COVID-19 and Blood Transfusion

Dr. Fakhredin Saba
Laboratory Hematology and Blood Banking

Introduction

دانشگاه علوم پزشکی و خدمات
بهداشتی درمانی کرمانشاه

- Beginning in late **December 2019**, there were numerous cases emerging from **Wuhan, Hubei Province**, China, of a new type of severe pneumonia of unknown etiology
- The etiologic pathogen has since been identified as severe acute respiratory syndrome coronavirus 2 (**SARS-CoV-2**); this virus has since spread rapidly to many countries throughout the world
- The SARS-CoV-2 outbreak has currently been labeled as a **pandemic** by the World Health Organization.

Diversity of Coronaviruses

دانشگاه علوم پزشکی و خدمات
بهداشتی درمانی کرمانشاه

As the largest known RNA viruses, CoVs are further divided into four genera

α-CoVs, β-CoVs, γ-CoVs, and δ-CoVs

Are able to infect mammals

Can infect birds and could also infect mammals

SARS → The emergence of in 2002

MERS-CoV → The emergence of in 2012

SARS-CoV-2 in December 2019

- Person-to-person transmission of SARS-CoV-2 has already been confirmed.
  - **Contact** with **respiratory secretions** from virus-infected individuals is currently known to be the main route of transmission, although there are reports of virus transmission via aerosol droplets and physical contact

Can the novel coronavirus disease 2019 (COVID-19) also be transmitted by blood transfusion?

SARS-CoV

دانشگاه علوم پزشکی و خدمات
بهداشتی درمانی کرمانشاه

- Atypical pneumonia putatively caused by SARS-CoV was first identified following an outbreak in **Guangdong** Province, **China**, in November 2002.
- The infection quickly spread to Beijing, Hong Kong, Vietnam, Singapore, and Canada in March 2003.
- This disease proved to be highly infectious with **respiratory droplets** as the **main route of transmission**.

SARS-CoV

دانشگاه علوم پزشکی و خدمات
بهداشتی درمانی کرمانشاه

- Many studies found that SARS-CoV RNA could be detected in the plasma of SARS patients even though it is a respiratory disease.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Identification of a Novel Coronavirus in Patients

WHO and the US Food and Drug Administration (FDA) drafted recommendations on blood safety and pointed out a theoretical risk of transmission of the SARS virus through transfusion of blood products.

Ron A.M. Fouchier, Ph.D., Annemarie Berger, Ph.D., Ana-Maria Burguière, Ph.D., Jindrich Cinatl, Ph.D., Markus Eickmann, Ph.D., Nicolas Escriou, Ph.D., Klaus Grywna, M.Sc., Stefanie Kramme, M.D., Jean-Claude Manuguerra, Ph.D., Stefanie Müller, M.Sc., Volker Rickerts, M.D., Martin Stürmer, Ph.D., Simon Vieth, Hans-Dieter Klenk, M.D., Albert D.M.E. Osterhaus, Ph.D., Herbert Schmitz, M.D., and Hans Wilhelm Doerr, M.D.

SARS-CoV

1. The deferral of blood donation by individuals from areas with **recent local transmission**.
2. **Blood donors** should **report** to **collection agencies** if they were diagnosed as **suspected or confirmed** SARS patients **within 1 month** following their donation; and in such instances, efforts would be made to trace recipients or recall any blood products not transfused.

Clinical Chemistry 49:12
1976–1980 (2003)

Molecular Diagnostics
and Genetics

Quantitative Analysis and Prognostic Implication of SARS Coronavirus RNA in the Plasma and Serum of Patients with Severe Acute Respiratory Syndrome

Enders K.O. Ng,[1] David S. Hui,[3] K.C. Allen Chan,[1] Emily C.W. Hung,[2] Rossa W.K. Chiu,[1] Nelson Lee,[3] Alan Wu,[3] Stephen S.C. Chim,[1] Yu K. Tong,[1] Joseph J.Y. Sung,[3] John S. Tam,[4] and Y.M. Dennis Lo[1*]

Serial Analysis of the Plasma Concentration of SARS Coronavirus RNA in Pediatric Patients With Severe Acute Respiratory Syndrome

Enders K O Ng [1], Pak-Cheung Ng, K L Ellis Hon, W T Frankie Cheng, Emily C W Hung, K C Allen Chan, Rossa W K Chiu, Albert M Li, Leo L M Poon, David S Hui, John S Tam, Tai-Fai Fok, Y M Dennis Lo

