the ARC comes from blood drives [9].

Even though blood product usage is expected to decline during the pandemic due to cancellation/postponement of elective surgeries, there is still a large demand [10,11]. A deficit in blood supply, is viewed as  $\leq 1$ -day supply [12]. On June 18, 32 centers reviewed revealed, 8 centers had  $\leq 1$ -day supply (Fig. 1) [12]. In addition, 15 centers exhibited a 2-day supply and 9 centers reported  $\geq 3$ -day supply of blood (Fig. 1) [12]. This correspond to a 25% decrease in centers with a  $\geq 3$ -day supply, a 114% increase in centers with a 1-2-day supply, and a 350% increase in centers with  $\leq 1$ -day supply (Fig. 1) [12].



**Fig. 1. legend. National blood supply prior to and during the pandemic.** The number of centers with a 0-1-day blood supply reached a maximum value of 19 on January 9<sup>th</sup>, 2020 and February 20<sup>th</sup>, 2020, followed by a decline through mid-March. The number of centers with 0-1-day blood supply ranged from 1-5 during the month of April and increased over the month of May and displayed a wide pattern of variation in June 2020. The number of centers with 1-2-day blood supply increased to a maximum of 24 on February 6<sup>th</sup> & 7<sup>th</sup>, 2020. The sinusoidal wave pattern persists until around March 4<sup>th</sup>, 2020, where an overall decline in cases is seen until approximately April 13<sup>th</sup>, 2020. An overall increase in centers with 1-2-day blood supply is observed after April 13<sup>th</sup>, 2020, reaching a maximum of 21 blood centers on May 29<sup>th</sup>, 2020. The number of centers with at least a 3-day blood supply displays an overall increase and reaches a maximum of 35 on blood centers on April 1<sup>st</sup>, 2020. An overall decline is observed until May 25<sup>th</sup>, where an inconsistent increase in blood centers occurs until June 18<sup>th</sup>, 2020. \*Source: Current National Blood Supply. America's Blood Centers. <https://americasblood.org/for-donors/americas-blood-supply/>. Published June 18, 2020. Accessed June 18, 2020.

A study of 5243 adults undergoing cardiac surgery compared restrictive red-cell transfusion, transfusion only if the hemoglobin concentration was <7.5 g/dL, vs liberal red-cell transfusion strategy, transfusion if the hemoglobin concentration was <9.5 g/dL [13]. The authors concluded that there was no significant difference between the two strategies in outcomes [13]. It is conceivable that the benefit seen in restrictive strategy is applicable to other surgeries to conserve hospital resources.

However, the need for blood donations in the US is likely underestimated. For example, the SAHO enforced by each state limits travel outside of a person's home [8,14-17]. In effect, the SAHO facilitated an environment in which there were less drivers on the road and multiple studies reported a decrease in motor vehicle collisions (MVCs) [18,19]. Similarly, a decrease in serious crime and gun-related violence was observed throughout the pandemic, a trend likely attributable to distancing guidelines [20-22]. Patients with traumatic injuries, have the potential to deplete the resources available for critically ill COVID-19 patients, and vice-versa.

While it is not practical to keep the nation under Stay At Home Orders for extended periods of time, enforcing social distancing measures in the long-term is a realistic option that has evidence of improvement of the national blood supply. In addition, an opportunity to donate is an opportunity to save a life and now the American Red Cross is currently offering free COVID-19 antibody testing with blood donation. Taken together these measures allow the economy to thrive in the midst of the pandemic.

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## Declaration of Competing Interest

Authors declare no competing interests.

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