



Procesiranje i skladištenje krvnih komponenti u uslovima Kovid-19 pandemije

Processing and Storage of Blood Components in the Conditions of the COVID-19 Pandemic

Ana Antić

Zavod za transfuziju krvi Niš

Institute of Blood Transfusion Niš

Apstrakt

Širenje virusa SARS-CoV-2 ima snažan uticaj na prikupljanje krvi, održavanje stabilnih zaliha svih krvnih komponenti i bezbednost same transfuzije. SARS-CoV-2 ima dug inkubacioni period (1–14 dana, u proseku 5–6 dana, najduže prijavljeno 24 dana) i kod velikog broja pacijenata izaziva asimptomatsku infekciju, što predstavlja veliki izazov u odabiru davaoca krvi i postizanju bezbedne transfuzije. U tom smislu, usvojene su precizne preporuke i mere predostrožnosti koje se odnose na kriterijume za privremeno odbijanje davalaca krvi u vreme Kovid-19 pandemije, organizaciju mobilnih ekipa i mesta kolekta, odlaganje medicinskog otpada, pregled potencijalnih davalaca i obavezno merenje telesne temperature, a iako nije dokazano prenošenje virusa kovid-19 putem krvi i krvnih komponenti, neke zemlje su uvele i obavezno NAT testiranje na SARS-CoV-2 u okviru skrining testiranja krvi. Takođe, preduzete su proaktivne mere poput privremenog skladištenja krvi u karantinu 14 dana nakon kolekcije, dok se posebna pažnja pridaje efikasnom upravljanju zalihama krvnih komponenti i razvijanju plana prikupljanja kako bi se izbegla pojava nestašice određenih krvnih komponenti ili njihovo isticanje iz roka.

Prvi korak u tom smislu jeste revidiranje mera u cilju poboljšane iskoristljivosti krvnih komponenti, odnosno smanjenja rasipanja zaliha, što se prevashodno odnosi na privremeno produženje roka trajanja krvnih komponenti. Produženje roka trajanja eritrocita (duže od 35 do 49 dana, što je definisano na nacionalnom nivou) treba razmotriti u što ranijoj fazi, jer kada se jednom pojavi nestašica eritrocita, oni će se izdavati mnogo pre isticanja krajnjeg roka skladištenja. Dosadašnja ispitivanja nisu pokazala značajne neželjene efekte transfuzije eritrocita sa produženim rokom skladištenja, pa je moguće razmotriti fleksibilnost uslova procesiranja krvi i skladištenja eritrocita, uz obaveznu unutrašnju validaciju procesa i kontrolu kvaliteta komponenti. Rok skladištenja koncentrata trombocita treba produžiti od 5 dana na 7, pa čak i 8 dana, uz obavezno bakteriološko testiranje ili patogenu inaktivaciju koncentrata. Druga opcija povećanja snabdevanja trombocitima u profilaktičke svrhe jeste redukcija doze trombocita deljenjem postojećih komponenti. Zamrznuta sveža plazma ima najduži rok skladištenja (do 3 godine), pa je održavanje stabilnih rezervi mnogo sigurnije nego za ćelijske komponente. Tečna plazma (nikada zamrznuta prethodno) ima rok skladištenja 7–40 dana i može se koristiti u uslovima smanjenog kapaciteta zamrzivača, deficita osoblja koje radi na procesiranju krvi ili za produkciju rekonvalescentne plazme.

Abstract

The spread of the COVID-19 virus has a strong impact on blood collection, maintaining stable supplies of all blood components, and the safety of the transfusion itself. SARS-CoV-2 has a long incubation period (1-14 days, 5-6 days on average, longest reported 24 days) and causes asymptomatic infection in a large number of patients, which represents a major challenge in selecting blood donors and achieving safe transfusion. In this sense, precise recommendations and precautionary measures have been adopted regarding the criteria for the temporary rejection of blood donors during the COVID-19 pandemic, the organization of mobile teams and collection points, the disposal of medical waste, the examination of potential donors, and the mandatory measurement of body temperature. Although transmission of the COVID-19 virus through blood and blood components has not been proven, some countries have also introduced mandatory NAT testing for SARS-CoV-2 as part of the screening blood test. Proactive measures have been taken as well, such as temporary storage of blood in quarantine for 14 days after collection, while special attention is paid to the efficient management of blood component supplies and the development of a collection plan, in order to avoid shortages of certain blood components or their expiration.

The first step in this regard is the revision of measures aimed at improving the usage of blood components, in other words, reducing the waste of stocks, which primarily refers to the temporary extension of the shelf life of blood components. Extending the shelf life of erythrocytes (longer than 35 to 49 days, which is defined at the national level) should be considered at the earliest possible stage because once a shortage of erythrocytes occurs, they will be issued long before the expiration date of storage. Previous studies have not shown significant side effects of erythrocyte transfusion with an extended storage period, so it is possible to consider the flexibility of blood processing and erythrocyte storage conditions with mandatory internal validation of the process and quality control of components. The shelf life of the platelet concentrate should be extended from 5 days to 7 or even 8 days, with mandatory bacteriological testing or pathogen inactivation of the concentrate. Another option to increase the supply of platelets for prophylactic purposes is to reduce the dose of platelets by dividing the existing components. Fresh frozen plasma has the longest shelf life (up to 3 years), so maintaining stable reserves is much safer than for cellular components. Liquid plasma (never previously frozen) has a shelf life of 7-40 days and can be used in conditions of reduced freezer capacity, shortage of the hospital staff working on blood processing, or for the production of convalescent plasma.



Patogena inaktivacija plazme i trombocita omogućava 3–6 log redukciju SARS-CoV-2 i MERS-CoV. Odluku o uvođenju neke od metoda patogene inaktivacije treba doneti uzimajući u obzir troškove i resurse potrebne za implementaciju. Za zemlje koje nemaju patogenu inaktivaciju već u rutinskoj praksi, njeno brzo uvođenje je veliki zadatak. Za sada se čini da je rizik transmisije SARS-CoV-2 putem krvi jako nizak, mada će se naše razumevanje virusa i ponašanje tokom pandemije vremenom poboljšavati. U tom smislu treba razmišljati i o patogenoj inaktivaciji rekonvalescentne plazme.

Pathogenic inactivation of plasma and platelets enables a 3-6 log reduction of SARS-CoV-2 and MERS-CoV. The decision to introduce one of the pathogenic inactivation methods should be made taking into account the costs and resources required for implementation. For countries that do not already have pathogen inactivation in routine practice, its rapid introduction is a major task. For now, the risk of bloodborne transmission of SARS-CoV-2 appears to be very low, although our understanding of the virus and pandemic behavior will improve over time. Therefore, we should also think about the pathogenic inactivation of convalescent plasma.