WHO and the American Association of Blood Banks (AABB) recommended

- (1) SARS patients are not infectious in the period of incubation time and the incubation time is relatively short
- (2) Almost all SARS-CoV–infected people have severe symptoms, and few asymptomatic carriers were found;
- (3) Data showed that the viral load from plasma of SARS patients was low
- (4) No transfusion transmission cases have been reported so far , and studies that screened blood donations for SARS-CoV RNA in 2003 failed to identify any positives

MERS-CoV

دانشگاه علوم پزشکی و خدمات بهداشتی درمانی کرمانشاه

- At that time, MERS-CoV was the sixth human coronavirus identified. MERS is a highly lethal respiratory disease and had a higher case fatality rate than SARS

Clinical Infectious Diseases

MAJOR ARTICLE

IDSA Infectious Diseases Society of America hivma hiv medicine association OXFORD

Viral Shedding and Antibody Response in 37 Patients With Middle East Respiratory Syndrome Coronavirus Infection

Victor M. Corman,[1,2] Ali M. Albarrak,[3] Ali Senosi Omrani,[3] Mohammed M. Albarrak,[4] Mohamed Elamin Farah,[5] Malak Almasri,[6] Doreen Muth,[1,2] Andrea Sieberg,[1] Benjamin Meyer,[1] Abdullah M. Assiri,[6] Tabea Binger,[1] Katja Steinhagen,[7] Erik Lattwein,[7] Jaffar Al-Tawfiq,[8,9] Marcel A. Müller,[1] Christian Drosten,[1,2,a] and Ziad A. Memish[6,10,a]

[1]Institute of Virology, University of Bonn Medical Centre, and [2]German Centre for Infection Research, Partner Site Bonn-Cologne, Bonn, Germany; [3]Division of Infectious Diseases, [4]Department of Critical Care, [5]Central Military Laboratory and Blood Bank, Microbiology Division, Prince Sultan Military City, [6]Ministry of Health, Riyadh, Kingdom of Saudi Arabia; [7]Euroimmun AG, Lübeck, Germany; [8]Johns Hopkins Aramco Healthcare, Dhahran, and [9]Indiana University School of Medicine, Indianapolis; and [10]College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia

SARS-CoV-2

دانشگاه علوم پزشکی و خدمات
بهداشتی درمانی کرمانشاه

- In January 2020, the European Center for Disease Prevention and Control (ECDC) and AABB published **rapid risk assessments** of the outbreak of SARS-CoV-2 and **blood safety**.
- ECDC implied a precautionary **deferral of donation** of blood and cells for **21 days** after possible **exposure** to a confirmed patient or anyone who returned from Wuhan, China applying the approach used for SARS-CoV and MERS-CoV.

Considerations regarding transfusion and organ transplantation:

1. Viral RNA in plasma or serum could be detected in COVID-19 patients on the first 2 or 3 days after onset of symptoms
2. Most patients, especially **younger adults** who can donate blood, had milder symptoms than the older adults
3. Patients with **no fever and asymptomatic carriers** have been identified in China, which increase the possibility that a COVID-19 patient or virus carrier could donate blood
4. The **rate of infectivity** of patients who are in the **incubation** period remains **uncertain**, and there are no data on the viral load in plasma, serum, or lymphocytes among individuals in the incubation period.

VoxSanguinis
The International Journal of Transfusion Medicine

ISBT International Society of Blood Transfusion

Vox Sanguinis (2020)

COMMENTARY

DOI: 10.1111/vox.12925

Post-donation COVID-19 identification in blood donors

So-Yong Kwon,[1] Eun-Jin Kim,[2] Yu Soek Jung,[1] Jin Sung Jang[1] & Nam-Sun Cho[1]

[1]*Blood Services Headquarters, Korean Red Cross, Wonju, Korea*

[2]*Daegu-Kyoungbook Blood Center, Korean Red Cross, Daegu, Korea*

Table 1 Characteristics of donors identified as COVID-19 post-donation and details of transfusion recipients[a]

No	Type of donation	Date of donation	Date of symptom onset	Date of COVID-19 diagnosis	Date of post-donation information	Date of transfusion	Date and results of SARS-CoV-2 RNA test on recipients' nasopharyngeal samples
1	Whole blood	10 Feb 2020	14 Feb 2020 (fever)	21 Feb 2020	26 Feb 2020	13 Feb 2020, PLT	27 Feb 2020, negative 10 Mar 2020, negative
						12 Feb 2020, RBC	Not done
2	Whole blood	10 Feb 2020	Unknown	25 Feb 2020	26 Feb 2020	12 Feb 2020, PLT	Not done
3	Whole blood	10 Feb 2020	20 Feb 2020 (sore throat)	26 Feb 2020	28 Feb 2020	12 Feb 2020, PLT	Unknown
						21 Feb 2020, RBC	24 Feb 2020, negative 27 Feb 2020, negative
4	Whole blood	13 Feb 2020	Unknown	22 Feb 2020	25 Feb 2020	14 Feb 2020, PLT	Not done
						21 Feb 2020, RBC	Not done
5	Whole blood	18 Feb 2020	Asymptomatic	24 Feb 2020	28 Feb 2020	20 Feb 2020, PLT	Not done
6	Whole blood	20 Feb 2020	23 Feb 2020 (cough)	26 Feb 2020	27 Feb 2020	22 Feb 2020, PLT	5 Mar 2020, negative
7	Source plasma	12 Feb 2020	16 Feb 2020 (nasal stuffiness)	26 Feb 2020	26 Feb 2020	Quarantined	-

G Model
JIPH-1342; No. of Pages 2

ARTICLE IN PRESS

Journal of Infection and Public Health xxx (2020) xxx–xxx

Contents lists available at ScienceDirect

Journal of Infection and Public Health

journal homepage: http://www.elsevier.com/locate/jiph

COVID-19 transmission and blood transfusion: A case report

Hee Jeong Cho [a,b], Ji Wan Koo [a], Soong Ki Roh [c], Yu Kyung Kim [c], Jang Soo Suh [c], Joon Ho Moon [a,b], Sang Kyun Sohn [a,b], Dong Won Baek [a,b,*]

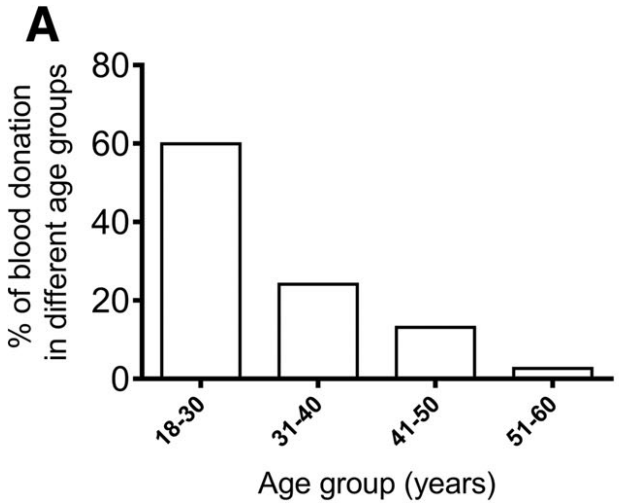
[a] *Department of Internal Medicine, Kyungpook National University Hospital, School of Medicine, Kyungpook National University, Daegu, Republic of Korea*
[b] *Department of Hematology/Oncology, Kyungpook National University Hospital, School of Medicine, Kyungpook National University, Daegu, Republic of Korea*
[c] *Department of Laboratory Medicine, Kyungpook National University Hospital, School of Medicine, Kyungpook National University, Daegu, Republic of Korea*

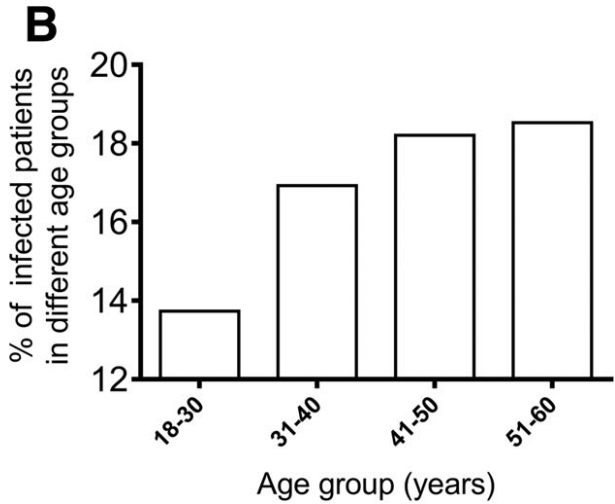
Estimation of the number of blood donors during the COVID-19 incubation period across China and analysis of prevention and control measures for blood transfusion transmission

Zhaohu Yuan,[1,2] Dandan Chen,[3] Xiaojie Chen,[1,2] and Yaming Wei[1,2]

$$P(T) = \sum_{i=1}^{n} Ni(T) \times Ci$$

(n) for analysis: 18-30, 31-40, 41-50, and 51-60 years





COVID-19 incubation period was 2.51, 3.40, and 4.05 in Wuhan city, Hubei Province, and the whole country